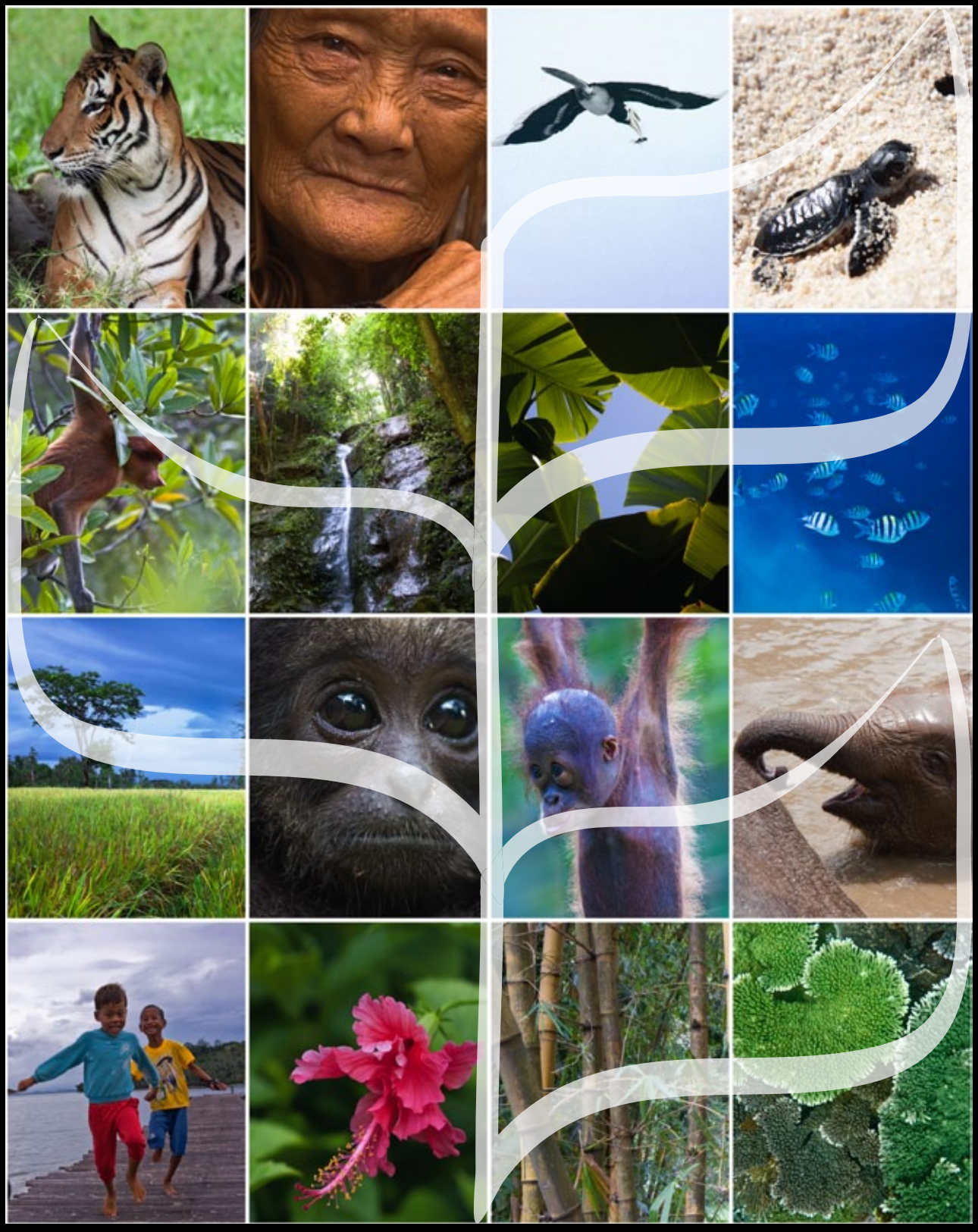
Government of Malaysia

4th National Report to the Convention on Biological Diversity



Ministry of Natural Resources and Environment

2009

Government of Malaysia

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Fourth National Report to the Convention on Biological Diversity

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Acronyms

ABS	–	Access and Benefits Sharing
APMI	–	ASEAN Peatland Management Initiative
ASEAN	–	Association of Southeast Asian Nations
CBD	–	United Nations Convention on Biological Diversity
CBNRM	–	Community-based Natural Resource Management
CBO	–	Community-based Organisation
CCD	–	United Nations Convention to Combat Desertification
CEMD	–	Conservation and Environmental Management Division
CEPA	–	Communication, Education, and Public Awareness
CITES	–	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	–	Conference of Parties
DANIDA	–	Danish International Development Assistance
DID	–	Department of Irrigation and Drainage
DMPM	–	Department of Marine Park Malaysia
DNA	–	Deoxyribonucleic acid
DOA	–	Department of Agriculture
DOE	–	Department of Environment
DOFM	–	Department of Fisheries, Malaysia
DVS	–	Department of Veterinary Service
DWNP	–	Department of Wildlife and National Parks
EIA	–	Environmental Impact Assessment
EPU	–	Economic Planning Unit
ESA	–	Environmentally Sensitive Areas
FAnGR	–	Farm Animal Genetic Resources
FAO	–	Food and Agriculture Organization
FDD	–	Forestry Development Division
FDPM	–	Forestry Department Peninsular Malaysia
FFRC	–	Freshwater Fish Research Centre

FMUs	–	Forest Management Units
FRIM	–	Forest Research Institute Malaysia
FSC	–	Forest Stewardship Council
GEF	–	Global Environment Facility
HCV	–	High Conservation Value
HCVF	–	High Conservation Value Forest
IAS	–	Invasive Alien Species
ITTO	–	International Timber Tropical Organization
IUCN	–	International Union for Conservation of Nature
LESTARI	–	Institute for Environment and Development
LULUCF	–	Land Use, Land Use Change and Forestry
MAQIS	–	Malaysian Quarantine and Inspection Services
MARDI	–	Malaysian Agricultural Research and Development Institute
MBBN	–	National Biodiversity-Biotechnology Council
MC&I	–	Malaysian Criteria and Indicators
MENGOs	–	Malaysian Environmental NGOs
MOA	–	Ministry of Agriculture and Agro-based Industry
MOSTI	–	Ministry of Science, Technology and Innovation
NBSAP	–	National Biodiversity Strategies and Action Plans
NCSA	–	National Capacity Needs Self-Assessment for Global Environmental Management
NGO	–	Non-governmental Organisation
NIAB	–	National Institute of Animal Biotechnology
NP	–	National Park
NPBD	–	National Policy on Biological Diversity
NPP	–	National Physical Plan
NRE	–	Ministry of Natural Resources and Environment
NUP	–	National Urbanisation Policy
PETRONAS	–	Petroliam Nasional Berhad

PRF	–	Permanent Reserved Forest
UKM	–	Universiti Kebangsaan Malaysia
UNDP	–	United Nations Development Programme
UNESCO	–	United Nations Educational, Scientific and Cultural Organization
UNFCCC	–	United Nations Framework Convention on Climate Change
R&D	–	Research and Development
SABC	–	Sabah Biodiversity Centre
SALM	–	*Skim Akreditasi Ladang Malaysia* Malaysian Farm Accreditation Scheme
SALT	–	*Skim Akreditasi Ladang Ternakan* Livestock Farm Accreditation Scheme
SBC	–	Sarawak Biodiversity Centre
SFC	–	Sarawak Forestry Corporation
SFM	–	Sustainable Forest Management
SGP	–	Small Grants Programme
SOM	–	*Skim Organik Malaysia* Malaysian Organic Scheme
SPALM	–	*Skim Persijilan Ladang Akuakulture Malaysia* Malaysian Aquaculture Farm Certification Scheme
SRBWG	–	Sarawak Reef Ball Working Group
TK	–	traditional knowledge
WCC	–	Wildlife Conservation Centre
WGRB	–	Wildlife Genetic Resource Bank
WWF	–	World Wide Fund for Nature
9MP	–	Ninth Malaysia Plan

Executive Summary

Malaysia signed the Convention on Biological Diversity (CBD) on 12 June 1992 and ratified it on 24 June 1994. This report builds upon the previous three National Reports with updates on recent developments, status and also achievements.

Chapter 1 presents an overview of biodiversity status, trends and threats in Malaysia. Safeguarding of ecosystems is important to ensure conservation of biodiversity. In 2007, among the 19.6 million hectares of forested areas in Malaysia, 14.3 million hectares (43.4%) were gazetted as permanent reserved forest, and 1.9 million hectares (5.9%) were gazetted as national parks, wildlife and bird sanctuaries. This is in line with the country's commitment to biodiversity conservation. Together they exceed the global 2010 biodiversity target of 10%. Malaysia has an estimated 15,000 species of vascular plants, 229 species of mammals, 742 species of birds, 242 species of amphibians, 567 species of reptiles, over 290 species of freshwater fish, and over 500 species of marine fish. This chapter also presents examples and extents of conservation of plant and animal genetic resources for food and agriculture.

Chapter 2 provides an overview of the implementation of the National Policy on Biological Diversity. It also presents the challenges and capacity development activities identified during the National Capacity Need Self-Assessment for Global Environmental Management (NCSA) Project. Thirteen activities are related to CBD that aim to improve and enhance existing implementation in terms of policy and institutional framework, regulation and guidelines, federal and state cooperation, inter-agency coordination, knowledge and information management, incentives, increasing the number of experts - particularly taxonomists, research and development, reporting framework and mainstreaming conservation of biological diversity.

Chapter 3 presents the mainstreaming of biodiversity considerations into the various policies, strategies and action plans. It shows how biodiversity issues are integrated into the various national policies, plans and instruments such as the 5-year Malaysia Plans, the National Policy on Biological Diversity (1998), National Policy on the Environment (2002), National Wetlands Policy (2004), National Physical Plan (2005), and National Urbanisation Plan (2006). Conservation of natural resources and biological diversity are implemented through various sectoral laws and regulations such as the Protection of Wildlife Act (1972), Environmental Quality Act (1974), National Forestry Act (1984) and Fisheries Act (1985).

Chapter 4 presents the progress towards the 2010 Target and the Implementation of the Strategic Plan. The 2010 Goals and Target provide an indicative direction for governments to focus their implementation. Based on the findings of this report and self-assessment, Malaysia is on track to achieve the 2010 Targets, and in some areas certain targets have already been achieved.

Malaysia is committed to sustainable use and management of natural resources. Continued financial and technical resource will be needed to ensure that this commitment is continually achieved. This has to be coupled with financial and technical support from donor countries and organisations for implementation of programmes and projects that are in line with national priorities, and aligned to the objectives of CBD.

1. Overview of Biodiversity Status, Trends and Threats

Malaysia signed the Convention on Biological Diversity (CBD) on 12 June 1992 and it was ratified on 24 June 1994. Efforts to address the conservation of natural resources and biodiversity started prior to the signing of CBD and were strengthened after the ratification of the Convention in 1994. This report builds upon three previous National Reports with updates on recent developments, status and achievements.

This chapter presents an overview of biodiversity status, trends and threats in Malaysia. It highlights a summary of key findings from previous and on-going assessments, and monitoring activities. This chapter is structured as follows:

- Section 1.1 gives a brief overview of biodiversity in Malaysia
- Sections 1.2, 1.3 and 1.4 cover the status, importance and trends of biodiversity components in Malaysia
- Section 1.5 presents the main threats and its implications to biodiversity.

1.1 Overview of the Country's Biodiversity

Malaysia, situated in South East Asia, consists of 13 states and 3 federal territories. Eleven states and two federal territories (Kuala Lumpur and Putrajaya) are located in Peninsular Malaysia while the two states of Sabah and Sarawak are located on the island of Borneo. The federal territory of Labuan is an island situated off Borneo. There are 877 islands within the political boundaries of Malaysia.

Malaysia is considered as one of the world's mega-diverse countries[1] and ranked 12th in the world according to the National Biodiversity Index. The index is based on the estimates of country richness and endemism in four terrestrial vertebrate classes and vascular plants[2]. In addition to these indicators, the 2008 Environmental Performance Index lead by Yale and Columbia Universities ranked Malaysia 26th out of 149 countries for efforts in the management of biodiversity and environment[3].

Located near the equator, Malaysia has a warm and humid climate throughout the year with daily temperatures ranging from 21^0C to 32^0C (with the exception of mountain and hill areas). Its climate is ideal for supporting a vast and diverse range of ecosystems, habitats and species from microscopic organisms such as bacteria to mammals, birds and fishes.

Malaysia has undergone rapid economic development since independence. This was attributed by the utilisation of its rich natural resources and the development of human capital. Inevitably, some of the original forests were converted for agriculture, plantation and urban development. Based on 2007 statistics, approximately 60% of the total land area of Malaysia is still forested. This includes permanent reserved forest (PRF), stateland forests, national parks, and wildlife and bird sanctuaries. The remaining 40 % are covered by agricultural crops, rubber plantations, oil palm plantations, urban and other uses. Table 1 presents a breakdown of the total forested area in Malaysia.

[1] http://www.cbd.int/countries/profile.shtml?country=my#status (viewed March 2009)
[2] FRIM and UNDP Malaysia (2008)
[3] Esty et al. (2008)

Table 1. Malaysia: Total Forested Area (Various Years)

Category	1990	2000	2005	2007
	Area ('000 ha)			
Permanent Reserved Forest (PRF)				
- Peninsular Malaysia	4,750	4,800	4,800	4,696
- Sabah	3,350	3,600	3,600	3,605
- Sarawak	4,500	6,000	6,000	6,000
(a) Total PRF	**12,600**	**14,400**	**14,400**	**14,301**
(b) Stateland Forest	6,820	4,640	4,141	3,416
(c) National Parks and Wildlife & Bird Sanctuary	1,120	1,120	1,120	1,946
Total Forested Area (a+b+c)	**20,540**	**20,160**	**19,661**	**19,663**
(d) Rubber plantation	1,836	1,431	1,229	1,207
(e) Other land (Oil palm, agricultural crops, urban and other uses)	10,480	11,265	11,966	11,986
(f) Inland water bodies	119	119	119	119
Total area for country (a+b+c+d+e+f)	**32,975**	**32,975**	**32,975**	**32,975**

Source: Forestry Department Peninsular Malaysia.

1.2 Status of Important Biodiversity Components

The terrestrial biodiversity of Malaysia is concentrated in tropical rainforests that extends from coastal plains to mountain areas, including inland waters such as lakes and rivers. Marine biodiversity is found among islands, marine and coastal ecosystems such as coral reefs and seagrasses. This report grouped the inter-related thematic areas and associated types of ecosystem into three main categories as depicted in the Table 2.

Table 2. Overview of Ecosystems

Thematic Area	Ecosystem
Forests Biodiversity	- Lowland evergreen forest - Lowland dipterocarp forest - Heath forest - Limestone forest - Mixed dipterocarp forest - Hill dipterocarp forest - Hill mixed dipterocarp forest

Thematic Area	Ecosystem
Mountain Biodiversity Inland Waters Biodiversity	- Montane forest - Subalpine forest - Peat swamp forest - Freshwater swamp forest - Riparian forest - Rivers, ponds, lakes, etc. - Mangrove forest
Marine and Coastal Biodiversity Islands Biodiversity (please refer to Forest Biodiversity for non-marine and non-coastal related ecosystems)	- Coastal hill dipterocarp forest - Mangrove forests - Mudflats - Coral reef - Seagrass
Agricultural Biodiversity	- Plantations - Rice fields - Fruit orchards & vegetable farms - Livestock rearing and aquaculture farms

1.2.1 Habitat Conservation and Management

Safeguarding ecosystems is important to ensure the conservation of biodiversity. In 2007, of the 19.6 million hectares of forested areas in Malaysia, 14.3 million hectares (43.4% of total land area) are gazetted as permanent reserved forest, and 1.9 million hectares (5.9% of total land area) are gazetted as national parks, wildlife and bird sanctuaries. These are in line with the country's commitment in biodiversity conservation and together these exceed the global 2010 biodiversity target of 10%.

Land and forests are under state jurisdiction while some protected areas are under the management of federal agencies. Malaysia has various forms of protection for natural habitats. These include permanent reserved forests, national and state parks, wildlife sanctuary, wildlife reserves, wildlife rehabilitation centres, bird reserves, bird sanctuaries, terrapin centres, conservation areas, some of which have been designated as United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site (Natural List), Association of Southeast Asian Nations (ASEAN) Heritage Sites, and Ramsar sites (see Table 3 and Table 4).

Table 3. World Heritage Sites

Parks	UNESCO World Heritage Site (Natural)	ASEAN Heritage Site
1. Kinabalu Park	√ (2000)	√
2. Mulu National Park	√ (2000)	√
3. Taman Negara National Park		√

Table 4. Ramsar Sites

Name	Date	Area (ha)
1. Tasek Bera, Pahang	10/11/94	31,120
2. Tanjung Piai, Johor	31/01/03	526
3. Pulau Kukup, Johor	31/01/03	647
4. Sungai Pulai, Johor	31/01/03	9,126
5. Kuching Wetlands, Sarawak	08/11/05	6,610
6. Lower Kinabatangan-Segama Wetlands, Sabah	28/10/08	78,803

Marine protected areas represent a wide range of habitats including coral reefs, seagrasses and mangrove forests. In 2007, the Department of Marine Park Malaysia (DMPM) managed 235,723 ha of marine protected areas. These include 40 islands in Peninsular Malaysia and federal territories that are gazetted as marine parks. In addition, there are 32 other islands located within the area of marine park waters. In February 2008, the two islands of Pulau Yu Besar, and Pulau Yu Kecil were gazetted as Marine Parks. In total, 19.9 % of the islands in Peninsular Malaysia and federal territories are located within the area managed by DMPM.

Marine protected areas covering 57,533 ha in Sabah are managed by Sabah Parks. In Sarawak, marine protected areas are managed by the Sarawak Forestry Department and covers an area of 206,344 ha.

1.2.2 Species Diversity

Ecosystems representing the various thematic areas listed in Table 2 are home to the diversity of species in Malaysia. The following tables present the species richness in Malaysia for flora, terrestrial fauna, and marine species respectively (see Table 5, Table 6 and Table 7). In addition, there are over three million natural history specimens that are held in 22 institutions in Malaysia[4].

Table 5. Estimated Numbers of Flora Species

Group	Number of Species		
	Peninsular Malaysia	Sabah	Sarawak
Algae	377		
Bryophytes	475	582	330
Fern and associates	637	963	
Gymnosperm	27	34	
Monocots	2,010	2,170	
Dicots	5,529	4,497	

Source: Ministry of Natural Resources and Environment (2007a).

[4] FRIM and UNDP Malaysia (2008).

Table 6. Summary of Terrestrial Fauna

Class	No of Species		
	Peninsular Malaysia	Sabah	Sarawak
Vertebrate			
1. Mammals	229	221	
2. Birds	742		
3. Amphibians	242		
4. Reptiles	567		
5. Freshwater fish	290	100	200
6. Marine fish	1,500		
Invertebrate			
1. Butterfly	1031	936	
2. Leaf insect	1,073		
3. Freshwater crabs	102		
4. Hard coral	500-600		
5. Soft coral	200		
6. Mollusc	3,000		

Source: Ministry of Natural Resources and Environment (2007a).

Table 7. Inventory of Marine Organisms

Organisms	Species
Corals	435
Worms	9
Phytoplankton	61
Fish	700
Seashells	50
Crabs, Barnacles, Prawns, Crayfish, Lobsters and Shrimps	48
Marine Fungi	56
Marine Mammal	21
Jellyfish	7
Turtles	4
Seaweed	289
Seagrass	15
Sponges	21
Squid, Cuttlefish, Octopus	18
Starfish and Sea urchins	12
Sea cucumber	19
Sea Snakes	9

Source: Ministry of Natural Resources and Environment (2007a).

1.2.2.1 Flora of Malaysia

The distinct floristic components of Malaysia are determined by the geographical location of Peninsular Malaysia that extends from mainland Asia, and the states of Sabah and Sarawak situated on the island of Borneo. Malaysia has an estimated 15,000 species of vascular plants (angiosperms, gymnosperms and pteridophytes). Peninsular Malaysia has about 8,300 species of vascular plants, whereas Sabah and Sarawak has about 12,000 species. The flora of Peninsular Malaysia is better documented than that of Sabah and Sarawak. It is estimated that there are 2,830 species of trees in Peninsular Malaysia[5]. Specimens are essential in the documentation of the flora of Malaysia. The following table presents the holdings of specimens for Malaysia (see Table 8).

Table 8. Selected important herbarium holdings in Malaysia

Institutions	Specimens
Forest Research Institute Malaysia	300,000
Forest Research Centre, Sandakan, Sabah	253,725
Forest Research Centre, Kuching, Sarawak	250,000
Universiti Malaya	65,000
Universiti Kebangsaan Malaysia	72,000

Source: Saw and Chung (2005).

1.2.2.2 Mammals

There are 229 species of mammals in Peninsular Malaysia and 221 species in Sabah and Sarawak, of which 152 species are similar.

Over the past 22 years, there have been 23 discoveries in Peninsular Malaysia while over the past 25 years, there have been 31 discoveries in Sabah and Sarawak. Nearly all discoveries were bats. Two genera (*Pithecheirops, Diplgale*) and 30 species are known only from records within Malaysia, and for the time being they are considered to be endemic (see Appendix 3.1). In addition, seven other species are considered near-endemic as they have been recorded from within and also beyond the borders of Malaysia[6].

1.2.2.3 Birds

A total of 742 species of birds belonging to 85 families has been recorded within Malaysia. High species diversity remains in the rainforest, both lowland and montane with over 395 species or 53% of the total species number. Out of these 43 species are endemic to Malaysia[7].

1.2.2.4 Amphibians and Reptiles

In general amphibians and reptiles constitute significant biomass, exceeding that of all other vertebrates. They form important linkages in the ecosystems by providing dispersal mechanisms for plants. In addition they also play an important part in the trophic structure through predation, scavenging and form a prey-base[8].

[5] Ng et al. (1990). Endemic trees of the Malay Peninsula in *Research Pamphlet* 106. Forest Research Institute Malaysia Kuala Lumpur. 118pp.
[6] Davidson and Zubaid Akbar (2005).
[7] Jeyarajasingam (2005).
[8] Das and Norsham Yaakob (2005).

In total, 242 species of amphibians and 567 species of reptiles are known in Malaysia. A number of species have been discovered and recognised as new in the recent half a decade. Most of the new discoveries have been made from montane regions and offshore islands. Important findings have also been made not too far from urban areas. Appendix 3.2 presents the compositions of amphibians and reptiles in Malaysia.

1.2.2.5 Fishes

Freshwater fishes

Freshwater fishes of Malaysia are diverse and inhabit a great variety of habitats ranging from small torrential streams to estuarine, highly acidic ecosystems and also alkaline waters. Several species are endemic. There are 290 species of freshwater fish in Peninsular Malaysia. Although inventory figures for Sabah are 100, and Sarawak 200, these are believed to be underestimates because their inventories started later compared to Peninsular Malaysia. In Sabah and Sarawak, the focus has mainly been on major rivers. Hence species in isolated, inaccessible and other inland water bodies have yet to be explored[9].

Marine fishes

There are about 500 species of marine fish recorded in Malaysia. More than 400 species were recorded in coastal areas and river estuaries, and more than 450 species were recorded offshore in Sabah and Sarawak alone[10]. The diversity in the coastal areas, estuaries and offshore is lower for Peninsular Malaysia compared to Sabah and Sarawak.

1.2.2.6 Insects

The following section presents summaries of biodiversity for butterflies, beetles, ants and wasps.

Butterflies

There are 936 species of butterflies in Sabah and Sarawak. Peninsular Malaysia has 1,031 species of butterflies. There are 21 species of butterflies that are endemic to Peninsular Malaysia, and 94 endemic to Borneo[11]. However most of them occur as different subspecies in the two different regions. Half of the species are distributed in lowlands below 750m, one seventh of the species occur in the highlands. The rest are found in habitats at both elevations. Butterflies and moths respond rapidly to habitat change and they fulfil most criteria as effective indicators of change in biodiversity.

Beetle

There are 106 recorded families of beetles in Borneo, mainly from Sabah. In Peninsular Malaysia, at least 93 beetle families are known. To date there are approximately 1,700 species of beetles from 89 families in the Coleoptera collection of the Forest Research Centre, Sepilok in Sandakan, Sabah. At the Sarawak Forest Research Centre in Kuching, more than 350,000 specimens from 31 families have been recorded, but only about 10% have been identified to the genus level. There is also a good collection of beetles at the Universiti Kebangsaan Malaysia in Bangi with more than 600 species identified beetle species, mainly from the family Chrysomelidae. A total of 61 families have been recorded at the Forest Research Institute Malaysia (FRIM) in Kepong[12].

[9] Ahmad and Khairul-Adha (2005).
[10] Md. Akhir Arshad and Padilah Bakar (2005).
[11] Chey (2005).
[12] Chung (2005).

Ants and Wasps

To date 1,200 ant species have been recorded in Malaysia while more than 20,000 wasps (ichneumonid) specimens have been collected. Many specimens have been recorded from Malaysia for the first time, and many new species have been identified[13]. In Malaysia, inventory work has just begun on braconids (wasps) and to date, there are 7,000 braconid specimens from 22 sub-families in the collection of the Centre for Insect Systematics, Universiti Kebangsaan Malaysia (UKM). Postgraduate collaboration with the Natural History Museum in Leiden, Holland and the University of Leiden, is on-going[14].

1.2.3 Protection and Conservation of Species

Based on the International Union for Conservation of Nature (IUCN) 2008 Red List, which provides the list of species that are threatened on earth, Malaysia is home to 1,141 of threatened species (consisting of plants and animals). With a high number of globally threatened species in Malaysia, increased efforts for conservation of biodiversity in Malaysia have greater potential to prevent the loss of these species. The protection of wildlife in Peninsular Malaysia is regulated by the Protection Wildlife Act 1972, while in Sabah and Sarawak, the Sabah Wildlife Conservation Enactment 1997 and the Sarawak Wildlife Protection Ordinance 1998 apply accordingly. See Table 9, Table 10 and Table 11 for the number of species protected under the respective legislations of the three regions.

The Department of Wildlife and National Parks (DWNP) is in the process of strengthening the current Protection of Wildlife Act 1972. The proposed new legislation is expected to increase the number of domestic species "protected" and "totally protected", to increase the penalties between 10 to 30 times in order to curb poaching and smuggling, and to include derivatives of wildlife. This proposed new legislation would also include provisions to regulate or ban the entry of a list of invasive alien species. It will also complement the International Trade in Endangered Species Act 2008 that was passed specifically to deal with the import, export and re-export of species listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) throughout Malaysia.

The following tables present summaries of the number of species that are protected in Malaysia. In addition, all species listed in CITES Appendix I and II are also protected based on the CITES Act. See Appendix 3.3 for examples of species of threatened animals and birds in Malaysia. In addition to *in-situ* conservation, Malaysia has established a number of *ex-situ* conservation centres to preserve the genetic resources some species. Action plans also exist for tigers, elephants, crocodiles, turtles, and sharks. See Appendix 3.4 for examples of animals breeding programmes for threatened or commercial species, and Appendix 3.5 for summaries of some of these programmes.

Please refer to Appendix 3.7 for the list of plant and tree species that are protected, and Appendix 3.8 for marine animals that are protected.

[13] Idris (2005).
[14] *Ibid* .

Table 9. Peninsular Malaysia: Number of Species that are protected under Protection of Wildlife Act 1972

Status of Protection	Mammal	Bird	Reptile	Insects	Total
Totally Protected	55	571	5	0	631
Protected	17	71	5	29	122
Total	**72**	**642**	**10**	**29**	**753**

Source: Department of Wildlife and National Parks.

Table 10. Sabah: Number of Species that are protected under Wildlife Conservation Enactment 1997

Status of Protection	Mammal	Bird	Reptile	Insects	Plants sp	Total
Totally Protected	7		3		4	14
Protected	73	132	7	2	13	227
Total	**80**	**132**	**10**	**2**	**17**	**241**

Source: Sabah Wildlife Department.

Table 11. Sarawak: Number of Species that are protected under Wildlife Protection Ordinance 1998

Status of Protection	Mammal	Bird	Reptile	Insects	Others, eg. Fish
Totally Protected	21 (1*)	26(2*)	5(1*)	-	**-**
Protected	12(7*)	17(10*)	8(3*)	1	**2***

Notes

- 21(1*): 1* refers to all species of *Cetacea.*
- 12(7*): 7* refers to all species of *Tupaiidae*, all species of *Chiroptera*, all species of primates, all species of *Petuaristinae*, all species of *Hystricidae*, all species of *Viverridae*, all species of *Lutra* and *Aonyz* and all species of *Felidae* (excluding those that are listed as Totally Protected).
- 17(10*): 10* refers to all species of *Ardeidae*, all species of *Ciconiidae*, all species of *Falconidae*, all species of *Phasianidae*, all species of *Charadiiformes*, all species of *Tytonidae* and *Strigidae*, all species of *Aerodramus*, *Hydrochous* and *Callocalia*, all species of *Alcedinidae*, all species of *Picidae*, and all species of *Psittacidae*.
- 5(1*): 1* refers to all species of *Chelonidae* and *Dermochelyidae*. Note 4 species of marine turtle landed on Sarawak shores.
- 8(3*): 3* refers to all species of *Tryonychidae*, all species of *Varanus* and all species of *Python*.
- 26(2*): 2* refers to all species of *Phalaropus* and all species of *Ducula.*
- 2*: All species of *Osteoglossidae* and all species of *Hydrozoa* and *Anthozoa.*

Source: Sarawak Forest Department.

1.2.4 Agricultural Biodiversity

In terms of agricultural biodiversity conservation and management, there are 25 livestock breeding centres directly involved in the conservation of farm animal genetic resources[15] and 3 genebanks for crops and floral genetic resources.

1.2.4.1 Plant Genetic Resources for Food and Agriculture

Plant-based agricultural biodiversity are actively documented in the following information systems[16]:

- Rice Genebank Information System.
- Agrobiodiversity Information Systems are databases on the genetic resources of plants, arthropods and microbes that have been collected, characterised and conserved in genebanks.
- Medicinal Plants Information System is a database on plants used as medicine in Malaysia.

The following tables present summaries of germplasm collection conserved in seed genebanks, field genebanks and arboretums in Malaysia (see Table 12 and Table 13). Appendix 3.9 presents detail examples of germplasm collections at selected field genebanks and other centres.

Table 12. Germplasm Collection Conserved in Seed Genebanks

Location	Rice (No of accessions)	Traditional Vegetables (No of accessions)	Ulam[17] (No of accessions)
Malaysian Agricultural Research and Development Institute (MARDI) Genebank, Bertam, Seberang Perai, Penang	11,470 (67% are of local origin)	130	100
Specific MARDI Stations		50 (chilli and tomato)	
Agricultural Research Centre / Department of Agriculture, Tuaran, Sabah	941 including 18 varieties of rice are also conserved	38 (number of species)	
Agriculture Research Centre*, Semengguh, Sarawak and various centres	1,690	646 (encompassing 29 species)	

* updated during preparation of this report.

Source: Adapted from Jamadon et al. (2007).

[15] Department of Veterinary Services (2003).
[16] Mohd. Shukor Nordin et al. (2007).
[17] Equivalent to raw vegetables prepared in salad form.

Table 13. Examples of Ex-situ Conservation of Indigenous Fruit Species: Maintained at Various Institutional Field Genebank/Arboretum In Malaysia

Institutions	Location of Field Genebank/Arboretum	No of species	No of accessions
MARDI	Various stations	165	3757*
Department of Agriculture, Peninsular Malaysia	Serdang	17	1,000
	Hulu Paka	110	235
Department of Agriculture, Sabah	Various agriculture Research Stations	204	n.a.
Department of Agriculture, Sarawak	Bintulu Agriculture Park	48	60
	Agriculture Research Centre, Semengguh**	88	197
Department of Agriculture, Sarawak	Betong Layar Station	54	n.a.
FRIM	Kepong	100	816
Universiti Putra Malaysia	Serdang	36	238
Universiti Kebangsaan Malaysia	Bangi	38	n.a
Universiti Malaysia	Rimba Ilmu, Petaling Jaya	71	207

* inclusive of over 1,000 accessions of traditional cultivar and land races involving 14 major fruit species.
** updated during preparation of this report.

Source: Adapted from Jamadon et al. (2007).

1.2.4.2 Animal Genetic Resources for Food and Agriculture

Biodiversity of Fishery Resources

Conservation and sustainable use of the biodiversity of fisheries resources are represented by systematic inventories and biological collections of fisheries fauna and flora kept at research institutes, institutes of higher learning and museums in Malaysia[18].

Checklists of important fauna include marine and freshwater fish, crustaceans, molluscs, marine mammals, sea snakes, invertebrates, zooplankton and benthic communities. Checklists of aquatic flora include corals, sponges, seagrasses, seaweeds, phytoplanktons, aquatic fungi, lower plants and microorganisms. Both checklists also include alien species.

Most of the fisheries research centres throughout Malaysia have sufficient facilities and equipment. The following table presents the fields of specialisation and facilities at Fisheries Research Institutes/Centres (see Table 14).

[18] Action Plan for the Conservation and Sustainable Use of Fishery Resource Biological Diversity of Malaysia.

Table 14. Specialisation and Facilities at Fisheries Research Institutes/Centres

Fisheries Research Institute / Centre	Field of Specialisation	Wet Laboratory	Specimen Collection Room	Database Storage	Live Specimen Holding Facility
Fisheries Research Institute	Marine Fauna and Flora Fisheries Gear Technology Biotechnology	√	√	√	√
National Fish Health Research Centre	Micro organisms Invasive Alien Species	√	√	√	√
Freshwater Fisheries Research Centre	Freshwater Fauna and Flora Freshwater Ecosystem Biotechnology	√	√	√	√
Marine Fishery Resource Development Management Department	Marine water Fauna and Flora Freshwater Fauna and Flora Oceanography Biotechnology	√	√	√	
Turtle and Marine Ecosystem Centre	Marine Fauna (marine mammals, sea turtles and invertebrates) Freshwater Fauna (Terrapins) Marine ecosystem	√	√	√	
Fisheries Research Institute Sarawak	Marine Fauna and Flora Ecosystems Biotechnology	√	√	√	
Fisheries Resource Centre Sabah	Marine Fauna and Flora Freshwater Fauna and Flora Ecosystems Biotechnology	√	√	√	√

Source: Department of Fisheries, Malaysia (2006a).

The Freshwater Fish Research Centre (FFRC) has a cryogenic lab facility. Research is currently targeted at Temoleh (*Probarbus jullieni*) and Kelah (*Tor tambroidesi*) in which sperms from these two fishes has been collected since 2007. Apart from the above, FFRC is also collecting specimen from freshwater fish in the wild for genetics and deoxyribonucleic acid (DNA) identification purposes. At the moment 385 samples have been collected from 54 species.

Farm Animal Genetic Resources

Breed information on Farm Animal Genetic Resources (FAnGR) of countries is being maintained on the Domestic Animal Diversity Information System developed and serviced by the Food and Agriculture Organization (FAO). Countries have the responsibility of updating records of their local breeds. The table below presents the breeds and major crossbreeds in the country (see Table 15).

Table 15. Breeds & Major Crossbreeds

Species	Breeds and Major Crossbreeds
Cattle	Australian Friesian Sahiwal, Australian Milking Zebu, Bali*, Boran X, Brahman & crosses, Brakmas, Charolais X, Charoke, Chianina X, Droughtmaster, Girlando, Hereford X, Holstein Friesian and crosses, Jersey and crosses, Kedah-Kelantan, Limousin X, Local Indian Dairy*, Mafriwal, Nelore, Red Friesian X, Sahiwal Friesian and Sabah Sahiwal-Friesian, Seladang*, Selembu*, Simbrah
Buffalo	Borneo Buffalo, Kerbau Sawah, Murrah*
Sheep	Barbados Blackbelly, Dorper X, Dorset X, Dorsimal*, Long Tail, Malin*, Morada Nova X, Santa Inés, Segurena X, Southdown X, Suffolk X, Sufrimal*, Sussex X
Goat	Alpine, Anglo Nubian, Australian Feral Goat, Boer, Jermasia, Jamnapari, German Fawn, Kambing Gurun*, Katjang*, Saanen, Toggenburg
Chicken	Ayam Hutan, Ayam Kampong, Ayam Sabong, Ayam Serama/Kapan, Ayam Sutera (Silky), Commercial Broiler Chickens, Commercial Layer Chickens
Duck	Belibis, Itik Jawa, Itik Kampong, Khaki Campbell, Muscovy, Pekin, Serati/Nila
Geese	Angsa Kampong, France White Rhine
Quail	Bob White, Japanese Quail, Puyuh IKTA (Male line), Puyuh IKTA (Female line),
Ostrich	Black Neck, Blue Neck
Turkey	Turkey British United Turkey, Bronze Turkey
Pig	Duroc, Iban, Landrace, Large White Yorkshire, Sarawakian Bearded Pig, South China Pig*
Horse	Arabs, Bimo Siam, Kuda Padi, Miniature Horses, Polo Horses, Quarter Horses, Saddlebred, Shetland Ponies, Thoroughbred
Deer	Axis, Sambar, Sika, Red Deer, Timorensis
Rabbits	Californian, Carolina, Giant White Bouscat, Hyplus, New Sigmonoire, New Zealand White

* Breeds thought to be at risk

Source: Department of Veterinary Services (2003).

In-situ conservation involves the maintenance and development of live populations of animals in their adaptive environment, or as close to it as is practically feasible. Breeds currently being conserved *in-situ* include Bali cattle (at Institute Haiwan, Kluang), Kedah-Kelantan cattle (at Tanah Merah farm), Malin sheep (at Jeram Pasu farm) and Sambar deer (at Institute Haiwan, Kluang).

Ex-situ conservation involves the preservation of animals in a situation removed from their normal habitat. Collection and freezing in liquid nitrogen of FAnGR in the form of semen, embryos or ova is considered as *ex-situ* conservation. Malaysia maintains a semen bank at the National Institute of Animal Biotechnology (NIAB), an umbrella of the Department of Veterinary Services (DVS). NIAB is responsible for FAnGR collection and storage programme for animals at risk, and those not at risk. NIAB is based in the state of Pahang. The frozen semen specimens stored include the Kedah-Kelantan cattle, Mafriwal cattle, Bali cattle and Swamp buffalo.

Insect Genetic Resources
An Action Plan on Arthropod Diversity is being developed. It aims to generate knowledge on the significance of arthropod diversity in delivering various ecosystem services for food and agriculture in the country.

Microbial and Fungal Genetic Resources
An Action Plan on Microbial Diversity is being developed. It strives to develop; and implement coordinated and holistic strategies with the intention of conserving and optimising the utilisation of microbial diversity. This is aimed to enhance productivity and improve the environment of agro-ecosystems.

1.2.5 Invasive Alien Species

Invasive Alien Species (IAS) affects all sectors such as agriculture, forestry, fishery, marine and animals. However, based on past records, the agriculture sector had been the most serious sector affected by the invasion of alien species[19]. These IAS could be insects, diseases (bacteria, viruses, mycoplasma), weeds (woody and non woody plants) and molluscs, fish, marine animals and vertebrate animals, etc. Their past introduction and establishment had caused serious damage to respective habitats by reducing yields, quality and increased production costs.

The total damages inflicted by the introduction of IAS are beyond those mentioned above because a country is also affected in terms of trade restrictions, pollution and pesticide hazards. All quarantine pests are listed as IAS but not all IAS are considered as quarantine pest such as food plants (new species or variety), plants used to control soil erosion, pets (insects or animals) and ornamental fishes that threaten biodiversity and cause losses to indigenous species.

Some of the examples of IAS that had affected Malaysia include:

a) Highly pathogenic avian influenza
b) Food and mouth disease
c) Cocoa pod borer (*Conopormopha cramerella*)
d) Diamondback moth (*Plutella xylostella*)
e) Beet armyworm (*Spodoptera exigua*)
f) Leaf miners (*Chromatomyia horticola and Liriomyza huidobrensis*)
g) Water hyacinth (*Eichhornia crassipes*)
h) Itch Grass (*Rottboellia cochinchinensis*)
i) Barnyard grass (*Echinochloa crus-galli*)
j) Siam weed (*Chromolaena odorata*)
k) Golden Apple Snail, (*Pomacea canaliculata*) and Black Apple Snail (*Pomacea insularus*)
l) Papaya Ring Spot Virus
m) Citrus Greening Disease (*Candidatus Liberobacter asiaticum)*
n) Virus Disease of Honeybees
o) African Catfishes (*Clarius gariepinus* and *C. lazera*)
p) Pacu (*Piaractus brachypomus*)

[19] Department of Agriculture (unpublished). *Draft National Action Plan for Prevention, Containment, Eradication and Control of Alien Invasive Species.*

1.3 Importance of Biodiversity

Ecosystems provide goods or services such as clean air, clean water and national parks. These contribute positively to human wellbeing. Eliciting economic values for environmental resources is easier for some resources compared to others because market systems reflect monetary values on society's goods (such as water, timber, fishery resources and agricultural resources) and services (such as entrance fees for national parks). Biodiversity, if considered as one resource, is complex and multifunctional. Hence it is not obvious how the myriad goods and services provided by these resources affect human welfare. In some cases such as wetland ecosystems, the market values are less tangible for services such as natural flood control, and prevention of saline water intrusion.

Nonetheless, there is growing recognition that such natural functions provide real benefits and values from human perspectives, and that these values need to be included in decision-making processes. The loss of environmental resources and the components of biodiversity becomes an economic problem when important values disappear and becomes irreversible. In Malaysia, economic valuation is used as a tool in the preparation of environmental impacts assessments of projects in Malaysia (see Box 1).

Box 1. Guidelines on the Economic Valuation of the Environmental Impacts for EIA Projects

In 2008, the Department of Environment (DOE) introduced Guidelines on Economic Valuation of The Environmental Impacts for Environmental Impact Assessments (EIA) Projects. This guideline constitutes a component of the requirements to prepare detailed EIA. It provides advice and instructions to assist project initiators, as well as a checklist for officers at DOE. It will also ensure the importance of biodiversity and its components are identified, quantified and where possible monetised in relation to the preparation of Environmental Impact Assessments.

The following table presents the importance of ecosystems through various contributions to human beings (Table 16). The importance for human well-being concerns the benefits in which market values are more tangible; the importance for other values concerns ecological services in which market values are more difficult to estimate and; the importance for ecosystem integrity shows the benefits of maintaining the integrity of ecosystems. All of these are inter-related.

Table 16. Importance of Ecosystems

Thematic areas	Importance for human well-being	Importance for other values	Importance for ecosystem integrity
Forests Biodiversity Mountain Biodiversity Inland waters Biodiversity	- Fresh water supply - Source for hydro-electricity - Food - Human habitat - Timber products - Non-timber products (ornamental plants, fishes, etc.) - Medicine and herbs - Education - Recreation - Tourism - Fisheries and aquaculture	- Animals and insects for pollination - Agricultural pest control - Watershed - Greenhouse gas regulation/ Carbon storage - Micro-climatic functions (e.g. flood mitigation) - Transportation - Nutrient recycling - Runoff regulation - Biodiversity values - Pharmaceutical values - Cultural and Heritage values	- Home to endemic species, including threatened species - Prevention of transmission of diseases - Food security - Adaptation to climate change - Gene pool - Existence value
Marine and coastal Biodiversity Islands Biodiversity (*please refer to forests for non-marine related ecosystems*)	- Human habitat - Ornamental fishes - Medicine and Herbs - Timber and Non-timber forest products (coastal forests) - Education - Recreation and Tourism - Fisheries and aquaculture	- Nursery ground for near-shore fisheries - Storm protection - Prevention of coastal erosion - Nutrient recycling - Biodiversity values - Pharmaceutical values - Cultural and Heritage values	- Home to endemic species, including threatened species - Food security - Support for migratory birds - Gene pool - Existence value - Adaptation to climate change

Thematic areas	Importance for human well-being	Importance for other values	Importance for ecosystem integrity
Agricultural Biodiversity	- Human habitat - Fisheries and aquaculture - Agriculture products - Source for fuel wood - Timber and non-timber products - Medicine and Herbs - Education - Recreation - Agro-tourism	- Animals and insects for pollination - Agricultural pest control - Greenhouse gas regulation / Carbon storage - Micro-climatic functions - Nutrient recycling - Biodiversity values - Pharmaceutical values - Cultural and heritage values	- Food security - Soil erosion control - Pest control - Prevention of transmission of diseases - Gene pool for agricultural production - Existence value - Adaptation to climate change

1.4 Trends of Biodiversity

Malaysia is committed towards achieving the "Provisional framework of goals, targets and indicators to assess progress towards the 2010 Biodiversity Target". In presenting the trends of biodiversity in Malaysia, existing data and information is used following the structure of the 2010 Targets.

Goal 1. Promote the conservation of the biological diversity of ecosystems, habitats and biomes.

- *Target 1.1: At least 10% of each of the world's ecological regions effectively conserved*
- *Target 1.2: Areas of particular importance to biodiversity protected*

In 2007, among the 19.6 million hectares of forested areas in Malaysia (60% of land area), 14.3 million hectares are gazetted as permanent reserved forest (43.4% of land area), and 1.9 million hectares are gazetted as national parks, wildlife and bird sanctuaries (5.9% of land area). These are in line with the country's commitment in biodiversity conservation. Together these exceed the global 2010 biodiversity target of 10%.

In 2007, the Department of Marine Park Malaysia (DMPM) managed 235,723 ha of marine protected areas. These include 40 islands in Peninsular Malaysia and federal territories that are gazetted as marine parks. In addition, there are 32 other islands located within the area of marine park waters. Recently in February 2008, the two islands of Pulau Yu Besar, and Pulau Yu Kecil were gazetted as Marine Parks. In total, 19.9 % of the islands in Peninsular Malaysia and federal territories are located within the area managed by DMPM. Marine protected areas covering 57,533 ha in Sabah are managed by Sabah Parks. In Sarawak, marine protected area is managed by Sarawak Forestry Department and covers an area of 206,344 ha.

Goal 2. Promote the conservation of species diversity.

- *Target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups*
- *Target 2.2: Status of threatened species improved*

The establishment of protected and conservation areas ensure the conservation of habitats of flora and fauna. The following tables present the estimated population of selected threatened animals in Malaysia (see Table 17, Table 18 and Table 19).

Table 17. Peninsular Malaysia: Estimated Population of Selected Threatened Large Mammals Based on Inventories up to 2008 at Main Conservation Areas

Species *Estimated Population*	**Main Conservation Areas**	
	Protected Area	**Other Areas**
Elephant 1,220-1,460	Taman Negara Kota Tinggi Wildlife Reserve Royal Belum State Park Endau-Rompin National Park	Forest Reserves in the states of Pahang, Perak, Kelantan, Terengganu, Johor and Kedah.
Tiger 490 – 1480*	Taman Negara Endau-Rompin National Park Kota Tinggi Wildlife Reserve Krau Wildlife Reserve Royal Belum State Park	Forest Reserves in the states of Pahang, Perak, Kelantan, Terengganu, Johor and Kedah.
Seladang 273-333	Taman Negara Royal Belum State Park Endau-Rompin National Park Krau Wildlife Reserve	Forest Reserves in the states of Pahang, Perak, Kelantan, Terengganu and Kedah.
Tapir 1,100-1,500	Taman Negara Endau-Rompin National Park Kota Tinggi Wildlife Reserve Krau Wildlife Reserve Royal Belum State Park	Forest Reserves in the states of Pahang, Perak, Kelantan, Terengganu, Kedah, Selangor and Negri Sembilan.

Source: Ministry of Natural Resources and Environment (2007a), *Department of Wildlife and National Parks (2008b).

Table 18. Sabah: Estimated Population of Orang Utan and Proboscis Monkey

Species *Estimated Population*	**Location**
	Protected Areas
Orang Utan* 11,000	Crocker Range National Park, Mount Kinabalu National Park, Tabin Wildlife Reserve, Kinabatangan Wildlife Sanctuary, Kulamba Wildlife Reserve and Danum Valley Conservation Area.
Proboscis Monkey** Min. 5,907	Ulu Tungud Forest Reserve, Deramakot Forest Reserve, Kinabatangan, Segama, Labuk Bay Proboscis Monkey Sanctuary, Pulau Kaget Nature Reserve and Bukau-Api Api Protection Forest Reserve.

Sources: *Ancrenaz et al. (2004), ** Sha et al. (2008).

Table 19. Sarawak: Estimated Population of Selected Threatened Large Mammals Based on Inventories up to 2008

Species *Estimated Population*	**Main Conservation Areas**	
	Protected Area*	**Other Conservation Areas**
Orangutan 1,500 – 2,000	Batang Ai National Park (NP) Lanjak-Entimau Wildlife Sanctuary	Ulu Sebuyau Proposed National Park Gunung Lesong Proposed National Park Sebangan Protected Forest
Proboscis Monkey 1,000 – 1,500	Bako NP Samumsam Wildlife sanctuary Maludan NP Rajang Mangrove NP Kuching Wetland NP	Limbang Mangrove Proposed NP Kuala Lawas Kuala Rajang
Red-banded langgur ≥ 300	Maludam NP	

* Protected area under the management of Sarawak Forestry Corporation (SFC).

Source: Sarawak Forest Department.

In terms of *ex-situ* conservation, the Department of Wildlife and National Parks (DWNP) has an *ex-situ* Conservation Division which manages 10 Wildlife Conservation Centres (WCC) and the Melaka Zoo. The 10 WCC are located in Sungai Dusun (Selangor), Sungkai and Bota Kanan (Perak), Bangas and Jemaluang (Johor), Bukit Pinang (Kedah), Sungai Batu Pahat (Perlis), Jenderak Selatan (Pahang), Gua Musang (Kelantan) and Bukit Paloh (Terengganu) [20]. The programmes carried out include captive breeding of endangered and commercial species, research and sampling for the Wildlife Genetic Resource Bank (WGRB) and establishing baseline data on wildlife DNA[21]. For instance, in order to halt the decline of the Milky Stork (*Mycteria cineria*), the DWNP and National Zoo started the re-introduction of this species into the mangrove forests of Matang Forest Reserve in the State of Perak. On-going monitoring programmes have indicated that the storks have acclimatised to their natural habitat.

Please refer to Appendix 3.5 for a summary of some the *ex-situ* conservation activities. Action plans have been developed for species such as tiger, elephants, crocodiles, turtle, and sharks.

[20] Department of Wildlife and National Parks (2008a).
[21] *Ibid.*

Goal 3. Promote the conservation of genetic diversity.

- *Target 3.1: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained.*

A national technical committee on agricultural biodiversity had been formed. This committee is in the process of preparing documents to develop National Strategies and Action Plans for Agricultural Biodiversity Conservation and Sustainable Utilisation.

Traditional varieties of rice, wild rice species, and other accessions including pure line varieties, modern high yielding varieties, elite breeding lines and special types (mutants and other derived plants) are stored in various seed genebanks in Malaysia. Please refer to Chapter 1.2.4 for a summary of examples of germplasm collection conserved in seed genebanks and field genebanks and arboretums in Malaysia. Examples of *in-situ* conservation of fruit species in protected areas are presented below (Box 2).

Box 2. *In-situ* Conservation of Fruit Species in protected areas.

An inventory made on 50 ha primary lowland rainforests in Peninsular Malaysia at Pasoh Forest Reserve (Negeri Sembilan) showed that there were 76 fruit species known to bear edible fruits. The most diverse species found include those related to the wild species of mango (*Mangifera,* 12 species), mangosteen (*Garcinia,* 13 species), jackfruit and breadfruit (*Artocarpus*, 10 species) and rambutan (*Nephelium,* 5 species).

Another survey inventorying the composition, distribution and abundance of wild fruit species in a 0.99 ha transect in a peat swamp, lowland and ridge forests at Sungai Dusun Wildlife Reserve, Selangor showed that the area contained 16 families, 28 genera and 42 species with 359 individuals of wild fruit trees. The highest number belonged to the family *Burseraceae*.

Source: Jamadon et al. (2007).

There are also various *in-situ* and *ex-situ* conservation of genetic resources for timber species. For instance, FRIM is working towards the conservation and monitoring of critically endangered species. Its work on *Dipterocarpus semivestitus* in the state of Perak and *Hopea subalata* in the state of Selangor are directed towards the preclusion of land-use change to the population sites. Other positive developments include the declaration of a area populated by *Dipterocarpus sarawakensis* in Jerangau Forest Reserve in the state of Terengganu as a High Conservation Value Forest (HCVF). These efforts are principally aimed at increasing the awareness of stakeholders of the uniqueness of their forest lands and in the long term, engaging them towards conservation of such lands. Please refer to Appendix 3.6 for examples of genetic resources conservation of timber species.

Examples for conservation of inland fisheries resources (Box 3), Wildlife Genetic Resource Bank and wildlife DNA fingerprinting are presented below (Box 4)**.**

Box 3. Projects on Conservation of Inland Fisheries Resources (2006 – 2010).

Much of the nation's biodiversity in inland water ecosystems has yet to be fully investigated and documented. Identification of the current status and monitoring of inland water ecosystems biodiversity is fundamental for sustainable management of its resources.

The programme aims to better understand inland water ecosystems and subsequently protecting inland fisheries resources. The results of these projects will help guide management practices for both short- and long-term conservation of threatened and endangered freshwater fish species in Malaysia.

The objectives of the projects are:

- To strengthen systematic studies in order to document species diversity and to use the information to formulate suitable conservation strategies for freshwater fisheries resources
- To establish a one-stop centre for national freshwater fisheries in order to facilitate in the dissemination of relevant information in order to promote cross-sectoral integration in the sustainable use of biological diversity
- To increase valuable fish stock and economy via the setting up of fish sanctuaries and public release efforts
- To establish a systematic, reliable and latest information system which enable Fishery Department in sustainable management of the inland fisheries resources

The projects that are carried out are as follows:

1. Ecology, Biology and Genetics of Selected Freshwater Fishes (*Probarbus jullieni* known as ikan temoleh*, Pangasius nasutus* known as ikan patin*, Tor sp.* known as ikan kelah). The project covers four areas of Sungai Pahang - Pekan (Paloh Hinai), Maran (Lubok Paku), Temerloh (Kuala Mai) and Jerantut (Ulu Tembeling); and three areas in Perak - Empangan Temenggor, Empangan Kenering and Sungai Rui (tributary of main Sungai Perak).
2. Conservation and Management of Freshwater Fishes. The study covers four areas of Sungai Pahang - Pekan (Paloh Hinai), Maran (Lubok Paku), Temerloh and Jerantut.
3. Repository Centre for Freshwater Fishes.
4. Sanctuary of Freshwater Fishes.

Box 4. Wildlife Genetic Resource Bank (WGRB) and Wildlife DNA Fingerprinting.

Throughout 2007, 300 blood samples, tissues, mouth swabs, hair and fur follicles of wildlife from various mammalian species, reptiles and birds were taken, received and kept at the WGRB laboratory. These are also recorded in DWNP's database. The Department's database has increased after the launching of genetic resource sample kits and their subsequent collection of samples from each state. Samples are also received from inventory activities and road kills. Semen samples are extracted from Barking Deer and Banteng for cryo-preservation.

Since its setup, the WGRB Lab has also carried out DNA extraction, amplification and analyzing DNA sequence of several wildlife species. This information will be disseminated to the concerned authorities for research and enforcement purposes.

As of March 2009, a total of 1306 samples from 3 classes (mammals, reptiles and birds), 18 orders and 119 species were recorded in Biomaterial Database, and 438 sequences from 22 species, 3 animal groups (mammals, reptiles and birds) were recorded in DNA Sequence Database.

Source: Department of Wildlife and National Parks.

Goal 4. Promote sustainable use and consumption.

- *Target 4.1: Biodiversity-based products derived from sources that are sustainably managed, and production areas managed consistent with the conservation of biodiversity*

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The Malaysian Criteria and Indicators which are standards for forest management certification based on the International Timber Tropical Organization (ITTO) Criteria and Indicators and the Forest Stewardship Council's Principles and Criteria will continue to be the basis for sustainable forest management. At the end of 2007, eight states in Peninsular Malaysia covering an area of 4.67 million ha. have been assessed and awarded the Forest Management Certificate under MC&I (2001)[22]. A total of 135 timber companies have been awarded the Certificate for Chain-of-Custody. Most of these companies are manufacturers and exporters of sawn timber, while some are manufacturers and exporters of solid finger-jointed timber, solid wood moulding and plywood[23] .

The effort of developing a toolkit for high conservation value forest assessment is presented below (Box 5).

[22] Forestry Department Peninsular (2008).
[23] Malaysian Timber Certification Council Website, http://www.mtcc.com.my/faqs.asp#FAQ2 (viewed March 2009).

Box 5. Developing Toolkit for High Conservation Value Forest Assessment.

The concept of High Conservation Value Forest (HCVF) was initially developed by the Forest Stewardship Council (FSC) for application in forest management certification and was first published in 1999.

The key concept of HCVF is the identification of important values that that need to be conserved, and appropriately managed in order to maintain or enhance the integrity of the identified values. Identifying these areas is an essential first step in developing appropriate management for them. However identification does not automatically mean a protected area where no logging is allowed. An entire forest concession can be designated as a HCVF but this simply means that it needs to be managed responsibly in accordance with the High Conservation Values (HCV) that it contains.

In Malaysia, HCVF assessments are a requirement for certification by Malaysian Criteria and Indicators (MC&I) for Forest Management Certification and FSC. Recognising that forest managers need guidance in identifying their HCVF areas, WWF-Malaysia has taken the initiative to develop a toolkit that will serve as a guide for conducting HCVF assessments within the Malaysian context. This toolkit contains guidelines for carrying out a HCVF assessment. The toolkit also takes a step further by offering management recommendations for each HCV.

WWF-Malaysia began work drafting the toolkit in mid-2007, after which it was subjected to an internal review process and refined further into a second draft by early 2008. External inputs were obtained from the scientific community through an Expert Review Meeting which took place in May 2008. After incorporating comments and suggestions from this meeting, the third draft was completed in September 2008. This third draft is being reviewed and awaiting inputs from various other stakeholders, comprising the industry, government and NGOs. Following these consultations the toolkit will then be field-tested before being finalised and socialised through a national-level stakeholder workshop in early 2009.

Source: WWF Malaysia (2009).

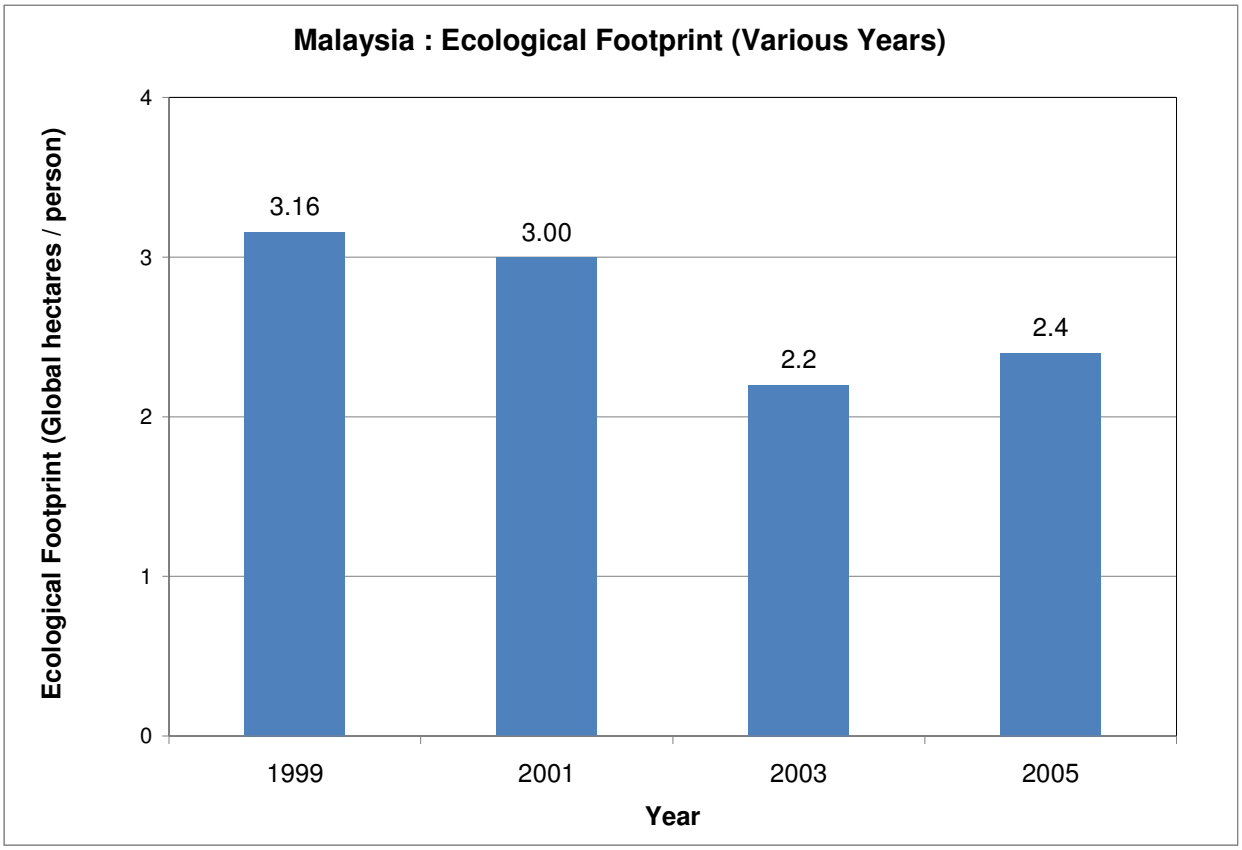
In the area of agricultural activities, the Ministry of Agriculture and Agro-based Industry (MOA) has introduced good agriculture practices through the implementation of Malaysian Farm Accreditation Scheme (SALM), Livestock Farm Accreditation Scheme (SALT), Malaysian Aquaculture Farm Certification Scheme (SPALM), and Malaysian Organic Scheme (SOM).

- *Target 4.2. Unsustainable consumption, of biological resources, or that impacts upon biodiversity, reduced*

Based on WWF's Living Planet Report (2008), it is estimated that the average Malaysian's ecological footprint is approximately 2.4 gha (global hectares) per person for the year 2005. It means that a total area 2.4 ha of productive land or sea is required for that year to produce all the crops, meat, seafood, wood, fibres, infrastructures, energy consumption and space. This is compared to the global average of 2.7 gha per person.

The chart below presents the trend of ecological footprint in terms of global hectares per person for Malaysia during the period 1999 – 2005 (see Chart 1).

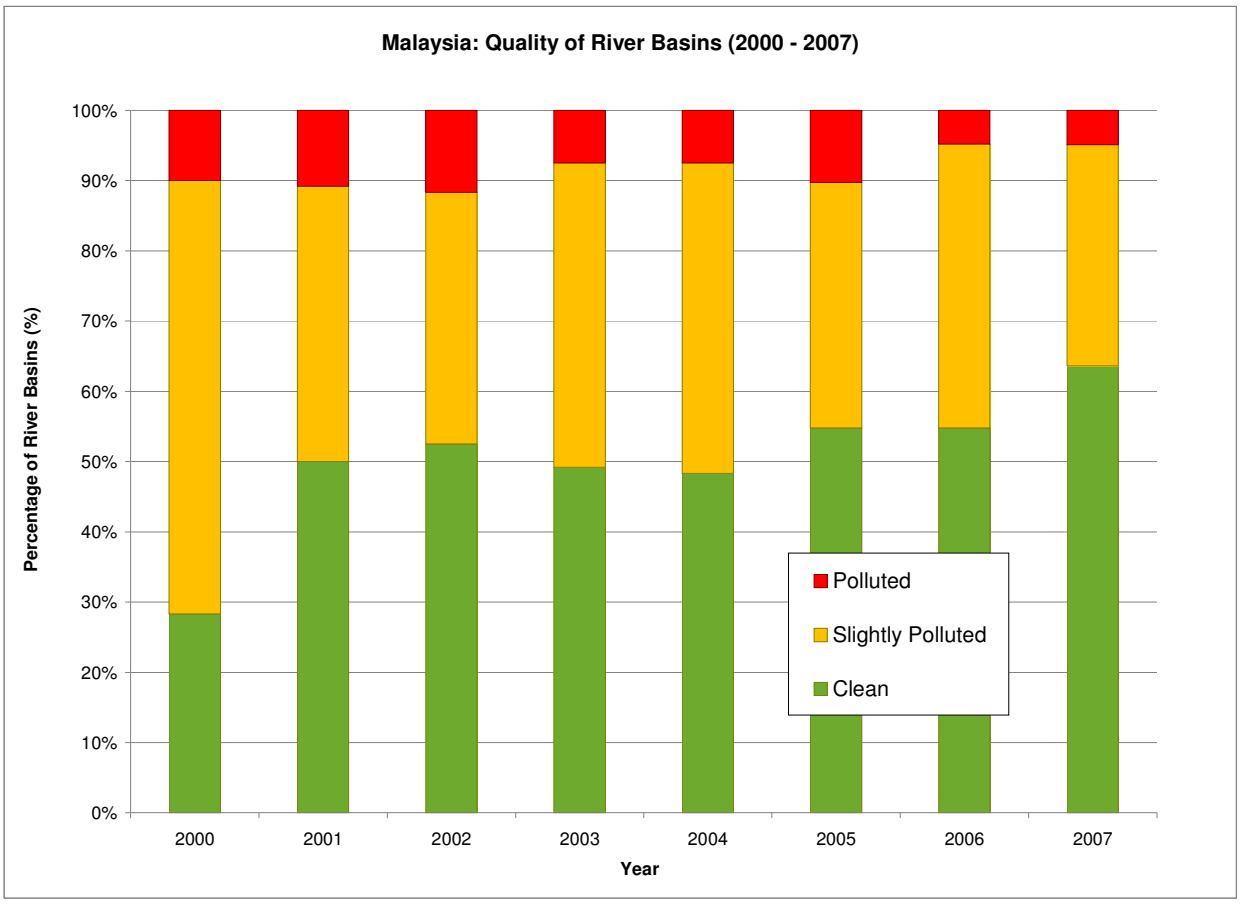
Chart 1.



Sources: WWF Living Planet Reports (various years)

The following chart presents an overview of the water quality of river basins in Malaysia that are monitored by the Department of Environment from 2000 – 2007 (see Chart 2). It shows increasing trend of river basins that classified as clean from year 2004 to 2007.

Chart 2.



Note: The numbers of basins increased from 120 to 146 at year 2005.

Source: Department of Environmental (2008).

- *Target 4.3: No species of wild flora or fauna endangered by international trade*

This target is addressed by the CITES. Malaysia deposited its instrument of accession in 1977 and CITES was entered into force in 1978. The International Trade in Endangered Species Act 2008 was gazetted to implement the CITES obligations. This new law enables authorities to take tougher actions against illegal traders who smuggle Malaysia's wild flora and fauna out of the country or bring in, or re-export them. Besides this Act, other national laws and state enactments also contain provisions for enforcing CITES listed species and meeting the target above. Enforcement officers are stationed at various official points of entry in the country.

In 2007, the DWNP's Law and Enforcement Division in Kuala Lumpur International Airport managed to intercept 18 attempts to smuggle wildlife into and out of the country. Leather products made from crocodilian species, pythons, ostrich; life specimens of Indian Star tortoise (*Geochelone elegans*) and Leopard tortoise (*Stigmochelys pardalis);* and ivory were among the items confiscated[24].

[24] Department of Wildlife and National Parks (2008a).

Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.

- *Target 5.1. Rate of loss and degradation of natural habitats decreased.*

The target above would be achieved through efforts in Goals 1 and 4. These include efforts in establishing and maintaining protected areas, forest reserves as well as other conservation areas such as marine parks, marine protected areas, and fisheries prohibited areas. The example below presents the Central Forest Spine initiative (Box 6).

Box 6. Central Forest Spine: Backbone of Environmentally Sensitive Area Network.

Under the Central Forest Spine (CFS) initiative of the National Physical Plan (NPP) adopted in 2005, most of the remaining forested areas in Peninsular Malaysia are to be conserved and protected through an integrated land use planning at state and district levels. The Town and Country Planning Department assumes an important role in monitoring the implementation of the CFS and the NPP. The actual management of the sites would be undertaken by the respective state or federal agencies.

In fact the NPP calls for re-establishment of a number of corridors to link a number of forest complexes that have been fragmented by development in the past. For instance, due to the requirement of CFS, the new East-West Highway linking Gua Musang in Kelantan and Kuala Berang in Terengganu had to be mitigated with the construction of three viaducts to allow wildlife crossings. The additional cost of RM29 million was borned by the Federal Government. In addition, the Terengganu State has agreed to create a 15,000 ha wildlife corridor surrounding the three viaducts which would enable the DWNP to manage the elephant and other wildlife populations.

Using this mechanism, the Government with the cooperation of the state governments expects to re-establish other corridors which have been identified under the CFS.

Since, Malaysia shares common borders with Thailand in the peninsula and with Indonesia in Borneo, the Federal Government has also initiated the establishment of transboundary protected areas on bilateral basis and through ASEAN. Such initiatives would be continued since the integrity of Malaysia's wildlife population and its genetic diversity are also dependent on the continued connectivity of such sites.

In addition various efforts are also taken to reverse the rate of loss of natural habitats. For instance more than RM 14 million has been invested in mangrove replanting projects during the period 2005-2008. The table below presents statistics on mangrove replanting as an example of efforts to reduce the rate of loss.

Table 20. Malaysia: Mangrove Replanting (2005-2008)

Year	2005	2006	2007	2008	Total
Expenditure (million RM)	0.9	1.6	5.3	6.6	14.4
Saplings planted	476,602	538,990	1,051,023	1,507,120	3,573,735
Area (ha)	169.30	113.45	398.90	620.29	1,301.94

Source: Forestry Department Peninsular Malaysia

In terms of marine conservation, 73 locations within the Marine Parks were placed with artificial reefs. The example below presents the success of a project on artificial reefs in the state of Sarawak (Box 7).

Box 7. Sarawak Reef Balls Project: The Protection Of Marine Habitat

The Sarawak Reef Ball Working Group (SRBWG) consists of Sarawak Forestry Corporation; Department of Marine Fisheries Department Malaysia, Sarawak; Marine Police, Sarawak Contingent; Ministry of Environment and Public Health; Sarawak Ministry of Urban Development and Tourism; Sarawak Ministry of Social Development and Urbanization, Sarawak Tourism Board; Sarawak Natural Resources and Environmental Board; Sarawak Museum Department; Sarawak Turtles' Board; Institute of Marine Fisheries, Sarawak; and Universiti Malaysia Sarawak.

SRBWG started this project to deter illegal trawling; provide secure and environmentally-friendly anchorages for buoys, provide eco-tourism dive sites, create new colonies of coral growth and enrich marine resources.

As of the end 2008, 2590 units of reef balls were deployed by SRBWG along the coasts of Sarawak. Of these, 100 reef balls were sponsored by Petroliam Nasional Berhad (PETRONAS). 1578 reef balls were used for protection of sea turtles inter-nesting areas around Talang-Satang National Parks, while another 1012 units were used to protect traditional fishing grounds of fishers at Lawas, Bintulu and Kampung Buntal in Kuching from the illegal trawlers.

Reef ball is a dome-shaped artificial reef made from a patented mixture of cement, sand, gravel, etc. that mimic the natural limestone of coral reefs. It has the same pH as salt water. The deployment of reef balls around Talang-Satang National Park have resulted in a marked reduction in number of dead turtles reported (around 20 dead turtles annually compared to 70 to 100 before 1998). Local fishers also benefited from the Sarawak Reef Ball Project as their traditional fishing grounds are protected from illegal trawlers activities. Based on Annual Fisheries Statistics 1999-2006, annual marine fish landing in Sematan and Santubong Districts were higher since 1999. Survey interviews found that local communities experienced an increased on total catches and income.

Source: Updated from media release from Sarawak Forestry Corporation. http://www.sarawakforestry.com/htm/news-mediarelease-detail.asp?id=287

Goal 6. Control threats from invasive alien species.

- *Target 6.1. Pathways for major potential alien invasive species controlled*

The Malaysian Quarantine and Inspection Services (MAQIS) controls 52 entry points all over the country for monitoring the risks of alien species in fisheries and agriculture. In addition to MAQIS, DWNP and other enforcement agencies area also involved in the control of invasive alien species.

- *Target 6.2. Management plans in place for major alien species that threaten ecosystems, habitat or species.*

A National Working Group was formed to address IAS issues in Malaysia. The members of this working group consist of agencies working with agriculture, fisheries, veterinary services, environment, irrigation and drainage, wildlife, forestry, public health, medical research, maritime, transportation, aviation, customs, research institutions and also universities. This working group is headed by the Director General of the Department of Agriculture Malaysia and the Director of Crop Protection and Plant Quarantine Division was elected as the secretariat.

Among others, the working group has developed a National Action Plan for Prevention, Containment, Eradication and Control of IAS in Malaysia with the following objectives:

- To develop a country invasive species list, and study the causes of introduction of alien species and the impacts of such introduction on biological diversity.
- To identify gaps in the existing legislation, regulation, ordinance, guidelines and procedures to counteract the introduction and establishment of IAS.
- To gather information and conduct research to address the problem of IAS for the development of scientific-based strategies and rapid respond in dealing with prevention, eradication, containment and control of those IAS.
- To intensify capacity building initiatives among the stakeholders in order to effectively implement this action plan.
- To promote awareness of IAS issues among senior level officers, policy makers, community stakeholders, industry and general public through media, education, curricula and other communication means.

The Draft National Action Plan for the Prevention, Containment, Eradication and Control of Alien Invasive Species is expected to be finalised by March 2009. Programmes and activities will be put in place to implement the action plan.

Goal 7. Address challenges to biodiversity from climate change, and pollution.

- *Target 7.1. Maintain and enhance resilience of the components of biodiversity to adapt to climate change.*

Efforts in conservation of biodiversity such as establishment of protected areas, and gazettement of forest reserves contribute towards the resilience of biodiversity and its components. Currently the CFS initiative aims to create terrestrial ecological corridors to reduce fragmentation of forest ecosystems and protected areas. 19 corridors had been proposed and this project is still being finalised. Although this project is not initiated to directly address climate change issues, its successful implementation will indirectly enhance the resilience biodiversity components to adapt to climate change.

There are currently three working groups formed under the project to prepare the Second National Communication to UNFCCC. The working group on "Vulnerability and Adaptation" also addresses topics on Biodiversity, Forestry, Agriculture, Water Resources, and Coastal Resources.

- *Target 7.2. Reduce pollution and its impacts on biodiversity.*

The implementation of Environmental Quality Act (1972) contributes directly to this target. In addition, concerns relating to pollution and climate change are addressed within the project to prepare the Second National Communication to UNFCCC. The working groups on "Greenhouse House Gas Inventory", and "Mitigation" are looking into issues on Land Use, Land Use Change and Forestry (LULUCF) which would include impacts on biodiversity.

Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods.

- *Target 8.1. Capacity of ecosystems to deliver goods and services maintained*

- *Target 8.2. Biological resources that support sustainable livelihoods, local food security and health care, especially of poor people maintained.*

The two targets above are achieved by Goals 1, 4, 5, 6, and 7. Efforts to establish, and manage protected areas, forest reserves as well as other conservation areas such as marine parks, marine protected areas, and fisheries prohibited area will ensure that capacity of ecosystems are maintained. Therefore these ecosystems will be able to provide resources for local communities in terms of sustainable livelihood, local food security and health care. As an example, as of July 2008 in Peninsular Malaysia, 657,589 ha of permanent forest reserves were gazetted for their watershed functions.

Goal 9 Maintain socio-cultural diversity of indigenous and local communities.

- *Target 9.1. Protect traditional knowledge, innovations and practices.*

Various projects have been initiated in Malaysia to document traditional knowledge, innovation and practices involving NGOs, and local communities (see Box 8). These projects have created databases on indigenous knowledge.

Box 8. Sarawak Biodiversity Centre's – Traditional Knowledge Documentation Programme

The Sarawak Biodiversity Centre **(**SBC) started a *Traditional Knowledge Documentation Programme* in 2001 that is currently on-going. SBC has conducted consultative meetings and collections in 33 locations among 12 ethnic communities in Sarawak. The main objective of the Traditional Knowledge Documentation Programme is to facilitate local indigenous communities in the State in preserving their Traditional Knowledge through proper recording or documenting techniques.

Such efforts are carried out through the Journal Methodology which include conducting consultative meetings with community leaders for *prior informed consent* and capacity building workshops to provide the local communities with necessary skills in documentation techniques, propagation and management of useful indigenous plants. The project also encourages local indigenous communities to cultivate useful indigenous plants for their own uses, as landscape for their surroundings and for awareness and appreciation purposes. SBC also implements the *Material Transfer Agreement* with the indigenous communities when SBC collects plant materials with communities.

To support the Traditional Knowledge Documentation Programme, SBC implements the Biodiversity Programme which provides a site for *ex-situ* conservation of useful indigenous plants and also contributes towards enhanced awareness and appreciation towards the State's indigenous plants among all levels of society. This programme also provides sufficient raw material for research on plants that may have potential in areas of product development, commercialisation or drug discovery. In year 2006, SBC established the Laila Taib Ethnobotanical Garden which currently house useful indigenous plants from various communities in Sarawak.

The Traditional Knowledge Documentation Programme also strongly supports the Research and Development (R&D) Programme in SBC. The Programme focuses on making discoveries that would lead to the development of herbal therapies, nutraceuticals, cosmaceuticals for health-care and pharmaceutical drugs for countering diseases such as cancer and infectious agents. The programme also aims to discover chemicals and enzymes from our biological resources that would be useful over a broad range of applications as industrial related products such as essential oils, bio-pesticides and commercial dyes.

In order to train young graduates to enhance their skills, knowledge and capabilities, SBC constantly invites and engage experts in fields of taxonomy and R&D. SBC also continuously establishes linkages and networks with both national and international institutions with similar interests. The following is the summary of achievements:

- Traditional Knowledge on Useful Plant Database – 2122 plants documented.
- Herbarium – 3716 plant specimen duplicates.
- Ex-situ Plant Collection - 1155 plants.
- Natural Product Library – 16678 plants parts extracts.
- Actinomycetes Collection – 6815 strains.
- Fungi Collection – 1946 strains.

There is a dedicated programme under the Ministry of Natural Resources and Environment (NRE) to document traditional knowledge. Its first phase covering traditional knowledge (TK) in Peninsular Malaysia is envisaged to end in 2010. This includes collating existing databases that are based in sectoral agencies, research institutions and universities. It also includes documenting TK that has not been documented. In addition to the database, one of its main outputs is a national action plan on TK. The government is also planning to establish a Traditional Knowledge Digital Library.

The Ministry of Health has initiated efforts to document medicinal plants and compile related databases of traditional and complementary medicine programmes. These are documented in the website – *Global Information Hub on Integrated Medicine* (GLOBINMED)[25].

- *Target 9.2. Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit-sharing.*

The National Policy on Biological Diversity, through its first strategy to improve scientific knowledge base provides policy guidance on this matter. The government is preparing a legal framework dedicated to the Protection of Traditional Knowledge, through the draft Access and Benefits Sharing (ABS) law.

Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources.

- *Target 10.1. All access to genetic resources is in line with the Convention on Biological Diversity and its relevant provisions.*

- *Target 10.2. Benefits arising from the commercial and other utilisation of genetic resources shared in a fair and equitable way with the countries providing such resources in line with the Convention on Biological Diversity and its relevant provisions*

Strategies 2 & 9 of the National Policy on Biological Diversity provide policy guidance on the implementation of this goal. At the moment in Peninsular Malaysia, the Economic Planning Unit has a set guideline for conducting research. In terms of biodiversity research involving foreign institutions and individuals, this guideline is in line with the CBD requirements on ABS. Various implementing agencies also have guidelines and regulations on access to genetic resources. A national legislation on ABS is envisaged to be in place in 2010, which is based on guidance from the decisions of CBD.

[25] http://www.globinmed.com/IMRContent/default.aspx (viewed March 2009).

Goal 11. Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention.

- *Target 11.1. New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20.*

- *Target 11.2. Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4.*

The above targets are not applicable to Malaysia. Based on the experience as a recipient country, it is suggested that financial resources that are allocated to develop and implement projects are considered based on the host country's level of priority and needs, instead of solely based the interest or priorities of the sponsoring countries or organisations.

1.5 Main Threats to Biodiversity

This section discusses the general threats to biodiversity in various states in Malaysia. These threats are addressed by the implementation of policies and guidelines, and enforcement laws (please refer to chapters 2 and 3). Efforts are in place by relevant agencies to identify and address the emerging threats such as invasive alien species and climate change.

The threats to biodiversity in Malaysia could be grouped into the following:

- Threats to ecosystems: land development, pollution, encroachment, climate change, invasive alien species.
- Threats to species: poaching and collection, invasive alien species.
- Indirect threats: climate change.

The following are some of the drivers of these threats:

- Economic growth.
- Demand for food and agricultural products.
- Demand for goods and services.
- Demand for exotic (wild) meat, traditional and herbal remedies.
- Demand for wild flora as pets, and wild ornamental plants.
- Tourism in pristine areas.

The following table presents the main threats and impacts to biodiversity by thematic areas (see Table 21).

Table 21. Main Threats to Thematic Areas

Thematic Area	Threats	Impacts/Implications on Biodiversity
Forest Biodiversity Mountain Biodiversity	Land development Encroachment Poaching and collection Climate change*	- Habitat loss - Fragmentation of ecosystems - Loss of species, especially endemic species, and threatened species - Pollution of inland waters - Loss of ecosystem benefits
Marine and coastal Biodiversity Island Biodiversity	Land development Encroachment Over-fishing Pollution Climate change*	- Loss and degradation of habitats such as coral reefs and mangrove areas - Loss of ecosystem benefits including degradation of the attractiveness of tourism destinations where relevant
Inland waters Biodiversity	Pollution Land development Invasive alien species Poaching and collection Climate change*	- Habitat loss including degradation in lakes and freshwater swamp forests - Loss of species, especially endemic species, and threatened species in lakes and swamps Loss of ecosystem benefits
Agricultural Biodiversity	Land development Invasive alien species Pollution Climate change*	- Loss of species, especially endemic species, and threatened species in lakes and swamps - Loss of diversity in local species in agricultural sector - Pollution of inland waters Loss of ecosystem benefits

Notes: * Considered as an indirect non-specific threat

2. Current Status of National Biodiversity Strategies and Action Plans

This chapter provides an overview of the implementation of the National Biodiversity Strategies and Action Plans (NBSAP).

2.1 Strategies and Actions

The National Policy on Biological Diversity (NPBD) which was published in 1998. The vision of this policy is to *"Transform Malaysia into a world centre of excellence in conservation, research and utilisation of tropical biological diversity by year 2020."*

This policy provides direction for the nation in terms of its 15 strategies which consist of 87 action plans for implementing CBD in Malaysia. The table below presents the 15 strategies and the articles in CBD which are addressed by the action plans (Table 22).

Table 22. National Policy on Biological Diversity: Strategies.

Strategy	Articles of CBD Addressed
1. Improve the scientific knowledge base	(Article 12. Research and Training; Article 15. Access to Genetic Resources)
2. Enhance sustainable utilisation of the components of biological diversity	(Article 14. Impact Assessment and Minimising Adverse Impacts; Article 19. Handling of Biotechnology and Distribution of its Benefits)
3. Develop a centre of excellence in industrial research in tropical biological diversity	(Article 12. Research and Training)
4. Strengthen the institutional framework for biological diversity management	(Article 4. Identification and Monitoring)
5. Strengthen and integrate conservation programmes	(Article 8. *In-situ* Conservation; Article 9. Ex-situ Conservation)
6. Integrate biological diversity considerations into sectoral planning strategies	(Article 10. Sustainable Use of Components of Biological Diversity)
7. Enhance skill, capabilities and competence	(Article 12. Research and Training)
8. Encourage private sector participation	(Article 16. Access to and Transfer of Technology)
9. Review legislation to reflect biological diversity needs	(Article 15. Access to Genetic Resources; Article 19. Handling of Biotechnology and Distribution of its Benefits)

Strategy	Articles of CBD Addressed
10. Minimise impacts of human activities on biological diversity	(Article 14. Impact Assessment and Minimising Adverse Impacts)
11. Develop policies, regulations, laws and capacity building on biosafety	(Article 14. Impact Assessment and Minimising Adverse Impacts)
12. Enhance institutional and public awareness	(Article 13. Public Education and Awareness)
13. Promote international cooperation and collaboration	(Article 5. Cooperation; Article 16. Access to and Transfer of Technology; Article 18. Technical and Scientific Cooperation)
14. Exchange of information	(Article 17. Exchange of Information)
15. Establish funding mechanisms	(Article 11. Incentive Measures; Article 20. Financial Resources)

2.2 Summary of Implementation Status

Conservation of biodiversity is cross-sectoral in nature and its implementation involves many government agencies, state governments and other stakeholders.

Various agencies are involved in the implementation of CBD and relevant action plans. The programmes of work for thematic areas and cross-cutting issues under CBD are coordinated by ministries which are supported by several other implementing agencies.

For instance, the MOA is the lead ministry for invasive alien species. Its Department of Agriculture (DOA) coordinates with other agencies that deal directly or indirectly with invasive alien species such as Department of Fisheries, Malaysia (DOFM), MARDI, FRIM and DWNP.

This section presents a summary of status of several strategies of the NPBD as follows:

Strategy I - Improve the scientific knowledge base

There are a number of projects related to improving the scientific knowledge base of government agencies, research institutes and universities in Malaysia. Among activities under Strategy I are: (a) database development on Plant Genetic Resources for Food and Agriculture, microbes and arthropods; (b) listing of literature on vascular and non vascular plants, fungi, vertebrate, and also establishment of the Rainforest Tropical Centre at Forest Research by FRIM; (c) development of database on insects by the Department of Agriculture; and (d) planning and development for a natural history museum in Malaysia.

Strategy 2 - Enhance sustainable utilisation of the components of biological diversity

The Government of Malaysia is fully committed to achieve sustainable forest management in the overall context of sustainable development so as to fulfil the second objective of sustainable use of biodiversity of CBD. Since 1994, Malaysia has developed a set of Malaysian Criteria and Indicators (MC&I) for Sustainable Forest Management at both the national and Forest Management Unit (FMU) levels based on criteria and indicators for sustainable management of natural tropical forest of the ITTO.

The Sustainable Forest Management (SFM) approach that is practised by the Forestry Department in managing forests in Malaysia is consistent with many elements of the ecosystem approach as defined by CBD. The vision of managing forest resources through an ecosystem approach is similar to the long-term goals of sustainable forest management in the overall context of sustainable development.

Strategy 5 - Strengthen and integrate conservation programme

Strategy 5 of NPBD is also in line with Article 8 (*in-situ* conservation) and Article 9 (*ex-situ* conservation) of the CBD. It outlines plans of actions to strengthen and integrate conservation programmes, amongst other, through (i) expanding network of *in-situ* conservation areas; (ii) strengthening capacity and role of *ex-situ* facilities in conservation activities and research; (iii) involving public participation in the planning and management of protected areas; and (iv) developing mechanisms for ensuring compatibility between conservation and sustainable management.

Through continuous efforts and awareness programmes by NRE and many other concerned stakeholders, the development of national and state parks systems has been encouraging. A number of parks have been gazetted in the last five years including the Gunung Ledang National Park in Johor, Selangor State Park in Selangor, Gunung Stong State Park in Kelantan, and Usun Apau National Park and Pulong Tua National Park in Sarawak.

Following the tsunami disaster in 2004, the Rt. Hon. Prime Minister called for more mangrove forests, beach forests and coastal forests to be conserved because these forests act as natural barriers to tidal waves.

Strategy 6 – Integrate biological diversity consideration into sectoral planning strategies

Conservation of natural resources and the environment is a major element of the national physical development process. The National Physical Plan (NPP) has identified environmental sensitive areas in Peninsular Malaysia and indicative location of ecological corridors to ensure connectivity amongst major forest areas. The NPP forms the core of land use planning in Peninsular Malaysia followed by State structure and local plans. This *modus operandi* will be applied to Sabah and Sarawak in the near future. The NPP is also in line with Article 6 (b) of the CBD which stated: *integrate as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies.*

Strategy 9 - Review legislation to reflect biological diversity needs
The government recognises the importance of a legal framework in biodiversity conservation and management. The government is currently reviewing the Protection of Wildlife Act 1972 to place more emphasis on biodiversity conservation and to strengthen related penalties. The Biosafety Act 2007 which regulates the transboundary movement of living modified organisms has recently been introduced.

The International Trade in Endangered Species Act 2008 was passed to specifically to deal with the import, export and re-export of CITES listed species throughout Malaysia. This Act empowers seven different federal and state agencies that are authorised to enforce various jurisdictions of this legislation across the 13 states and three federal territories of Malaysia.

Malaysia is also currently developing legislations to regulate the access to biological resources and to ensure the fair and equitable sharing of benefits arising from the utilisation of these resources. Benefits sharing will encourage sustainable use of biodiversity, which among others form a platform for new wealth creation for the nation through, for instance the application of biotechnology. With this proposed legislation, the protection of TK will be ensured together with the rights of the communities who are custodians of this knowledge. It will allow supplementary and alternative livelihood for these communities when the sharing of benefits of biological resources and their associated TK is legally prospected.

In order to improve the implementation of the NPBD, the National Forestry Act, and Fisheries Act are being reviewed.

Strategy 12 - Enhance Institutional and public awareness
Malaysia's effort to promote cooperation and exchange programmes for biodiversity education and awareness at the national, regional and international levels fulfil Article 13 of CBD. The NRE, MOA, Ministry of Science, Technology and Innovation (MOSTI), Economic Planning Unit (EPU) and institutions of higher learning such as the Universiti Kebangsaan Malaysia, Universiti Malaya, MARDI and FRIM to name a few, are engaged in organising seminars and conferences including international conferences to promote and exchange knowledge and expertise on biodiversity research and management. Media coverage on biological diversity issues is also enhanced. Subject of environmental and biodiversity management are part of daily coverage by the national TV channels. News on the importance of biodiversity receive regular coverage in major national newspapers.

Strategy 13 - Collaboration with other countries and international organisation
The government encourages collaboration with other countries and with international organisations to enhance its capacity and capability in managing its biodiversity. Malaysia has established collaboration and cooperation with several developed countries in many aspects of biodiversity research and management such as the Borneo Biodiversity and Ecosystem Conservation project (with the Japanese government) and many biodiversity projects with the Danish government through its Danish International Development Assistance (DANIDA). Malaysia collaborates with international organisations such as the Global Environment Facility (GEF), ITTO and the International Treaty on Plant Genetic Resources for Food and Agriculture to further strengthen her capacity in biodiversity management and conservation.

The Heart of Borneo conservation project is also an initiative to strengthen collaboration of three countries namely Malaysia, Indonesia and Brunei in biodiversity conservation.

Box 9. Important Roles of Environmental NGOs

Non-governmental organisations (NGOs) play an important role in the implementation of CBD in Malaysia. Environmental NGOs are able to engage the public, government agencies, private sector as well as local communities in various activities such as public awareness activities, conservation projects, dialogues and capacity building workshops and seminars. Environmental NGOs cooperate and supports government agencies, at times with technical and know-how on the grounds in some of these projects.

The Malaysian Environmental NGOs (MENGOs) is a coalition formed in November 2001 supported by a programme by DANIDA. The objective of this programme was to strengthen MENGOs and facilitate their impact on the decision making at all levels in the Malaysian society. MENGOs play a very important role in the country's path towards sustainable development. The following are the primary roles played by MENGOs:

- Collaborate and provide services to the Government, where appropriate, thereby complementing and supplementing the initiatives of the Government.
- Education and awareness raising on environmental concerns.
- Facilitate community mobilisation and participation around environmental issues.
- Empower of ordinary citizens, including those from the grassroots in defending their environmental rights.
- Contribute fresh insights into the environmental debate and advocate for improvements in environmental policy and legislation.
- Act as watchdogs in ensuring that the country genuinely embarks on a development model, which is environmentally sound and socially just.
- Promote the implementation of Agenda 21 and other appropriate international environmental agreements and conventions.

MENGO will be publishing a compilation of best practices entitled *"Journeys Taken - Lessons Learnt: Empowering Malaysian Communities for Conservation and Sustainable Resource Use"* in 2009. One of MENGO's programme is the Community-Based Natural Resource Management facility in Malaysia (CBNRM). CBNRM aims to enhance the capacity of Malaysian NGOs and CBOs in influencing sustainable development policies and practices related to natural resource management and biodiversity conservation, including the recognition of the importance of indigenous peoples and gender equity. The eight on-going community-based projects supported by CBNRM are located in Peninsular Malaysia, Sabah and Sarawak respectively.

The GEF Small Grants Programme (SGP) for Malaysia is oriented towards supporting the interventions by NGOs, Community-based Organisations (CBO) and local communities throughout Peninsular Malaysia, Sabah and Sarawak. Among others, it is designed to building the capacity and capability of civil society NGOs, CBOs and indigenous people organisations to initiate and implement sustainable development and sustainable livelihood and environmental imperatives. Some of the areas covered include traditional knowledge and equitable access and proper benefit sharing of traditional knowledge (TK) with its holders, especially indigenous peoples throughout Malaysia; eco-tourism, cultural handicrafts, value-added downstream products, micro-credit schemes, etc.

2.3 Challenges and Opportunities

The Malaysian government has always adopted a pro-active approach in biodiversity management. However, with the growing impacts of emerging threats to biodiversity such as climate change presents greater challenges which will need more concerted effort not only at the national level, but also global level.

Twenty-five activities were proposed by the National Capacity Needs Self-Assessment process[26] to improve and enhance the implementation of the three international conventions, namely the United Nations Convention on Biological Diversity (CBD), United Nations Framework Convention on Climate Change (UNFCCC) and United Nations Convention to Combat Desertification (CCD). The NCSA process analysed the country's capacity strengths, constraints and needs, and recommended capacity development actions to address them.

Thirteen of the actions are related to Conservation of Biological Diversity. These actions are intended to address the capacity gaps that were identified by the NCSA process in order to improve and enhance existing implementation in terms of policy and institutional framework, regulation and guidelines, federal and state cooperation, inter-agency coordination, knowledge and information management, incentives, increasing the number of experts (particularly taxonomists), research and development, reporting framework and mainstreaming.

The table below presents the capacity gaps identified as challenges and the capacity development action that were identified to address them (Table 23).

Table 23. Capacity Gaps and Proposed Action Plans

Capacity Gaps / Challenges	Capacity Development Actions
1. After 10 years since its launch, it is timely to review the implementation of NPBD. NPBD currently does not provide targets and timeframe, nor does it delegate duties of implementation to relevant agencies. The results of a review may enhance its implementation and to re-strategise its emphasis over the next ten years.	Review implementation of National Policy on Biological Diversity (NPBD).
2. There are gaps and overlaps in existing laws and regulations that govern conservation and sustainable use of biodiversity.	Fine tune and harmonise legislations and regulations to effectively implement conservation and sustainable use of biodiversity.
3. Coordination among implementing agencies can be further strengthened especially to improve policy planning and implementation programmes specific to CBD. Consultation with state governments, and guidance and assistance from federal government in terms of implementation could be further improved.	Streamline mandates and roles of implementing agencies.

[26] This report is available at http://www.nre.gov.my/EN/Documents/NCSA%20Report%20FA%20adjusted%2009jan09.pdf (viewed April 2009).

Capacity Gaps / Challenges	Capacity Development Actions
4. Systematic implementation of the NPBD at the States level could be improved. Most of the states do not have an "active" platform to implement NPBD in a systematic and strategic manner, although some of the states address the issue of biodiversity indirectly in forums such as the State Action Council where its main focus may not be on biodiversity.	Activate State Biodiversity Councils or equivalent relevant bodies for implementation of NPBD at state levels.
5. It is a challenge to apply economic instruments for conservation of biodiversity. Applying economic incentives require greater understanding of how these mechanisms work, and confidence that these have been designed and developed correctly in the Malaysian context.	Develop incentive scheme for states to conserve biodiversity.
6. There is a need for an overall and comprehensive monitoring mechanism for the implementation of NPBD by relevant implementing agencies and also state governments.	Establish regular reporting framework on the implementation on NPBD.
7. Lack of framework that guides research and development related to biodiversity at macro-level in a coherent manner. There is duplication and overlap in research works that had been carried out. Funding from various sources is not managed at the "macro" level to ensure efficient use of research funds. Furthermore there is no dedicated funding from the National Science Fund for biodiversity.	Develop a framework to coordinate research among implementing agencies, research institutions and universities.
8. University courses are biased towards applied sciences and do not offer courses to produce enough experts. There is lack of experts, particularly taxonomists in marine and freshwater fishes, arthropods and pathogens. This is not effectively addressed by the Public Services Department, local universities and research institutions. For instance, promotion opportunities within government institutions for taxonomists are rather limited within their field of expertise.	Develop a programme to systematically address the shortages of experts in the country related to biodiversity in the country, particularly taxonomists.
9. Awareness of the importance and significance of biodiversity conservation and management could be improved. Technical officers may not relate their work in terms of contribution towards conservation of biological diversity. Mainstreaming and allocation of financial resources for issues related to biodiversity conservation could be increased.	Mainstream CBD and promote its importance and significance so that conservation issues can be integrated into decision making and planning.
10. The benefits sharing aspect of "Access and Benefits Sharing" is not well developed and regulated in Malaysia. The Access and Benefits Sharing Bill has not been passed as a law. When it passed as a law, capacity building will be needed to implement the law.	Develop and implement a programme for ABS.

Capacity Gaps / Challenges	Capacity Development Actions
11. Conservation of marine biodiversity is not as advanced compared to terrestrial ecosystems. Currently in Peninsular Malaysia, the conservation of marine biodiversity is carried out by Department of Marine Park Malaysia and the Department of Fisheries. Integration of activities related to conservation of marine diversity with other related agencies could be further enhanced.	Enhance and strengthen marine biodiversity conservation.
12. Protected areas are gazetted under specific state or federal laws (e.g. state enactment, National Forestry Act, National Park Act, etc.) and are managed by various implementing agencies. Governance of protected area management can be further improved and harmonised with a national guideline or policy.	Strengthen the network of Protected Areas management in Malaysia.
13. Mechanisms to recognise local and indigenous peoples as custodians of biodiversity could be improved. Their traditional knowledge should be protected, together with the ecosystem (terrestrial or marine) and habitat which houses biodiversity.	Establish a national programme on traditional knowledge related to conservation of biodiversity.

In addition, seven activities are aimed at addressing cross-cutting issues and concerns that are common among the three conventions. These activities are targeted at increasing negotiation skills at the COP; harmonising and streamlining of country policies, strategies, action plans and laws; enhancing the use of common platforms to address shared concerns of the three conventions; mainstreaming, increasing public awareness and education programmes; consolidating training for decision makers; and engaging and integrating participation of local communities and NGOs in terms of implementation.

The implementation of this action plan will be led by the Ministry of Natural Resources and Environment.

3. Sectoral and Cross-sectoral Integration and Mainstreaming of Biodiversity Considerations.

Efforts to protect biodiversity in Malaysia are vital. Conservation of biodiversity is cross-sectoral in nature and its implementation involves many government agencies, state governments and other stakeholders. Some agencies play leadings roles compared to others.

Malaysia began its efforts to address conservation of natural resources as well as biodiversity before signing CBD in 1992. Following the ratification of the Convention in 1994, such efforts have been further strengthened. The Government has taken several major steps to strengthen its capabilities in policy-making and institutions involved in biodiversity conservation. These are:-

- A holistic country study on biodiversity in 1996;
- The launch of the National Policy on Biological Diversity in 1998;
- The establishment of the National Biodiversity-Biotechnology Council (MBBN), chaired by the Prime Minister in 2001; and
- The establishment of a dedicated Ministry to enhance environmental management by the creation of the Ministry of Natural Resources and Environment in 2004.

Conservation and sustainable use of biological diversity is consistently reflected in Malaysia's five-year plans - currently into its Ninth Malaysia Plan, as well as other policies and plans. This chapter presents the instruments such as policies, strategies, and action plans related to the implementation of CBD.

3.1 Integration of Conservation of Biodiversity in National Development Plan, Policies and Action Plans

Recognising the important role of biological diversity in nation building and long-term development, Malaysia has continued to improve and strengthen existing provisions of policy, legal and institutional frameworks to support the integration of biodiversity considerations into policy and decision-making across all sectors.

Conservation and sustainable use of biodiversity has always been addressed within the context of sustainable development. Conservation of biodiversity has been mainstreamed in various national documents such as Malaysia's five-year Development Plan, more commonly known as Malaysia Plan as well as several national policies.

This section presents some examples of the integration of conservation in these instruments.

Ninth Malaysia Plan (9MP) (2006-2010)
The 9MP recognises the value of biodiversity. This leads to the following statement *"efforts will be intensified to protect and optimise the utilisation of biodiversity"*.

The conclusion in Chapter 22 of 9MP states the following:

- Efforts were also intensified to protect and conserve land, water, biodiversity and forest resources.
- The promotion of sustainable natural resource management practices in relation to land, water, forest, energy and marine resources, will be intensified.
- There will also be closer cooperation with stakeholders and non-governmental organisations (NGOs) in addressing environment and natural resource concerns.
- These efforts will enhance protection of the environment and conservation of natural resources and contribute towards improving the quality of life.

The overall approaches and methods mentioned are summarised in the following table (Table 24).

Table 24. 9MP – Summary of Approaches and Methods

Focus Area	Approaches/Methods
Biodiversity conservation	– Efforts will be intensified to protect critical habitats. Towards this end, existing management plans will be reviewed to further strengthen the protection of threatened flora and fauna. The EIA processes will be reviewed to include the assessment of impacts to ecosystems. The Highland Conservation and Management Strategy study for Sabah and Sarawak will be implemented[27]. – The Guidelines for Access and Benefits Sharing (ABS) of Biological Resources will be developed to ensure equitable sharing of benefits from the use of biodiversity resources as well as address issues of bio-piracy. – Research institutions and universities will develop a comprehensive biodiversity inventory to facilitate bio-prospecting
Forest resources	– The conservation and sustainable use of forest products, watersheds and water catchments will be emphasised to promote sustainable forest management. – The development of sustainable sources of wealth from forest products such as herbal and medicinal products, eco-tourism and bio-prospecting activities will be promoted. – Centres on Forest and Non-Forest Products will be established to further develop capacity in environmental and natural resources management. – The Malaysian Criteria and Indicators (MC&I) system will be strengthened to consolidate efforts for sustainable forest management.

[27] Completed in 2007.

Focus Area	Approaches/Methods
Marine and coastal resources	– Marine and coastal resources conservation and protection measures will be incorporated into the ongoing development programmes – The rehabilitation and improvement of the coastline will be intensified through regeneration and re-vegetation programmes. – A comprehensive management plan for mangroves and coastal forests will be developed to arrest the mangrove depletion rate to ensure a continuous supply of resources as well as to mitigate the impact of coastal erosion and tsunamis.
Managing water resource	– Emphasis will be placed on maintaining and enhancing the ecosystem functions of river systems through the restoration and maintenance of highland catchments, wetlands, river buffers and riparian zones. – The suitability of market-based instruments will be explored to internalise environmental costs, including scarcity, into water pricing systems. – Measures to reduce water demand will be emphasised including through the provision of tax rebates for industries that recycle water.
Landuse planning	– The application of the spatial development approach, which integrates environmentally sustainable development concepts and methodologies, will be promoted. The strategies in the NPP will be implemented via incorporation into structure plans – Appropriate methods and parameters will be developed to identify and manage environmentally sensitive areas (ESAs) to enable them to serve as buffer zones in the control of development sprawl.

Mid-Term Review of the Ninth Malaysia Plan (2008)

The implementation of 9MP since 2006 has witnessed many concerted efforts to fulfil the goals of creating a healthy and safe environment as well as promoting sustainable management of resources. In this regard, wider usage of environmental planning tools such as Strategic Environmental Assessment and Sustainability Assessment will be encouraged.

The Mid-term review also states that programmes on *in-situ* and *ex-situ* conservation, propagation, breeding and rehabilitation of degraded forest areas will be expanded to reduce pressure on flora and fauna in its natural habitat. Two conservation initiatives, namely the Central Forest Spine in Peninsular Malaysia and the Heart of Borneo in Sabah and Sarawak will be carried out to improve connectivity of forests for wildlife mobility, biodiversity reservoir, protection of watershed areas and create a destination for eco-tourism. Land use planning for development will be improved in line with the National Physical Plan.

Commitments on programmes and strategies related on conservation of biodiversity include:

- A database on Malaysia's biodiversity to be established.
- Polluted river basins to be upgraded from Class III category to Class II category through Pollution Prevention and River Quality Upgrading Programme.
- Capability in legal issues regarding biodiversity, biotechnology and biosafety in Malaysia to be enhanced.

National Policy on Biological Diversity (1998)
The National Policy on Biological Diversity (NPBD) is the most important guiding document for the implementation of CBD in Malaysia. It was drafted among others, to fulfil the country's obligation and requirement in implementing CBD.

The policy contains long-term direction, strategies and action plans for the conservation and sustainable utilisation of biodiversity, thus providing an over-arching framework to streamline policies, strategies and action plans in respective sectors. It provides direction and strategies to all government agencies, including the State Governments, on the conservation and management of biological diversity in the country.

The document consists of the following:

- Policy which enunciates vision and policy statements and lists the Principles on which conservation and sustainable utilisation of the nation's biological diversity are based.
- Objectives of the nation with respect to biological diversity and provides the Rationale for conservation and sustainable utilisation.
- Strategies and action plans for effective management of biological diversity

An overview of the NBSAP and its implementation status are described in Chapter 2.

National Policy on the Environment (2002)
The National Policy on the Environment aims at achieving continued economic, social and cultural progress in Malaysia and enhancing the quality of life of its people, through environmentally sound and sustainable development. One of its three objectives is to '*conserve Malaysia's unique and diverse cultural and natural heritage with effective participation by all sectors of society'*. A broad-based strategic approach is adopted to promote environmental soundness through research and development, economic efficiency, social equity, responsibility and accountability. The key strategy of the policy that is relevant to biodiversity is *Strategy 2. Effective Management of Natural Resources and the Environment.* Among others, this strategy states the following:

2.1 National inventory and audit of environment and natural resources will be maintained and regularly updated, with particular emphasis on depletion and renewability, to serve as a guide to policy formulation and decision making.

Appropriate environmental monitoring systems shall be established to facilitate the evaluation of programmes and projects.

2.2 Natural resources areas, particularly those containing biologically rich habitats and ecosystems will be established and maintained as zones for the conservation and protection of indigenous flora and fauna and genetic resources.

2.5 The nation's forests and their resources will be managed sustainably to ensure continued and sustainable economic benefits and compatibility with environmental stability, ecological balance and social stability of communities inhabiting such areas.

2.8 Seas, coastal zones, lakes, rivers, mangroves and other wetlands, islands, seagrass and coral reefs shall be managed in an environmentally sound manner; including the prevention of ecologically unsustainable harvesting of living marine and aqua.

National Forestry Policy (1992)

The tropical rainforests of Malaysia constitute the largest core of biodiversity in Malaysia. In 1977, the National Forestry Policy was accepted by the National Forestry Council and later endorsed by the National Land Council on 19 April 1978. This Policy was revised in 1992 to take cognisance of the current concerns expressed by the world community on the importance of biological diversity conservation and sustainable utilisation of genetic resources, as well as the role of local communities in forest management.

The acceptance of the Policy is considered as a major breakthrough in strengthening the institutional base and enhancing the co-operation and understanding between Federal and State Governments in the field of forestry sector development and management. The selected points of the revised National Forestry Policy relevant to biodiversity are as follows:

(i) To dedicate as Permanent Forest Estate sufficient land areas strategically located throughout the country in accordance with the concept of rational land use. The Permanent Forest Estate will be managed and classified under four major functions:

(a) **Protection Forest** for ensuring favourable climatic and physical conditions of the country, the safeguarding of water resources, soil fertility, environmental quality, conservation of biological diversity and the minimisation of damage by floods and erosion to rivers and agricultural lands;

(b) **Production Forest** for the supply in perpetuity at reasonable rates of all forms of forest produce which can be economically produced within the country and are required for agricultural, domestic and industrial purposes, as well as for export;

(c) **Amenity Forest** for the conservation of adequate forest areas for recreation, ecotourism and in promoting public awareness in forestry; and

(d) **Research and education forest** for the conduct of research, education and conservation of biological diversity.

(viii) To provide for the conservation of biological diversity and areas with unique species of flora and fauna, including specific areas for the purpose of forestry education and other scientific studies;

(ix) To develop a comprehensive programme in community forestry to cater for the needs of the rural and urban communities and to promote active local community involvement in forestry management projects, including agro-forestry projects; and

(x) To undertake and support intensive research programmes in forestry and forest products aimed at enhancing maximum benefits from the forest.

National Wetlands Policy (2004)
The National Wetlands Policy was passed by Cabinet in 2004. The aim of this policy is to ensure conservation and wise-use of the wetlands to benefit from its functions and to fulfil its obligation under the Ramsar Convention. The policy's objectives are:

1. Protect and conserve each type of wetlands.
2. Manage wetlands in integration with water catchment areas and river basins,
3. Optimise socio-economic benefits of wetlands through sustainable harvesting of wetlands products.
4. Integrate wetlands conservation interest into overall natural resource planning, management and decisions.
5. Increase scientific and technical knowledge on wetlands.
6. Increase public appreciation on the functions and benefits of wetlands.
7. Restore degraded wetlands.

In order to achieve these objectives four strategies are emphasised as outlined below:-

- Ensure adequate legislation for conservation and wise use.
- Provide coordination for the efforts of all stakeholders.
- Encourage research on local wetlands.
- Enhance appreciation of the functions and benefits of wetlands respective to stakeholders.

National Agriculture Policy (2006)
The Third National Agricultural Policy sets the strategic directions for agricultural development to the year 2010. These focus on new approaches to increase productivity and competitiveness, deepen linkages with other sectors, venture into new frontier areas as well as conserve and utilise natural resources on a sustainable basis.

One of the policy's objectives is to conserve and utilise natural resources on a sustainable basis. One of the thrusts of this policy states that: *Sustainable management and utilisation of resources will be the guiding principle in pursuing agricultural and forestry development. Rules, regulations and incentives will be strengthened to encourage environment-friendly agricultural and forestry practices and to minimise the negative impact of these activities on the environment.*

National Physical Plan (2005)
The NPP was passed in 2005. It contributes towards the conservation of the Country's biodiversity through its fourth objective *to secure spatial and environmental quality and diversity for a high quality of life*. This objective is supported by two environmentally sound principles:

- Protect national heritage areas and locations, under which greater resolve are dedicated from all quarters to conserve, among others, the natural resources and manage it in a sustainable manner in particular for areas of natural beauty and ecological richness such as pristine forests, hills and wetlands, and habitats for the Malaysian fauna and flora.
- Avoid disrupting ecological stability, by promoting incorporation of guidelines on development on environmentally sensitive into the NPP, at the same time discourages coastal land reclamation for certain purposes, encourages careful monitoring of developments within water catchment areas and other environmentally sensitive areas, including application of the concept of Integrated River Basin Management.

In terms of conserving biodiversity, the NPP articulated the following policies:-

- NPP 18: Environmentally Sensitive Areas (ESA) shall be integrated in the planning and management of land use and natural resources to ensure sustainable development.
- NPP 19: A Central Forest Spine shall be established to form the backbone of the Environmentally Sensitive Area network.
- NPP 20: Sensitive coastal ecosystems shall be protected and used in a sustainable manner.
- NPP 22: All surface and ground water resources are strategic assets to be safeguarded and used optimally.

National Urbanisation Policy (2006)
The National Urbanisation Policy (NUP), passed in 2006, has addressed the following concerns that are related to conservation of biodiversity:

- NUP 5. Optimal and balanced land use planning shall be given emphasis in urban development
  - Ensure each new development is compatible with the surrounding land use

- NUP 8. Environmentally sensitive area and prime agricultural area shall be conserved
  - Protect and maintain ESA and prime agricultural area
  - Establish green areas a buffer zones to limit urban development

- NUP 19. A planned, effective and sustainable solid waste and toxic management system shall be implemented.

- NUP 26. A sustainable and environmentally friendly development shall form the basis of environmental conservation and improve the urban quality of life.

Farm Animal Genetic Resources Management Plan (1998)
The FAnGR Management Plan for Malaysia was developed in 1998. It includes a policy statement, which states that the National Policy on FAnGR is to conserve and utilise these resources in a sustainable manner for food security and nutritional well-being of the nation. This document also provides objectives, rationale and 17 strategies for effective management of farm animal genetic resources. It is used as a supporting document for the development and management of animal genetic resources at the Department of Veterinary Services in farms in Malaysia.

National Biotechnology Policy (2006)
The formulation of the National Biotechnology Policy provides a framework for the Government, in partnership with key stakeholders, to harness the benefits of biotechnology development that is in accordance with established social and ethical norms. One of its main objectives is to create greater values from agriculture and natural resources utilising unique biodiversity and natural environment.

Action Plan for the Conservation and Sustainable Use of Fishery Resource Biological Diversity of Malaysia (2006)
This document was prepared by the Department of Fisheries Technical Committee on Biodiversity. The Action Plan for the Conservation and Sustainable Use of Fishery Resource Biological Diversity of Malaysia[28] consists of 62 actions that are grouped into nine strategies as follows:

1. Effective Fishery Resource Conservation and Management
2. Reduce Loss of Biological Diversity
3. Strengthen Research on Fishery Resource Biological Diversity
4. Improve Capacity Building
5. Enhance Information Dissemination and Networking
6. Control and Management of Fish Trade
7. Control and Management of Invasive Alien Species
8. Regulation in Biosafety Management
9. Control and Management of Biopiracy

National Action Plan for the Management of Coral Reefs in Malaysia (2008)
The National Action Plan for the Management of Coral Reefs in Malaysia was formulated by the Department of Marine Park Malaysia to guide efforts in the management of marine parks and at the same time conserve and protect marine biodiversity. The action plan was formulated through consultation and participation of all stakeholders. It provides a regional overview, consented future directions and guidelines to those utilizing marine parks, stakeholders, agencies and organisations for their planning and decision making. The plan includes strategies on:

1. Conservation
2. Resource management
3. Education, communication, consultation and commitment

[28] Department of Fisheries, Malaysia (2006a).

4. Research and monitoring
5. Integrated planning
6. Capacity building
7. Recognition of local communities and stakeholder interests
8. Management processes and
9. Legislation

3.2 Legal and Regulatory Framework

Various legislations, mechanism and practices have been implemented in specific sectors prior to 1992 towards conservation of biological diversity. In other words, each sector has its own sets of laws and regulations, and guidelines to regulate biodiversity related issues. Indirectly, this also provides a platform for the mainstreaming process.

Some of these legislations were established before the country's ratification of the CBD in 1994. There will be on-going efforts to ensure that specific consideration on the issues of conservation and management of biological diversity as a whole will be improved. For instance, the government is in the process of amending its Protection of Wild Life Act 1972 to place more emphasis on biodiversity conservation. In addition, a new legislation to regulate the access of biological resources and the sharing of benefits resulting from the utilisation of those resources is being prepared. The following is a non-exhaustive list of main legislations that contribute towards implementation of CBD in the country:

- Waters Act 1920
- Animal Act 1953 (Amended 2006)
- Aboriginal People Act 1954
- Land Conservation Act 1960
- National Land Code 1965
- Protection of Wild Life Act 1972
- Environmental Quality Act 1974
- Pesticides Act 1974
- Local Government Act 1976
- Plant Quarantine Act 1976
- Town and Country Planning Act 1976
- National Parks Act 1980
- National Forestry Act 1984
- Fisheries Act 1985
- New Plant Variety Protection Act 2004
- Biosafety Act 2007
- International Trade in Endangered Species Act 2008

Sabah

- Land Ordinance Cap 68
- Land Acquisition Ordinance
- Mineral Enactment
- Interpretation of the Native Ordinance 1952
- Fauna Conservation Ordinance 1963
- Forest Enactment 1968
- Forest Rules 1969
- Sabah Forestry Development Authority Enactment 1981
- Parks Enactment 1984
- Native Court Enactment 1992
- Native Court (Native Customary Laws) Rules 1995
- Wildlife Conservation Enactment 1997
- Cultural Heritage (Conservation) Enactment 1997
- Sabah Water Resources Enactment 1998
- Sabah Biodiversity Enactment 2000
- Environment Protection Enactment 2002
- Environment Protection (Prescribed Activities) Order 2005
- Environment Protection (Prescribed Activities)(Environmental Impact Assessment) Order 2005

Sarawak

- State Local Authorities Ordinance
- Forest Ordinance 1954
- Forest Rules 1962
- Native Courts (Amendment) Ordinance 1992
- Natural Resources and Environment (Amendment) Ordinance 1993
- Public Parks and Green Ordinance 1993
- Sarawak River Ordinance 1993
- Water Ordinance 1994
- Sarawak Forestry Corporation Ordinance 1995
- State Land Code Ordinance 1997
- The Forests (Planted Forests) Rules 1997
- Wild Life Protection Ordinance 1998
- National Parks and Nature Reserves Ordinance 1998
- Protection of Public Health Ordinance 1999
- State Veterinary Public Health Ordinance 1999
- Sarawak Biodiversity Centre (Amendment) Ordinance 2003
- Sarawak Biodiversity Regulations 2004

3.3 Implementing Agencies

The implementation of CBD is carried out by various agencies. The programmes of work for thematic areas and cross-cutting issues under CBD are coordinated by ministries which are supported by several other implementing agencies. For instance, the MOA is the lead ministry for invasive alien species. Its Department of Agriculture (DOA) coordinates with other agencies that deal directly or indirectly with invasive alien species such as DOFM, MARDI, FRIM and DWNP.

The table below presents ministries and relevant implementing agencies involved in terms of programmes of work by thematic areas and cross cutting issues (Table 25). Such involvement ensures effective coordination among them which is necessary for the successful implementation of CBD. It also demonstrates that concerns on biodiversity are integrated in the roles and functions of these agencies.

Table 25. CBD: Main Implementing Agencies

Ministries/State Agencies	Agencies*
Ministry of Natural Resources and Environment (NRE)	Forestry Department of Peninsular Malaysia (FDPM) Department of Wildlife and National Parks (DWNP) Department of Marine Park Malaysia (DMPM) Department of Irrigation and Drainage (DID) Department of Environment (DOE) Forest Research Institute Malaysia (FRIM) National Hydraulic Research Institute of Malaysia
Ministry of Agriculture and Agro-based Industries (MOA)	Department of Agriculture (DOA) Department of Fisheries, Malaysia (DOFM) Department of Veterinary Service (DVS) Department of Agriculture - Sabah Department of Agriculture - Sarawak Malaysian Agricultural Research and Development Institute (MARDI)
Ministry of Housing and Local Government	Town and Country Planning Department
Ministry of Plantation Industries and Commodities	Malaysian Palm Oil Board Malaysian Cocoa Board Malaysian Rubber Board

Ministries/State Agencies	Agencies*
State Agencies	State Forestry Departments Department of Agriculture Protected Area Management Authorities: - Johor National Parks Corporation - Perak State Park Corporation - Selangor State Park Corporation - Sabah Parks - Sabah Wildlife Department - Sarawak Forestry Corporation Sabah Biodiversity Centre Sarawak Biodiversity Centre

* non-exhaustive inter alia

In addition to the implementing agencies above, many centres of excellence have been established to support the implementation of the NPBD, including the Centre of Excellence for Biodiversity Law (CEBLAW) for issues related to ABS and biosafety, the Malaysian Mountain Ecosystem Research Initiatives (MMERI) based at the Institute for Environment and Development (LESTARI), and Marine Ecosystem Research Centre (EKOMAR) at UKM, Malaysia Institute of Ocean and Earth Science (IOES) at Universiti Malaya, and the Borneo Marine Research Centre at Universiti Malaysia Sabah. Private sector involvement, environmental-based NGOs and universities also play important roles in supporting the various activities related to CBD.

3.4 Institutional Framework for Implementation

The existing institutional framework for implementing conservation of biological diversity reflects the cross-sectoral integration of the many agencies involved in implementation. Through this, the process of mainstreaming is also achieved.

National Focal Point

The Conservation and Environmental Management Division (CEMD) of the NRE is the focal point for the implementation of CBD in Malaysia. The CEMD works closely with other institutions and agencies in various areas such as in scientific assessments, indicators, technological transfer and cooperation, access and benefits-sharing, traditional knowledge, biosafety, liability and redress, financial resources and mechanisms for CBD, clearing house mechanism (in collaboration with FRIM), national reports, education and public awareness.

National Biodiversity - Biotechnology Council (MBBN)
The National Biodiversity-Biotechnology Council or *Majlis Biodiversiti-Bioteknologi Negara* (MBBN) was established in 2001. The MBBN is chaired by the Prime Minister and is attended by relevant ministers and chief ministers of all states and other decision makers. The function of MBBN is to deliberate on biodiversity and biotechnology issues at the national level.

The members are:

– Prime Minister as the Chairman
– Chief Minister of all States
– Minister of Natural Resources and the Environment (NRE)
– Minister of Science, Technology and Innovation
– Minister of International Trade and Industry
– Ministry of Agriculture and Agro-Based Industry
– Minister of Plantation Industries and Commodities
– Minister of Education
– Minister of Higher Education
– Minister of Domestic Trade and Consumer Affairs
– Minister of Health
– Minister of Energy, Water and Communications
– Chief Secretary of the Government of Malaysia
– Attorney General
– Science Advisor to Prime Minister
– Secretary General of NRE as the secretary

The terms of reference of the MBBN are as follows:

- Determine and endorse the direction, policy and strategy for conservation of biodiversity and biotechnology.
- Coordinate conservation of biodiversity and development of biotechnology.
- Identify and monitor the implementation of the relevant obligations of multilateral environmental agreements related to biodiversity and biotechnology that Malaysia have signed.

The MBBN is supported by the National Technical Committee on Biodiversity and Biotechnology, which in turn is supported by two task forces, the Biodiversity Task Force and the Biotechnology Task Force. Within the Biodiversity Task Force, five working groups were initially formed to involve institutes of higher learning in areas of forest biodiversity, marine biodiversity, mountain ecosystems, wetlands and agro/rural biodiversity.

Other National Councils
In addition to the MBBN, issues related to biodiversity would also be addressed in other national councils such as the National Land Council, National Forestry Council, National Mineral Council, National Water Council, and National Physical Planning Council. This is because agencies from federal ministries and state governments that are involved in implementing activities on conservation and management of biodiversity would be represented at these national councils. Incidentally, the NRE is the secretariat of all these councils except for the National Physical Planning Council in which the secretariat is based at the Ministry of Housing and Local Government.

State Biodiversity Councils
State governments have also established similar or equivalent councils to carry out conservation of biodiversity at state level, and also to ensure that development within the state and local levels are aligned with the NPBD and decisions made at the MBBN.

For instance, the states of Sabah and Sarawak have created councils towards the conservation and sustainable use of biodiversity.

Sabah

The Sabah Biodiversity Council is the highest policy making authority of biodiversity and ecosystems conservation in the state. It is responsible for the implementation of Sabah Biodiversity Enactment 2000. However, the responsibility is taken up by the Sabah Biodiversity Centre (SABC), which is established under the enactment. The State Water Resource Council as well as the Environment Protection Council also act as platforms to address issues related to biodiversity.

Sarawak

The Sarawak Biodiversity Centre Ordinance was enacted by the State Government of Sarawak in 1997 to initiate programmes for the conservation, utilisation, protection and sustainable development of biodiversity in Sarawak. Subsequently, the Sarawak Biodiversity Centre (SBC) was established in the following year. The Sarawak Biodiversity (Access, Collection and Research) Regulations was also enacted in 1998.

In December 2003, taking into consideration Sarawak's potential for intensive biotechnology based research and product development, the State Legislative Assembly passed the Sarawak Biodiversity Centre (Amendment) Ordinance 2003, as well as reviewed and passed the revision of the Sarawak Biodiversity Regulations in 2004. The amendment relieved SBC of its role in conducting general biodiversity inventory and regulating general biodiversity research. Instead, it is now entrusted to initiate intensive biotechnology-based research and development on the State's biological resources – particularly those that have been utilised by indigenous communities and to facilitate the documentation of the fast disappearing traditional knowledge of how indigenous communities utilise the State's biological resources.

Box 10. Example of Private Sector Initiative
Voluntary Carbon Offset Scheme for Conservation of Biological Diversity of Pahang Peat Swamp Forests

Malaysian Airlines and its subsidiaries have introduced a mechanism to off-set green house gas emissions in June 2008. Passengers of Malaysian Airlines, Firefly and MASwings are able to make voluntary contributions to reduce their carbon footprints of their flights by contributing towards a trust fund that is managed by the Forest Research Institute (FRIM) on behalf of the Ministry of Natural Resources and Environment.

The fund has been earmarked for programmes to protect rainforests. Projects that are planned include conservation of 10,000 ha tropical peat swamp forests in Pekan, Pahang. Contributions made by passengers will be used for the management, protection and rehabilitation of this peat swamp forest. Similar efforts in Sabah and Sarawak are being considered.

The voluntary payment for a one-way journey range from about RM35 for flights to European destinations, RM15 for Asian destinations and RM10 for domestic flights. Passengers also have an option to contribute a token amount of RM5. Corporate clients will also get a “carbon statement” at the end of each month. This programme also helps to create awareness among passengers on the need to save the planet.

4. Conclusions: Progress towards the 2010 Target and Implementation of the Strategic Plan

The implementation activities related to conservation of biological diversity in the country is relevant to the goals of CBD. CBD's 2010 Target provides a guide in terms of implementation at the national context.

Most of the goals and the targets in the Provisional Framework of Goals, Targets and Indicators to Assess Progress towards the 2010 Biodiversity Target are related to implementation of national policy documents. Hence data, information and statistics that are related to some of the goals and targets exist. These are compiled and presented in Chapter 1.4 of this report.

Biodiversity covers many components, hence the task of adopting the Provisional Framework of Goals, Targets and Indicators to Assess a Country's Progress towards the 2010 Biodiversity Target has been a challenging task. For instance, some of the targets and relevant provisional indicators are too general. Considering that biodiversity covers many components involving a wide range of organisms and issues, time is needed to develop meaningful, relevant and practical indicators at the national level.

The process of preparing this Fourth National Report is has been useful because it contributed towards reviewing of achievement of the 2010 Targets at the national level.

4.1 Progress Towards the 2010 Targets

This section presents the progress of the country in terms of addressing the concerns in the Provisional Framework of Goals, Targets and Indicators to Assess Progress towards the 2010 Biodiversity Target.

Promote the conservation of the biological diversity of ecosystems, habitats and biomes

- *Target 1.1: At least 10% of each of the world's ecological regions effectively conserved*

- *Target 1.2: Areas of particular importance to biodiversity protected*

In 2007, of the 19.6 million hectares of forested areas in Malaysia (60% of the country's land area), 14.3 million hectares were gazetted as permanent reserved forest (43.4% of the country's land area), and 1.9 million hectares were gazetted as national parks, wildlife and bird sanctuaries (5.9% of the country's land area). These are in line with the country's commitment in biodiversity conservation. Together these exceed the 2010 target of 10%.

The Department of Marine Park Malaysia (DMPM) has gazetted 42 islands in Peninsular Malaysia and federal territories as marine parks. There are also 32 other islands located within the area of marine park waters. In all, 20 % of the islands in Peninsular Malaysia and federal territories are located within the area managed by the DMPM.

Goal 2. Promote the conservation of species diversity

- *Target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups*

- *Target 2.2: Status of threatened species improved*

Various *in-situ* and *ex-situ* conservation programmes are carried out by respective implementing agencies such as the Department of Wildlife and National Parks, Department of Marine Park Malaysia, Department of Fisheries, State Forestry Departments, and national park authorities in various states to achieve this goal.

Goal 3. Promote the conservation of genetic diversity

- *Target 3.1: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained.*

Among others, this goal is addressed by:

1. National Strategy for Plant Conservation.
2. Action Plan for the Conservation and Sustainable Use of Fishery Resource Biological Diversity of Malaysia.
3. National Action Plan for the Management of Coral Reefs in Malaysia.
4. Farm Animal Genetic Resources Management Plan.

A national technical committee on agricultural biodiversity has been formed. This committee is preparing the documents to develop the National Strategies and Action Plans for Agricultural Biodiversity Conservation and Sustainable Utilisation.

The genetic diversity of crops and livestock and of harvested species of trees, fish and wildlife and other valuable species are conserved various *in-situ* and ex-situ conservation programmes. Varieties of rice and agricultural biodiversity are stored in seed genebanks, field genebanks, arboretums, semen bank and wildlife genetic resource bank.

Please refer also to goal 9 on issues related to indigenous and local knowledge.

Goal 4. Promote sustainable use and consumption

- *Target 4.1: Biodiversity-based products derived from sources that are sustainably managed, and production areas managed consistent with the conservation of biodiversity*

Currently forest reserves in Malaysia are managed based on sustainable management practices. At the end of 2007, an area covering 4.67 million hectares were assessed and awarded the Forest Management Certificate under MC&I (2001)[29]. In addition, a total of 135 timber companies have been awarded the Certificate for Chain-of-Custody. Most of these companies are manufacturers and exporters of sawn timber, while some are also manufacturers and exporters of solid finger-jointed timber, solid wood moulding and plywood."[30]

With respect to agricultural activities, the MOA has introduced good agriculture practices through the implementation of the Malaysian Farm Accreditation Scheme, Livestock Farm Accreditation Scheme, Malaysian Aquaculture Farm Certification Scheme, and Malaysian Organic Scheme.

- *Target 4.2. Unsustainable consumption, of biological resources, or that impacts upon biodiversity, reduced*

WWF's Living Planet Report (2008) has estimated that the average Malaysian's ecological footprint is approximately 2.4 gha (global hectares) per person for the year 2005. The global average is 2.7 gha per person. Among others, the Department of Environment also monitors water quality of rivers basins which provide indication of biodiversity that is dependent on water quality. It shows an increasing trend of river basins that are classified as clean from year 2004 to 2007.

- *Target 4.3: No species of wild flora or fauna endangered by international trade.*

This target is addressed by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In Malaysia, CITES was entered into force in 1978. The International Trade in Endangered Species Act 2008 was gazetted to implement the CITES obligations. Besides this Act, other national laws and state enactments also contain provisions for meeting the target above. Enforcement officers are stationed at various official points of entry in the country to curb such illegal trade activities.

[29] Forestry Department Peninsular (2008)
[30] Malaysian Timber Certification Council Website, http://www.mtcc.com.my/faqs.asp#FAQ2 (viewed March 2009).

Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.

- *Target 5.1. Rate of loss and degradation of natural habitats decreased.*

This target above is achieved by the efforts to achieve Goals 1 and 4. For instance efforts in terms of establishing and maintaining protected areas, forest reserves as well as other conservation areas such as marine parks, marine protected areas and fisheries prohibited areas can contribute to reduction in the rate of loss and degradation of natural habitats. More than RM 14 million was invested in mangrove replanting projects throughout the country during the period 2005-2008. In terms of marine conservation, 73 locations within the Marine Parks were placed with artificial reefs. In the state of Sarawak, more than 2,500 reef balls have been deployed along its coasts. All these efforts contribute positively towards habitat preservation and re-generation.

Goal 6. Control threats from invasive alien species

- *Target 6.1. Pathways for major potential alien invasive species controlled*

To address the threats of invasive alien species to the agricultural sector, the Malaysian Quarantine and Inspection Services (MAQIS) controls 52 entry points in the country. In addition to MAQIS, other enforcement agencies area also involved in the controlling of invasive alien species.

- *Target 6.2. Management plans in place for major alien species that threaten ecosystems, habitats or species.*

The Draft National Action Plan for Prevention, Containment, Eradication and Control of Alien Invasive Species is expected to be finalised by March 2009. Programmes and activities will be put in place to implement the action plan.

Goal 7. Address challenges to biodiversity from climate change, and pollution

- *Target 7.1. Maintain and enhance resilience of the components of biodiversity to adapt to climate change.*

Efforts in conservation of biodiversity such as establishment of protected areas and gazettement of forest reserves can contribute towards maintaining and enhancing the resilience of the components of biodiversity to adapt to climate change. The Central Forest Spine initiative is being developed to create terrestrial ecological corridors to reduce fragmentation of forest ecosystems and protected areas. Successful implementation of this project will indirectly enhance the resilience of the components of biodiversity to adapt to climate change.

There are currently three working groups formed under the project to prepare the Second National Communication to UNFCCC. The Working Group on “Vulnerability and Adaptation”, also addresses topics on Biodiversity, Forestry, Agriculture, Water Resources, and Coastal Resources.

- *Target 7.2. Reduce pollution and its impacts on biodiversity.*

The implementation of Environmental Quality Act (1972) contributes directly to this target. In addition concerns relating to pollution and climate change are addressed under the project on preparation of the Second National Communication to the UNFCCC. The Working Groups on "Greenhouse House Gas Inventory", and "Mitigation" are looking into issues on Land Use, Land Use Change and Forestry (LULUCF) which would include impacts on biodiversity.

Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods

- *Target 8.1. Capacity of ecosystems to deliver goods and services maintained*

- *Target 8.2. Biological resources that support sustainable livelihoods, local food security and health care, especially of poor people maintained.*

The two targets above are achieved by the efforts to achieve Goals 1, 4, 5, 6, and 7. For instance efforts in terms of establishing and managing protected areas, forest reserves, conservation areas such as marine parks, marine protected areas, and fisheries prohibited area will ensure that capacity of ecosystems are maintained. These ecosystems will be able to provide resources for local communities in terms of sustainable livelihood, local food security and health care.

Target 8.2 is also addressed by efforts of achieving Goals 9 and 10.

Goal 9 Maintain socio-cultural diversity of indigenous and local communities

- *Target 9.1. Protect traditional knowledge, innovations and practices*

There is a dedicated programme under the Ministry of Natural Resources and Environment to document traditional knowledge. This includes collating existing databases that are based at sectoral agencies, research institutions, universities and other implementing organisations. In addition to the database, one of its main outputs is a national action plan on TK. The government also is planning to establish a Traditional Knowledge Digital Library. The Ministry of Health also has a programme to document medicinal plants and programmes to promote traditional and complementary medicine programmes. These are documented in the website – *Global Information Hub on Integrated Medicine* (GLOBINMED)[31].

- *Target 9.2. Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit-sharing.*

The National Policy on Biological Diversity, through its first strategy to improve scientific knowledge base provides policy guidance on this matter. The government is preparing a legal framework dedicated to the Protection of Traditional Knowledge, through the draft Access and Benefit Sharing (ABS) law.

[31] http://www.globinmed.com/IMRContent/default.aspx (viewed March 2009)

Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources

- *Target 10.1. All access to genetic resources is in line with the Convention on Biological Diversity and its relevant provisions.*

- *Target 10.2. Benefits arising from the commercial and other utilisation of genetic resources shared in a fair and equitable way with the countries providing such resources in line with the Convention on Biological Diversity and its relevant provisions.*

Strategies 2 and 9 of the National Policy on Biological Diversity provide policy guidance on the implementation of this goal. Various implementing agencies also have guidelines and regulations on access to genetic resources. A national legislation on access and benefits sharing is envisaged to be in place in 2010, which is based on guidance from the decisions of CBD.

Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention

- *Target 11.1. New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20.*

- *Target 11.2. Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4.*

The above targets are not applicable to Malaysia. Based on the experience as a recipient country, it is suggested that decisions on financial resources allocations for project development and implementation should be based on the host country's level of priority and needs, instead of solely based the interest or priorities of the sponsoring countries or organisations.

4.2 Progress towards the Goals and Objectives of the Strategic Plan of the Convention

Goal 1: The Convention is fulfilling its leadership role in international biodiversity issues

1.1 The Convention is setting the global biodiversity agenda

1.2 The Convention is promoting cooperation between all relevant international instruments and processes to enhance policy coherence

1.3 Other international processes are actively supporting implementation of the Convention, in a manner consistent with their respective frameworks

From the perspective of Malaysia, these objectives are currently being addressed through its participation in the CBD, and also through the implementation of National Policy on Biological Diversity. Malaysia is contributing positively to the process, and also benefiting from the various efforts organised by the CBD in terms of implementing the various programmes of work.

The implementation of CBD also contributes towards the implementation of related international treaty or convention such as the International Treaty on Plant Genetic Resources for Food and Agriculture, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention).

Continued international support in terms of financial and technical resources is required to carry through the various activities of the Strategic Plan of CBD at international and national levels.

1.4 The Cartagena Protocol on Biosafety is widely implemented

Malaysia passed its Biosafety Act in 2007, and has recently formed a core team to implement the Act.

1.5 Biodiversity concerns are being integrated into relevant sectoral or cross-sectoral plans, programmes and policies at the regional and global levels

1.6 Parties are collaborating at the regional and subregional levels to implement the Convention

Malaysia is a member of ASEAN Working Groups on Multilateral Environmental Agreements, Nature Conservation and Biodiversity, Coastal and Marine Environment, Environmentally Sustainable Cities and Water Resources and Environment. Malaysia has participated in various activities organised by the ASEAN Centre for Biodiversity. Malaysia is also a member of the ASEAN Peatland Management Initiative (APMI) which aims to promote sustainable management of peatlands in the ASEAN region through collective actions and enhanced cooperation to support and sustain local

livelihoods, reduce risk of fire and associated regional haze, and contribute to global environmental management.

Goal 2: Parties have improved financial, human, scientific, technical, and technological capacity to implement the Convention.

2.1 All Parties have adequate capacity for implementation of priority actions in national biodiversity strategy and action plans

2.2 Developing country Parties, in particular the least developed and the small island developing States amongst them, and other Parties with economies in transition, have sufficient resources available to implement the three objectives of the Convention

Over the years Malaysia has enhanced its capacities towards the implementation of CBD. Nevertheless, capacity gaps have been identified and documented in the National Capacity Needs Self-Assessment Project which covered CBD, UNFCCC and CCD. The National Capacity Action Plan is the output of this process. Continued financial and technical resources are needed to ensure prompt and sustained implementation of these action plans.

2.3 Developing country Parties, in particular the least developed and the small island developing States amongst them, and other Parties with economies in transition, have increased resources and technology transfer available to implement the Cartagena Protocol on Biosafety

2.4 All Parties have adequate capacity to implement the Cartagena Protocol on Biosafety

2.5 Technical and scientific cooperation is making a significant contribution to building capacity.

The introduction of the Biosafety Act 2007 and the formation of a core team to implement the Cartagena Protocol are aligned with these goals. Co-funding from UNDP-GEF for capacity building during the infancy stage for implementing this protocol needs to be continued and sustained. Prior to this, various capacity building and training workshops were conducted for risk assessments and risk management on biosafety issues. Nevertheless since biosafety is a highly technical and specialised area, continued capacity building is required to ensure meaningful implementation of the Protocol. This has to be coupled with financial and technical support from donor countries. This support should be in line with national priorities that are aligned to the objectives of the Protocol.

Goal 3: National biodiversity strategies and action plans and the integration of biodiversity concerns into relevant sectors serve as an effective framework for the implementation of the objectives of the Convention.

3.1 Every Party has effective national strategies, plans and programmes in place to provide a national framework for implementing the three objectives of the Convention and to set clear national priorities.

Malaysia launched its National Policy on Biological Diversity in 1998. Subsequently, continued efforts have been enhanced to ensure that conservation of biodiversity is included in decision making across related sectors. These efforts are further strengthened with the MBBN which is chaired by the Rt. Hon. Prime Minister.

3.2 Every Party to the Cartagena Protocol on Biosafety has a regulatory framework in place and functioning to implement the Protocol.

Malaysia has just passed its Biosafety Act. Its regulatory framework and procedures are currently being drafted and will be finalised in the near future.

3.3 Biodiversity concerns are being integrated into relevant national sectoral and cross-sectoral plans, programmes and policies.

3.4 The priorities in national biodiversity strategies and action plans are being actively implemented, as a means to achieve national implementation of the Convention, and as a significant contribution towards the global biodiversity agenda.

In the context of Malaysia, Objectives 3.3 and 3.4 are achieved because biodiversity concerns have been integrated into national sectors and cross-sectoral plans, programmes and policies. These are described in Chapter 3. Some of the achievements presented in Chapter 1.4.

Goal 4: There is a better understanding of the importance of biodiversity and of the Convention, and this has led to broader engagement across society in implementation.

4.1 All Parties are implementing a communication, education, and public awareness (CEPA) strategy and promoting public participation in support of the Convention

CEPA and environmental education activities are undertaken by various government and non-governmental organisations (NGOs). A National CEPA Plan of Action[32] was drafted in 2006 to promote collaborative approach to CEPA and biodiversity related activities throughout the country. This document aims to create a framework to enhance success, encourage synergies, strengthen links and build upon current activities and developments.

[32] Ministry of Natural Resources and Environment (2007b).

4.2 Every Party to the Cartagena Protocol on Biosafety is promoting and facilitating public awareness, education and participation in support of the Protocol.

This component is addressed by the NRE and different stakeholders in carrying out various national activities. Current efforts are complemented by outputs from the UNDP-GEF capacity building project on implementing the Cartagena Protocol.

4.3 Indigenous and local communities are effectively involved in implementation and in the processes of the Convention, at national, regional and international levels.

Various indigenous and local communities are involved in the implementation and the processes of the convention. The Malaysian Environmental NGO (MENGO) will be publishing a compilation of best practices entitled *"Journeys Taken - Lessons Learnt: Empowering Malaysian Communities for Conservation and Sustainable Resource Use"* in 2009. MENGO also has a programme on Community-Based Natural Resource Management Facility in Malaysia.

GEF Small Grants Programme (SGP) for Malaysia is an example of a programme that is oriented towards supporting the interventions by NGOs, community-based organisations and local communities throughout Peninsular Malaysia, Sabah and Sarawak. Among others, it is designed to building the capacity and capability of civil society to initiate and implement sustainable development and sustainable livelihood and environmental imperatives. Some of the areas covered include traditional knowledge and equitable access and proper benefit sharing of anything valuable emerging from traditional knowledge (TK) with its holders, especially indigenous people throughout Malaysia.

4.4 Key actors and stakeholders, including the private sector, are engaged in partnership to implement the Convention and are integrating biodiversity concerns into their relevant sectoral and cross-sectoral plans, programmes and policies.

The implementation of programmes and project in conservation of biodiversity involves the participation, cooperation and partnerships of related stakeholders. These projects, programmes and activities also require the feedback, input, support and partnership of private sector, NGOs and local communities.

4.3 Conclusions

The CBD has also ensured that global biodiversity concerns are given international attention, and is able to provide forums in which these concerns are discussed. The CBD has also provided support in terms of developing general programmes of work to thematic areas. These are helpful in terms of harmonisation of terminologies, and development of common approaches, etc. Flexibility in terms of implementation at national level allows countries to localise and customise these programmes to suit prevailing national conditions. As a result, countries are able to enhance and increase the priority of conservation of biological diversity.

The 2010 Goals and Target provide an indicative direction for governments to focus their implementation. Based on the findings of this report, Malaysia is on track to achieve the 2010 Targets, and in certain areas some targets have already been achieved.

Malaysia is committed to sustainable use and management of natural resources. Continued financial and technical resource will be needed to ensure that this commitment is continually achieved. This has to be coupled with financial and technical support from donor countries and organisations for implementation of programmes and projects that are in line with national priorities, and aligned to the objectives of CBD.

The recently completed National Capacity Needs Self-Assessment for Global Environmental Management (NCSA) Project has proposed 25 activities to improve and enhance the implementation of CBD, UNFCCC and CCD. Thirteen of the activities are related to CBD (as reported in Chapter 2.3). These activities are intended to address the capacity gaps that were identified by the NCSA process in order to improve and enhance existing implementation in terms of policy and institutional framework, regulation and guidelines, federal and state cooperation, inter-agency coordination, knowledge and information management, incentives, increasing the number of experts - particularly taxonomists, research and development, reporting framework and mainstreaming. In addition, seven activities are related to addressing issues and concerns that are cross-cutting among the three conventions.

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MENGO Website
www.mengo.org

Report on National Capacity Needs Self-Assessment for Global Environmental Management and National Capacity Action Plan Website
www.nre.gov.my/EN/Documents/NCSA%20Report%20FA%20adjusted%2009jan09.pdf

Appendix 1 Information Concerning Reporting Party and Preparation of National Report

Reporting Party

Contracting Party	
NATIONAL FOCAL POINT	
Full name of the institution	Ministry of Natural Resources and Environment, Malaysia
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SUBMISSION	
Signature of officer responsible for submitting national report	
Date of submission	30 April 2009

Process for the Preparation of the National Report

The Fourth National Report to CBD was prepared under the UNDP/GEF funded 2010 Biodiversity Targets National Assessments project for Malaysia. This project was undertaken by the Conservation and Environmental Management Division, Ministry of Natural Resources and Environment with the assistance of a team of local consultants.

The objective of this project was to carry out an initial assessment with regards to applicable 2010 Biodiversity Targets at the national level. As the central theme of the fourth national report of the Convention on Biological Diversity focused on the analysis of progress towards the 2010 Biodiversity Targets, the format of this report was developed in accord with the Conference of the Parties (COP) decision VIII/14, and the CBD Secretariat notification 2006-083 Ref No. ITS/NR/LC/MC/55455, sent out to all Parties on 28 July 2006.

This project was conducted in six months from 1 October 2008 to 29 March 2009 as follows:

- A review of existing information relevant to reporting on the implementation of the CBD at national level, with particular focus on the 2010 indicators. This included previous national reports submitted to the CBD secretariat, project reports prepared by the Government of Malaysia such as the National Capacity Needs Self-Assessment Report, and related documentation prepared by the implementing agencies and stakeholders;
- A stakeholder identification process to ensure that relevant stakeholders at all levels of the country were involved in the preparation process;
- A series of consultations/information sharing with stakeholders were conducted to gather feedback and comments. Participatory meetings were held on four occasions.
    - At the beginning to introduce the project as well as to gather initial feedback;
    - In the middle of the project to present the preliminary findings on the status, trends and status of biodiversity, and current status of NBSAP;
    - In the third quarter of the project to present findings on mainstreaming of biodiversity, progress towards the 2010 targets and implementation of the strategic plan;
    - At the end of the project period for finalisation by the stakeholders.
- A compilation and synthesis of the inputs into the Fourth National Report;
- Final endorsement by the Minister of Natural Resources and Environment; and
- Submission of the Fourth National Report to the CBD.

The preparation of the Fourth National Report was coordinated by the Conservation and Environmental Management Division, Ministry of Natural Resources and Environment with the engagement of the following stakeholders:

- Economic Planning Unit, Prime Minister's Department
- Forestry Development Division, Ministry of Natural Resources and Environment
- State Governments of Sabah and Sarawak
- Forestry Department Peninsular Malaysia
- Department of Wildlife and National Parks
- Department of Marine Park Malaysia
- Department of Fisheries, Malaysia
- Department of Agriculture
- Department of Veterinary Services
- Town and Country Planning Department
- Department of Environment
- Department of Irrigation and Drainage
- Malaysian Quarantine and Inspection Services
- Jabatan Hal Ehwal Orang Asli (Department of Orang Asli Affairs)
- Forest Research Institute of Malaysia (FRIM)
- Malaysian Agricultural Research and Development Institute (MARDI)
- Sabah Fisheries Department
- Sabah Forestry Department
- Sabah Wildlife Department
- Sabah Parks
- Sabah Biodiversity Centre
- Sarawak Forest Department
- Sarawak Forestry Corporation
- Sarawak Biodiversity Centre
- Intellectual Property Corporation of Malaysia (MyIPO)
- Malaysia Environmental NGOs (MENGO)
- Malaysian Nature Society
- WWF Malaysia

Appendix 2 Progress Towards Targets of the Global Strategy for Plant Conservation

The COP to the CBD, at its sixth meeting in 2002, adopted decision VI/9 on the *Global Strategy for Plant Conservation.* The focus of the *Global Strategy* is to reduce drastically by 2010 the rate of loss of plant species worldwide, as part of the global agenda of the World Summit in Johannesburg to significantly reduce the rate of biodiversity loss by that time frame.

The Malaysian Response: ***National Strategy for Plant Conservation***
Plant conservation has been very much part of the management tools applied to the sustainable harvest and use of plant resources in Malaysia. The legacy of documenting and conserving plant resources, which was put in place during the British colonial administration, has continued until today. Many of the targets set up by the Global Strategy for Plant Conservation (GSPC) have mechanisms that had been practiced for over a century. The GSPC has provided a framework which Malaysia could use to identify the gaps and strategise its own conservation efforts in a more holistic manner.

Arising from a workshop held in 2004, the National Strategy for Plant Conservation facilitated experts in the country to take stock of the direction Malaysia ought to undertake in order to fulfil her responsibility as a good steward of a very rich heritage. The strategy has 17 targets. Although the thrust is on plant conservation, other aspects such as sustainable use, benefit-sharing and capacity building are also included. The 17 targets are arranged under the following five objectives.

Objective 1: Understanding and Documenting Plant Diversity.

> Target 1: A widely accessible working list of known plant species, as a step towards a complete national flora
>
> Target 2: A preliminary assessment of the conservation status of all known plant species of the nation
>
> Target 3: Development of models with protocols for plant conservation and sustainable use, based on research and practical experience

Objective 2: Conserving Plant Diversity.

> Target 4: Put in place national policies and legislation that will meet the plant conservation needs of the nation
>
> Target 5: At least 10% of each of the nation's ecological habitats effectively conserved
>
> Target 6: Protection of 50% of the most important areas for plant diversity assured
>
> Target 7: At least 30% of production lands managed consistent with the conservation of plant diversity
>
> Target 8: 60% of the nation's threatened species conserved *in-situ*

Target 9: 60% of threatened plant species in *e- situ* collections within the country, and 10% of them included in recovery and restoration programmes

Objective 3: Using Plant Diversity Sustainably.

Target 10: 70% of the genetic diversity of crops and other major socio-economically valuable plant species conserved, and associated indigenous and local knowledge maintained

Target 11: Management plans in place for major alien species that threaten plants, plant communities, and associated habitats and ecosystems

Target 12: No species of wild flora endangered by national and international trade

Target 13: 30% of plant-based products derived from sources that are sustainably managed

Target 14: The decline of plant resources, and associated indigenous and local knowledge, innovations and practices that support sustainable livelihoods, local food security and health care, halted

Objective 4: Promoting Education and Awareness about Plant Diversity.

Target 15: The importance of plant diversity and the need for its conservation incorporated into communication, education and public-awareness (CEPA) programmes

Objective 5: Building Capacity for the Conservation of Plant Diversity

Target 16: The number of trained people working with appropriate facilities in plant conservation increased to achieve the targets of this Strategy

Target 17: Networks for plant conservation activities established or strengthened at the national level

Implementation of the Strategy

The NRE was created on 24 March 2004 combining all relevant departments and agencies that have portfolios related to natural resources and the environment. These include river and drainage, mineral and geo-science, lands and mines, forestry, wildlife and national parks, and marine parks. For the plant strategy for Malaysia, this convenient melting pot brings together all pertinent agencies dealing with indigenous plant resources. For cultivated or agricultural crops, however, these remained under the purview of the Ministry of Agriculture and the Ministry of Plantation Industries and Commodities. With this new cohesion, Malaysia has a strong institutional setup to implement the plant conservation strategy.

Implementing Institutions

Ministry of Natural Resources and Environment

- Forestry Department Peninsular Malaysia
- Forest Research Institute Malaysia
- Department of Wildlife and National Parks

Ministry of Agriculture and Agro-based Industry

- Department of Agriculture
- Malaysian Agricultural Research and Development Institute

Ministry of Rural and Regional Development

- Department of Orang Asli Affairs

Ministry of Science, Technology and Innovation

- Malaysian Centre for Remote Sensing

Sabah

- Sabah Forestry Department
- Sabah Parks

Sarawak

- Sarawak Forest Department
- Sarawak Forestry Corporation
- Sarawak Biodiversity Centre

<u>Boards</u>

- Malaysian Timber Industry Board
- Malaysian Palm Oil Board
- Malaysian Rubber Board
- Malaysian Cocoa Board

<u>Universities</u>

- Universiti Malaya
- Universiti Sains Malaysia
- Universiti Putra Malaysia
- Universiti Kebangsaan Malaysia
- Universiti Malaysia Sarawak
- Universiti Malaysia Sabah
- Universiti Malaysia Terengganu

Appendix 3 Other Details

Appendix 3.1

Malaysia: Mammals so far Known from Specimens and Sightings within Malaysia*

Common Name	*Scientific Name*	Location	Habitat
Black Shrew	*Suncus ater*	Sabah (Kinabalu)	Montane
Kinabalu Shrew	*Crocidura baluensis*	Sabah (Kinabalu)	Montane
Mountain treeshrew	*Tupaia montane*	Sarawak, Sabah	Montane
Convex Horseshoe Bat	*Rhinolophus convexus*	Peninsular Malaysia	Montane
Chiewkwee's Horseshoe Bat	*Rhinolophus chiewkweeae*	Peninsular Malaysia	Lowland
Bicoloured leaf-nosed bat	*Hipposideros bicolor 142 kHz*	Peninsular Malaysia	Lowland
Cox's Roundleaf Bat	*Hipposideros coxi*	Sarawak	Lowland
Malayan Roundleaf Bat	*Hipposideros nequam*	Peninsular Malaysia	Lowland
Ridley's bat	*Myotis ridleyi*	Peninsular Malaysia, Sabah	Lowland
Gomantong Myotis	*Myotis gomantongensis*	Sabah	Lowland
Coppery pipistrelle	*Pipistrellus cuprosus*	Sabah	Lowland
Social Pipistrelle	*Pipistrellus societatis*	Peninsular Malaysia	Lowland
False serotine bat	*Hesperoptenus doriae*	Peninsular Malaysia, Sarawak	Lowland
Large False Serotine	*Hesperoptenus tomesi*	Peninsular Malaysia, Sabah	Lowland
Bronze Tube-Nosed Bat	*Murina aenea*	Peninsular Malaysia, Sabah	Lowland
Gilded Tube-Nosed Bat	*Murina rozendaali*	Peninsular Malaysia, Sabah	Lowland
Krau Woolly Bat	*Kerivoula krauensis sp. nov.*	Peninsular Malaysia	Lowland
Sculptor Squirrel	*Collasciurus (Glyphotes) simus*	Sabah, Sarawak	Montane
Four-striped Ground Squirrel	*Lariscus hosei*	Sabah, Sarawak	Largely montane
Bornean Mountain Ground Squirrel	*Dremomys everetti*	Sabah, Sarawak	Montane
Lesser Pygmy Flying Squirrel	*Petaurillus emiliae*	Sarawak	Lowland
Mountain Spiny Rat	*Maxomys alticola*	Sabah	Montane
Small Bornean Maxomys / Small Spiny Rat	*Maxomys baeodon*	Sabah, Sarawak	Montane
Malayan Mountain Spiny Rat	*Maxomys inas*	Peninsular Malaysia	Montane

Common Name	*Scientific Name*	Location	Habitat
Sundaic Lenothrix / Gray Tree Rat	*Lenothrix malaisia*	Peninsular Malaysia, Sabah, Sarawak	Lowland
Bornean pithecheirops	*Pithecheirops otion*	Sabah	Lowland
Large Pencil-Tailed Tree Mouse	*Chiropodomys major*	Sabah, Sarawak	Lowland and submontane
Kinabalu Ferret-badger	*Melogale everetti*	Sabah	Montane
Hose's Palm Civet	*Diplogale hosei*	Sabah, Sarawak	Montane
Hose's Mongoose	*Herpestes hosei*	Sarawak	Unknown

Endemic to Peninsular Malaysia	7 (Lowland 5; Montane 2)
Endemic to Sabah	7 (Lowland 3; Montane 4)
Endemic to Sarawak	3 (Lowland 2; Unknown 1)
Endemic to Sabah + Sarawak	7 (Lowland 1; Montane: 6)
Endemic to PM, Sabah and/or Sarawak	6 (Lowland 6)
Total endemic to Malaysia	30 (Lowland 17; Montane 12; Unknown 1)

Source: Davidson and Zubaid (2005).

* There is a strong possibility that species known from Peninsular Malaysia, Sabah and Sarawak may also occur in Kalimantan, Sumatra and/or Brunei.

Appendix 3.2

Composition of Amphibians and Reptiles Fauna in Malaysia
(including introduced species)

Amphibians
Family
Bufonidae
Megophryidae
Microhylidae
Ranidae
Rhacophoridae
Ichthyophiidae

Reptiles
Family
Acrochordidae
Anomochilidae
Boidae
Colubridae
Cylindrophiidae
Elapidae
Hydrophiidae
Typhlopidae
Viperidae
Xenopeltidae
Xenophidiidae
Agamidae
Anguidae
Eublepharidae
Dibamidae
Gekkonidae
Lacertidae
Lanthanotidae
Scincidae
Uromastycidae
Varanidae
Crocodylidae
Cheloniidae
Dermochelyidae
Emydidae
Geoemydidae
Testudinidae
Trionychidae

Source: Das and Norsham Yaakob (2005).

Appendix 3.3

Examples of Threatened Animals and Birds in Protected Areas

Common Name	Scientific Name
Mammals	
Sumatran Rhino	*Dicerorhinus sumatrensis*
Elephant	*Elephas maximus*
Tiger	*Panthera tigris*
Gaur	*Bos gaurus hubbacki*
Tapir	*Tapirus indicus*
Malay Bear / Sun Bear	*Helarctos malayanus*
Serow	*Capricornis sumatraensis*
Red Dog or Dhole	*Cuon alpinus*
Siamang	*Hylobates syndactylus*
Orangutan	*Pongo pygmaeus*
Proboscis Monkey	*Nasalis larvatus*
Red-banded Langur	*Presbytis chrysomelas*
Silvered Langur	*Presbytis cristata*
Hose's langur	*Presbytis hosei*
White-fronted langur	*Presbytis frontata*
Maroon langur	*Presbytis rubicunda*
Bornean Gibbon	*Hylobates muelleri*
Clouded leopard	*Neofelis diardi*
Birds	
Great Argus	*Argusianus argus*
Malaysian Peacock Pheasant	*Polyplectron malacense*

Common Name	Scientific Name
Crested Argus	*Rheinardia ocellata*
Mountain Peacock Pheasant	*Polyplectron inopinatum*
Rhinoceros Hornbill	*Buceros rhinoceros*
Indian/Oriental Pied Hornbill	*Anthracoceros albirostris*
Black Hornbill	*Anthracoceros malayanus*
Wrinkled Hornbill	*Aceros corrugatus*
Blyth's/Plain-pouched Hornbill	*Aceros subruficollis*
Helmeted Hornbill	*Buceros vigil*
Wreathed Hornbill	*Aceros undulates*
White-crowned Hornbill	*Aceros comatus*
Great Hornbill	*Buceros bicornis*
Bornean peacock	*Polyplectron schleiermacheri*
Bulwer’s pheasant	*Lophura bulweri*
Bushy-crested hornbill	*Anorrhinus galeritus*

Appendix 3.4

Examples of Threatened Animals with Breeding Programmes

Common Name	*Scientific Name*
Mammals	
Tiger	*Panthera tigris*
Orangutan	*Pongo pygmeus*
Lesser Mouse-deer	*Tragulus kancil*
Barking Deer / Indian Muntjac	*Muntiacus muntjac*
Large Mouse-deer	*Tragulus napu*
Sambar Deer	*Cervus unicolor*
Gaur	*Bos gaurus hubbacki*
Tapir	*Tapirus indicus*
Porcupine	*Hystrix brachyura*
Slow Loris	*Nycticebus coucang*
Reptiles	
River Terrapin	*Batagur baska*
Painted Terrapin	*Callagur borneoensis*
Birds	
Green Peafowl	*Pavo muticus*
Malaysian Peacock Pheasant	*Polyplectron malacense*
Crested Fireback	*Lophura ignita*
Great Argus	*Argusianus argus*
Crestless Fireback	*Lophura erythrophthalma*
Mountain Peacock Pheasant	*Polyplectron inopinatum*

Appendix 3.5

Summary of Ex-situ Conservation Programmes

Summarised from DWNP Annual Report 2007

Seladang (*Bos gaurus hubbacki*)
There are three centres for breeding of this species in captivity located in Wildlife Conservation Centres (WCC) at Jenderak Selatan in Pahang, Sungkai in Perak and Gua Musang in Kelantan. The number of Seladang in captivity is 48. To increase the population of Seladang, coordinated breeding and the application of the advanced reproductive biotechnology are being carried out. Four tamed Seladang are selected for this programme which is a collaborative research between DWNP, MARDI and the National Agro Biotechnology Institute (ABI).

Sambar Deer (*Cervus unicolor*)
The there are two centres for breeding this species in captivity located in WCC at Sungkai, and Gua Musang. DNA fingerprinting is being carried out to identify pure breed to be used for the breeding and release programs.

Barking Deer (*Muntiacus muntjak, Muntiacus atherodes*)
There are three centres for breeding of this species in captivity. Barking deers are "highly-strung" and tense species. Breeding them in captivity has been a challenge.

Lesser Mousedeer (*Tragulus javanicus*)
There are two centres for breeding of this species in captivity located in WCC at Sungai Batu Pahat in Perlis and Bangas in Johor. DWNP also has a commercial breeding programme for the species above.

Greater Mousedeer (*Tragulus napu*)
There is a captive breeding programme for this species at the Sungai Batu Pahat WCC.

Malayan Tapir (*Tapirus indicus*)
There is a captive breeding programme for this species at the Sungai Dusun WCC in Selangor. The birth of the twin tapirs on 2 May 2007 at Sungai Dusun is the first ever recorded twin birth in the world.

Malayan Porcupine (*Hystrix brachyura*)
There is a captive breeding programmes for porcupines at the Sungai Dusun WCC. As part of a collaborative research programme, 20 Malayan Porcupines are also placed in Universiti Kebangsaan Malaysia and their breeding behavior studied. DWNP also has a collaborative programme for commercial breeding of this species aimed at sustainable use of resources, and prevention of reduction of population in the wild.

River Terrapin and Painted Terrapin (*Batagur baska and Callagur borneoensis*)
There are three WCCs working with these two species. These are located at Bota Kanan WCC in Perak, Bukit Pinang WCC in Kedah, and Kuala Berang WCC in Terengganu. A total of 230 river terrapins were released at Sungai Bukit Paloh and Sungai Terengganu in March, May and December 2007 in conjunction with the release programs for terrapins.

Julung-julung Crocodile (*Tomistoma schlegelii*)
The programme for the species above is located at the Sungai Dusun WCC in Selangor.

Pheasants (*Polyplectron inopinatum, Polyplectron malacense, Lophura ignata, Lophura erythropthalma, Argusianus argus, Rheinardia ocellata, Pavo muticus*)
The pheasants breeding programs are carried out at the Sungkai WCC in Perak and Jemaluang WCC in Johor.

Hornbills *(Buceros rhinoceros, Buceros bicornis, Anthracoceros malayanus, Anthracoceros albirostris, Aceros comatus)*
The Sungkai WCC in Perak is the conservation centre for hornbills.

Appendix 3.6

Examples of Conservation of Genetic Resources of Timber Species

In its efforts to conserve various forest and ecological types in their original conditions, Malaysia has set aside pockets of virgin forest throughout the country. These pockets, known as Virgin Jungle Reserves (VJRs), were established to serve as permanent nature reserves and natural arboreta; as control plots for comparing with harvested and silviculturally treated forests; and as undisturbed natural forests for ecological and botanical studies.

Malaysia has also established two Genetic Resources Areas (GRAs), one in the Ulu Sedili Forest Reserve in Johor, covering 4806 ha and the other one in Semengoh Forest Reserve in Sarawak. The GRAs in Johor and Sarawak have initially targeted 8 and 14 commercial species for genetic conservation, respectively. These species are by no means exclusive and research is in progress to identify additional species for genetic conservation.

FRIM has generated the ecological genetics information for a rare and predominantly outcrossed dipterocarp (*Shorea lumutensis*), a rare and predominantly selfing dipterocarp (*Hopea bilitonensis*), and a widespread endemic and predominantly outcrossed dipterocarp (*Neobalanocarpus heimii*) to set conservation strategies so to prevent the common species from becoming an endangered plant and to protect the rare species against extinction.

At present, Malaysia has many *ex-situ* conservation areas and examples in various states. Collections are conserved mainly in arboreta of research institutions, universities and government agencies. The universities include Universiti Malaya, Universiti Putra Malaysia and Universiti Kebangsaan Malaysia, and government funded research centres include Semengoh in Sarawak and at Sepilok and Poring in Sabah. Of the research institutions, the Forest Research Institute Malaysia (FRIM), the Malaysia Palm Oil Board, the Malaysia Rubber Board and the Malaysian Agricultural Research and Development Institute have arboreta for various groups of wild species. For example, the arboreta of FRIM have a collection of more than 500 forest plant species, including 150 dipterocarp species. The largest groups of forest plant species under *ex-situ* conservation are orchids, followed by fruit trees, timber species and medicinal plants.

Seed genebanks for forest species are not appropriate as most of the plants produce recalcitrant seeds, which cannot be stored for long. Various institutes in the country are carrying out research to explore the possibilities of using cryogenic and *in vitro* techniques for long-term gene conservation of tree species. Some of the species that have been successfully cryo-preserved for *ex-situ* conservation are *Dipterocarpus alatus, Dipterocarpus intricartus, Swietenia macrophylla, Pterocarpus indicus, Thyrosostachys siamenis, Bambusa arundinacea, Dendrocalamus membranaceus and Dendrocalamus brandissi*. Tissue culture through *in vitro* techniques has been widely studied in *Swietenia macrophylla, Shorea leprosula, Shorea ovalis, Shorea parvifolia, Shorea macrophylla, Hopea odorata,* and *Calamus manan*.

Appendix 3.7

Protected Tree/Plant Species

Appendix 3.7.1 Peninsular Malaysia

Currently, in Peninsular Malaysia, there are 32 timber species that are not allowed to be harvested within the PRF. They are conserved because of their importance to fauna species, medicinal values, and usage by *Orang Asli* (Indigenous Peoples). In practice, these trees are not tagged by Forestry Department staff during the tree marking operations and thus, cannot be removed by the loggers. These species are:

Under-storey species
Scientific Name (Local Name)

1. *Archidendron bubalirum* Kerdas (fruit)
2. *Archidendron jiringa* Jering (fruit)
3. *Durio zibethinus* Durian (fruit)
4. *Mangifera indica* Mangga (fruit)
5. *Baccaurea maingayi* Tampoi (fruit)
6. *Baccaurea sumatrana* Tampoi (fruit)
7. *Artocarpus rigidus* Temponek (fruit)
8. *Dysoxylum sp.* Mersindok (jungle langsat)
9. *Nephelium lappaceum* Rambutan Hutan (fruit)
10. *Garcinia artoviridis* Asam Gelugor (fruit)
11. *Boucea macrophyla* Kundang Hutan (fruit)
12. *Barringtonia sp.* Putat (fruit)
13. *Sandoricum koetjape* Sentul (fruit)
14. *Ardisia sp.* Mata Pelanduk (fruit)
15. *Artocarpus heterophyllus* Nangka (fruit)
16. *Aglaia sp.* Bekak (fruit)
17. *Eugenia (Syzygium) sp.* Kelat Jambu Laut (fruit)
18. *Artocarpus integer* Cempedak (fruit)

Over-storey species
Scientific Name (Local Name)

19. *Koompassia excelsa* Tualang (depository of wild honey)
20. *Ficus spp.* Ara (fruit)
21. *Mangifera longipetiolata* Machang (fruit)
22. *Parkia sp.* Petai (bean)
23. *Podocarpus sp.* Podo (hill / beach conservation)
24. *Dialium sp.* Keranji (fruit)
25. *Sterculia foetida* Kelumpang Jari (seeds)
26. *Lithocarpus cyclophorus* Mempening Gajah (fruits)
27. *Knema sp.* Basong (fruit)
28. *Myristica sp.* Basong (fruit)
29. *Sterculia parvifolia* Kelumpang (fruit)
30. *Santiria laevigata* Kedondong Gergaji Daun Licin (fruit)
31. *Castanopsis spp.* Berangan (fruit)
32. *Irvingia malayana* Pauh (fruit)

Appendix 3.7.2 Sabah

Under Sabah enactments, the term used for protected tree species is "prohibited species". Prohibited species means:

- Any tree marked for retention by the Director of Forestry.
- The following trees*:

Scientific name (Local Name)

All Mangifera spp. (Assam family - Mangga or Macang Hutan)

All Durio spp. (Durian)

Triomma, Dacryodes and Canarium spp. (All Kedondong species)

Shorea pinanga, Shorea amplexicaulis,Shorea pilosa, Shorea mecistopteryx,Shorea cristata,Shorea macrophylla (All Tengkawanag / kawang)

All Dracontomelon spp. (Sengkuang)

All Lansium spp. (Langsat)

All Baccaurea spp. (Tampoi, Rambai and Belimbing Hutan)

Parartocarpus spp. (Terap)

Artocarpus dadah (Buruni)

Artocarpus integer (Pulutan)

All Nephelium spp. (Meritam and Rambutan)

Paranephelium nitidum (Membuakat)

Aquileria malaccensis (Gaharu)

Euphoria malaiensis (Mata Kuching)

* Forest Reserve only

Appendix 3.7.3 Sarawak

Under Section 31 of Sarawak's Wildlife Protection Ordinance, 48 protected plant species are listed as follows:

Part I – Totally Protected Plants
Scientific Name (Local Name)

1. All *Rafflesia* species (Bunga pakma)
2. *Dipterocarpus Obloglofolius* (Ensurai)

Part II – Protected Plants
Scientific Name (Local Name)

1. *Shorea macrophylla* (Engkabang jantong)
2. *Shorea splendida* (Engkabang bintang)
3. *Shorea hemsleyana* (Engkabang gading)
4. *Shorea seminis* (Engkabang terendak)
5. *Shorea palembanica* (Engkabang asu)
6. *Shorea stenoptera* (Engkabang rusa)
7. *Shorea pinanga* (Meranti langgai bukit)
8. *Shorea ochracea* (Raruk)
9. All *Ficus* species (Ara, Entimau, tempan)
10. *Sonneratia alba* (Perepat)
11. *Sonneratia caseolaris* (Pedada)
12. *Avicennia alba* (Api-api hitam)
13. *Avicennia lanata* (Api-api bulu)
14. *Avicennia marina* (Api-api merah)
15. *Avicennia officinalis* (Api-api sudu)
16. *Lumnitzera littorea* (Teruntum merah)
17. *Koompassia excelsa* (Tapang)
18. *Koompassia malaccensis* (Menggris)
19. *Aetoxylon sympetalum* (Kayu gaharu)
20. *Aquilaria beccariana* (Kayu gaharu, engkaras)
21. *Aquilaria malaccensis* (Kayu gaharu)
22. *Aquilaria microcarpa* (Kayu gaharu)
23. *Didesmandra aspera* (Simpor pelagus)
24. *Casuarina equisetifolia* (Rhu laut)
25. All *Rhododendron* species (Bunga gegansai)
26. All *Nepenthes* species (Periok kera, Entuyut)
27. All *Orchidaceae* species (Orkid)
28. *Salacca magnifica* (Salak)
29. *Johannesteysmannia altifrons* (Ekor buaya)
30. *Areca triandra* (Pinang borneo)
31. *Areca jugahpunya* (Pinang jugah)
32. *Pinanga mirabilis* (Pinang tudong pelandok)
33. *Areca subcaulis* (Pinang pici)
34. *Licuala orbicularis* (Biris)
35. *Eurycoma longifolia* (Tongkat ali, Sengkayap)

36. *Goniothalamus velutinus* (Kayu hujan panas, Lim panas)
37. All *Monophyllaea* species
38. *Antiaris toxicaria* (Ipoh)
39. All peat swamp species of *Madhuca* (Ketiau)
40. *Calophyllum lanigerum* (Bintangor)
41. *Calophyllum teysmanii* (Bintangor gading)
42. *Cycas rumphii* (Paku gajah, Paku laut)
43. All epiphytic *Lycopodium* species (Ekor tupai)
44. All *Begonia* species (Riang, telinga gajah)
45. All *Aeschynanthus* species (Lip-stick plant)
46. All *Cyrtandra, Didymorcarpus*, and *Didissandra* species (Melebab)
47. All species of plants listed in Appendices I and II of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), excluding those already listed in Part I.

Appendix 3.8

Protected Marine Animals

Fisheries (Control of Endangered Species of Fish) Regulations 1999 (updated 2008)

Group	Species
Dugong	*Dugong dugon*
Whale	*Balaenoptera edeni*
	Balaenoptera borealis
	Balaenoptera musculus
	Balaenoptera physalus
	Balaenoptera acutorostrata
	Megaptera novaeangliae
Dolphin	*Orcaella brevirostris*
	Sousa chinensis
	Orcinus orca
	Tursiops truncates
	Lagenodelphis hosei
	Stenella longirostris
	Globicephala macrorhynchus
	Grampus griseus
	Kogia breviceps
	Neophocaena phocaenoides
	Delphinus delphis
	Pseudorca crassidens
	Physeter catadon
Whale Shark	*Rhincodon typus*
Clams	*Tridacna gigas*
	Tridacna squamosa
	Tridacna maxima
	Tridacna crocea
Sawfish	*Anoxypristis cuspidate*
	Pristis clavata
	Pristis microdon
	Pristis pectinata
	Pristis perotteti
	Pristis pristis
	Pristis zijsron

Appendix 3.9

Example of Germplasm Collection
(Conserved in MARDI field genebank and other centres)

Crops	Location of Field Genebank/ Arboretum	No of accessions
Coconut	MARDI, Hilir Perak	45
Coffee	MARDI, Kluang	425
Roots and tubers	MARDI, Serdang	800*
Medicinal Plants (encompassing 275 species)	MARDI, Cameron Highlands	62
	MARDI, Jerangau	3,377
Spices and beverages	MARDI, Kluang	300
Ulam	MARDI, Jerangau	78
	MARDI, Seberang Perai	60
Herbal plants	Department of Agriculture, Sarawak, various centres	over 200
Useful Plants	Sarawak Biodiversity Centre	1155**

*estimates, ** updated during preparation of this report.

Source: Jamadon et al. (2007).