

BAB **4** *Chapter*



TANAH/ALAM SEKITAR TERESTRIAL
LAND/TERRESTRIAL ENVIRONMENT

A. LATAR BELAKANG

A.1 Lokasi

Malaysia terletak di Asia Tenggara dan terdiri daripada dua kawasan yang dipisahkan oleh Laut China Selatan, iaitu Semenanjung Malaysia dan Malaysia Timur (Sabah dan Sarawak) yang terletak di dalam Kepulauan Borneo. Malaysia terletak berdekatan dengan garisan khatulistiwa di antara latitud 1° dan 7° utara dan longitud 100° dan 119° timur.

Topografi

Malaysia terbentuk daripada kawasan tanah tinggi, tanah pamah, dataran, lembangan sungai dan pinggir laut. Topografi Semenanjung Malaysia bercirikan banjaran gunung yang bermula dari selatan iaitu Negeri Sembilan hingga ke utara sempadan Malaysia-Thailand. Banjaran gunung yang terpanjang di Semenanjung Malaysia adalah Banjaran Titiwangsa yang panjangnya 480 km dengan ketinggian di antara 900 meter hingga 2,100 meter dari aras laut. Puncak tertinggi di Semenanjung Malaysia adalah Gunung Tahan pada ketinggian 2,187 meter yang terletak di Banjaran Tahan.

Topografi Sabah adalah gabungan kawasan bergunung-ganang, berpantai dan hutan hujan tropika. Di bahagian barat adalah bergunung-ganang dengan tiga gunung tertinggi di Malaysia, manakala di bahagian timur pula merupakan zon tanah rata, kawasan rendah berpayau dan delta. Banjaran Crocker memisahkan dataran pantai barat daripada sebahagian Sabah di selatan Gunung Kinabalu. Banjaran Crocker adalah banjaran terpanjang dan tertinggi di Malaysia, berada lebih daripada 300 meter dari aras laut dan mengunjur hingga 139,919 hektar di kawasan hutan yang padat.

Topografi Sarawak menunjukkan pesisirannya yang mendatar, bukit bukau sempit dan banjaran bergunung-ganang yang tinggi, mengunjur sepanjang negeri. Dua gunung yang tertinggi di Sarawak ialah Gunung Murud (2,425 meter) dan Gunung Mulu (2,371 meter). Gunung Mulu mempunyai sistem gua batu kapur semula jadi terbesar di dunia yang terdiri daripada Gua Angin, Gua Lang, Gua Rusa dan Gua Air Jernih.

A. BACKGROUND

A.1 Location

Malaysia is located in South East Asia and comprises two regions which are separated by the South China Sea, i.e. Peninsular Malaysia and East Malaysia (Sabah and Sarawak) which is located in the Borneo Islands. Malaysia lies between latitude 1° and 7° north of the equator and longitude 100° and 119° east.

Topography

Malaysia is made up of highland, lowland, flatland, river basins and coastline. The topography of Peninsular Malaysia is characterised by the central mountain ranges which runs from the southern state of Negeri Sembilan to the northern at the Malaysia-Thailand border. The longest mountain range in Peninsular Malaysia is the Titiwangsa Range extending 480 km in length and 900 metres to 2,100 metres in height above sea level. The highest peak in Peninsular Malaysia is Mount Tahan at 2,187 metres, located on the Tahan Range.

The topography of Sabah is a mix of mountainous region, beaches and tropical rainforest. The western side is mostly mountainous with three of Malaysia's highest mountains while the eastern part are flat ground, low-lying swampy zones and deltas. The Crocker Range divides the western coastal plains from the rest of Sabah to the south of Mount Kinabalu. Crocker Range is the longest and also the highest mountain range in Malaysia, lying more than 300 metres above sea level and spreads over 139,919 hectares of densely forested terrain.

Sarawak's topography shows a flat coastal plain followed by a narrow belt of hills with a sharp rise of mountainous mass extending the full length of the state. The two highest peaks in Sarawak are Mount Murud (2,425 metres) and Mount Mulu (2,371 metres). Mount Mulu has the largest natural limestone cave system in the world comprising Wind Cave, Lang Cave, Deer Cave and Clearwater Cave.

Keluasan

Pada 2009, keluasan tanah di Malaysia adalah kekal pada 330,803 kilometer persegi (km²). Sarawak merupakan negeri terbesar merangkumi keluasan sebanyak 124,450 km² (37.62%), diikuti oleh Sabah 73,631 km² (22.26%). Bagi Semenanjung Malaysia, Pahang merupakan negeri terbesar yang meliputi keluasan 36,137 km² (10.92%) daripada keseluruhan keluasan tanah.

Area

In 2009, the total land area of Malaysia remained unchanged at 330,803 square kilometres (km²). Sarawak is the largest state covering an area of 124,450 km² (37.62%), followed by Sabah 73,631 km² (22.26%). As for Peninsular Malaysia, Pahang is the largest state accounting for 36,137 km² (10.92%) of the total land area.

Jadual 4.1: Jumlah keluasan tanah mengikut negeri, Malaysia, 2009

Table 4.1: Total land area by state, Malaysia, 2009

Negeri <i>State</i>	Keluasan (km ²) <i>Area</i>	Peratus <i>Per cent</i>
Malaysia	330,803	100.00
Johor	19,210	5.81
Kedah	9,500	2.87
Kelantan	15,099	4.56
Melaka	1,664	0.50
Negeri Sembilan	6,686	2.02
Pahang	36,137	10.92
Perak	21,035	6.36
Perlis	821	0.25
Pulau Pinang	1,048	0.32
Sabah	73,631	22.26
Sarawak	124,450	37.62
Selangor	8,104	2.45
Terengganu	13,035	3.94
W.P. Kuala Lumpur	243	0.07
W.P. Putrajaya	49	0.01
W.P. Labuan	91	0.03

Punca: Jabatan Ukur dan Pemetaan Malaysia, Jabatan Tanah dan Ukur Sabah dan Jabatan Tanah dan Survei, Sarawak

Source: Department of Survey and Mapping Malaysia, Sabah Lands and Surveys Department and Land and Survey Department, Sarawak

A.2 Tanah bencah

Pengenalan

The Convention on Wetlands of International Importance (Ramsar) telah dirasmikan pada 1971 di Ramsar, Iran. Ramsar merupakan perjanjian di antara kerajaan-kerajaan yang menyediakan rangka kerja untuk tindakan nasional dan kerjasama antarabangsa bagi pemuliharaan dan penggunaan lestari tanah bencah dan sumber-sumbernya. Malaysia telah memperakui Konvensyen Ramsar pada 1994.

Definisi

Konvensyen Ramsar mendefinisikan tanah bencah sebagai “kawasan berpaya, rawa, tanah gambut atau berair sama ada secara semula jadi atau buatan, kekal atau sementara, dengan air yang statik, mengalir, segar, payau atau masin, termasuk kawasan air marin, dengan kedalamannya semasa air surut tidak melebihi enam meter”.

Jenis tanah bencah

Ekosistem tanah bencah memainkan peranan penting sebagai habitat dan nurseri kepada spesies tumbuhan dan haiwan, penghalang banjir dan mendapan, penapis pencemaran, pembekal oksigen dan sumber makanan utama hidupan serta sebagai kawasan rekreasi. Terdapat dua jenis tanah bencah di Malaysia iaitu tanah bencah semula jadi dan tanah bencah buatan. Tasik semula jadi, sungai, kuala, paya laut, hutan paya gambut dan delta adalah antara tanah bencah semula jadi. Empangan, sawah padi dan tasik buatan manusia adalah antara tanah bencah buatan.

Hutan paya gambut

Hutan paya gambut adalah jenis hutan tanah bencah terbesar di Malaysia. Ia merupakan ekosistem yang unik dan sangat bernilai sebagai sumber balak, penampungan banjir, recaj air bawah tanah dan sebagai pembekal air. Hutan paya gambut digambarkan dengan lapisan tebal gambut yang boleh mencapai sehingga 30 meter, kebanyakannya merupakan bahan tumbuhan separa mereput yang terkumpul sehingga ribuan tahun.

A.2 Wetlands

Introduction

The Convention on Wetlands of International Importance (Ramsar) was launched in 1971 in Ramsar, Iran. Ramsar is an inter-governmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Malaysia had ratified the Ramsar Convention in 1994.

Definition

The Ramsar Convention defines wetlands as “areas of marshes, fen, peat land or water whether natural or artificial, permanent or temporary, with water that is static, flowing, fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed six metres”.

Type of wetlands

Wetlands ecosystem play an important role as a habitat and nursery for plant and animal species, protection from flooding and erosion, filter for pollution, oxygen supplier, major food resources for humans and animals as well as sites for recreation. There are two types of wetlands found in Malaysia namely natural wetlands and man-made wetlands. Natural lakes, rivers, estuaries, mangrove forests, peat swamp forests and deltas are among the natural wetlands. Reservoirs, paddy fields and man-made lakes are man-made wetlands.

Peat swamp forest

Peat swamp forest is the largest wetland forest type in Malaysia. It is a unique ecosystem and important as a timber resource, flood mitigation, groundwater recharge and for water supply. Peat swamp forests are characterised by a thick layer of peat which can reach up to 30 metres and composed of mainly semi-decayed plant material accumulated over thousands of years.

Hutan paya gambut sangat penting kerana ia menampung spesies tumbuh-tumbuhan endemik dan haiwan terancam. Ia juga merupakan habitat air tawar penting yang memerlukan perlindungan.

Peat swamp forest is extremely important because of the endemic plant species and the endangered animals they support. They are also regarded as significant freshwater habitats which need protection.

Jadual 4.2 dan **Carta 4.1** menunjukkan keluasan hutan paya gambut dari 2005 hingga 2009. Keluasan hutan paya gambut pada 2008 dan 2009 tidak berubah iaitu 1.3 juta hektar. Sarawak mempunyai keluasan paya gambut terbesar iaitu 907,884 hektar (**71.5%**), manakala Semenanjung Malaysia hanya meliputi 241,474 hektar (**19.0%**) dan Sabah 120,000 hektar (**9.5%**). Hanya empat negeri di Semenanjung Malaysia yang mempunyai maklumat keluasan hutan paya gambut iaitu Pahang, Johor, Selangor dan Terengganu, di mana Pahang mempunyai keluasan terbesar iaitu 140,830 hektar. **[Carta 4.2]**

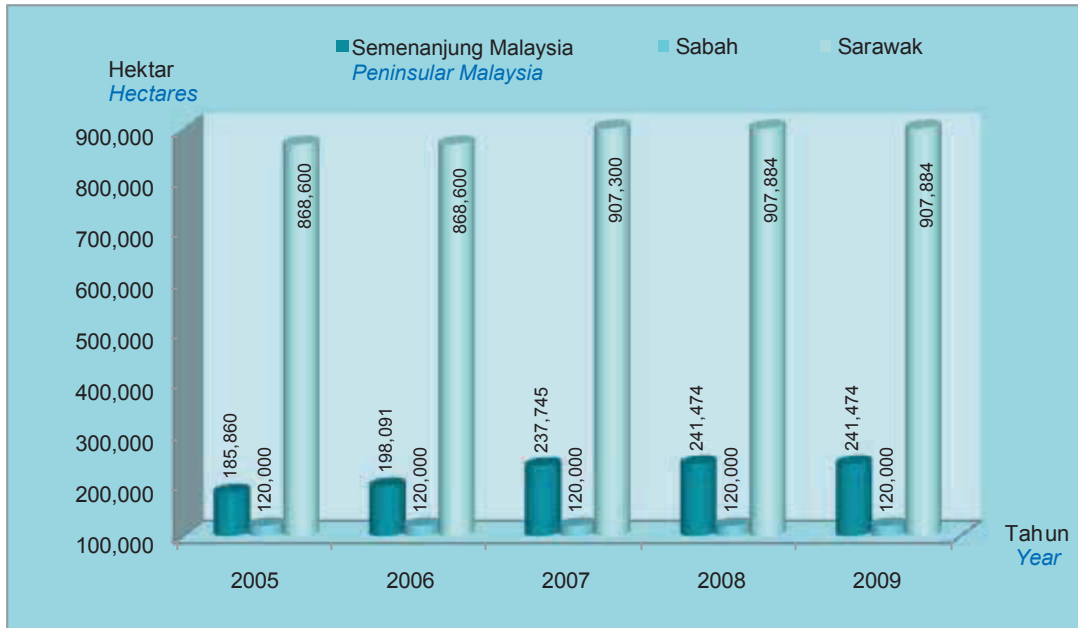
Table 4.2** and **Chart 4.1** shows the hectareage of peat swamp forest from 2005 to 2009. Total areas of peat swamp forest in 2008 and 2009 remained at 1.3 million hectares. Sarawak has the largest area of peat swamp forest i.e. 907,884 hectares (71.5%) while Peninsular Malaysia covers only 241,474 hectares (19.0%) and Sabah 120,000 hectares (9.5%). Only four states in Peninsular Malaysia have hectareage information pertaining to peat swamp forest i.e. Pahang, Johor, Selangor and Terengganu among which Pahang has the largest area at 140,830 hectares. **[Chart 4.2]

Jadual 4.2: Keluasan hutan paya gambut mengikut negeri, Malaysia, 2005–2009
Table 4.2: Area of peat swamp forest by state, Malaysia, 2005–2009

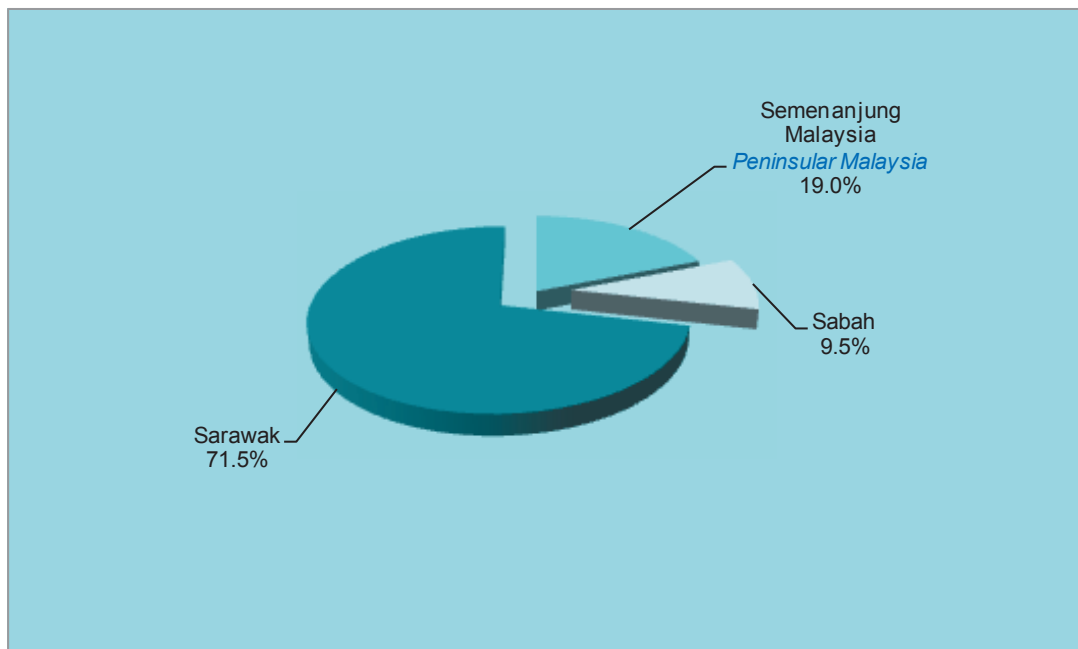
Negeri <i>State</i>	2005	2006	2007	2008	Hektar <i>Hectares</i> 2009
Malaysia	1,174,460	1,186,691	1,265,045	1,269,358	1,269,358
Semenanjung Malaysia <i>Peninsular Malaysia</i>	185,860	198,091	237,745	241,474	241,474
Johor	4,272	5,429	5,429	5,429	5,429
Kedah	-	-	-	-	-
Kelantan	-	-	-	-	-
Melaka	-	-	-	-	-
Negeri Sembilan	-	-	-	-	-
Pahang	97,441	97,441	137,101	140,830	140,830
Perak	-	-	-	-	-
Perlis	-	-	-	-	-
Pulau Pinang	-	-	-	-	-
Selangor	75,762	81,464	81,458	81,458	81,458
Terengganu	8,385	13,757	13,757	13,757	13,757
W.P. Kuala Lumpur	-	-	-	-	-
W.P. Putrajaya	-	-	-	-	-
W.P. Labuan	-	-	-	-	-
Sabah	120,000	120,000	120,000	120,000	120,000^e
Sarawak	868,600	868,600	907,300	907,884 ^f	907,884

Punca: Jabatan Perhutanan Semenanjung Malaysia, Jabatan Perhutanan Sabah dan Jabatan Hutan Sarawak
Source: Forestry Department Peninsular Malaysia, Sabah Forestry Department and Forest Department Sarawak

Carta 4.1: Keluasan hutan paya gambut mengikut kawasan, Malaysia, 2005–2009
Chart 4.1: Area of peat swamp forest by region, Malaysia, 2005–2009



Carta 4.2: Taburan peratus keluasan hutan paya gambut mengikut kawasan, Malaysia, 2009
Chart 4.2: Percentage distribution of area of peat swamp forest by region, Malaysia, 2009



Hutan paya laut

Hutan paya laut merupakan ekosistem yang unik. Kebiasaannya, ia ditemui di sepanjang kawasan pantai terlindung dan tumbuh dengan subur di tanah masin dan air payau. Hutan paya laut memainkan peranan penting sebagai penampas ribut taufan. Ia juga menjadi habitat fizikal dan nurseri, juga sebagai rantaian makanan kepada organisma marin.

Jadual 4.3 menunjukkan keluasan kawasan hutan paya laut pada 2009. Keluasan kawasan hutan paya laut meningkat sebanyak **0.2 peratus** daripada 558,312 hektar pada 2008 kepada 559,288 hektar pada 2009.

Sabah mempunyai hutan paya laut terbesar meliputi 340,488 hektar (**61%**). Ini diikuti oleh Sarawak dengan keluasan 117,000 hektar (**21.0%**) dan Semenanjung Malaysia 101,800 hektar (**18.2%**). [**Carta 4.3**]

Di Semenanjung Malaysia, Perak mempunyai keluasan hutan paya laut terbesar meliputi 40,538 hektar (**39.8%**), diikuti oleh Johor 32,129 hektar (**31.5%**) dan Selangor 18,089 hektar (**17.8%**). Sementara itu, keluasan hutan paya laut di Johor telah meningkat sebanyak 976 hektar (**3.1%**) pada 2009 berbanding 2008. Walau bagaimanapun, tiada perubahan bagi tujuh negeri lain. [**Carta 4.4**]

Mangrove forest

Mangrove forest is a unique ecosystem. They are generally found along sheltered coasts where they grow abundantly in saline soil and brackish water. Mangrove forest plays an important role as storm buffers. They also provide physical habitat and nursery grounds as well as a food chain to marine organisms.

***Table 4.3** shows the area under mangrove forest in 2009. The area under mangrove forest has increased by **0.2 per cent** from 558,312 hectares in 2008 to 559,288 hectares in 2009.*

*Sabah has the largest mangrove forest which constituted 340,488 hectares (61%). This was followed by Sarawak with an area of 117,000 hectares (21.0%) and Peninsular Malaysia 101,800 hectares (18.2%). [**Chart 4.3**]*

*In Peninsular Malaysia, Perak has the largest mangrove forest area which constituted 40,538 hectares (39.8%), followed by Johor 32,129 hectares (31.5%) and Selangor 18,089 hectares (17.8%). Meanwhile, the mangrove forest area in Johor had increased by 976 hectares (3.1%) in 2009 compared to 2008. Nevertheless, there was no changes for the remaining seven states. [**Chart 4.4**]*

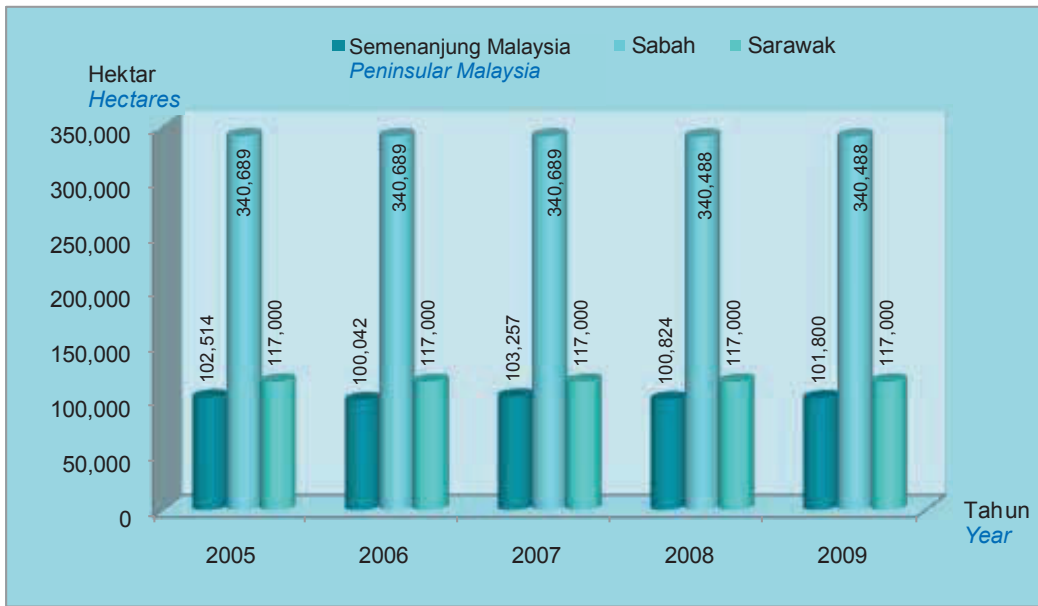
Jadual 4.3: Keluasan hutan paya laut mengikut negeri, Malaysia, 2005–2009
Table 4.3: Area of mangrove forest by state, Malaysia, 2005–2009

Hektar
Hectares

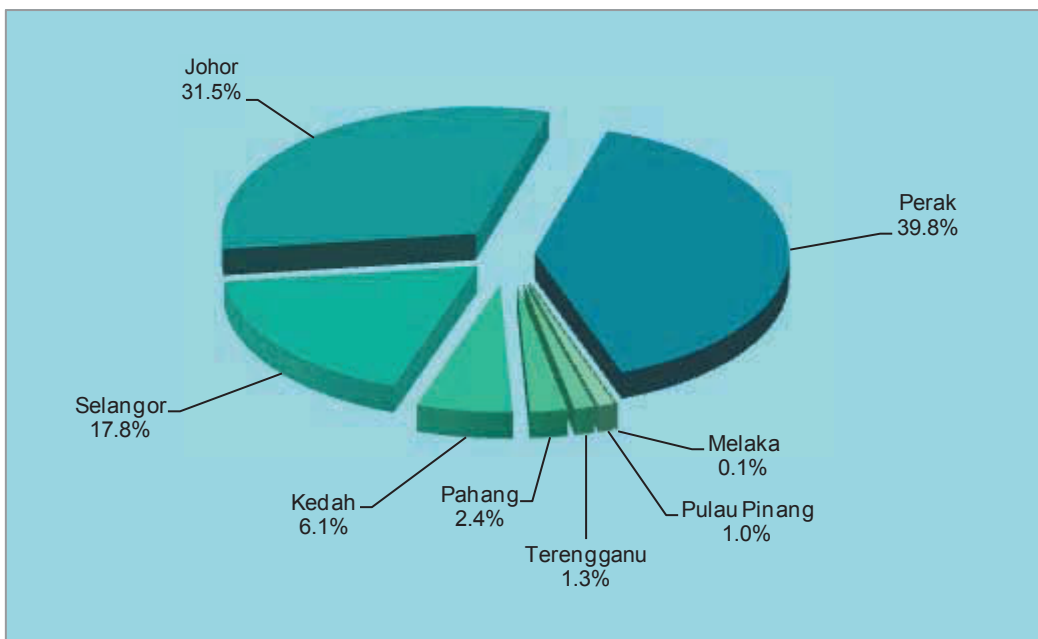
Negeri <i>State</i>	2005	2006	2007	2008	2009
Malaysia	560,203	557,731	560,946	558,312^f	559,288
Semenanjung Malaysia <i>Peninsular Malaysia</i>	102,514	100,042	103,257	100,824	101,800
Johor	31,887	33,846	33,036	31,153	32,129
Kedah	6,201	6,201	6,201	6,201	6,201
Kelantan	-	-	-	-	-
Melaka	80	80	92	92	92
Negeri Sembilan	-	-	-	-	-
Pahang	2,416	2,416	3,038	2,416	2,416
Perak	41,302	41,617	40,465	40,538	40,538
Perlis	-	-	-	-	-
Pulau Pinang	376	376	1,040	1,040	1,040
Selangor	18,957	14,211	18,089	18,089	18,089
Terengganu	1,295	1,295	1,295	1,295	1,295
W.P. Kuala Lumpur	-	-	-	-	-
W.P. Putrajaya	-	-	-	-	-
W.P. Labuan	-	-	-	-	-
Sabah	340,689	340,689	340,689	340,488 ^f	340,488
Sarawak	117,000	117,000	117,000	117,000	117,000

Punca: Jabatan Perhutanan Semenanjung Malaysia, Jabatan Perhutanan Sabah dan Jabatan Hutan Sarawak
Source: Forestry Department Peninsular Malaysia, Sabah Forestry Department and Forest Department Sarawak

Carta 4.3: Keluasan hutan paya laut mengikut kawasan, Malaysia, 2005–2009
Chart 4.3: Area of mangrove forest by region, Malaysia, 2005–2009



Carta 4.4: Taburan peratus keluasan hutan paya laut, Semenanjung Malaysia, 2009
Chart 4.4: Percentage distribution of area of mangrove forest, Peninsular Malaysia, 2009



A.3 Kepelbagaian biologi daratan

Megakepelbagaian

Konsep megakepelbagaian melibatkan anggaran jumlah bilangan semua organisma hidup di dalam ekosistem dan ini bermakna sesuatu kawasan itu mempunyai sekurang-kurangnya 60 peratus daripada spesies yang diketahui di dunia. Sebahagian besar daripada kepelbagaian tersebut adalah endemisme dan ini menggambarkan keunikan kawasan tersebut. *Global Diversity Outlook 2001* mengiktiraf Malaysia sebagai salah satu daripada 12 negara megakepelbagaian di dunia, manakala Sabah dan Sarawak telah disenaraikan sebagai kawasan utama bagi endemisme.

Kepelbagaian biologi

Kepelbagaian biologi bermaksud keragaman di antara organisma hidup daripada pelbagai sumber, termasuk daratan, marin serta ekosistem akuatik lain; ia termasuklah kepelbagaian di dalam peringkat genetik, spesies dan ekosistem. Definisi ini diadaptasi daripada *United Nations Convention on Biological Diversity*.

Flora dan fauna

Malaysia sememangnya kaya dengan flora dan dianggarkan terdapat sebanyak 17,631 spesies tumbuhan yang merangkumi 377 alga, 1,387 briofit, 1,600 paku pakis dan sekutunya, 61 gimnosperm, 4,180 monokot dan 10,026 dikot.

Bagi fauna pula, terdapat 480 spesies mamalia, 742 burung, 242 amfibia, 567 reptilia, 590 ikan air tawar, 1,967 kupu-kupu dan 1,037 kumbang daun.¹

Flora dan fauna daratan terdapat di pelbagai habitat dan ekosistem iaitu dari tanah rendah hingga ke puncak gunung yang tertinggi. Kebanyakan spesies ini adalah unik dan tidak ditemui di tempat lain di dunia.

A.3 Terrestrial biodiversity

Megadiversity

The concept of megadiversity involves an estimate of the total number of all the organisms in an ecosystem and is represented by an area that comprises at least 60 per cent of the world's known species. A major part of diversity is endemism as this reflects the uniqueness of an area. The 2001 Global Diversity Outlook recognized Malaysia as one of the 12 megadiversity countries in the world, while Sabah and Sarawak are listed as the main areas for endemism.

Biological diversity

Biological diversity means the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems; this includes diversity at the genetic, species and ecosystem level. This definition is adopted by the United Nations Convention on Biological Diversity.

Flora and fauna

Malaysia is rich in flora and estimated to be made up of about 17,631 species of plants which consist of 377 of algae, 1,387 bryophyte, 1,600 species ferns and ferns allies, 61 gymnosperm, 4,180 monocots and 10,062 dicots.

As for fauna, there are about 480 mammals, 742 birds, 242 amphibians, 567 reptiles, 590 freshwater fish, 1,967 butterflies and 1,037 leaf beetles species.¹

The terrestrial flora and fauna are found in a range of habitats and ecosystems from the lowlands to the top of the highest mountains. Many of these are unique and are not found anywhere else in the world.

¹ Ekspedisi Saintifik Kepelbagaian Biologi Hutan, Jabatan Perhutanan Semenanjung Malaysia
Forest Biodiversity Scientific Expedition, Forestry Department Peninsular Malaysia

B. KEADAAN

B.1 Keadaan alam sekitar daratan

Kawasan perlindungan/kawasan simpanan

Definisi kawasan perlindungan yang diadaptasi oleh *The International Union for Conservation of Nature (IUCN)* ditakrifkan sebagai “kawasan tanah dan/atau laut khususnya bagi perlindungan dan pemuliharaan kepelbagaian biologi, yang berkaitan dengan sumber semula jadi dan diurus melalui perundangan ataupun cara-cara lain yang berkesan”.

Jabatan Perlindungan Hidupan Liar dan Taman Negara (PERHILITAN) berperanan untuk menguruskan kawasan perlindungan bertaraf Taman Negara, Rezab Hidupan Liar dan kawasan tanah bencah Ramsar di Semenanjung Malaysia. Di Sabah, peranan tersebut dipertanggungjawabkan kepada Jabatan Hidupan Liar dan Taman-Taman Sabah, manakala di Sarawak kepada *Sarawak Forestry Corporation*. Pengurusan kawasan perlindungan ini menekankan kepada perancangan dan pelaksanaan pelbagai aktiviti yang menyumbang kepada pemuliharaan jangka panjang. Pembangunan kawasan perlindungan dilaksanakan secara lestari agar mendatangkan manfaat kepada manusia dan membawa kesejahteraan kepada alam sekitar untuk generasi masa kini dan akan datang.

Jadual 4.4a hingga **4.4c** menunjukkan keluasan dan anggaran bilangan spesies yang terdapat di kawasan perlindungan yang digazet di Malaysia pada 2009. Kawasan perlindungan yang terbesar di Semenanjung Malaysia adalah Taman Negara dengan keluasan 431,453 hektar dan merupakan antara hutan hujan tropika yang tertua di dunia. Taman Negara ini merupakan cantuman tiga kawasan perlindungan iaitu Taman Negara Kelantan, Taman Negara Terengganu dan Taman Negara Pahang. Di antara tiga taman negara ini, Taman Negara Pahang merupakan kawasan terbesar dengan keluasan 248,121 hektar.

Taman Negara Banjaran Crocker di Sabah merupakan kawasan perlindungan yang terluas (139,919 hektar), sementara Santuari Hidupan Liar Lanjak Entimau (168,758 hektar) adalah kawasan perlindungan yang terbesar di Sarawak.

B. THE STATE

B.1 Status of the terrestrial environment

Protected areas/preserved areas

The International Union for Conservation of Nature (IUCN) has adopted the definition of protected area as “an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources and managed through legal or other effective means”.

The Department of Wildlife and National Parks (DWNP) is responsible for the management of national parks, wildlife reserves and Ramsar wetlands in Peninsular Malaysia. In Sabah, the responsibility lies with the Sabah Wildlife Department and Sabah Parks while Sarawak Forestry Corporation is responsible in Sarawak. The management of these areas focus on the planning and implementation of various activities which contribute to the long-term conservation of protected areas. The development of protected areas was done sustainably to ensure optimum benefit to human and prosperity to the environment for the present and future generation.

Table 4.4a to 4.4c show the areas and estimated number of species found in gazetted protected areas in Malaysia for 2009. Taman Negara with an area of 431,453 hectares is the largest protected area in Peninsular Malaysia and is among one of the oldest tropical rainforests in the world. Taman Negara is a combination of three protected areas namely, Taman Negara Kelantan, Taman Negara Terengganu and Taman Negara Pahang. Among the three, Taman Negara Pahang is the largest with an area of 248,121 hectares.

The Crocker Range National Park is the largest protected area (139,919 hectares) in Sabah, while Lanjak Entimau Wildlife Sanctuary (168,758 hectares) is the largest protected area in Sarawak.

Jadual 4.4a: Kawasan perlindungan yang digazet, Semenanjung Malaysia, 2009

Table 4.4a: Gazetted protected area, Peninsular Malaysia, 2009

Negeri <i>State</i>	Kawasan perlindungan <i>Protected area</i>	Keluasan (hektar) <i>Area (hectares)</i>	Bilangan spesies <i>Number of species</i>			
			Fauna			Flora
			Mamalia <i>Mammals</i>	Burung <i>Birds</i>	Spesies vertebrat yang lain ¹ <i>Other vertebrate species¹</i>	Tumbuhan <i>Plants</i>
Johor	Taman Negara Endau Rompin	48,905.0	-	-	-	-
	Taman Negara Tanjung Piai	926.0	7	46	114	-
	Taman Negara Gunung Ledang	10,022.0	32	212	19	-
	Taman Negara Johor Kepulauan Mersing	4,040.0	-	-	-	-
	Taman Negara Johor Pulau Kukup	647.3	7	23	83	-
	Rezab Hidupan Liar Endau Kluang	52,493.0	28	137	-	-
	Rezab Hidupan Liar Endau Kota Tinggi (Timur)	8,660.0	39	142	33	-
	Rezab Hidupan Liar Endau Kota Tinggi (Barat)	45,581.0	-	-	-	-
	Rezab Hidupan Liar Four Island	1.0	-	14	-	-
	Rezab Hidupan Liar Segamat	12,216.0	4	60	9	-
	Rezab Perhilitan Jemaluang	50.0	-	-	-	-
	Tapak Ramsar Sungai Pulai	9,126.0	26	55	163	-
Kedah	Rezab Tuntung Bukit Pinang	1.0	2	5	17	84
	Hutan Simpan Tuntung Sidam	1.0	-	-	-	-
Kelantan	Taman Negara Kelantan	80,250.0	-	-	-	-
	Pusat Pemuliharaan Hidupan Liar Gua Musang	127.0	-	-	-	-
	Pusat Konservasi Hidupan Liar Gua Musang	97.4	-	-	-	-
Melaka	Rezab Hidupan Liar Tanjung Tuan	61.0	9	54	-	-
	Zoo Melaka	21.1	83	85	16	-
	Rezab Sembilan Pulau	1.0	-	-	-	-
Negeri Sembilan	Rezab Hidupan Liar Pulau Babi	0.1	-	-	-	-
	Rezab hidupan Liar Burung Four Islands	0.5	-	-	-	-
	Rezab Hidupan Liar Pulau Perjudi	0.2	-	-	-	-
	Rezab Hidupan Liar Port Dickson Islands	0.5	-	-	-	-
Pahang	Taman Negara Pahang	248,121.0	-	-	-	-
	Rezab Hidupan Liar Bukit Fraser	2,000.0	-	-	-	-
	Tapak Ramsar Tasek Bera	31,255.0	64	230	173	413
	Tasik Chini	5,085.0	-	-	-	-
	Rezab Hidupan Liar Pulau Tioman	9,455.0	-	-	-	-
	Rezab Hidupan Liar Krau	62,395.0	125	330	220	-
	Rezab Hidupan Liar Pahang Tua	1,335.0	-	-	-	-
	Rezab Hidupan Liar Jenderak Selatan	62,395.0	1	-	-	-

Jadual 4.4a: Kawasan perlindungan yang digazet, Semenanjung Malaysia, 2009 (samb.)
Table 4.4a: Gazetted protected area, Peninsular Malaysia, 2009 (cont'd)

Negeri <i>State</i>	Kawasan perlindungan <i>Protected area</i>	Keluasan (hektar) <i>Area (hectares)</i>	Bilangan spesies <i>Number of species</i>			
			Fauna			Flora
			Mamalia <i>Mammals</i>	Burung <i>Birds</i>	Spesies vertebrat yang lain ¹ <i>Other vertebrate species¹</i>	Tumbuhan <i>Plants</i>
Perak	Taman Negeri Royal Belum	117,500.0	70	163	200	-
	Rezab Hidupan Liar Chior	689.0	17	7	12	-
	Rezab Hidupan Liar Sungkai	2,468.0	32	28	66	-
	Rezab Tuntung Bota Kanan	6.0	-	-	-	-
	Rezab Hidupan Liar Batu Gajah	4.5	2	22	1	-
	Kuala Gula Bird's Sanctuary	0.4	-	195	8	-
Perlis	Taman Negeri Perlis	5,134.0	-	-	-	-
	Rezab Hidupan Liar Wang Pinang	68.0	9	34	15	-
	Pusat Konservasi Hidupan Liar Napoh, Sg. Batu Pahat	27.0	-	-	-	-
Pulau Pinang	Taman Negara Pulau Pinang ²	2,563.0	-	-	585	-
	Taman Botani	242.0	6	13	-	-
Selangor	Rezab Hidupan Liar Bukit Kutu	1,943.0	-	-	-	-
	Rezab Hidupan Liar Bukit Fraser	2,979.0	-	-	-	-
	Rezab Hidupan Liar Klang Gate	130.0	-	-	-	-
	Rezab Hidupan Liar Kuala Selangor Hill	44.0	-	-	-	-
	Rezab Hidupan Liar Bukit Sungai Puteh	36.0	-	-	-	-
	Rezab Hidupan Liar Sungai Dusun	4,330.0	44	76	2,059	-
	Rezab Hidupan Liar Templer Park	966.0	-	-	-	-
Terengganu	Paya Indah Wetlands	450.0	63	210	49	-
	Taman Negara Terengganu	103,082.0	-	-	-	-
	Rezab Tuntung Bukit Palong	1.0	-	-	-	-
Kuala Lumpur	Santuari Penyu Rantau Abang	-	-	-	-	-
	Rezab Hidupan Liar Kelab Golf Diraja Selangor	403.0	-	-	-	-
	Rezab Hidupan Liar Bukit Nanas	16.0	-	-	-	-
	Rezab Hidupan Liar Bukit Sungai Puteh	4.0	-	-	-	-
JUMLAH BESAR GRAND TOTAL		938,355.0	670	2,141	3,842	497

Punca: Jabatan Perlindungan Hidupan Liar dan Taman Negara, Semenanjung Malaysia dan Banci Kawasan Perlindungan dan Kepelbagaian Biologi Malaysia, 2010

Source: Department of Wildlife and National Parks, Peninsular Malaysia and Census on Protected Areas and Biodiversity Malaysia, 2010

¹ Lain-lain vertebrat seperti reptilia, amfibia dan ikan
Other vertebrates like reptiles, amphibians and fishes

² Termasuk Taman Negara Pantai Acheh
Includes Taman Negara Pantai Acheh

Jadual 4.4b: Kawasan perlindungan yang digazet, Sabah, 2009
Table 4.4b: Gazetted protected area, Sabah, 2009

Bil. No.	Kawasan dilindungi sepenuhnya <i>Totally protected area</i>	Keluasan (hektar) <i>Area (hectares)</i>	Bilangan spesies <i>Number of species</i>			
			Fauna			Flora
			Mamalia <i>Mammals</i>	Burung <i>Birds</i>	Spesies vertebrat yang lain ¹ <i>Other vertebrate species¹</i>	Tumbuhan <i>Plants</i>
	a. Taman Negara <i>National Parks</i>					
1	Banjaran Crocker	139,919.0	-	235	78	-
2	Bukit Tawau	27,927.0	23	60	66	-
3	Pulau Tiga	15,864.0	4	39	141	-
4	Pulau Penyu	1,740.0	3	20	1	7
5	Kinabalu	75,370.0	91	306	79	-
6	Tunku Abdul Rahman	4,929.0	10	69	716	-
	Jumlah Total	265,749.0	131	729	1081	7
	b. Rizab Hidupan Liar <i>Wildlife Reserve</i>					
1	Kulamba, Sandakan	20,682.0	33	89	-	-
2	Hutan Simpanan Hidupan Liar Tabin, Lahad Datu	120,521.0	71	262	41	945
3	Hidupan Liar Pulau Lankayan, Tegaipil, Bilean dan keseluruhan perairan	46,317.0	-	-	-	-
4	Simpanan Semula Jadi Mesilau	75,370.0	-	-	-	-
	Jumlah Total	262,890.0	104	351	41	945
	c. Santuari Hidupan Liar <i>Wildlife Sanctuaries</i>					
1	Hilir Kinabatangan	27,800.0	58	243	-	-
2	Pulau Sipadan	1,200.0	-	65	-	-
3	Likas	24.0	-	-	-	-
4	Pulau Mantanani	61.0	3	36	3	-
5	Kota Belud	2,200.0	-	-	-	-
6	Padang Teratak, Beaufort	-	18	26	8	-
	Jumlah Total	31,285.0	79	370	11	-
	JUMLAH BESAR GRAND TOTAL	559,924.0	314	1,450	1,133	952

Punca: Jabatan Hidupan Liar Sabah
 Source: Department of Wildlife Sabah

¹ Lain-lain vertebrat seperti reptilia, amfibia dan ikan
Other vertebrates like reptiles, amphibians and fishes

Jadual 4.4c: Kawasan perlindungan yang digazet, Sarawak, 2010
Table 4.4c: Gazetted protected area, Sarawak, 2010

Bil. No.	Kawasan dilindungi sepenuhnya <i>Totally protected area</i>	Keluasan (hektar) <i>Area (hectares)</i>	Bilangan spesies <i>Number of species</i>			
			Fauna			Flora
			Mamalia <i>Mammals</i>	Burung <i>Birds</i>	Spesies vertebrat yang lain ¹ <i>Other vertebrate species¹</i>	Tumbuhan <i>Plants</i>
	a. Taman Negara <i>National Parks</i>					
1	Bako	2,727.0	30	197	31	4
2	Gunung Gading	4,196.0	-	-	-	-
3	Kubah	2,230.0	57	126	150	-
4	Tanjung Datu	1,379.0	-	-	-	-
5	Talang Satang	19,414.0 ²	-	-	-	-
6	Kuching Wetland	6,610.0	-	-	-	-
7	Batang Ai	24,040.0	-	-	-	-
8	Maludam	43,147.0	-	-	-	-
9	Similajau	7,064.0	34	185	-	-
	Similajau 1 st Extension	1,932.0	-	-	-	-
10	Bukit Tiban	8,000.0	-	-	-	-
11	Niah	3,138.0	64	190	94	-
12	Bukit Lambir	6,949.0	32	157	20,035	-
13	Loagan Bunut	10,736.0	38	92	115	-
14	Usun Apau	49,355.0	-	-	-	-
15	Gunung Buda	6,235.0	-	-	-	-
16	Pulong Tau	59,817.0	-	-	-	-
17	Gunung Mulu	52,865.0	125	307	20,295	6,286
18	Rajang Mangrove	9,373.0	-	-	-	-
19	Miri-Sibuti Coral Reefs	186,930.0 ²	-	-	-	-
20	Santubong	1,410.0	-	-	-	-
21	The Bungo Range	8,096.0	-	-	-	-
22	Ulu Sebuyau	18,287.0	-	-	-	-
23	Gunung Lesung	2,143.0	-	-	-	-
	Jumlah <i>Total</i>	329,729.0³	-	-	-	-

¹ Lain-lain vertebrat seperti reptilia, amfibia dan ikan
Other vertebrates like reptiles, amphibians and fishes

² Keluasan water bodies
Water bodies hectareage

³ Keluasan tidak termasuk 'water bodies'
Excluding hectareage for water bodies

Jadual 4.4c: Kawasan perlindungan yang digazet, Sarawak, 2009 (samb.)

Table 4.4c: Gazetted protected area, Sarawak, 2009 (cont'd)

Bil. No.	Kawasan dilindungi sepenuhnya <i>Totally protected area</i>	Keluasan (hektar) <i>Area (hectares)</i>	Bilangan spesies <i>Number of species</i>			
			Fauna			Flora
			Mamalia <i>Mammals</i>	Burung <i>Birds</i>	Spesies vertebrat yang lain ¹ <i>Other vertebrate species¹</i>	Tumbuhan <i>Plants</i>
	b. Santuari Hidupan Liar <i>Wildlife Sanctuaries</i>					
1	Samunsam	6,092.0	14	26	17	-
	Samunsam 1 st Extension	16,706.0	-	-	-	-
2	Pulau Tukong Ara	1.4	-	3	4	-
3	Lanjak Entimau	168,758.0	46	241	1,209	-
4	Sibuti Wild Life Sanctuary	678.0	-	-	-	-
	Jumlah <i>Total</i>	192,235.4	60	270	1,230	-
1	Wind Cave	6.2	-	-	-	-
2	Sama Jaya	37.9	-	-	-	-
3	Semenggoh	653.0	-	-	-	-
4	Bukit Hitam	147.0	-	-	-	-
5	Bukit Sembiling	101.0	-	-	-	-
	Jumlah <i>Total</i>	945.1	-	-	-	-
	JUMLAH BESAR <i>GRAND TOTAL</i>	522,909.5	440	1,524	41,950	6,290

Punca: Banci Kawasan Perlindungan dan Kepelbagaian Biologi 2010 dan *Sarawak Forestry Corporation*

Source: *Census on Protected Area and Biodiversity 2010*

¹ Lain-lain vertebrat seperti reptilia, amfibia dan ikan
Other vertebrates like reptiles, amphibians and fishes

B.2 Perhutanan

Pengenalan

Hutan adalah salah satu komponen penting dalam sistem biofizikal Malaysia. Iklim dan keadaan tanah yang sesuai menggalakkan pertumbuhan hutan hujan tropika, terutamanya spesies hutan tanah rendah dan hutan bukit dipterokarp. Hutan dianggap sebagai penyaman udara yang besar, menapis hujan dan menghalang hakisan tanah yang teruk. Ia juga berperanan sebagai span besar yang menyerap, menyimpan dan menyalurkan kembali air dengan perlahan ke sungai serta laluan air. Hutan turut membekalkan produk balak dan bukan balak serta menjadi gedung tanaman ubatan dan kawasan simpanan pelbagai biologi.

Pengelasan hutan boleh dikategorikan mengikut perubahan ciri-ciri altitud, komposisi flora, habitat, iklim, tanah dan biotik. Kawasan berhutan diklasifikasikan sebagai hutan simpanan kekal, tanah kerajaan, taman hidupan liar dan hutan simpan lain yang terdiri daripada beberapa jenis hutan seperti hutan darat, hutan paya gambut dan hutan paya laut.

Pada 2009, kawasan berhutan di Malaysia adalah seluas **55.3 peratus**, manakala kawasan tidak berhutan **44.7 peratus**. Secara keseluruhannya, kawasan hutan telah meningkat sebanyak **0.1 peratus** kepada 18,243,922 hektar pada 2009 berbanding 18,216,847 hektar pada 2008. [**Jadual 4.5**]

Kawasan berhutan

Pada keseluruhannya, Sarawak merangkumi **44.2 peratus** daripada jumlah kawasan berhutan Malaysia pada 2009. Ini diikuti oleh Semenanjung Malaysia (**32.2%**) dan Sabah (**23.6%**). [**Carta 4.5**]

Taburan peratus kawasan berhutan di Semenanjung Malaysia pada 2009 ditunjukkan di **Carta 4.6**. Negeri yang mencatatkan peratus kawasan berhutan terbesar adalah Pahang (**35.2%**), diikuti oleh Perak (**17.6%**), Kelantan (**14.7%**) dan Terengganu (**11.1%**).

Jadual 4.5 menunjukkan keluasan berhutan dan tidak berhutan di Malaysia mengikut negeri dari 2005 hingga

B.2 Forestry

Introduction

Forest is one of the most important components of the Malaysian biophysical system. The favourable climate and soil conditions enable largely evergreen tropical rain forest to flourish, mainly species-rich lowland and hill dipterocarp forest. Forest can be considered as huge air-conditioners. The forests intercept rainfall and prevent massive erosion of the topsoil. It acts as a huge sponge that absorbs, retains and slowly releases water back to the rivers and waterways. It also provides timber and non-timber products and is also a depository for medicinal plants as well as a reservoir of biological diversities.

Forested area can be classified according to changes of altitude, flora composition, habitat, climate, land and biotic characteristics. It can be classified into permanent reserved forest, state land, wildlife reserve and other reserved areas which consist of various types of forests such as inland forest, peat swamp forest and mangrove forest.

*In 2009, there were **55.3 per cent** forested areas in Malaysia while **44.7 per cent** were non-forested areas. Overall, the forested area had increased marginally by **0.1 per cent** to 18,243,922 hectares in 2009 compared to 18,216,847 hectares in 2008. [**Table 4.5**]*

Forested area

*Overall, Sarawak accounted for **44.2 per cent** of Malaysia's total forested area in 2009. This was followed by Peninsular Malaysia (**32.2%**) and Sabah (**23.6%**). [**Chart 4.5**]*

***Chart 4.6** shows the percentage distribution of forested area by state in Peninsular Malaysia in 2009. The largest forested areas are located in the state of Pahang (**35.2%**), followed by Perak (**17.6%**), Kelantan (**14.7%**) and Terengganu (**11.1%**).*

***Table 4.5** shows the forested and non-forested hectareage in Malaysia by state from 2005 to 2009. In*

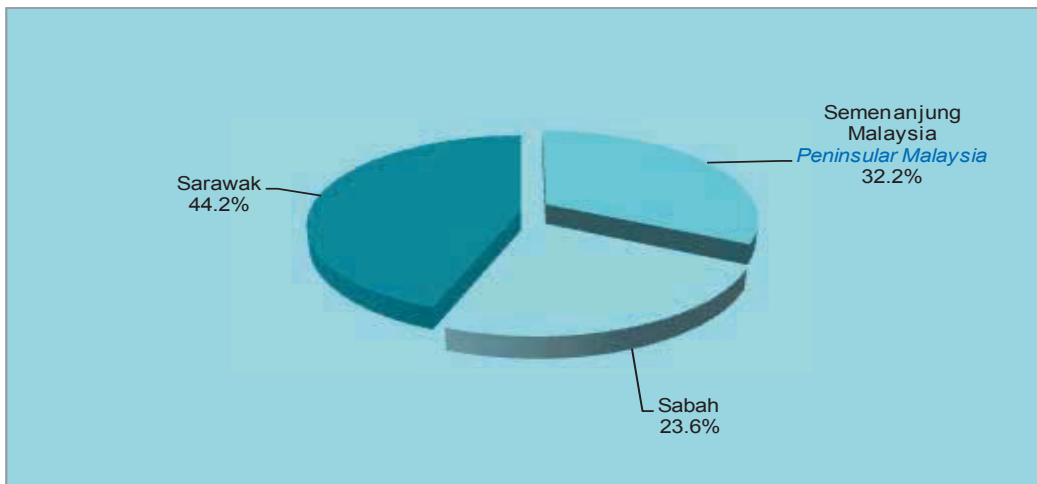
2009. Pada 2009, jumlah kawasan berhutan di Sarawak adalah sebanyak 8.1 juta hektar (**65.5%**), Sabah, 4.3 juta hektar (**57.5%**) dan Semenanjung Malaysia, 5.9 juta hektar (**44.6%**).

2009, the total forested area for Sarawak was 8.1 million hectares (65.5%), Sabah 4.3 million hectares (57.5%) and Peninsular Malaysia 5.9 million hectares (44.6%).

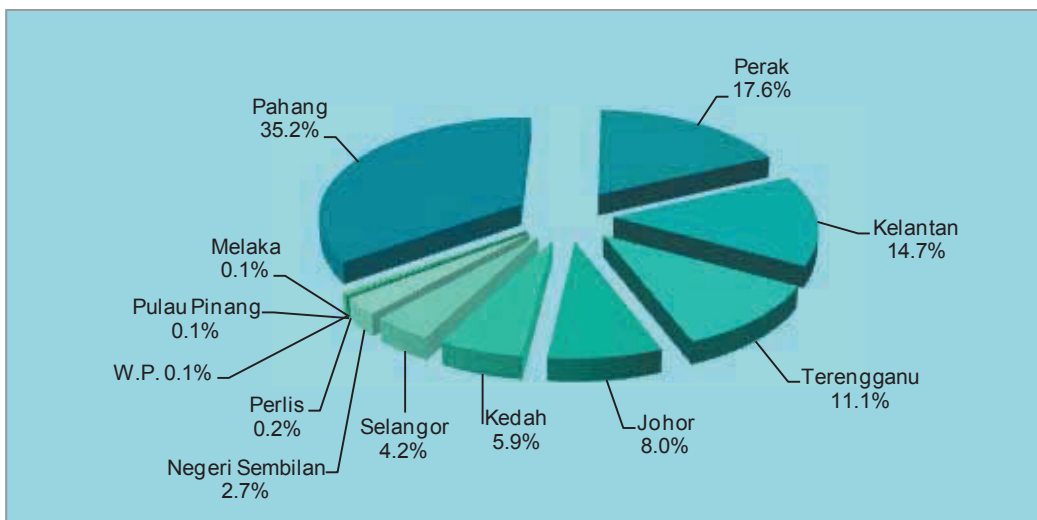
Di Semenanjung Malaysia, Selangor mencatatkan peningkatan tertinggi sebanyak 4,617 hektar (**1.9%**) pada 2009 kepada 247,793 hektar berbanding 2008. Negeri Sembilan, Pahang, Perlis, Selangor dan Wilayah Persekutuan (W.P.) juga turut mengalami peningkatan, manakala Johor dan Kelantan masing-masing mencatatkan penurunan sebanyak 22,605 hektar (**-4.6%**) dan 3,849 hektar (**-0.4%**). Sementara itu, tiada perubahan keluasan berhutan bagi negeri-negeri lain. [Jadual 4.5]

In Peninsular Malaysia, Selangor recorded the highest increase at 4,617 hectares (1.9%) in 2009 to 247,793 hectares compared to 2008. The forested areas in Negeri Sembilan, Pahang, Perlis, Selangor and Wilayah Persekutuan (W.P.) experienced a slight increase while Johor and Kelantan recorded a decrease of 22,605 hectares (-4.6%) and 3,849 hectares (-0.4%) respectively. Meanwhile, the forested areas for other states were unchanged. [Table 4.5]

Carta 4.5: Taburan peratus keluasan berhutan mengikut kawasan, Malaysia, 2009
Chart 4.5: Percentage distribution of forested area by region, Malaysia, 2009



Carta 4.6: Taburan peratus keluasan berhutan, Semenanjung Malaysia, 2009
Chart 4.6: Percentage distribution of forested area, Peninsular Malaysia, 2009



Jadual 4.5: Kawasan berhutan dan tidak berhutan, Malaysia, 2005–2009
Table 4.5: Forested and non-forested areas, Malaysia, 2005–2009

Negeri State	Tahun Year	Berhutan Forested		Tidak Berhutan Non-Forested	
		Hektar Hectares	(%)	Hektar Hectares	(%)
Malaysia	2005	18,293,363	55.8	14,560,749	44.2
	2006	18,286,562 ^f	55.8	14,678,847 ^f	44.2
	2007	18,225,795 ^f	55.3	14,739,614 ^f	44.7
	2008	18,216,847	55.2	14,767,045	44.8
	2009	18,243,922	55.3	14,741,508	44.7
Semenanjung Malaysia <i>Peninsular Malaysia</i>	2005	5,888,190	44.7	7,279,055	55.3
	2006	5,901,389 ^f	44.8	7,260,856 ^f	55.2
	2007	5,841,195	44.4	7,321,050	55.6
	2008	5,848,587	44.4	7,323,141	55.6
	2009	5,873,764	44.6	7,308,502	55.4
Johor	2005	493,072	26.0	1,405,557	74.0
	2006	508,495	26.8	1,390,134	73.2
	2007	490,209	25.8	1,408,420	74.2
	2008	441,209	23.3	1,456,852	76.7
	2009	468,451	24.7	1,430,178	75.3
Kedah	2005	345,382	36.6	597,218	63.4
	2006	345,382	36.6	597,218	63.4
	2007	345,382	36.6	597,218	63.4
	2008	345,382	36.6	597,218	63.4
	2009	345,382	36.6	597,218	63.4
Kelantan	2005	894,591	59.9	598,590	40.1
	2006	894,591	59.9	598,590	40.1
	2007	886,767	59.4	606,414	40.6
	2008	867,866	57.8	634,334	42.2
	2009	864,017	57.5	638,183	42.5
Melaka	2005	6,385	3.9	158,719	96.1
	2006	6,359 ^f	3.9	158,745 ^f	96.2
	2007	5,307	3.2	159,797	96.8
	2008	5,328	3.2	160,240	96.8
	2009	5,328	3.2	160,240	96.8
Negeri Sembilan	2005	164,047	24.7	500,544	75.3
	2006	160,171	24.1	504,420	75.9
	2007	158,081	23.8	506,510	76.2
	2008	159,724	24.0	504,867	76.0
	2009	160,873	24.2	503,718	75.8
Pahang	2005	2,025,204	56.3	1,571,381	43.7
	2006	2,025,204	56.3	1,571,381	43.7
	2007	1,981,185	55.1	1,615,400	44.9
	2008	2,068,199	57.5	1,528,386	42.5
	2009	2,068,605	57.5	1,527,980	42.5
Perak	2005	1,050,225	50.0	1,051,897	50.0
	2006	1,050,225	50.0	1,051,897	50.0
	2007	1,050,225	50.0	1,051,897	50.0
	2008	1,043,668	49.7	1,058,454	50.4
	2009	1,035,704	49.3	1,066,418	50.7

Jadual 4.5: Kawasan berhutan dan tidak berhutan, Malaysia, 2005–2009 (samb.)
Table 4.5: Forested and non-forested areas, Malaysia, 2005–2009 (cont'd)

Negeri State	Tahun Year	Berhutan Forested		Tidak Berhutan Non-Forested	
		Hektar Hectares	(%)	Hektar Hectares	(%)
Perlis	2005	11,555	14.4	68,747	85.6
	2006	11,555	14.4	68,747	85.6
	2007	11,555	14.4	68,747	85.6
	2008	10,972	13.7	69,330	86.3
	2009	11,479	14.0	70,361	86.0
Pulau Pinang	2005	7,809	7.6	95,341	92.4
	2006	7,809	7.6	95,341	92.4
	2007	7,809	7.6	95,341	92.4
	2008	7,809	7.6	95,341	92.4
	2009	7,809	7.6	95,341	92.4
Selangor	2005	241,289	30.3	554,795	69.7
	2006	235,212	29.7	555,872	70.3
	2007	248,289	31.4	542,795	68.6
	2008	243,176	30.7	547,908	69.3
	2009	247,793	31.3	543,291	68.7
Terengganu	2005	648,570	50.1	646,996	49.9
	2006	656,325	50.7	639,241	49.3
	2007	656,325	50.7	639,241	49.3
	2008	654,625	50.5	640,941	49.5
	2009	654,625	50.5	640,941	49.5
Wilayah Persekutuan ¹	2005	61	0.2	24,339	99.8
	2006	61	0.2	24,339	99.8
	2007	61	0.2	24,339	99.8
	2008 ¹	3,678	9.6	34,653	99.8
	2009¹	3,698	9.6	34,633	90.4
Sabah	2005	4,360,000	59.2	3,011,267	40.8
	2006	4,340,000	59.0	3,147,564	41.0
	2007	4,320,000	57.7	3,167,564	42.3
	2008	4,300,000	57.4	3,187,564	42.6
	2009	4,305,512	57.5	3,182,052	42.5
Sarawak	2005	8,064,600	65.5	4,251,000	34.5
	2006	8,064,600	65.5	4,251,000	34.5
	2007	8,064,600	65.3	4,251,000	34.7
	2008	8,064,643	65.5	4,250,957	34.5
	2009	8,064,646	65.5	4,250,954	34.5

Punca: Jabatan Perhutanan Semenanjung Malaysia, Jabatan Perhutanan Sabah dan Jabatan Hutan Sarawak
 Source: Forestry Department Peninsular Malaysia, Sabah Forestry Department and Forest Department Sarawak

¹ Bagi 2005 hingga 2007 merujuk kepada W.P. Kuala Lumpur. Bermula 2008, termasuk W.P. Kuala Lumpur, Putrajaya dan Labuan
 For 2005 to 2007, refer to W.P. Kuala Lumpur. Commencing 2008, includes W.P. Kuala Lumpur, Putrajaya and Labuan

Hutan simpanan kekal

Keluasan hutan simpanan kekal pada 2005 hingga 2009 ditunjukkan di **Jadual 4.6**. Keluasan hutan simpanan kekal di Semenanjung Malaysia bertambah kepada **2.5 peratus** kepada 4.9 juta hektar pada 2009. Perak mencatatkan peningkatan tertinggi sebanyak 117,500 hektar (**13.4%**) kepada 991,436 hektar. Ini diikuti oleh Wilayah Persekutuan Kuala Lumpur (**3.3%**), Selangor (**2.6%**) dan Perlis (**2.1%**), manakala Negeri Sembilan dan Pahang meningkat kurang daripada satu peratus. Hanya Johor mencatatkan penurunan keluasan (**-0.6%**) kepada 438,751 hektar manakala keluasan bagi lima negeri lain tidak berubah.

Keluasan hutan simpanan kekal di Sabah meningkat sedikit kepada 3,604,894 hektar pada 2009 berbanding 3,604,866 hektar pada 2008. Walau bagaimanapun, keluasan di Sarawak berkurangan sebanyak **2.1 peratus** pada 2009. [**Peta 4.1**]

Permanent reserved forest

*The hectarage of permanent reserved forest from 2005 to 2009 is shown in **Table 4.6**. The permanent reserved forest in Peninsular Malaysia rose by **2.5 per cent** to 4.9 million hectares in 2009. Perak recorded the highest increase of 117,500 hectares (**13.4%**) to 991,436 hectares. This was followed by Wilayah Persekutuan Kuala Lumpur (**3.3%**) Selangor (**2.6%**) and Perlis (**2.1%**) while Negeri Sembilan and Pahang registered increases of less than one per cent. Johor was the only state which recorded a decrease in area (**-0.6%**) to 438,751 hectares while the remaining five states were unchanged.*

*The hectarage of permanent reserved forest in Sabah increased marginally to 3,604,894 hectares in 2009 as compared to 3,604,866 in 2008. However, the hectarage in Sarawak decreased by **2.1 per cent** in 2009. [**Map 4.1**]*

Jadual 4.6: Keluasan hutan simpanan kekal, Malaysia, 2005–2009

Table 4.6: Permanent reserved forest, Malaysia, 2005–2009

Negeri State	2005	2006	2007	2008	2009
Malaysia	13,014,350	13,007,668	12,871,716	13,093,974	13,119,072
Semenanjung Malaysia ¹ <i>Peninsular Malaysia</i>	4,711,264	4,726,182	4,695,630	4,807,565	4,930,569
Johor	375,864	391,499	391,499	441,251	438,751
Kedah	342,613	342,613	342,613	342,613	342,613
Kelantan	629,687	629,687	629,687	623,849	623,849
Melaka	5,185	5,159	5,079	5,080	5,080
Negeri Sembilan	160,151	156,275	154,185	155,909	157,058
Pahang	1,519,501	1,519,501	1,484,099	1,562,496	1,562,902
Perak	884,205	884,205	884,205	873,936	991,436
Perlis	10,718	10,718	10,718	10,586	10,808
Pulau Pinang	5,434	5,434	6,098	6,098	6,098
Selangor	239,782	235,212	241,568	241,568	247,793
Terengganu	538,063	545,818	545,818	544,118	544,118
W.P.Kuala Lumpur	61	61	61	61	63
W.P.Putrajaya	-	-	-	-	-
W.P.Labuan	-	-	-	-	-
Sabah ²	3,523,186	3,503,186 ^e	3,483,186 ^e	3,604,866	3,604,894
Sarawak ³	4,779,900 ^e	4,778,300 ^e	4,692,900 ^e	4,681,543	4,583,609

Punca: Jabatan Perhutanan Semenanjung Malaysia, Jabatan Perhutanan Sabah dan Jabatan Hutan Sarawak

Source: Forestry Department Peninsular Malaysia, Sabah Forestry Department and Forest Department Sarawak

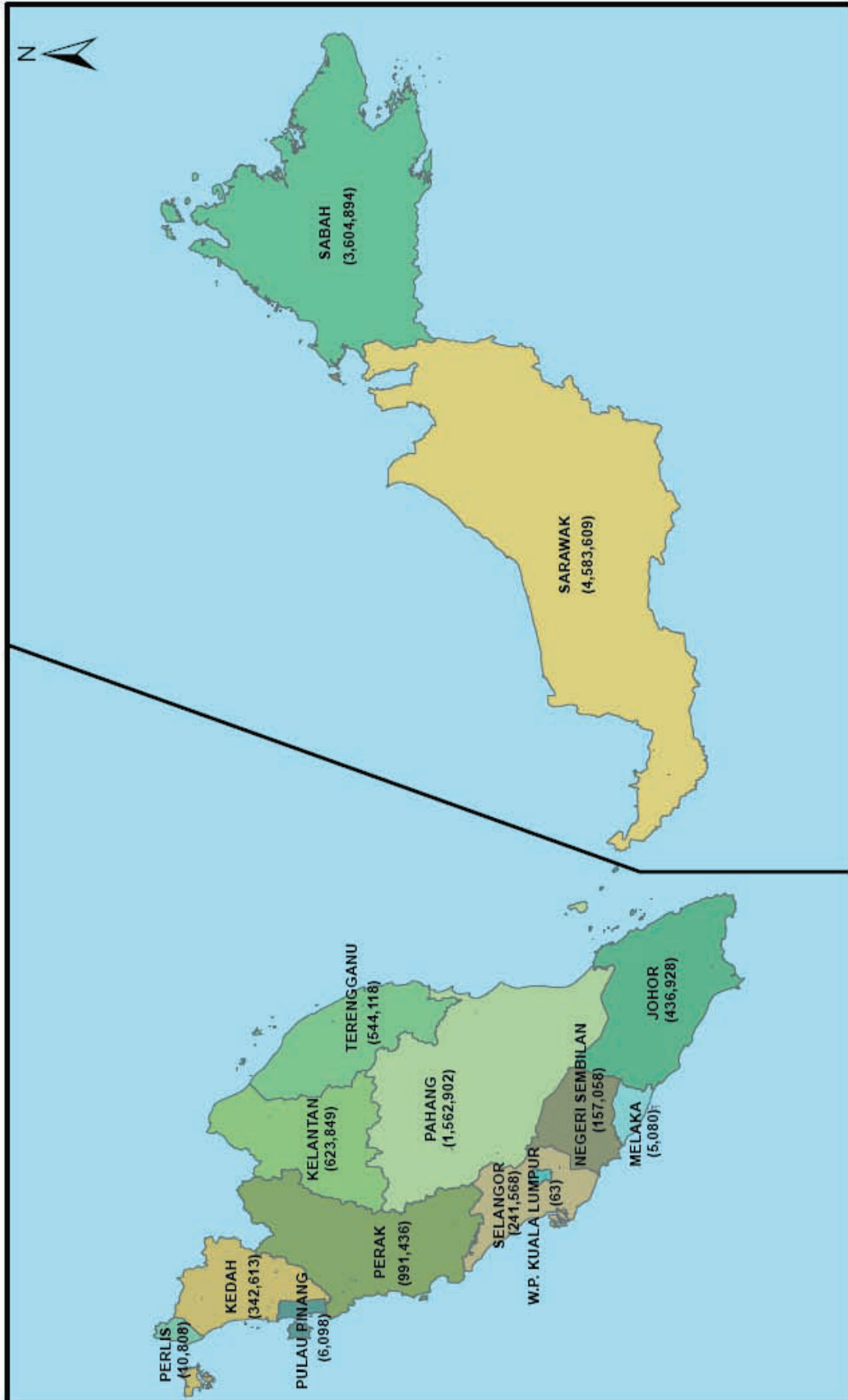
¹ Hutan simpanan kekal di Semenanjung Malaysia terdiri daripada ladang hutan, hutan darat, paya gambut dan paya laut
Permanent reserved forest in Peninsular Malaysia consists of forest plantation, inland forest, peat swamp forest and mangrove forest

² Hutan simpanan kekal di Sabah terdiri daripada hutan darat, paya gambut, paya laut dan bukit
Permanent reserved forest in Sabah consists of inland forest, peat swamp forest, mangrove forest and hill

³ Hutan simpanan kekal di Sarawak terdiri daripada paya gambut, paya laut dan bukit
Permanent reserved forest in Sarawak consists of peat swamp forest, mangrove forest and hill

Peta 4.1: Keluasan hutan simpanan kekal, Malaysia, 2009
Map 4.1: Area of permanent reserved forest, Malaysia, 2009

Hektar
Hectare



C. TEKAMAN

C.1 Aktiviti yang memberi kesan kepada tanah di Malaysia

Kesan pembangunan tanah hutan

Tanah merupakan sumber penting kepada sesebuah negara. Pertukaran kegunaan tanah bagi pembangunan perbandaran, perindustrian, pertanian, perlombongan dan perhutanan mempunyai lebih keutamaan di mana ia memberi pulangan lebih tinggi dalam pelaburan.

Walaupun bagaimanapun, pelbagai isu berkaitan pemuliharaan sumber asli dan alam sekitar banyak mendapat perhatian kebelakangan ini, sama ada di peringkat tempatan dan antarabangsa.

Oleh itu, keberkesanan dalam penggunaan dan pengurusan tanah hutan amat penting. Perlindungan hutan dan pemuliharaan alam merupakan usaha untuk melindungi sumber hutan daripada aktiviti manusia yang mengancam alam sekitar seperti pembakaran hutan terbuka dan pembalakan haram.

Kebakaran tanah gambut

Musim kemarau yang berpanjangan dan juga aktiviti pembersihan kawasan menyebabkan kehilangan air yang berlebihan. Ini akan mengakibatkan tanah gambut menjadi kering serta kehilangan ciri-ciri kelembapan dan juga keupayaan menyerap air yang akhirnya menyebabkan kebakaran.

C. THE PRESSURE

C.1 Activities that affect land in Malaysia

Effects on development of forest land

Land is an important resource to the country. Conversion of land for urbanisation, industrial, agricultural, mining and forestry development has higher priority as it brings a much higher rate of return on investment.

However, various issues relating to the conservation of natural resources and the environment has lately been given much attention at the local and international levels.

Hence, its effective utilization and management is of critical importance. Forest protection and nature conservation are efforts taken to protect its resources from harmful human activities which deteriorate the environment such as open burning of forest and illegal logging.

Peat fires

Prolonged periods of drought and land clearing activities cause excessive loss of water. As a result, peat lands will dry out and lose their „sponge’ like characteristics and their ability to absorb water thus causing fire.

C.2 Sumber hutan

Sektor perhutanan memainkan peranan penting dalam pembangunan sosio-ekonomi Malaysia dari segi menjana hasil eksport dan menyediakan peluang pekerjaan. Pengeluaran produk kayu-kayan yang utama mengikut negeri di Malaysia dari 2005 hingga 2009 ditunjukkan di **Jadual 4.7** dan **Carta 4.8**.

Pengeluaran kayu balak kekal sebagai penyumbang terbesar dalam pengeluaran produk kayu-kayan. Bagaimanapun, ia menurun sebanyak **9.6 peratus** daripada 20,082,668 meter padu pada 2008 kepada 18,147,193 meter padu pada 2009. Pengeluaran produk kayu-kayan utama lain turut menurun kecuali kayu kumai yang meningkat sebanyak **32.6 peratus** kepada 467,808 meter padu pada 2009.

Sarawak merupakan pengeluar kayu balak terbesar iaitu sebanyak **57.2 peratus** pada 2009. Ini diikuti Sabah (**22.5%**) dan Semenanjung Malaysia (**20.3%**). [**Carta 4.7**]

Di Semenanjung Malaysia, Selangor menunjukkan penurunan mendadak sebanyak **74.0 peratus** pengeluaran kayu balak. Negeri-negeri lain di Semenanjung Malaysia turut mengalami penurunan kecuali Negeri Sembilan dan Pahang yang masing-masing mencatatkan peningkatan sebanyak **33.4 peratus** dan **4.8 peratus** pada 2009. [**Jadual 4.7**]

C.2 Forestry resources

*The forestry sector plays an important role in the socioeconomic development of Malaysia by generating export earnings and providing employment opportunities. The production of major timber products by state in Malaysia from 2005 to 2009 is shown in **Table 4.7** and **Chart 4.8**.*

*Log production remained the largest contributor to the production of major timber products. However, it has decreased by **9.6 per cent** from 20,082,668 cubic metres in 2008 to 18,147,193 cubic metres in 2009. The production of other major timber products also decreased except for moulding which increased **32.6 per cent** to 467,808 cubic metres in 2009.*

*Sarawak was the biggest contributor of log production in 2009 at **57.2 per cent**. This was followed by Sabah (**22.5%**) and Peninsular Malaysia (**20.3%**). [**Chart 4.7**]*

*In Peninsular Malaysia, Selangor showed a steep decrease in log production of **74.0 per cent**. Other states in Peninsular Malaysia also recorded decreases except for Negeri Sembilan and Pahang which has increases of **33.4 per cent** and **4.8 per cent** respectively in 2009. [**Table 4.7**]*

Jadual 4.7: Pengeluaran produk kayu-kayan utama mengikut negeri, Malaysia, 2005–2009
Table 4.7: Production of major timber products by state, Malaysia, 2005–2009

Negeri/Kawasan <i>State/Region</i>	Tahun <i>Year</i>	Kayu balak <i>Logs</i>	Kayu gergaji <i>Sawn timber</i>	Papan lapis <i>Plywood</i>	Meter padu <i>Cubic metres</i>		
					Venir <i>Veneer</i>	Papan blok <i>Blackboard</i>	Kayu kumai <i>Moulding</i>
Malaysia	2005	22,398,330	5,257,195	5,114,685	636,108	131,277	624,844
	2006	21,843,004	5,129,284	5,432,160	611,558	125,590	400,450
	2007	22,052,775	5,064,315	5,438,684	732,446	114,698	455,138
	2008	20,082,668	4,465,834	4,837,306	1,004,262	98,287	352,778
	2009	18,147,193	3,888,305	4,155,629	845,672	72,142	467,808
Semenanjung Malaysia <i>Peninsular Malaysia</i>	2005	4,405,091	3,235,774	492,202	97,191	162	330,776
	2006	4,642,756	3,018,881	458,738	100,730	146	159,524
	2007	4,220,302	2,668,030	473,145	45,293	41	195,716
	2008	4,028,724	2,386,598	467,153	13,739	0	170,846
	2009	3,686,717	2,080,706	357,490	7,685	0	307,995
Johor	2005	96,419	332,443	46,546	5,879	0	39,543
	2006	213,817	313,630	21,540	6,350	0	1,198
	2007	171,047	282,724	14,500	6,500	0	1,125
	2008	105,428	282,569	12,781	2,977	0	1,530
	2009	70,740	231,574	1,397	2,776	0	1,185
Kedah	2005	109,480	61,588	161,787	0	0	17,328
	2006	128,764	70,483	164,100	0	0	20,781
	2007	178,092	59,791	172,541	0	0	53,994
	2008	233,046	59,524	195,755	0	0	27,291
	2009	209,330	54,884	125,096	0	0	10,660
Kelantan	2005	815,585	570,399	4,433	7,614	0	3,915
	2006	1,066,482	521,882	5,434	8,588	0	2,350
	2007	1,442,811	512,509	7,499	7,438	0	3,082
	2008	1,408,715	489,189	14,970	5,313	0	874
	2009	1,265,291	438,156	23,364	1,438	0	3,616
Melaka	2005	111	35,437	316	0	0	0
	2006	1,508	23,410	615	0	0	0
	2007	1,573	19,645	719	0	0	0
	2008	692	22,501	75	0	0	0
	2009	679	33,815	0	0	0	0
Negeri Sembilan	2005	80,956	234,775	16,077	16,077	0	12,622
	2006	73,861	245,738	18,634	19,927	0	11,625
	2007	92,607	207,628	13,464	22,293	0	4,964
	2008	65,844	188,423	4,413	0	0	951
	2009	87,843	177,158	6,030	0	0	1,235
Pahang	2005	1,953,273	914,603	163,870	56,758	162	39,281
	2006	1,782,522	842,766	159,886	60,043	91	34,422
	2007	1,136,901	679,867	163,421	6,570	41	32,999
	2008	1,121,226	559,823	164,652	4,617	0	22,904
	2009	1,174,658	464,607	153,305	2,755	0	180,506

Jadual 4.7: Pengeluaran produk kayu-kayan utama mengikut Negeri, Malaysia, 2005–2009 (samb.)
Table 4.7: Production of major timber products by state, Malaysia, 2005–2009 (cont'd)

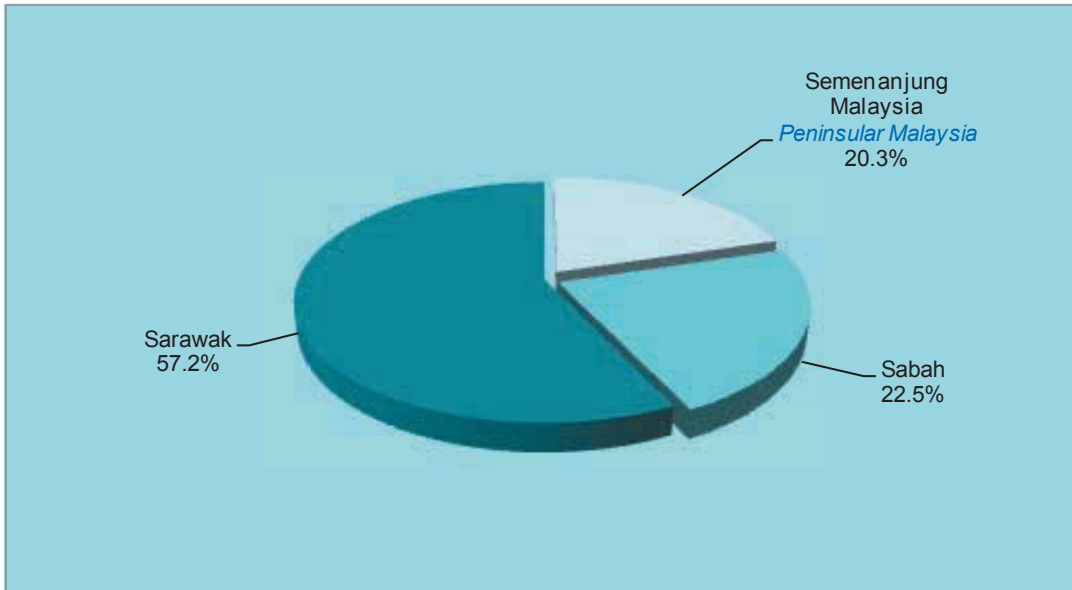
Meter padu
Cubic metres

Negeri/Kawasan <i>State/Region</i>	Tahun <i>Year</i>	Kayu balak <i>Logs</i>	Kayu gergaji <i>Sawn timber</i>	Papan lapis <i>Plywood</i>	Venir <i>Veneer</i>	Papan blok <i>Blackboard</i>	Kayu kumai <i>Moulding</i>
Perak	2005	787,548	288,974	35,430	0	0	2,525
	2006	833,802	324,170	42,141	555	0	2,797
	2007	755,638	297,878	36,398	173	0	2,879
	2008	681,722	286,851	34,144	259	0	2,411
	2009	567,594	234,323	29,412	0	0	1,604
Perlis	2005	0	0	0	0	0	0
	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	0	0	0	0
	2009	0	0	0	0	0	0
Pulau Pinang	2005	0	52,352	13,334	0	0	98,200
	2006	0	61,625	14,964	0	0	11,229
	2007	0	51,849	18,370	0	0	48,925
	2008	0	50,623	9,575	0	0	13,732
	2009	0	47,240	3,849	0	0	16,884
Selangor	2005	38,981	324,295	28,712	789	0	82,102
	2006	48,141	220,830	12,976	651	55	43,864
	2007	37,847	185,357	21,851	1,224	0	17,296
	2008	23,789	87,538	20,315	573	0	75,654
	2009	6,193	101,510	12,306	716	0	68,298
Terengganu	2005	522,738	414,927	23,697	10,074	0	35,260
	2006	493,859	389,558	18,448	4,616	0	31,258
	2007	403,786	368,439	24,382	1,095	0	30,452
	2008	388,262	358,308	10,473	0	0	25,499
	2009	304,389	295,529	2,731	0		24,007
W.P. Kuala Lumpur	2005	0	5,981	0	0	0	0
	2006	0	4,789	0	0	0	0
	2007	0	2,643	0	0	0	0
	2008	0	1,249	0	0	0	0
	2009	0	1,910	0	0	0	0
Sabah	2005	5,957,526	825,421	1,580,536	212,647	85,310	266,762
	2006	5,336,081	862,188	1,570,479	210,027	78,008	224,026
	2007	5,941,229	964,432	1,511,895	204,355	59,489	238,188
	2008	4,718,368	855,779	1,245,958	190,554	65,684	164,558
	2009	4,089,337	741,251	1,033,825	163,604	43,172	145,355
Sarawak	2005	12,035,713	1,196,000	3,041,947	326,270	45,805	27,306
	2006	11,864,167	1,248,215	3,402,943	300,801	47,436	16,900
	2007	11,891,244	1,431,553	3,453,644	482,798	55,168	21,234
	2008	11,335,576	1,223,457	3,124,195	799,969	32,603	17,374
	2009	10,371,139	1,066,348	2,764,314	674,383	28,970	14,458

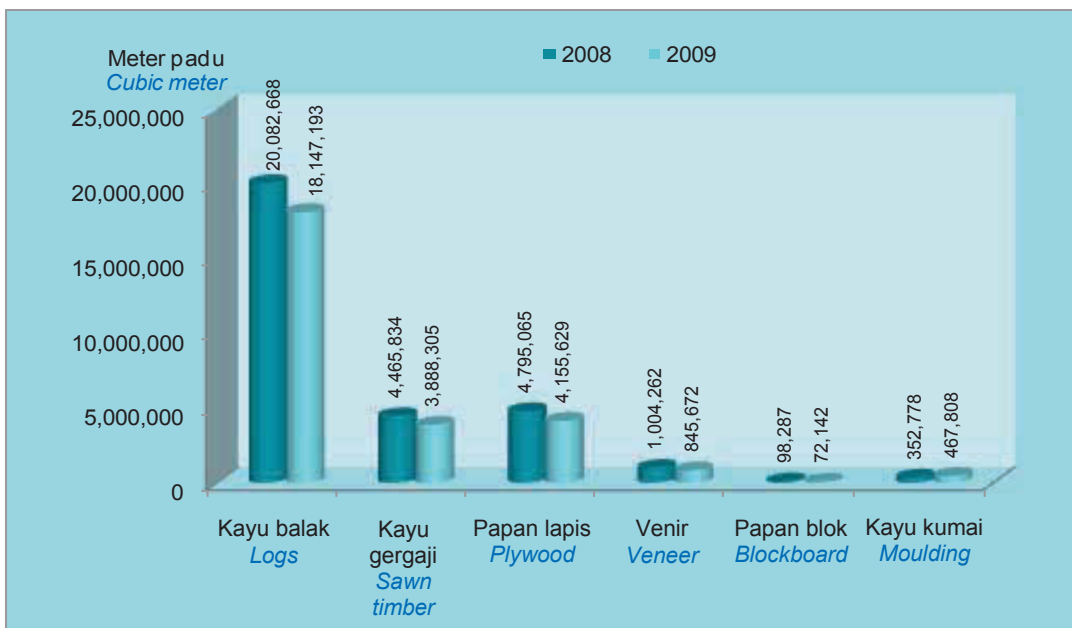
Punca: Jabatan Perhutanan Semenanjung Malaysia, Jabatan Perhutanan Sabah, Jabatan Hutan Sarawak dan Perbadanan Kemajuan Perusahaan Kayu Sarawak

Source: Forestry Department Peninsular Malaysia, Sabah Forestry Department, Forest Department Sarawak and Sarawak Timber Industry Development Corporation

Carta 4.7: Pengeluaran kayu balak mengikut kawasan, Malaysia, 2009
Chart 4.7: Production of logs by region, Malaysia, 2009



Carta 4.8: Pengeluaran produk kayu-kayan utama, Malaysia, 2008 dan 2009
Chart 4.8: Production of major timber products, Malaysia, 2008 and 2009



Pengusahaan hutan

Pengusahaan hutan merupakan aktiviti mengambil dan mengeluarkan hasil hutan dan seterusnya menyumbang kepada perkembangan dan pembangunan sosio-ekonomi. Di Malaysia, aktiviti pengusahaan hutan adalah dikawal melalui perundangan, dasar dan garis panduan pengoperasian. Pada 2009, jumlah keluasan yang dibuka untuk pengusahaan mengikut negeri dan kawasan telah menurun kepada 392,959 hektar (-19.1%). [Jadual 4.8]

Di Semenanjung Malaysia, keluasan kawasan yang dibuka untuk pengusahaan menurun dengan mendadak sebanyak **32.2 peratus** kepada 69,996 hektar pada 2009. Selangor mencatatkan penurunan terbesar sebanyak **82.3 peratus** berbanding 2008. Ini diikuti oleh Pahang (-54.2%), Johor (-51.9%) dan Melaka (-32.9%).

Sementara itu, hanya Negeri Sembilan menunjukkan peningkatan sebanyak **12.0 peratus**, manakala Perlis dan Pulau Pinang telah membuka kawasan hutan untuk pengusahaan yang mana masing-masing sebanyak 88 hektar dan satu hektar. **Carta 4.9** menunjukkan kawasan yang dibuka untuk pengusahaan mengikut negeri pada 2008 dan 2009.

Keluasan kawasan yang dibuka untuk pengusahaan di Sabah menurun sebanyak **24.1 peratus** kepada 130,962 hektar dan Sarawak turut menurun sebanyak **8.5 peratus** kepada 192,001 hektar pada 2009.

Forest harvesting

Forest harvesting are activities of gathering and taking out forest products which in turn contribute to the socio-economic growth and development. In Malaysia, forest harvesting activities are controlled by legislation, policies and operational guidelines. In 2009, the total area opened for harvesting by state and region shrunk to 392,959 hectares (-19.1%). [Table 4.8]

*In Peninsular Malaysia, the area opened for harvesting decreased considerably by **32.2 per cent** to 69,996 hectares in 2009. Selangor registered the largest decrease at **82.3 per cent** compared to 2008. This was followed by Pahang (-54.2%), Johor (-51.9%) and Melaka (-32.9%).*

*Meanwhile, only Negeri Sembilan showed an increase of **12.0 per cent** while Perlis and Pulau Pinang has newly opened areas for forest harvesting which covered 88 hectares and one hectare respectively. **Chart 4.9** shows the area open for harvesting by state in 2008 and 2009.*

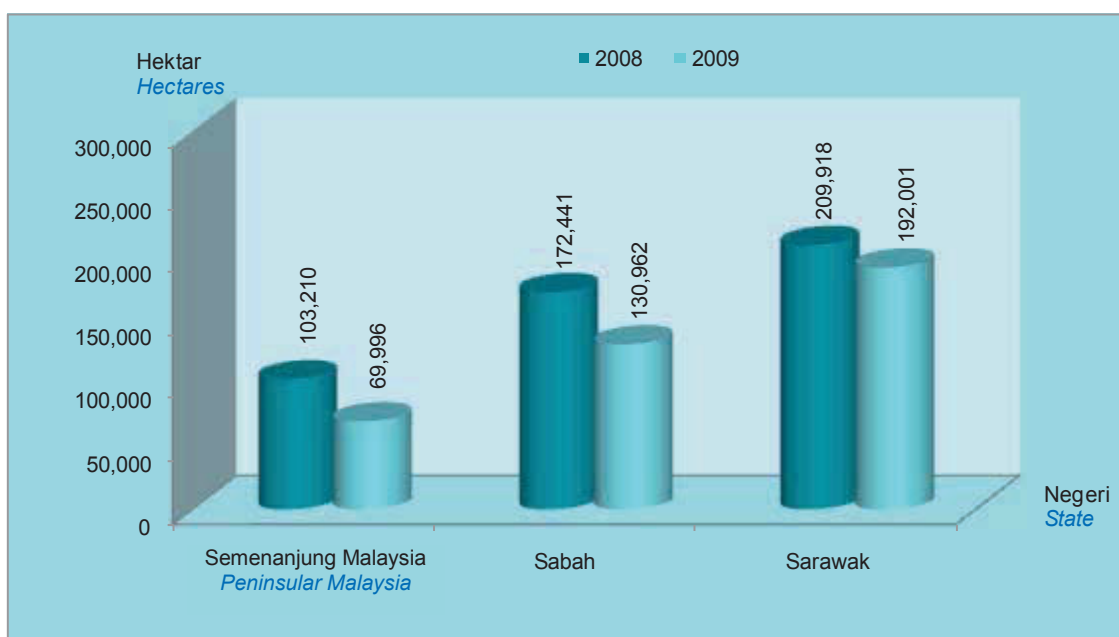
*The area opened for harvesting in Sabah decreased by **24.1 per cent** to 130,962 hectares and similarly for Sarawak, a decrease of **8.5 per cent** to 192,001 hectares in 2009 was recorded.*

Jadual 4.8: Keluasan dibuka untuk pengusahaan mengikut negeri, Malaysia, 2005–2009
Table 4.8: Area opened for harvesting by state, Malaysia, 2005–2009

Negeri State	2005	2006	2007	2008	2009
Malaysia	447,373	430,442	434,565	485,569	392,959
Semenanjung Malaysia <i>Peninsular Malaysia</i>	103,810	112,075	103,599	103,210	69,996
Johor	9,473	17,174	10,930	8,968	4,316
Kedah	2,607	3,265	4,419	5,447	4,031
Kelantan	21,034	31,601	28,578	30,464	24,831
Melaka	262	205	275	85	57
Negeri Sembilan	6,078	3,188	8,746	3,861	4,323
Pahang	38,046	27,950	21,579	29,214	13,368
Perak	10,290	13,910	14,007	15,742	11,977
Perlis	-	-	-	-	88
Pulau Pinang	-	-	-	-	1
Selangor	2,651	5,292	3,170	1,188	210
Terengganu	13,369	9,490	11,895	8,241	6,794
W.P. Kuala Lumpur	-	-	-	-	-
Sabah	120,786	98,654	110,776	172,441	130,962
Sarawak	222,777	219,713	220,190	209,918	192,001^e

Punca: Jabatan Perhutanan Semenanjung Malaysia, Jabatan Perhutanan Sabah dan Jabatan Hutan Sarawak
 Source: *Forestry Department Peninsular Malaysia, Sabah Forestry Department and Forest Department Sarawak*

Carta 4.9: Keluasan dibuka untuk pengusahaan mengikut kawasan, Malaysia, 2008 dan 2009
Chart 4.9: Area opened for harvesting by region, Malaysia, 2008 and 2009



C.3 Pertanian

Pengenalan

Dalam Rancangan Malaysia ke-10 (RMK10), sektor pertanian merupakan salah satu daripada 12 Bidang Ekonomi Utama Negara (NKEA) yang berpotensi untuk menjana pendapatan tinggi. Seiring dengan pertumbuhan populasi dunia, permintaan terhadap makanan turut meningkat dan ini menyumbang kepada perkembangan ekonomi negara.

Walau bagaimanapun, pengeluaran pertanian boleh memberi kesan kepada perubahan cuaca, kesan daripada pelepasan gas rumah hijau. Pembukaan kawasan hutan bagi tujuan pertanian, penggunaan racun perosak serta baja kimia adalah antara penyumbang kepada kemerosotan persekitaran.

Keluasan tanaman

Jadual 4.9 menunjukkan keluasan tanah tanaman/ ladang perindustrian dari 2005 hingga 2009. Pada 2009, keluasan tanaman tembakau meningkat kepada 7.6 ribu hektar (**13.4%**) berbanding 2008. Tanaman kelapa sawit turut meningkat kepada 4,691.1 ribu hektar (**4.5%**), diikuti oleh tanaman padi kepada 674.8 ribu hektar (**2.8%**) dan tanaman lada kepada 13.6 ribu hektar (**1.5%**).

Keluasan tanaman getah mencatatkan penurunan terbesar iaitu **15.2 peratus** manakala tanaman koko menurun sebanyak **1.4 peratus**. Sebaliknya, keluasan tanaman teh tidak berubah bagi tempoh 2005 hingga 2009.

C.3 Agriculture

Introduction

In the 10th Malaysia Plan (10MP), the agriculture sector is identified as one of the 12 National Key Economic Areas (NKEA) which has the potential to generate high income. Along with the growth of world population, demand for food has increased and this contributes to national economic growth.

However, agricultural production gives an impact to climate change due to greenhouse gas emissions. Opening of forested land for agriculture, usage of pesticides and chemical fertiliser are among the contributing factors to environmental degradation.

Plantation area

***Table 4.9** shows the area of cropland/industrial plantation from 2005 to 2009. In 2009, the area planted with tobacco increased to 7.6 thousand hectares (**13.4%**) as compared to 2008. Area planted with oil palm also increased to 4,691.1 thousand hectares (**4.5%**) followed by paddy to 674.8 thousand hectares (**2.8%**) and pepper to 13.6 thousand hectares (**1.5%**).*

*Area planted with rubber recorded the largest decrease at **15.2 per cent**, while cocoa planted area decline marginally at **1.4 per cent**. On the other hand, planted area for tea remained the same during the 2005 to 2009 period.*

Jadual 4.9: Keluasan tanah tanaman/ladang perindustrian, Malaysia, 2005–2009
Table 4.9: Area of cropland/industrial plantation, Malaysia, 2005–2009

	„000 hektar hectares				
Tanaman <i>Crop</i>	2005	2006	2007	2008	2009
Padi <i>Paddy</i>	666.7 ^r	676.1 ^r	676.1 ^r	656.6 ^r	674.9
Teh <i>Tea</i>	3.5	3.5	3.5	3.5	3.5
Koko <i>Cocoa</i>	33.4	31.2	28.2	20.9	20.6
Getah <i>Rubber</i>	1,271.3	1,263.6	1,247.4	1,246.9	1,057.8
Kelapa sawit <i>Oil palm</i>	4,051.3	4,165.2	4,304.9	4,487.9	4,691.1
Tembakau <i>Tobacco</i>	8.5	6.8	6.8	6.7	7.6
Lada <i>Pepper</i>	12.7	12.1	13.0	13.4	13.6

Punca: Jabatan Pertanian Semenanjung Malaysia, Lembaga Minyak Sawit Malaysia, Lembaga Tembakau Negara Malaysia, Lembaga Koko Malaysia dan Jemaah Pemasaran Lada Hitam

Source: Department of Agriculture Peninsular Malaysia, Malaysian Palm Oil Board (MPOB), National Tobacco Board Malaysia, Malaysia Cocoa Board and Pepper Marketing Board

Pengeluaran tanaman perindustrian

Pada 2009, pengeluaran tembakau merekodkan penurunan terbesar sebanyak **61.9 peratus**. Ini diikuti oleh biji koko (**-35.2%**), getah (**-20.1%**) dan teh (**-12.1%**). Sebaliknya hanya pengeluaran beras yang merekodkan peningkatan sebanyak 104 ribu tan metrik (**6.9%**).

Bagi tempoh Januari hingga Jun 2010, peningkatan terbesar dicatatkan oleh pengeluaran tembakau (**69.2%**) iaitu daripada 1.3 ribu tan metrik pada setengah tahun pertama 2009 kepada 2.2 ribu tan metrik. Ini diikuti oleh pengeluaran teh dan getah masing-masing mencatatkan peningkatan **40.4 peratus** dan **17.4 peratus** pada setengah tahun pertama 2010.

Sebaliknya, hanya pengeluaran biji koko mengalami penurunan (**-17.4%**) pada setengah tahun pertama 2009 dan 2010. [Jadual 4.10]

Production of industrial crops

*In 2009, production of tobacco recorded the largest decrease at **61.9 per cent**. This was followed by cocoa beans (**-35.2%**), rubber (**-20.1%**) and tea (**-12.1%**). However, only the production of rice recorded an increase of 104 thousand tonnes (**6.9%**).*

*During the January to June 2010 period, the largest increase was recorded by production of tobacco (**69.2%**) i.e from 1.3 thousand tonnes in the first half of 2009 to 2.2 thousand tonnes. This was followed by production of tea and rubber which recorded increases **40.4 per cent** and **17.4 per cent** respectively in the first half of 2010.*

*On the other hand, only the production of cocoa beans recorded a decrease (**-17.4%**) in first half of 2009 and 2010. [Table 4.10]*

Jadual 4.10: Pengeluaran tanaman perindustrian, Malaysia, 2005–2010*Table 4.10: Production of industrial crops, Malaysia, 2005–2010*,000 tan metrik
tonnes

Komoditi <i>Commodity</i>	2005	2006	2007	2008	2009	2009 (Jan-Jun)	2010 (Jan-Jun)
Beras <i>Rice</i>	1,490.0	1,407.0	1,531.0	1,516.0	1,620.0	-	-
Teh (daun hijau) ¹ <i>Tea (green leaves)</i>	11.4	11.1	10.8	11.6	10.2	4.7	6.6
Minyak kelapa (mentah dan bertapis) <i>Coconut oil (crude and refined)</i>	30.8	27.8	37.1	42.3	41.9	21.1	23.7
Biji koko (mentah/disalai) <i>Cocoa beans (raw/roasted)</i>	28.0	31.9	35.0	28.0	18.2	11.5	9.5
Getah <i>Rubber</i>	1,126.0	1,283.6	1,198.2 [†]	1,072.4	857.0	383.6	450.3
Minyak sawit mentah <i>Crude palm oil</i>	14,961.7	15,880.8	15,823.7	17,734.4	17,564.9	7,918.5	7,977.0
Tembakau <i>Tobacco</i>	9.4	6.1	6.5	6.3	2.4	1.3	2.2

Punca: Jabatan Pertanian Semenanjung Malaysia, Lembaga Minyak Sawit Malaysia, Lembaga Tembakau Negara Malaysia, Lembaga Koko Malaysia dan Jemaah Pemasaran Lada Hitam

Source: Department of Agriculture Peninsular Malaysia, Malaysian Palm Oil Board (MPOB), National Tobacco Board Malaysia, Malaysia Cocoa Board and Pepper Marketing Board

C.4 Pembuatan

Pengenalan

Malaysia pada hari ini merupakan salah satu daripada lokasi utama di dunia bagi perindustrian luar pesisir dan operasi berasaskan perkhidmatan. Ekonomi berasaskan pasaran serta polisi kerajaan yang menyediakan perniagaan dengan peluang peningkatan dan keuntungan telah menjadikan Malaysia sebagai pangkalan eksport dan perkilangan yang sangat kompetitif. Walau bagaimanapun, aktiviti perindustrian juga boleh mengakibatkan pencemaran alam sekitar yang menjejaskan kesihatan manusia dan persekitarannya.

C.4 Manufacturing

Introduction

Presently, Malaysia is one of the world's top location for offshore manufacturing and service coupled with based operations. A market-oriented economy coupled with government policies that provide businesses with the opportunity for growth and profits have made Malaysia a highly competitive manufacturing and export base. However, the industrial activities will also lead to environmental pollution which in turn adversely affect human health and its environment.

¹ Merujuk kepada pengeluaran dari estet di Semenanjung Malaysia sahaja
Refers to production from estates in Peninsular Malaysia only

Indeks Pengeluaran Perindustrian

Indeks Pengeluaran Perindustrian (IPP) merangkumi sektor perlombongan, pembuatan dan elektrik. Secara keseluruhannya, IPP menunjukkan penurunan sebanyak **7.8 peratus** pada 2009 berbanding 2008. Penurunan ini disebabkan oleh penurunan indeks bagi sektor pembuatan (-10.0%) dan perlombongan (-4.2%). Walau bagaimanapun, indeks elektrik meningkat sebanyak **0.8 peratus**.

Index of Industrial Production

The Index of Industrial Production (IIP) comprises mining, manufacturing and electricity sectors. The overall IIP decreased marginally by **7.8 per cent** in 2009 as against 2008. This decline was due to the decrease of two indices namely manufacturing (-10.0%) and mining (-4.2%). However, the electricity index increased by **0.8 per cent**.

Jadual 4.11: Indeks Pengeluaran Perindustrian, Malaysia, 2005–2009

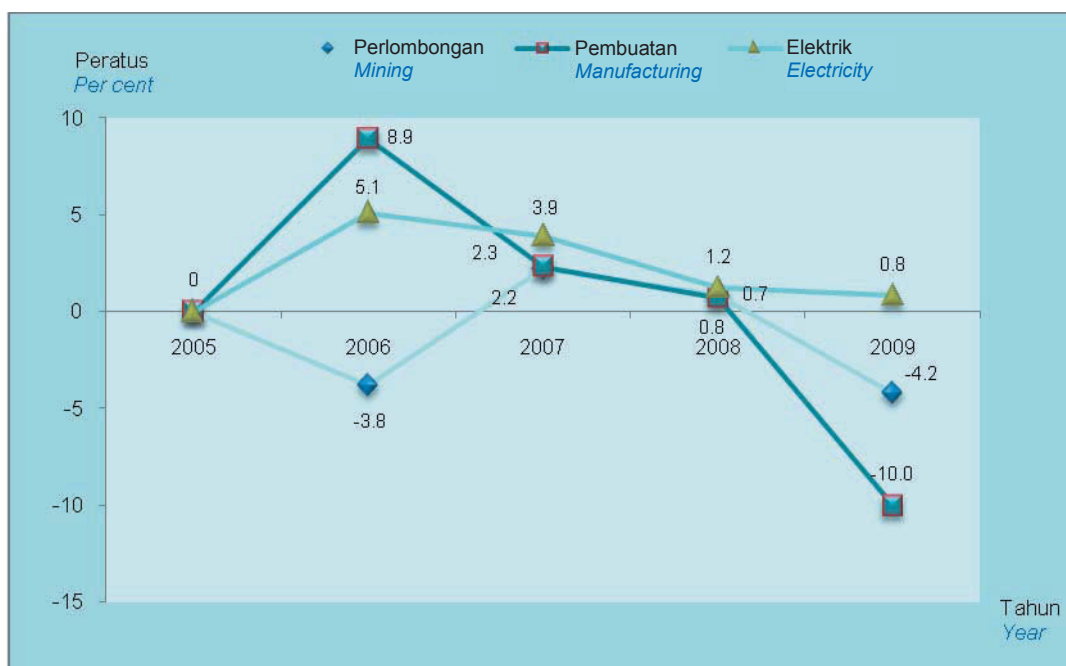
Table 4.11: Index of Industrial Production, Malaysia, 2005–2009

Tahun asas (2005=100)
Base year

	Wajaran Weights	2005	2006	2007	2008	2009
Indeks keseluruhan Overall index	100.00	100.0	104.8	107.3	108.1	99.7
Perlombongan Mining	30.61	100.0	96.2	98.3	99.1	94.9
Pembuatan Manufacturing	63.51	100.0	108.9	111.4	112.2	101.0
Elektrik Electricity	5.88	100.0	105.1	109.2	110.5	111.4

Carta 4.10: Peratus perubahan Indeks Pengeluaran Perindustrian, Malaysia, 2005–2009

Chart 4.10: Percentage change of Index of Industrial Production, Malaysia, 2005–2009



Pengeluaran simen

Simen adalah input asas kepada pengeluaran konkrit yang merupakan bahan utama bagi industri pembinaan. Bagaimanapun, pengeluaran simen akan memberikan kesan buruk kepada alam sekitar dan kesihatan manusia yang disebabkan oleh pelepasan CO₂.

Pada 2009, pengeluaran simen menurun sebanyak **0.9 peratus** kepada 19.5 juta tan metrik berbanding tahun sebelumnya.

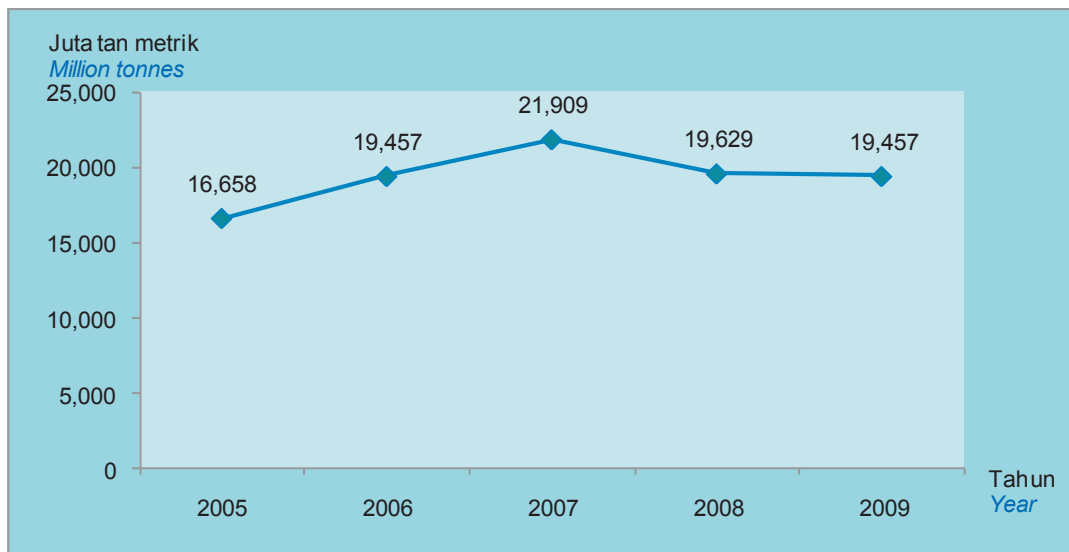
Production of cement

Cement is an essential input for the production of concrete and primary building material for the construction industry. However, cement production will give a negative impact to the environment and human health due to the CO₂ emissions.

*In 2009, cement production dropped by **0.9 per cent** to 19.5 million tonnes compared to the previous year.*

Carta 4.11: Pengeluaran simen, Malaysia, 2005–2009

Chart 4.11: Production of cement, Malaysia, 2005–2009



C.5 Perlombongan

Pengenalan

Perlombongan adalah aktiviti pengestrakan mineral berharga atau bahan geologi lain dari dasar bumi. Bagaimanapun, aktiviti perlombongan akan menyebabkan kemerosotan kualiti udara, air dan tanah serta penduduk setempat, kesan daripada bunyi bising, habuk dan penglihatan.

Pengeluaran galian

Mineral boleh diklasifikasikan kepada berlogam, bukan berlogam dan mineral tenaga. Bagi mineral berlogam, pengeluaran ilmenit mengalami penurunan mendadak (-56.5%) pada 2009. Ini diikuti oleh timah dalam konsentrat (-7.4%) dan bauksit (-4.2%). Walau

C.5 Mining

Introduction

Mining is the extraction of valuable minerals or other geological materials from the earth's bed. However, mining activities will lead to the deterioration of the ambient air, water and soil qualities as well as surrounding communities through noise, dust and visual impact.

Production of minerals

Minerals can be classified into metallic, non-metallic and energy minerals. For metallic minerals, production of ilmenite has dropped significantly (-56.5%) in 2009. This was followed by tin-in-concentrates (-7.4%) and bauxite (-4.2%). However, production of iron ore has increased

bagaimanapun, pengeluaran bijih besi telah meningkat sebanyak **49.7 peratus** manakala emas mentah pada **12.2 peratus**.

Bagi pengeluaran mineral bukan berlogam, silika mencatatkan penurunan yang besar sebanyak 184,332 tan metrik (-53.4%). Ini diikuti oleh tanah liat (-36.8%), pasir dan kerikil (-29.0%), mika (-22.7%), feldspar natrium (-17.2%), batu kapur (untuk simen) (-7.1%) dan bahan tanah (-6.9%). Walau bagaimanapun, barit, agregat dan kaolin mencatatkan peningkatan sebanyak **45.9 peratus**, **14.0 peratus** dan **10.6 peratus** masing-masing. Pengeluaran arang batu bagi jenis mineral tenaga juga telah menunjukkan peningkatan yang signifikan kepada 2,138,390 tan metrik (**83.3%**) pada 2009.

by **49.7 per cent** and raw gold **12.2 per cent**.

For non-metallic minerals, silica production recorded the largest decrease of 184,332 tonnes (-53.4%). This was followed by clay (-36.8%), sand and gravel (-29.0%), mica (-22.7%), sodium feldspar (-17.2%), limestone (for cement) (-7.1%) and earth materials (-6.9%). However, barytes, aggregate and kaolin registered an increased of **45.9 per cent**, **14.0 per cent** and **10.6 per cent** respectively. As for energy minerals, coal production also showed a significant increase to 2,138,390 tonnes (**83.3%**) in 2009.

Jadual 4.12: Pengeluaran galian mengikut jenis, Malaysia, 2005–2009
Table 4.12: Production of minerals by type, Malaysia, 2005–2009

Galian Minerals	2005	2006	2007	2008	2009 ^P
Meneral berlogam <i>Metalic minerals</i>					
Timah dalam konsentrat ¹ <i>Tin-in-concentrates</i>	2,857	2,398	2,264	2,606 ^f	2,412
Bijih besi <i>Iron ore</i>	949,605	667,082	802,031	981,932	1,470,186
Bauksit <i>Bauxite</i>	4,735	91,806	156,785	275,069 ^f	263,432
Ilmenit <i>Ilmenite</i>	38,196	45,649	59,310	36,779	15,983
Emas mentah ('000 gram) <i>Raw gold ('000 grams)</i>	4,249.6	3,497.2	2,912.6	2,490.0	2,794.2
Mineral bukan berlogam <i>Non-metallic minerals</i>					
Barit <i>Barytes</i>	-	910	0	4,372	6,380
Tanah liat <i>Clay</i>	9,404,208	7,923,527	6,336,980	4,765,242	3,013,288
Bahan tanah <i>Earth materials</i>	19,353,493	17,157,647	21,955,443	20,299,975	18,903,729
Feldspar natrium <i>Sodium feldspar</i>	33,600	1,500	316,922	430,497	356,620
Kaolin <i>Kaolin</i>	451,675	262,583	498,639	419,157	463,736
Batu kapur (untuk simen) <i>Limestone (for cement)</i>	20,373,001	21,164,546	20,947,943	23,852,825	22,165,099
Mika <i>Mica</i>	4,542	5,150	5,208	5,593	4,323
Pasir dan kerikil <i>Sand and gravel</i>	17,071,000	25,225,911	22,371,000 ^f	24,472,000 ^f	17,382,000
Silika <i>Silica</i>	310,288	191,235	280,749	345,447	161,115
Agregat <i>Aggregates</i>	62,762,000	79,912,682	77,673,790 ^f	75,883,364 ^f	86,497,394
Mineral tenaga <i>Energy mineral</i>					
Arang batu <i>Coal</i>	789,357	901,801	1,063,075	1,166,524 ^f	2,138,390

Tan metrik
Tonnes

Punca: Jabatan Mineral dan Geosains
Source: Minerals and Geoscience Department

¹ Timah merujuk kepada "Timah dalam konsentrat" yang mana ia adalah kandungan timah dalam "Konsentrat Timah"
Tin refers to "tin-in concentrate" which is the tin content in "Tin Concentrate"

C.6 Tenaga

Tenaga merupakan bahan utama kepada aktiviti ekonomi. Walau bagaimanapun, penggunaan tenaga boleh memberikan kesan yang tidak diinginkan kepada alam sekitar seperti pelepasan gas rumah hijau dan bahan pencemar lain.

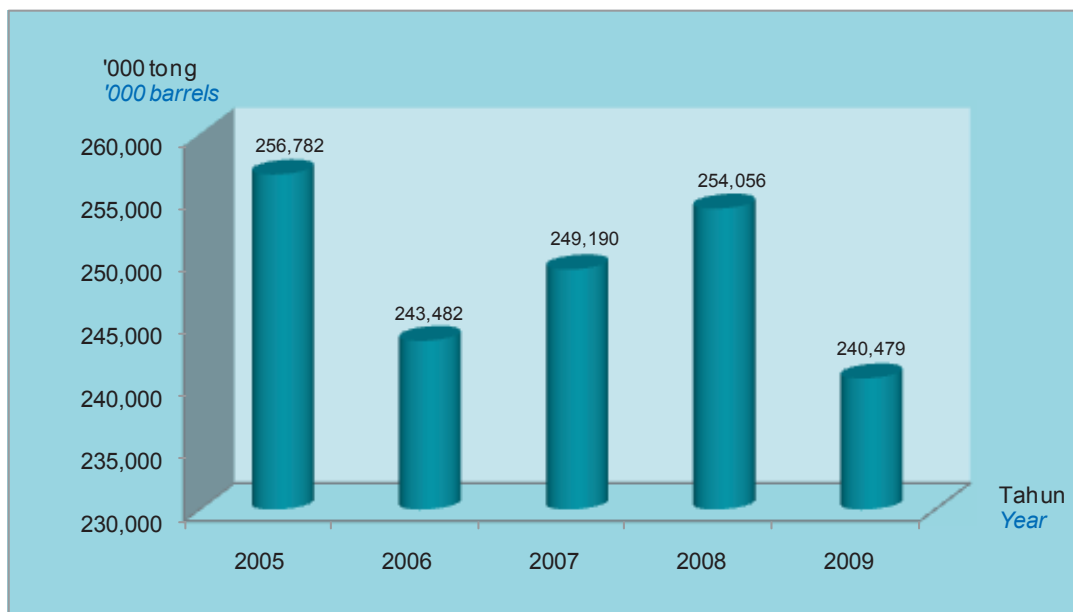
Pada 2009, pengeluaran minyak mentah menurun sebanyak **5.3 peratus** kepada 240.5 juta tong daripada 254.1 juta tong pada 2008. Sementara itu, pengeluaran bersih gas asli mencatatkan peningkatan sebanyak **1.3 peratus** kepada 2,068,548 juta kaki padu standard (JKPS). Pengeluaran bersih gas asli merujuk kepada pengeluaran kasar gas asli (gas bersekutu dan gas tidak bersekutu) tolak suntikan semula dan pembakaran. [Carta 4.12 dan Carta 4.13]

C.6 Energy

Energy is a key ingredient to economic activity. However, consumption of energy will produce some undesirable impact to the environment such as emission of greenhouse gases and other pollutants.

*In 2009, crude oil production dropped by **5.3 per cent** to 240.5 million barrels from 254.1 million barrels in 2008. Meanwhile, net production of natural gas recorded an increase at **1.3 per cent** to 2,068,548 million standard cubic feet (MMSCF). Net production of natural gas refers to gross production of natural gas (associated and non-associated gas less re-injected and flared. [Chart 4.12 and Chart 4.13]*

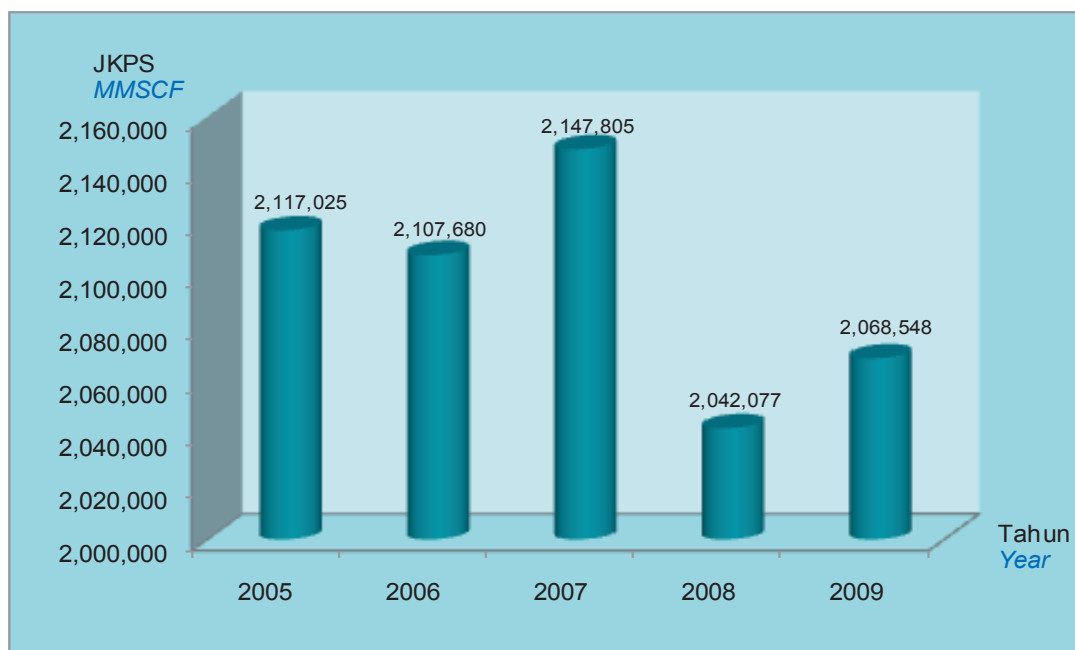
Carta 4.12: Pengeluaran minyak mentah¹, Malaysia, 2005–2009
Chart 4.12: Crude oil production¹, Malaysia, 2005–2009



Punca/Source: PETRONAS

¹ Pengeluaran minyak mentah adalah termasuk petroleum mentah dan kondensat
Crude oil production includes crude petroleum and condensate

Carta 4.13: Pengeluaran bersih gas asli, Malaysia, 2005–2009
Chart 4.13: Net production of natural gas, Malaysia, 2005–2009



Punca/Source: PETRONAS

Penjanaan tenaga elektrik

Jadual 4.13 menunjukkan jumlah penjanaan tenaga elektrik mengikut kawasan dan stesen dari 2005 hingga 2009. Jumlah penjanaan elektrik terus meningkat dari 96,213.9 juta kilowatt jam (KWH) pada 2005 kepada 107,413.8 juta KWH pada 2009.

Di Malaysia, daripada empat jenis stesen penjanaan tenaga elektrik, hanya stesen diesel menunjukkan peningkatan pada 2009 kepada 4,270.8 juta KWH berbanding 2008.

Jumlah penjanaan elektrik pada 2009 di Semenanjung Malaysia telah menurun sebanyak **0.4 peratus**, manakala Sabah dan Sarawak masing-masing meningkat **2.9 peratus** dan **11.9 peratus** berbanding 2008.

Electricity generated

Table 4.13 shows the total electricity generated by station and region from 2005 to 2009. Total electricity generated continues to increase from 96,213.9 million kilowatt hours (KWH) in 2005 to 107,413.8 million KWH in 2009.

In Malaysia, from the four types of station generating electricity, only diesel stations showed an increase to 4,270.8 million KWH in 2009 compared to 2008.

Total electricity generated in 2009 for Peninsular Malaysia has decreased by **0.4 per cent**, while Sabah and Sarawak increased by **2.9 per cent** and **11.9 per cent** respectively when compared with 2008.

Jadual 4.13: Penjanaan tenaga elektrik mengikut kawasan dan stesen, Malaysia, 2005–2009
Table 4.13: Electricity generated by region and station, Malaysia, 2005–2009

Juta KWH
 Million KWH

Kawasan <i>Region</i>	Tahun <i>Year</i>	Stesen wap <i>Steam stations</i>	Stesen diesel <i>Diesel stations</i>	Stesen hidro <i>Hydro stations</i>	Turbin gas <i>Gas turbines</i>	Lain-lain ¹ <i>Others</i>	Jumlah <i>Total</i>
Malaysia	2005	23,210.7	3,014.9	6,600.9	62,261.9	1,125.6	96,213.9
	2006	24,297.9	3,186.6	6,779.1	65,198.2	1,378.5	100,840.5
	2007	25,193.2	3,601.3	6,984.9	67,795.6	1,375.2	104,950.0
	2008	25,637.5	3,826.9	7,192.5	68,771.0	1,498.9	106,926.9
	2009	25,471.5	4,270.8	7,005.4	67,634.1	3,031.8	107,413.8
Semenanjung Malaysia ¹ <i>Peninsular Malaysia</i>	2005	22,935.8	297.4	5,604.6	57,683.9	165.6	86,687.2
	2006	24,074.9	306.1	5,882.9	60,540.5	165.8	90,970.3
	2007	24,954.4	312.8	6,097.8	62,745.8	165.8	94,276.5
	2008	25,350.1	315.7	6,194.6	63,738.2	165.8	95,764.4
	2009	25,239.0	314.9	6,167.4	63,459.5	165.8	95,346.6
Sabah	2005	274.9	2,500.5	469.4	585.6	0.0	3,830.4
	2006	223.0	2,592.5	546.5	655.5	0.0	4,017.6
	2007	238.8	2,955.7	513.0	687.9	0.0	4,395.4
	2008	287.4	3,161.8	491.4	775.2	0.0	4,715.9
	2009	232.5	3,678.8	394.4	545.2	0.0	4,851.0
Sarawak ¹	2005	0.0	217.0	526.9	3,992.4	960.0	5,696.3
	2006	0.0	288.0	349.7	4,002.2	1,212.7	5,852.6
	2007	0.0	332.8	374.1	4,361.9	1,209.4	6,278.1
	2008	0.0	349.4	506.5	4,257.6	1,333.1	6,446.6
	2009	0.0	277.1	443.6	3,629.4	2,866.0	7,216.2

Punca: Tenaga Nasional Berhad, Bekalan Elektrik Sabah Sdn. Bhd., Sarawak Energy Berhad, Jabatan Bekalan Elektrik & Gas dan Pengeluar Tenaga Bebas

Source: Tenaga Nasional Berhad, Sabah Electricity Sdn. Bhd., Sarawak Energy Berhad, Department of Electricity & Gas Supply and Independent Power Producer

¹ Semenanjung Malaysia merujuk kepada biomassa dan Sarawak merujuk kepada arang batu dan solar
 For Peninsular Malaysia refers to biomass and Sarawak refers to coal and solar

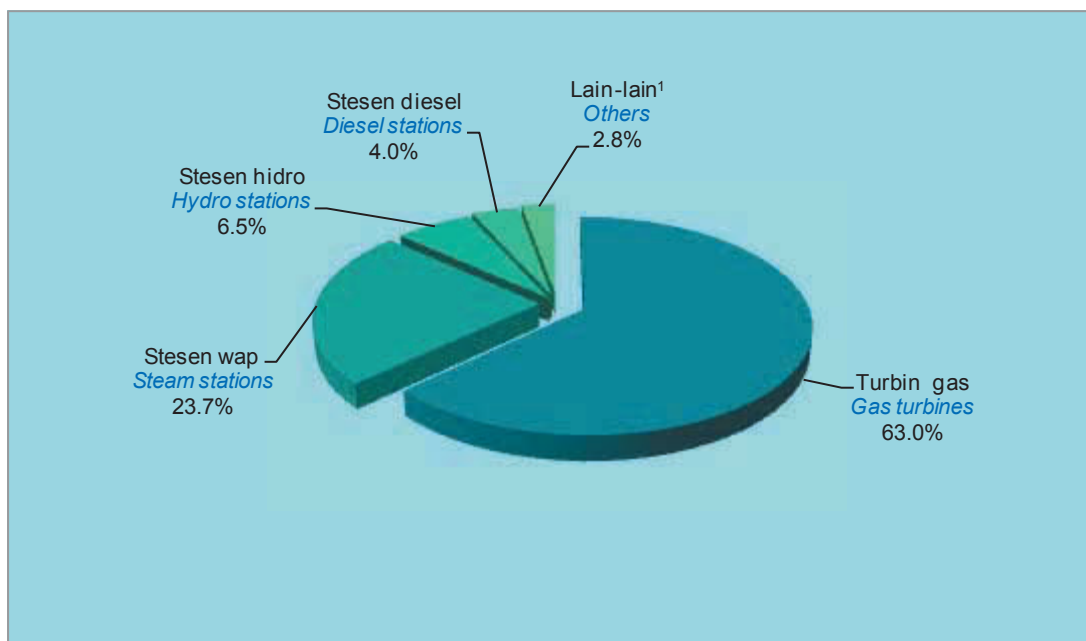
Penjanaan elektrik campuran

Pada 2009, turbin gas merupakan penyumbang utama (**63.0%**) daripada keseluruhan jumlah penjanaan elektrik di Malaysia. Ini diikuti oleh stesen wap (**23.7%**), hidro (**6.5%**), diesel (**4.0%**) dan lain-lain (**2.8%**).

Mix electricity generation

In 2009, turbine gas was predominant (**63.0%**) of the total electricity generated in Malaysia. This was followed by steam (**23.7%**), hydro (**6.5%**), diesel (**4.0%**) and other stations (**2.8%**).

Carta 4.14: Taburan peratus penjanaan tenaga elektrik mengikut stesen, Malaysia, 2009
Chart 4.14: Percentage distribution of the generation of electricity by stations, Malaysia, 2009



C.7 Pembinaan jalan raya

Bagi tempoh 2005 hingga 2009, jumlah panjang jalan raya meningkat daripada 87,025 kepada 135,226 km. Daripada jumlah ini, 16,946 km (**12.5%**) adalah di bawah bidang kuasa persekutuan dan 118,280 km (**87.5%**) di bawah bidang kuasa negeri.

Di bawah bidang kuasa persekutuan, panjang jalan berturap meningkat **2.0 peratus** manakala jalan kelikir tidak mencatatkan sebarang perubahan.

Manakala, di bawah bidang kuasa negeri, jarak jalan berturap meningkat **13.5 peratus** pada 2009 berbanding 2008. Ini diikuti oleh jalan tanah (**9.3%**) dan jalan kelikir (**2.6%**). [Jadual 4.14]

C.7 Road construction

For the period 2005 to 2009, the total length of roads increased from 87,025 to 135,226 km. Of this total, 16,946 km (**12.5%**) was under federal jurisdiction and 118,280 km (**87.5%**) under state jurisdiction.

The length of paved roads, under federal jurisdiction, increased **2.0 per cent** while the length of gravel roads remained unchanged.

Meanwhile, for state jurisdiction roads, the length of paved roads increased by **13.5 per cent** in 2009 compared to 2008. This was followed by earth (**9.3%**) and gravel roads (**2.6%**). [Table 4.14]

¹ Semenanjung Malaysia merujuk kepada biomassa dan Sarawak merujuk kepada arang batu dan solar
For Peninsular Malaysia refers to biomass and Sarawak refers to coal and solar

Jadual 4.14: Jalan raya mengikut jenis dan bidang kuasa¹, Malaysia, 2005–2009
Table 4.14: Roads by surface type and jurisdiction¹, Malaysia, 2005–2009

Bidang Kuasa <i>Jurisdiction</i>		Kilometer <i>Kilometre</i>				
Jenis <i>Type</i>	2005	2006	2007	2008	2009	
Jumlah <i>Total</i>	87,025	90,127	117,711	122,670	135,226	
Persekutuan <i>Federal</i>	Jumlah <i>Total</i>	16,276	16,275	16,899	16,612	16,946
	Berturap <i>Paved</i>	15,963	16,020	16,641	16,602	16,936
	Kelikir <i>Gravel</i>	85	56	65	10	10
	Tanah <i>Earth</i>	228	199	193	-	-
Negeri <i>State</i>	Jumlah <i>Total</i>	70,749	73,852	100,812	106,058	118,280
	Berturap <i>Paved</i>	51,888	55,272	64,404	81,413	92,438
	Kelikir <i>Gravel</i>	15,904	15,651	33,263	16,363	16,796
	Tanah <i>Earth</i>	2,957	2,929	3,145	8,280	9,046

Punca: Jabatan Kerja Raya

Source: Public Works Department

¹ Tidak termasuk jalan di bawah jagaan Pihak Berkuasa Tempatan
Excludes roads maintain by Local Authorities

D. TINDAK BALAS KEPADA KESAN ALAM SEKITAR

D.1 Pengurusan hutan

Pemuliharaan hutan paya laut

Kementerian Sumber Asli dan Alam Sekitar bersama jabatan dan agensi lain telah melaksanakan program penanaman semula pokok bakau di pesisiran pantai. Pemuliharaan kawasan pesisiran pantai dengan penanaman pokok bakau adalah penting bagi mengelak dan mengurangkan kemusnahan disebabkan pukulan ombak dan tiupan angin kencang. Kawasan hutan bakau yang berfungsi sebagai zon penampungan hakisan pantai semula jadi yang kukuh dan stabil turut menjadi habitat kepada pelbagai spesies biologi. Penanaman semula pokok bakau ini mampu menangani masalah perubahan cuaca dunia dengan mengurangkan pelepasan gas rumah hijau. Pokok menyerap karbon dioksida daripada udara dan menghasilkan oksigen. Karbon dioksida merupakan salah satu gas rumah hijau yang utama.

Pendekatan perhutani

Pendekatan perhutani merupakan salah satu pendekatan strategik yang digariskan di dalam Dasar Pertanian Negara ke Tiga (DPN3) oleh Kementerian Pertanian dan Industri Asas Tani. Perhutani adalah gabungan teknologi pertanian dan perhutanan untuk menggalakkan penggunaan tanah secara integrasi, optima dan berkekalan. Kedua-dua aktiviti pertanian dan perhutanan digabungkan di atas tanah yang sama untuk menggunakan sepenuhnya sumber cahaya matahari, air dan nutrisi. Pendekatan ini dilihat mampu mengurangkan permintaan terhadap tanah pertanian baru kerana aktiviti pertanian dan perhutanan dilaksanakan di atas tanah yang sama. Ia juga mempunyai peranan penting di dalam memulihara kepelbagaian biologi dengan meningkatkan pengeluaran biojisim dan menyumbang kepada keadaan iklim yang lebih baik.

D. RESPONSES TO ENVIRONMENTAL IMPACTS

D.1 Forest management

Conservation of mangrove forest

Ministry of Natural Resources and Environment, together with other departments and agencies have been implementing a programme of replanting mangrove trees on the coastal areas. Conservation of coastal areas by planting mangrove trees is important to avoid and reduce damages caused by strong waves and wind. Mangrove forests that serve as a strong and stable buffer zone of natural beach erosion are also habitat for a variety of biological species. Replanting of mangroves enable in combatting global climate change by reducing greenhouse gas emissions. Trees absorb carbon dioxide from the air and produce oxygen. Carbon dioxide is one of the main greenhouse gas.

Agroforestry approach

The Agroforestry approach is one of the strategic approaches outlined in the Third National Agricultural Policy (DPN3) by the Ministry of Agriculture and Agro-Based Industry. Agroforestry is the combination of agriculture and forestry technologies to foster integrated, optimal and sustainable land use. Both agriculture and forestry activities are combined on a same piece of land to fully utilise the resources of sunlight, water and nutrition. This approach can reduce the demand pressure for new arable land as both agriculture and forestry activities are done on the same land. Agroforestry has an important role in improving biodiversity by increasing biomass production and providing better climate.

Peruntukan dan perbelanjaan pembangunan sumber hutan

Jumlah peruntukan dan perbelanjaan bagi pembangunan sumber hutan di Malaysia ditunjukkan di **Jadual 4.15**. Jumlah peruntukan pembangunan sumber hutan bagi Semenanjung Malaysia mencatatkan pengurangan sebanyak RM53.7 juta pada 2009 berbanding RM116.8 juta pada 2008. Sebanyak RM59.8 juta (**94.8%**) daripada RM63.1 juta yang diperuntukan bagi pembangunan sumber hutan telah dibelanjakan pada 2009.

Di Sabah, jumlah peruntukan bagi pembangunan sumber hutan bertambah sebanyak **1.9 peratus** kepada RM43.3 juta pada 2009. Walau bagaimanapun, jumlah yang dibelanjakan menurun **1.7 peratus** kepada RM40.7 juta.

Di Sarawak pula, sejumlah RM19.4 juta (**96.5%**) telah dibelanjakan daripada RM20.1 juta yang telah diperuntukkan untuk pembangunan sumber hutan. Jumlah peruntukan ini meningkat **4.1 peratus** berbanding tahun sebelumnya.

Forest resource development allocation and expenditure

*The total allocation for forest development in Malaysia is shown in **Table 4.15**. The total allocation for forest development in Peninsular Malaysia showed a decrease of RM53.7 million in 2009 compared to RM116.8 million in 2008. About RM59.8 million (**94.8%**) out of RM63.1 million allocated for forest resource development had been spent in 2009.*

*In Sabah, total allocation for forest development increased by **1.9 per cent** to RM43.3 million in 2009. However, total expenditure decreased **1.7 per cent** to RM40.7 million.*

*Meanwhile, in Sarawak, a total of RM19.4 million (**96.5%**) was spent from the RM20.1 million which was allocated for forest resource development. This total allocation increased **4.1 per cent** compared to the previous year.*

Jadual 4.15: Peruntukan dan perbelanjaan pembangunan sumber hutan, Malaysia, 2005–2009
Table 4.15: Forest resource development allocation and expenditure, Malaysia, 2005–2009

RM juta
RM million

Negeri <i>State</i>	Bidang Kuasa <i>Jurisdiction</i>	Perkara <i>Items</i>	2005	2006	2007	2008	2009
Malaysia <i>Malaysia</i>	Jumlah <i>Total</i>	Peruntukan <i>Allocation</i>	165.9	208.1	237.7	178.6	126.5
		Perbelanjaan <i>Expenditure</i>	147.0	198.9	212.1	155.2	119.9
	Negeri <i>State</i>	Peruntukan <i>Allocation</i>	125.8	173.8	180.7	118.5	65.5
		Perbelanjaan <i>Expenditure</i>	110.0	165.7	157.1	97.1	60.7
	Persekutuan <i>Federal</i>	Peruntukan <i>Allocation</i>	40.1	34.3	57.0	60.1	61.0
		Perbelanjaan <i>Expenditure</i>	37.0	33.2	55.0	58.1	59.2
Semenanjung Malaysia <i>Peninsular Malaysia</i>	Jumlah <i>Total</i>	Peruntukan <i>Allocation</i>	43.6	92.1	118.3	116.8	63.1
		Perbelanjaan <i>Expenditure</i>	35.1	84.8	106.2	95.8	59.8
	Negeri <i>State</i>	Peruntukan <i>Allocation</i>	36.1	81.2	99.1	96.5	42.0
		Perbelanjaan <i>Expenditure</i>	28.0	74.2	87.9	75.9	39.0
	Persekutuan <i>Federal</i>	Peruntukan <i>Allocation</i>	7.5	10.9	19.2	20.3	21.1
		Perbelanjaan <i>Expenditure</i>	7.1	10.6	18.3	19.9	20.8
Sabah	Jumlah <i>Total</i>	Peruntukan <i>Allocation</i>	23.7	27.0	43.6	42.5	43.3
		Perbelanjaan <i>Expenditure</i>	22.5	26.3	41.4	41.4	40.7
	Negeri <i>State</i>	Peruntukan <i>Allocation</i>	9.8	14.2	18.6	20.2	22.5
		Perbelanjaan <i>Expenditure</i>	8.8	13.6	17.3	20.1	20.9
	Persekutuan <i>Federal</i>	Peruntukan <i>Allocation</i>	13.9	12.8	25.0	22.3	20.8
		Perbelanjaan <i>Expenditure</i>	13.7	12.7	24.1	21.3	19.8
Sarawak	Jumlah <i>Total</i>	Peruntukan <i>Allocation</i>	98.6	89.0	75.8	19.3	20.1
		Perbelanjaan <i>Expenditure</i>	89.4	87.8	64.5	18.0	19.4
	Negeri <i>State</i>	Peruntukan <i>Allocation</i>	79.9	78.4	63.0	1.8	1.0
		Perbelanjaan <i>Expenditure</i>	73.2	77.9	51.9	1.1	0.8
	Persekutuan <i>Federal</i>	Peruntukan <i>Allocation</i>	18.7	10.6	12.8	17.5	19.1
		Perbelanjaan <i>Expenditure</i>	16.2	9.9	12.6	16.9	18.6

Punca: Jabatan Perhutanan Semenanjung Malaysia
 Source: Forestry Department Peninsular Malaysia

D.2 Pembangunan sumber hutan

Jadual 4.16 menunjukkan pembangunan sumber hutan di Semenanjung Malaysia dari 2005 hingga 2009. Pembangunan sumber hutan bagi hutan bandar pada 2009 adalah sebanyak 396,248 berbanding hanya 30,011 batang pokok pada 2008. Begitu juga dengan tanaman mengaya dengan keluasan dari 120 kepada 715 hektar.

Sebaliknya, bagi ladang hutan, pada 2009 hanya seluas 145 berbanding 6,760 hektar pada 2008, ini diikuti oleh tumbuhan ubatan hanya seluas 34 berbanding 42 hektar. Manakala tanaman kawasan pantai sebanyak 991,614 berbanding 1,130,317 batang pokok pada tempoh yang sama.

D.2 Forest resource development

Table 4.16 shows the forest resource development in Peninsular Malaysia from 2005 to 2009. Forest resource development of urban forest in 2009 was 396,248 trees compared to 30,011 trees in 2008. Similarly enrichment planting area increased from 120 to 715 hectares.

Alternatively, forest plantation in 2009 was only 145 hectares compared to 6,760 hectares in 2008, followed by medicinal plants with an area of only 34 compared to 42 hectares. For coastal plantation there were 991,614 number of trees compared to 1,130,317 number of trees over the same period.

Jadual 4.16: Pembangunan sumber hutan, Semenanjung Malaysia, 2005–2009
Table 4.16: Forest resource development, Peninsular Malaysia, 2005–2009

Sumber <i>Source</i>	2005	2006	2007	2008	Hektar Hectares 2009
Tanaman mengaya <i>Enrichment planting</i>	158	202	83	120	715
Ladang hutan <i>Forest plantation</i>	21	60	2,725	6,760	145
Tanaman bakau <i>Planting of mangroves</i>	733	210	183	856	-
Tanaman rotan <i>Planting of rattan</i>	30	43	205	42	-
Tanaman kawasan lapang <i>Open space planting</i>	60	60	50	-	134
Tanaman buluh <i>Planting of bamboo</i>	30	-	-	10	0
Tumbuhan ubatan <i>Medicinal plants</i>	80	76	36	42	34
Tanaman di lebuh raya (km) <i>Highway planting (km)</i>	6	11	5	24	-
Hutan perkampungan <i>Community forest</i>	45	70	50	-	-
Tanaman kawasan pantai <i>Coastal plantation</i>	61	16	275,572 ¹	1,130,317 ¹	991,614¹
Hutan bandar (bilangan pokok) <i>Urban forest (number of trees)</i>	6,100	60,139	38,510	30,011	396,248
Kawasan semaian (bilangan tapak) <i>Nursery area established (number of sites)</i>	5	10	13	19	-

Punca: Jabatan Perhutanan Semenanjung Malaysia
Source: Forestry Department of Peninsular Malaysia

¹ Bilangan pokok
Number of trees

Jadual 4.17 menunjukkan pembangunan sumber hutan terbesar di Sabah adalah ladang hutan yang terdiri daripada tanaman cepat tumbuh, nilai tinggi, rotan dan gaharu iaitu 211,399 hektar pada 2009 berbanding 201,661 hektar pada 2008. Tanaman mengaya pula adalah seluas 24,867 hektar berbanding 21,203 hektar bagi tempoh yang sama.

Table 4.17 shows that the largest forest resource development in Sabah was forest plantation which consist of fast growing, high value, rattan planting and gaharu with 211,399 hectares in 2009 compared to 201,661 hectares in 2008. Enrichment planting was 24,867 hectares compared to 21,203 hectares in the same period.

Jadual 4.17: Pembangunan sumber hutan, Sabah, 2005–2009
Table 4.17: Forest resource development, Sabah, 2005–2009

Sumber <i>Source</i>	2005	2006	2007	2008	Hektar <i>Hectares</i> 2009
Tanaman mengaya <i>Enrichment planting</i>	21,952	23,182	19,395	21,203	24,867
Ladang hutan <i>Forest plantation</i>	206,977	192,312	194,713	201,661	211,399
Spesies cepat tumbuh <i>Fast growing species</i>	107,764	110,099	102,705	104,540	112,991
Spesies nilai tinggi ¹ <i>High value species</i>	82,042	79,534	89,358	94,717	98,349
Tanaman rotan <i>Planting of rattan</i>	17,191	2,679	2,650	2,404	-
Gaharu ¹	-	-	-	-	179
Tanaman bakau <i>Mangroves</i>	-	15	168	n.a	-
Tumbuhan ubatan <i>Medicinal plants</i>	124	124	124	124	-
Pokok buah <i>Fruit trees</i>	100	100	100	100	-
Hutan perkampungan <i>Community forest</i>	33,654	33,654	33,654	-	-

Punca: Jabatan Perhutanan Sabah
Source: Sabah Forestry Department

Pada 2009, keluasan tanaman ladang hutan di Sarawak adalah 30,568 hektar berbanding 19,063 hektar pada tahun sebelumnya. Ini diikuti oleh tanaman bakau 88 hektar pada 2009 berbanding 64 hektar pada 2008. Pembangunan sumber hutan bagi tanaman kawasan pantai pula adalah 177,775 pokok berbanding 153,600 pokok bagi tempoh yang sama. [Jadual 4.18]

In 2009, area of forest plantation in Sarawak was 30,568 hectares compared to 19,063 hectares in the previous year. This was followed by mangroves 88 hectares in 2009 compared to 64 hectares in 2008. Forest resources development for coastal plantation was 177,775 trees compared to 153,600 trees in the same period. [Table 4.18]

¹ Gaharu: 120 hektar ditanam secara integrasi di dalam kawasan pokok jati (spesies tanam nilai tinggi)
Gaharu: 120 hectares is intergrated planting within teak planting (high value species)

Jadual 4.18: Pembangunan sumber hutan, Sarawak, 2005–2009
Table 4.18: Forest resource development, Sarawak, 2005–2009

Sumber <i>Source</i>	Hektar <i>Hectares</i>				
	2005	2006	2007	2008	2009
Ladang hutan <i>Forest plantation</i>	17,380	40,853	37,920	19,063	30,568
Tanaman bakau <i>Mangroves</i>	-	10	26	64	88
Tanaman kawasan pantai (bilangan pokok) <i>Coastal plantation (number of trees)</i>	-	25,000	65,000	153,600	177,775

Punca: Jabatan Hutan Sarawak
Source: Forest Department Sarawak