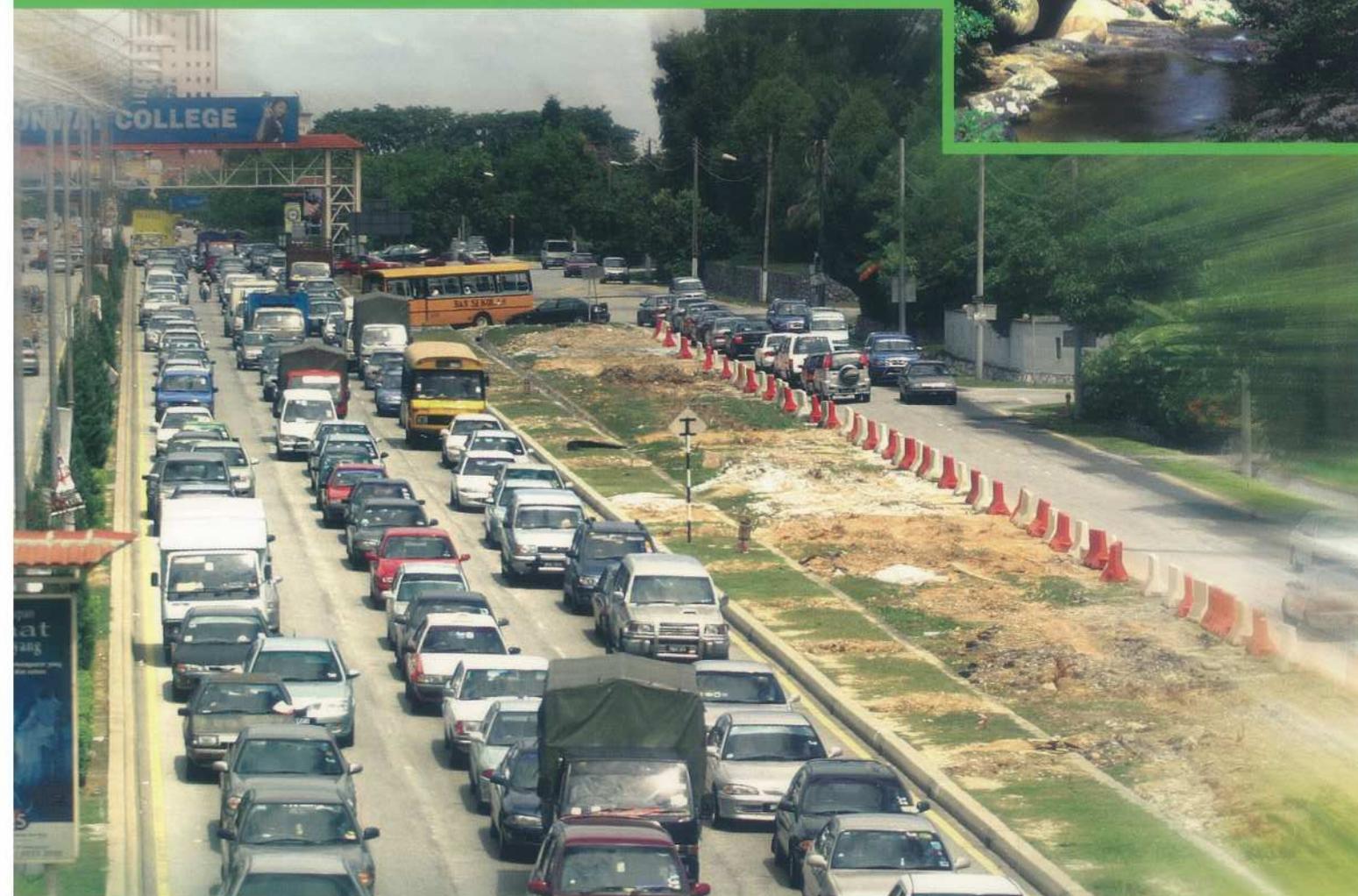
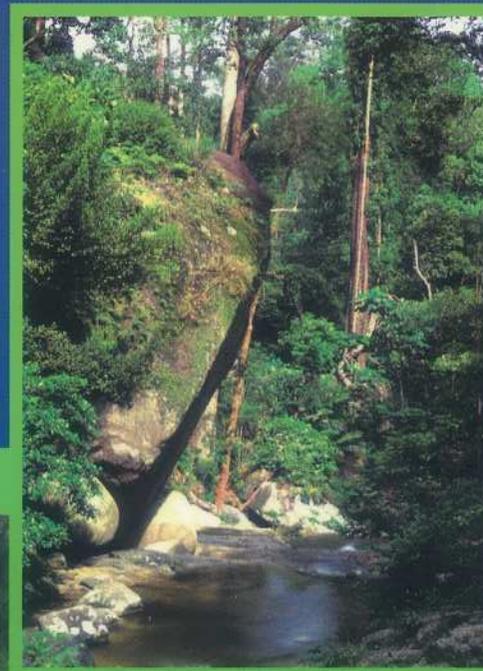


# Climate Change in Malaysia

Conservation and Environmental  
Management Division (CEMD)  
Ministry of Natural  
Resources and Environment (NRE)





## Multilateral Environmental Agreements: Capacity Building and Implementation Project (MEA Project), Malaysia

The DANIDA funded MEA Project is based in the Conservation and Environmental Management Division (CEMD) of the Malaysian Federal Ministry of Natural Resources and Environment. The project aims to build capacity at the CEMD and other relevant stakeholders to support Malaysian participation in international negotiations and national implementation of commitments under selected MEAs such as The Convention on Biological Diversity (CBD) and United Nations Framework Convention on Climate Change (UNFCCC), including their Protocols.

The project also aims at building close working relations among all key stakeholders in conservation and environmental management through joint training activities, network building and mobilisation of relevant expertise and knowledge. The project is developing implementation strategies for the selected MEAs and will operationalise MEA implementation. Two states have been selected for a state-federal pilot initiative in the management of wetlands.

*Text copyright @ Conservation and Environmental  
Management Division  
Photographs copyright @ as credited*

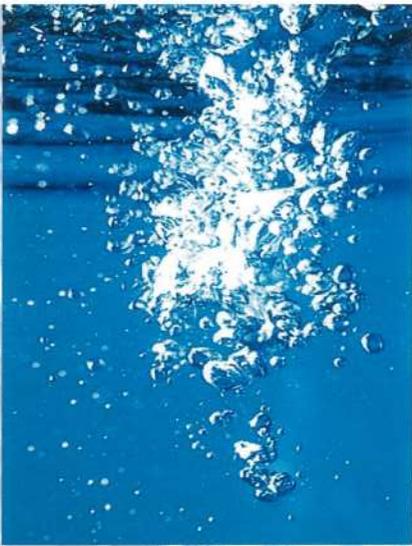
*This publication may be reproduced in whole or in part  
in any form for education or non-profit uses, without  
special permission from the copyright holder, provided  
acknowledgement of the source is made.*

First published 2005

ISBN 983-42861-0-7

# Contents

<b>Preface</b>	3
<b>It's not just hot air</b>	
<i>What is Climate Change?</i>	4
<b>Feeling the heat in Malaysia</b>	
<i>Impact of Climate Change</i>	5
<b>Agriculture</b>	6
<b>Water Resources</b>	7
<b>Forestry</b>	8
<b>Coastal Resources</b>	9
<b>Public Health</b>	10
<b>Energy Sector</b>	11
<b>Signed, sealed and delivered</b>	
<i>International Agreements on Climate Change</i>	12
<i>The Milestones</i>	13
<b>Tackling climate change in Malaysia</b>	
<i>Malaysia's Scorecard</i>	14
<i>The Approach</i>	15
<b>Commitments and opportunities</b>	
<i>Fulfilling Malaysia's Obligations</i>	
<b>National Communication</b>	16
<b>Clean Development Mechanism</b>	18
<b>Bilateral and Multilateral Cooperation</b>	18
<b>Challenges ahead</b>	
<i>Preparing for the Inevitable</i>	19
<i>Making Sense of Climate Change</i>	20
<b>Climate change related projects</b>	21
<b>Contacts</b>	22
<b>Abbreviations</b>	23



## Preface

It has been more than 10 years since Malaysia ratified the United Nations Framework Convention on Climate Change (UNFCCC) and developments since then have been encouraging, both locally and globally. Foremost is the ratification of the Kyoto Protocol by Russia in 2004, which allowed for it to enter into force on 16 February this year. Although Malaysia, as a Non-Annex 1 Party to the Kyoto Protocol that was ratified in 2002, has no obligations towards reducing emissions of greenhouse gases, the Government has taken the necessary steps to tackle the challenges brought about by climate change.

At the turn of the millennium, Malaysia fulfilled one of its obligations to the UNFCCC by submitting the Initial National Communication (INC), outlining Malaysia's efforts in addressing the causes and impacts of climate change, and the various strategies that have been and continue to be pursued. The three important elements of the National Communication concern the country's plans and activities in preparing GHG inventories, adaptation and mitigation. The international commitments and Malaysia's own sustainable development goals form the overarching framework in its bid to tackle these three elements.

Among others, this objective is achieved through multilateral and bilateral collaborations, whereby the Government of Malaysia has responded positively towards the exchange of information and capacity building with international and local bodies. One such collaboration is with the Danish International Development Agency (DANIDA), formerly the Danish Cooperation for Environment and Development (DANCED), to undertake the Multilateral Environmental Agreements: Capacity Building and Implementation Project (MEA Project). This Project is carried out by the Conservation and Environmental Management Division of the Ministry of Natural Resources and Environment. It aims to facilitate the participation in and implementation of the MEAs that Malaysia has committed to.

This booklet is an output of the MEA Project's awareness component. It attempts to collate, summarise and communicate information concerning climate change, targeting the needs of readers from within the Government – ranging from the decision makers at the federal level to the officers at the state and district levels, Members of Parliament, the private sector, civil society groups involved in environmental issues, and the media. The booklet illustrates the relevance of the climate change issue to Malaysians and how such a phenomenon could well require the attention and action of all parties.

The publication of this booklet is also timely because it coincides with the preparations for the Second National Communication. It is hoped that the readers will be able to reflect on the developments since INC and to review how best to tackle the challenges that are ahead of us in dealing with climate change.



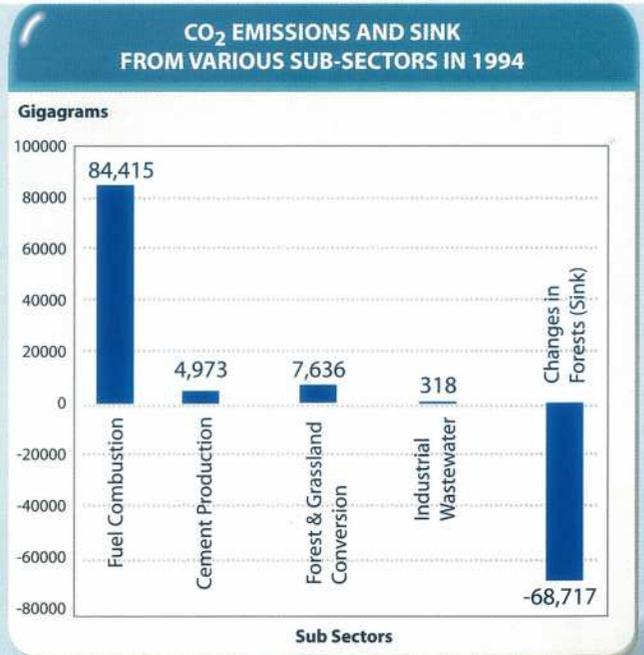
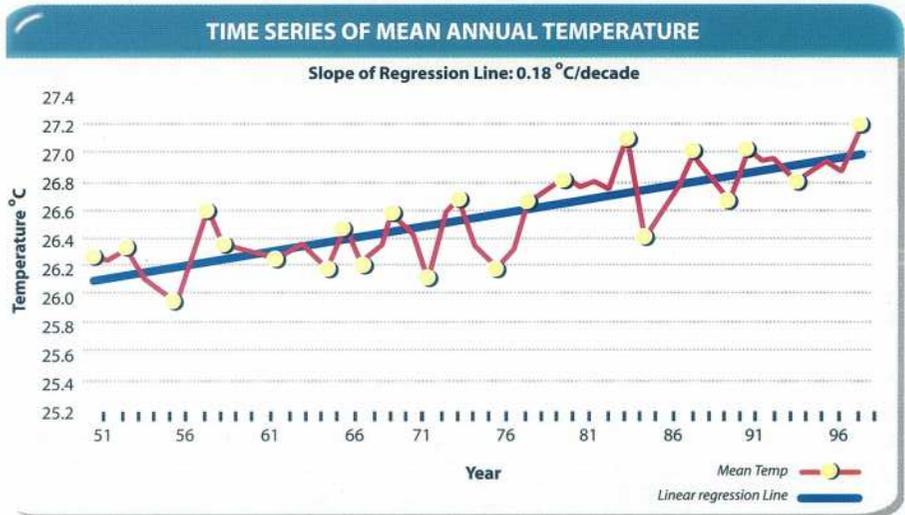
# Feeling the heat in Malaysia

## Impacts of Climate Change

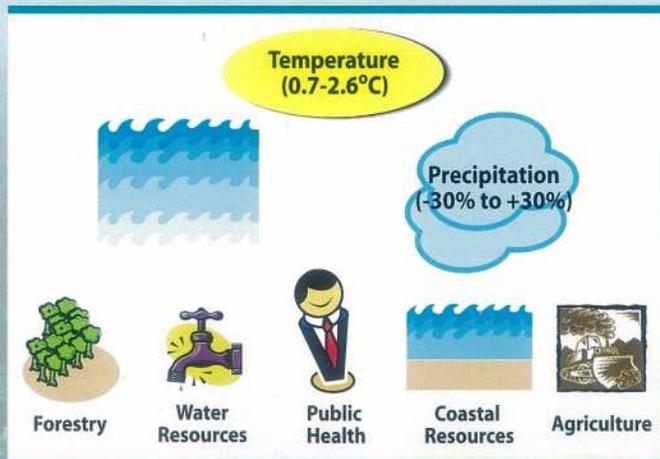
It is hard to predict accurately the impact of climate change because of the many uncertainties concerning the ways in which we measure climatic changes. Scientific analysis is often made difficult due to limited information from across the globe that could explain trends in weather patterns and make long term predictions. Despite this constraint, scientists have been able to come up with a set of indicators that can be used to map the extent of these changes.

According to the IPCC and based on what is known as the Global Climate Models (GCM), it is expected that by the year 2100, global temperatures could increase between 1 degree Celcius and 4.5 degrees Celcius. Assuming higher concentrations of the GHGs, the GCMs also project higher global precipitation, with the highest in areas with high latitudes during winter. With such changes in temperatures and rainfall, sea levels are expected to rise between 13 and 94 cm within 100 years.

In Malaysia, forecasts have been made based on climate modelling using 14 GCMs, which show that Malaysia could experience temperature changes from +0.7 degrees Celcius to +2.6 degrees Celcius, and precipitation changes ranging from -30% to +30%. In the INC submitted to the UNFCCC in 2000, the impact of climate change was identified in several sectors in Malaysia.



### POTENTIAL CLIMATE CHANGE IMPACT IN MALAYSIA





# Agriculture

1

At least a third of the country's population depend the agriculture sector for their livelihood, with some 14% working in farms and plantations. From the perspective of land use, about 16% of total land use involves tree crops like rubber, oil palm, cocoa and coconut. In Malaysia's INC, it was estimated that with changes in average temperature and rainfall, key crops like rubber, oil palm, cocoa and rice as well as other agricultural activities like animal husbandry and aquaculture could be affected. A major concern in this aspect is also the sustainability of food supply that could be affected by climate change.

However, the impacts on agriculture differ from one to the other. Some crops like oil palm could flourish with higher rainfall, but rubber plantations could suffer due to loss of tapping days and crop washout. According to official projections, increased temperature and changes in rainfall pattern could affect crop yields directly, or by the spread of fungus and diseases indirectly. States most vulnerable to these changes are in the northern Peninsular, as well as the coastal areas of Sabah and Sarawak.

## HOW CLIMATE CHANGE AFFECTS THE AGRICULTURE INDUSTRY

- Increase in rainfall is bad for rubber but good for oil palm, unless flooding occurs
- 273,000 ha of land or 15% of current rubber land could be affected, without supporting mechanisms
- Rise in sea level could force the abandoning of low-lying planted areas
- Decreases in rainfall could also happen, affecting crops that need wet conditions
- Rice grain yields may decline by 9% to 10% for each 1 degree Celsius rise
- Prolonged droughts make it impossible to sustain the flooded rice ecosystem
- Jeopardise security of food supply

Source: INC, 2000



2

3



## Adaptation Measures

- *Develop plant varieties that are tolerant to high temperatures and high water use efficiency*
- *Develop the means to maximise efficient usage of water and nutrient input*
- *Preserve PFRs and water catchment areas to ensure adequate water supply for agriculture*
- *Develop appropriate management practices for post-harvest handling*
- *Strengthen the Integrated Pest Management and biocontrol procedures to deal with increased incidences of pests and diseases*
- *Conduct research on impact of environment on the physiology of animals to cope with the changes and perform optimally*
- *Establish semi-controlled or controlled plant and animal housing*
- *Implement microclimatic modification through landscaping and agro-forestry*
- *Develop appropriate responses to land use conversion that address socio-economic causes of land-use conversion*

1. Plantations close to the coast, like this in Kelantan, could be exposed to floods due to sea level rise. Photo by: WWF-Malaysia / M. Kavanagh.

2. Climate change affects biodiversity; the much-loved petai may be lost when forests suffer from changes in rainfall and temperature. Photo by: WWF-Malaysia / M. Fujita.

3. With more rains, crops could be exposed to diseases, thus affecting yield. Photo by: WWF-Malaysia / Lee Kup Jip.

Think Climate Change and .....  
- Agricultural Policy



# Water Resources

Rapid urbanisation and industrialisation has led to higher demands for water resources from the industrial sector, agriculture (through irrigation) and for household and commercial use. With projected increases in temperature and changes in precipitation, we could be faced with two possible scenarios, not necessarily independent of each other.

On the one hand, flood intensity and frequency could increase with a higher storm magnitude. More floods essentially mean destruction of properties and infrastructure, and loss of livelihoods in critical areas. The National Water Resources study in 1982 projected that long-term annual average flood damage to be at RM100 million.

On the other hand, Malaysia could experience lower rainfalls that could affect the availability of water, thus placing a strain on households, the agriculture sector and industries. This scenario is also worrying against the backdrop of rising demand as a result of the growth in population and industrialisation.

Water management is an area that requires the attention of both the Federal and State authorities. For example, while the Drainage and Irrigation Department (DID) holds a macro view of drainage and irrigation matters, local authorities still have a large say in water, land and infrastructure development in their localities.



4. Malaysians experience water shortages especially during the drought season. Photo by: WWF-Malaysia / Peter Teh.

5. Climate change could affect the supply of water for industrial, agricultural and domestic use. Photo by: WWF-Malaysia / Peter Teh.



## Adaptation Measures

- *Enlarging reservoir capacity*
- *Improving hydrological forecasting*
- *Promoting widespread use of groundwater*
- *Changing land use practices*
- *Demand side management for water resources*
- *Buffer zones in agriculture and forestry industries to minimise erosion and sedimentation*

Think Climate Change and .....  
Town and Country Planning  
Water Resources Management



5



## Plugging the leaks through cooperation

In its Urban Stormwater Management Manual for Malaysia (2001), which replaced the 1975 manual, the DID noted that for its management of stormwater to succeed, it would require planning and implementation that is consistent throughout the local, state and federal administrations to ensure that social, development, safety and environmental objectives are met.

## Losing millions in floods

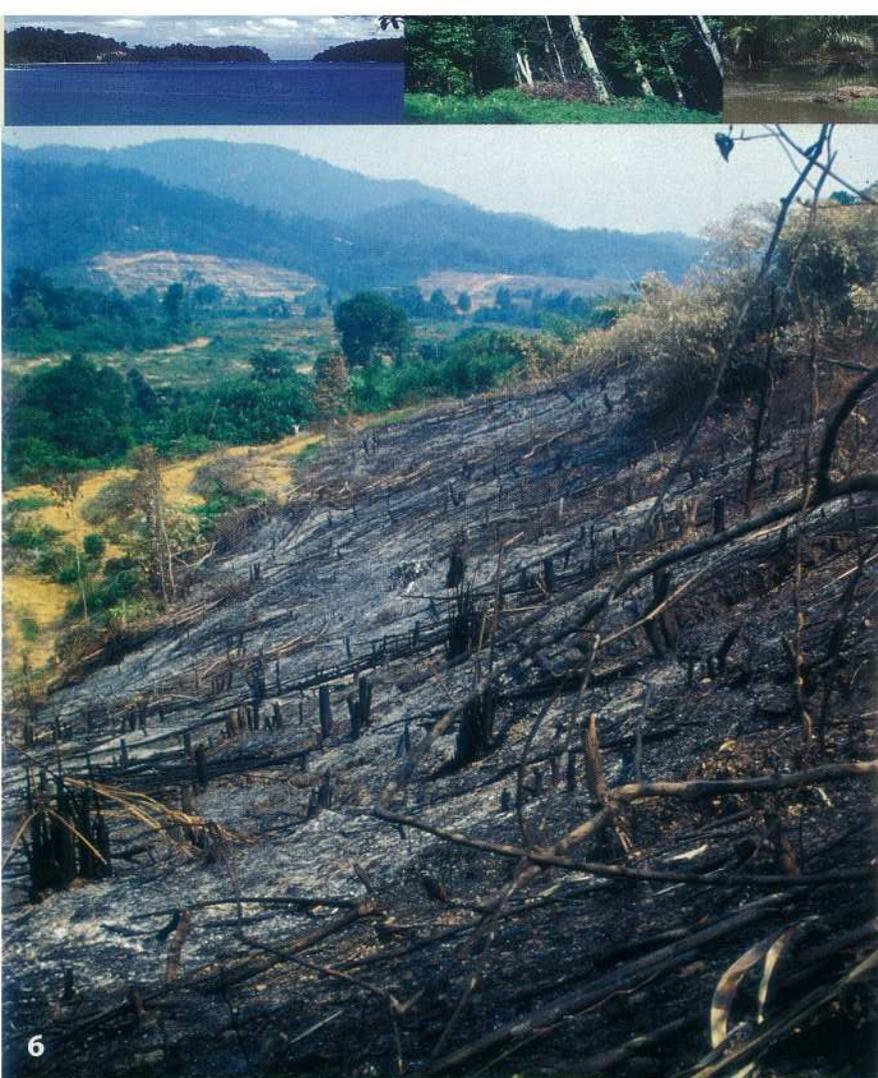
Floods are common in Malaysia, especially in the east coast of Peninsular Malaysia where heavy rainfall from November to January sometimes bring devastating rains to the affected areas and the communities. As much as nine percent of the land area in Malaysia (29,000sq.km) is flood prone and as many as 2.7 million people have become victims. The biggest flood to have hit Malaysia occurred in 1926, and there have been at least seven other severe floods since then, the most recent in 1992. Without adequate measures, occurrence of floods could cost the country RM100 million annually in damages.

# Forestry

Forests are important to an ecosystem because of two very unique features: as a reservoir for carbon, through a cycle commonly known as carbon sinks; and as an integral part of the global biological system. While climate change seems to have lesser impact on forests compared to the potential losses from land use change, the Government is seriously studying the extent to which forests can adapt to the projected changes. At the 9<sup>th</sup> Conference of Parties, a set of guidelines for CDM projects in reforestation and afforestation were adopted, indicating the importance of forestry resources, mainly as carbon sinks.

Through Sustainable Forest Management, areas gazetted as permanent forest reserved (PFRs) increased to 14.39 million hectares in 2003 from 12.74 million hectares in 1990, while national parks and wildlife sanctuaries expanded to 2.4 million hectares from 1.5 million hectares in the same period, according to the Malaysian Timber Council's 2004 Fact Sheets on Forestry and Environment. The conservation of forests and their resources is also in tandem with the commitments outlined in the Convention on Biological Diversity, which Malaysia ratified in 1994.

## WETLANDS AS CARBON STORAGE



## Adaptation Measures

- Forest plantation establishment
- National seed bank collection
- Promotion of greater use of timber
- Reduction of wastage in forest harvesting and increased efficiency in wood processing
- Strengthen and integrate conservation of protected areas

6. The country's rich rainforest is at risk due to forest fires like these in Sandakan, Sabah. Photo by: WWF-Malaysia / Balu Perumal.

7. Reforestation and afforestation are projects that qualify for CDM. Photo by: WWF-Malaysia / Dionysius Sharma.

Think Climate Change and .....  
- Forest Management  
- Ramsar Convention

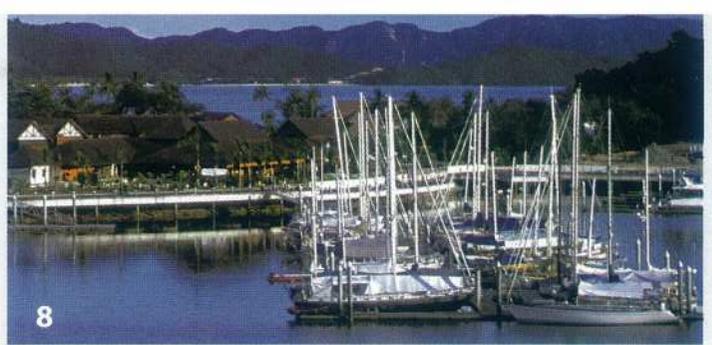


# Coastal Resources

Unlike the northern hemisphere where ice caps are melting and possible rise in sea levels could cause floods, Malaysia's exposure to this phenomenon is unclear. Areas most susceptible to sea level rise are in the east coast of the Peninsular Malaysia, Sabah and Sarawak – where the effects may be felt by farmers with crops close to the sea, or fishermen, and communities who depend on the resources along the coast.

In a worse case scenario where sea levels are projected to rise 0.9cm/yr for 2100, the impacts could range from tidal inundation, shoreline erosion, increased wave action, and to a minimum extent, saline intrusion. It is estimated that at that level of rise, the fringing mangrove belt could deplete and the sandy shoreline could retreat at a rate of 30% more to the existing shoreline erosion.

Changes in the coastline are particularly felt by fishermen, whose losses could top RM300 million in prawn harvesting as a result of losses in mangrove by about 20%; and farmers especially in the Western Johor Agricultural Development Project Area who could suffer losses amounting to RM46 million. Apart from socioeconomic impacts, mangroves that are home to diverse flora and fauna are under threat of destruction.



8

## SOCIO-ECONOMIC IMPACTS RESULTING FROM SEA LEVEL RISE

Type of Impact	Socio-economic Impacts based on the High Rate of Sea Level Rise (0.9cm/yr)
Loss of agricultural production from eroded/inundated lands	RM46 million for Western Johor Agriculture Development Project area. The West Johor Project area accounts for about 25% of the national drainage areas
Displacements of flood victims with associated disruption of business/economic activities resulting from increased flooding	Long-term annual flood damage estimated at about RM88 million for Peninsular Malaysia and RM12 million for Sabah/Sarawak based on 1980 price level. If the flood frequency is doubled, the annual flood damage will increase by 1.67 times.
Loss of fisheries production due to mangrove loss	RM300 million loss based on 20% loss of mangrove resulting in a loss of about 70,000 tonnes of prawn production valued at RM4,500/tonne.
Interruption of port operation	May see some improvement due to reduced siltation

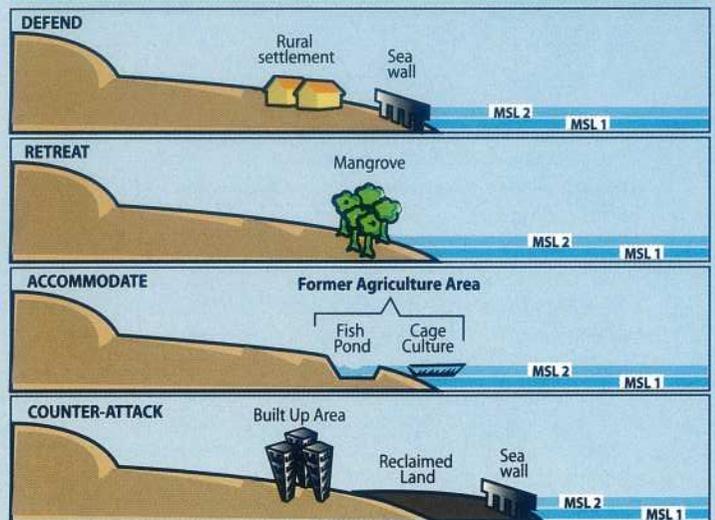
Source: INC, 2000

### IMPACT OF SEA LEVEL RISE (0.9cm/yr)



- Shoreline retreat of 30%
- Increased wave action
- RM300 million losses of fisheries production because of loss in mangrove by about 20%

### POSSIBLE RESPONSE OPTIONS TO THE IMPACTS OF A RESING SEA



Source: National Response Strategies to Climate Change, 2001

8. Popular tourist spots like Pangkor Island need to be protected against sea level rise. Photo by: WWF-Malaysia / Stephen Hogg.



### Adaptation Measures

- *Defend*
- *Accommodate*
- *Retreat*
- *Counter Attack*
- *Coastal land buyback*
- *Integrated coastal zone management (ICZM)*

Think Climate Change and .....  
- Integrated Coastal Zone Management





# Public Health

Predictions about the impact of climate change on public health are speculative and general, given that region-specific scenarios are not available. Nevertheless, Malaysia can expect significant impact mainly because of its tropical weather with high rainfall and temperatures that make dangerous combinations for vector-, air-, food- and water-borne diseases; respiratory illnesses due to air pollution; and even deaths due to heat stress. The most common vector-borne disease is malaria; though numbers have reduced over the decades, increases in temperature and rainfall could see more and new breeding grounds suitable for the malaria vectors (see box). Dengue, which has become an urban phenomenon, could become more serious if rainfall increased to a level that raises

the transmission opportunities for the vectors.

Other diseases common to Malaysia that could spread wider due to temperature and humidity rise include arboviral diseases like viral encephalitis. An increase in temperature shortens the reproductive cycle and intrinsic development of the pathogens, allowing the transmission of the diseases. The 1998-99 outbreak of the Nipah Virus resulted in more than 100 human fatalities and the culling of thousands of pigs. In this case, departments responsible for veterinary services, public health, local authorities and medical research institutes relied on each other to effectively deal with the problem.



## How climate change increases cases of malaria...

Public health initiatives have been successful in significantly reducing the number of malaria cases. It has been recorded that from 243,870 malaria cases detected in 1961, the number dropped to 26,652 in 1997, in other words down by 90 percent in over 35 years. Malaysia's success has been widely recognised by international bodies such as the World Health Organisation. This success is however being threatened by changes in the climate that could reverse the downward trend in cases and pose dangers to communities living close to what could be new and more mosquito breeding grounds.

- An increase in rainfall and temperature would allow malaria vectors to survive in areas immediately surrounding their current distribution limit

- Possibility of increase in sea level could lead to a corresponding rise in coastal vectors with more breeding grounds, as there will be more areas covered with brackish water
- Deforestation, without proper and sound land practice, could open more breeding areas, thus leading to a higher incidence of malaria

## Under the blanket of haze

August of 2005 saw many areas in the west coast of the Peninsular shrouded in haze, almost a repeat of the 1997 episode. In 1997, the haze occurred when prolonged drought brought about by El Nino, contributed to the forest fires within the region. Among the worse affected were Malaysia, Singapore and Indonesia, where haze and smoke led to respiratory-related health problems like asthma and bronchitis as well as cardiovascular problems with the vulnerable groups like the elderly, the very young and those with pre-existing problems. In the latest incident, at least seven deaths were said to be related to the haze.

El Nino is a phenomenon resulting from temperature changes in the Pacific currents, resulting in changes in the weather around the world. Governments are becoming more vigilant of new patterns in the weather, mainly to prepare against any catastrophes.

It is usually a combination of factors that lead to degradation in air quality and, among them, open burning by industries and individuals, and emissions from the transportation and industrial sectors, which necessitate action from various departments.

9. Children suffer the most during the haze; at dangerous levels, schools are closed and parents advised to keep their children indoors.  
Photo by: WWF-Malaysia / Stephen Hogg.

10. Selangor was hit by the haze again in August this year.  
Photo by: WWF-Malaysia / Laili.

Think Climate Change and .....  
- Health Policy  
- Forestry and Public Health



# Energy Sector

While the energy sector contributes significantly to emissions of GHGs, it is also one of the areas that will be affected by climate change. Specifically, changes in rainfall, temperature and rise in sea level could affect the way electricity is produced and consumed, while there are concerns about the exposure to the oil and gas industry.

## Sea level rise

Operations that are most exposed to sea level rise are electrical power producing, as most thermal power plants are located near the sea for cooling purposes, and boat landing facilities for the oil and gas exploration activities. It can be assumed that these operations will experience higher maintenance or relocating costs as a result of coastal erosion or when landing platforms are submerged.

## Temperature

The efficiency of thermal power plants is also determined by water and sea temperature, where higher temperature could translate into a drop in output and higher production costs. An increase of 1 degree Celsius in the temperature of sea water will result in an eight percent drop in the performance of a typical 110MW steam turbine, or a loss of two percent power output as a result of increases in the similar magnitude in ambient air temperature. For households, warmer weather will mean a higher tendency to use more electrical energy for cooling purposes.



11



12

### PROJECTED IMPACTS AND ADAPTATION/MITIGATION MEASURES IN OIL AND GAS SECTOR

Climate Change	Impact	Adaptation/Mitigation
Rise in sea level	Offshore boat landing facilities will be submerged	Raise the offshore platform which is costly
	Coastal facilities will be flooded	Build retaining wall/dredging
	Loading and unloading activities at the port will be interrupted The port cannot function for its intended purpose	Build retaining wall/dredging Build retaining wall/dredging
Higher rainfall (flooding)	Operation of coastal facilities will be affected	Install water pump; Upgrade irrigation system
	Overflow of waste water treatment	Install water pump; Upgrade irrigation system
	Soil and ground water pollution	Clean the polluted area
Increase in tropical storms	Crew changeovers at the offshore terminals will be delayed	Reschedule
	An increase in late cargo deliveries	Reschedule
Increase in air & water temperature	Reduced efficiency of cooling water systems	Upgrade existing cooling system
	Higher make-up water requirement	Use some external cooling system
	More fuel consumption in transport	Use more efficient air conditioning systems

Source: INC, 2000

### PROJECTED IMPACTS AND ADAPTATION/MITIGATION MEASURES AND COSTS IN THE ELECTRICITY SECTOR

Climate Change	Impact	Unit cost of impact	Estimated cost of impact	Adaptation/Mitigation
For every 1°C rise in ambient air temperature	Loss in gas turbine power output by 2%	Loss of RM0.67 million/yr per 110 MW gas turbine	About RM40 million/yr for 6,600 MW capacity	Air intake cooling
	Loss of 2% power output of hydro turbine	Loss of RM0.9 million/yr per 100 MW hydro turbine	About RM18 million/yr for 2,000 MW capacity	Precipitation enhancement
For every 1°C rise in water air temperature	Loss of 8% power output of steam turbine	Loss of RM2.6 million/yr per 110 MW steam turbine	About RM95 million/yr for 4,000 MW capacity	Air cool condenser
1m rise in sea level	Erosion of beaches fronting power station	Specific to a few stations. Currently RM2 million is spent annually to mitigate erosion problems at each of the stations affected by coastal erosion		Wave break waters Relocation of power plants
	Corrosion	RM3 million/yr per station	RM18 million/yr for six stations	Cathodic protection, painting

Source: INC, 2000

11. The transportation sector is a major emitter of GHGs. Photo by: WWF-Malaysia / Stephen Hogg.

12. Industrial energy demand for cooling purposes could rise due to higher ambient temperatures. Photo by: WWF-Malaysia / Azwad MN.

Think Climate Change and .....  
- National Energy Policy



# Signed, sealed and delivered

## *International Agreements on Climate Change*

The two most important documents directing global attention towards climate change are the UNFCCC and the Kyoto Protocol.

The UNFCCC, which came into force in 1994, sets out an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognises that the climate system is a shared resource and that its stability can be affected by industrial and other emissions of GHGs. As of September 2005, 189 countries have ratified the Convention.

Despite the noble intentions in the Convention, implementation posed a serious challenge. Governments meeting at the First Convention of Parties meeting in Berlin in 1995 then launched a new round of talks to decide on stronger and more detailed commitments for industrialised countries.

The result came two years later at COP 3 in Japan – the Kyoto Protocol. Even then, the parties that had signed or were committed to sign the Protocol had issues to resolve concerning targets and implementation mechanisms, which began to take a more visible shape during COP 7, subsequently through the adoption of the Marrakesh Accords.



## MILESTONES IN CLIMATE

1972	1989	1990	1992
1 <sup>st</sup> Earth Summit, Stockholm	Malaysia ratified Montreal Protocol on Substances that Deplete the Ozone Layer	1 <sup>st</sup> IPCC report - <i>The planet seems to be warming</i>  - Human activity seems to be responsible for it	2 <sup>nd</sup> Earth Summit, Rio de Janeiro - UNFCCC was adopted at Rio Convention  - Call for a stabilisation of GHG emissions by 2000

13. In Hague in 2000, delegates to COP 6 had a tough time at talks. Photo by: Courtesy IISD.

# The Milestones

## UNFCCC

### Under the Convention, governments:

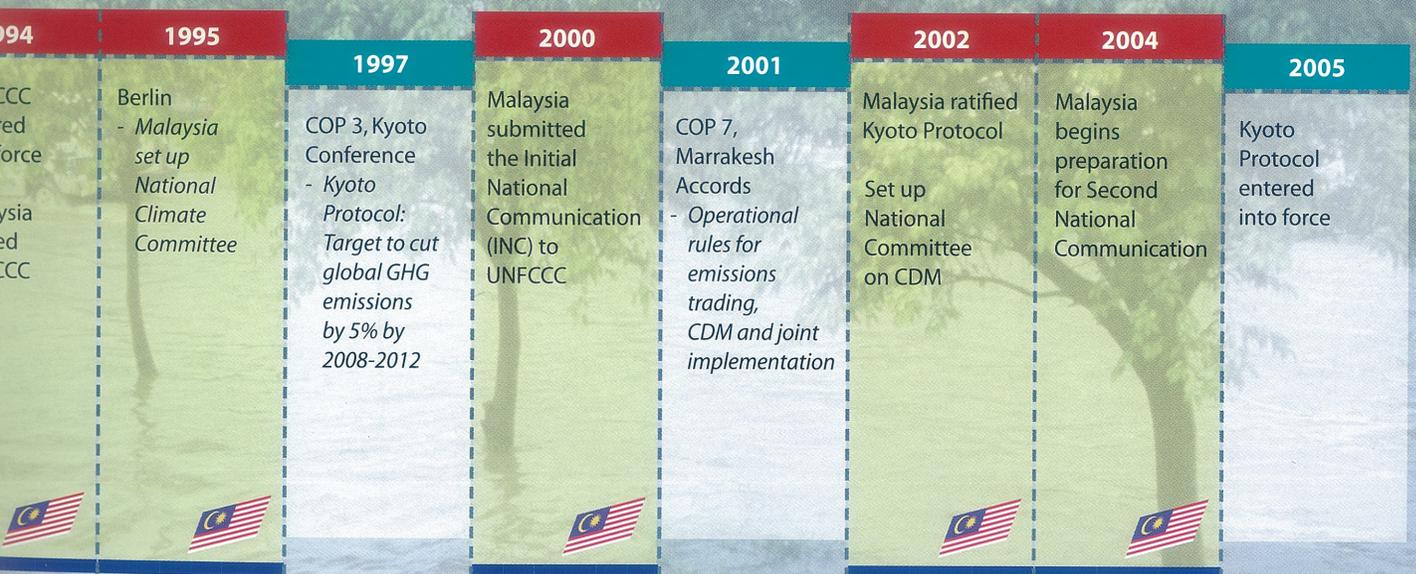
- gather and share information on GHG emissions, national policies and best practices
- launch national strategies for addressing GHG and adapting to expected impacts, including the provision of financial and technological support to developing countries
- cooperate in preparing for adaptation to the impacts of climate change

## Kyoto Protocol

### The Protocol:

- Sets targets for industrialised countries, known as Annex 1 Parties to reduce their overall emissions of GHGs by at least 5% below their 1990 emission levels during 2008-2012
- Has more "teeth" to ensure compliance among Annex 1 Parties
- Has mechanisms to assist Annex 1 Parties to cut their emissions – joint implementation, clean development mechanism and emissions trading
- Introduced the clean development mechanism that allows developing countries to achieve their sustainable development goals in the spirit of the Convention

## CLIMATE CHANGE COMMITMENT (INTERNATIONAL AND LOCAL)



4. Delegates discuss the Kyoto Protocol mechanisms at COP meetings.  
Photo by: Courtesy IISD.



# Tackling climate change

## Malaysia's Scorecard



In general, Malaysia adopts a “precautionary principle” and “no regret” policy, that action, justified in their right, could be taken to mitigate or adapt to climate change, even though there are still scientific uncertainties. The overarching framework is sustainable developments goals that are embodied in the Third Malaysia Plan (1976 - 1980).

A National Climate Committee was formed in January 1995 and chaired by the Secretary-General of the then Ministry of Science, Technology and the Environment, now the Ministry of Natural Resources and Environment. At least ten Government ministries and agencies are represented in this committee that also includes stakeholders from the business and civil society groups.

Some of the strategies adopted by Malaysia to address climate change are as follows:

- Identifying the energy sector as a major contribution of GHGs to the atmosphere. To reduce the heavy dependence on oil, the Government has identified hydro power and gas, besides oil and coal, as the primary sources to meet increasing energy demands
- Promotion of energy efficiency among industries, buildings and the transport sector
- Implementation of public awareness programmes by government agencies and non-government organisations to promote energy efficiency, recycling and use of public transport
- Maintenance of an effective forest management and conservation programme to preserve biodiversity and sinks for GHGs
- Ensuring food sufficiency by obtaining detailed information on the supply and demand gaps from food production and supported by research projects
- Undertaking a coastal vulnerability index study (CVI) that could serve as a basis for recommending proactive adaptive measures to mitigate the impact of sea level rise

### Environment-related policies in Malaysia

- National Forestry Policy, 1978
- National Energy Policy, 1979
- National Policy on Biological Diversity, 1998
- National Policy on the Environment, 2002
- Third National Agricultural Policy, 1998-2010

### Laws related to climate change

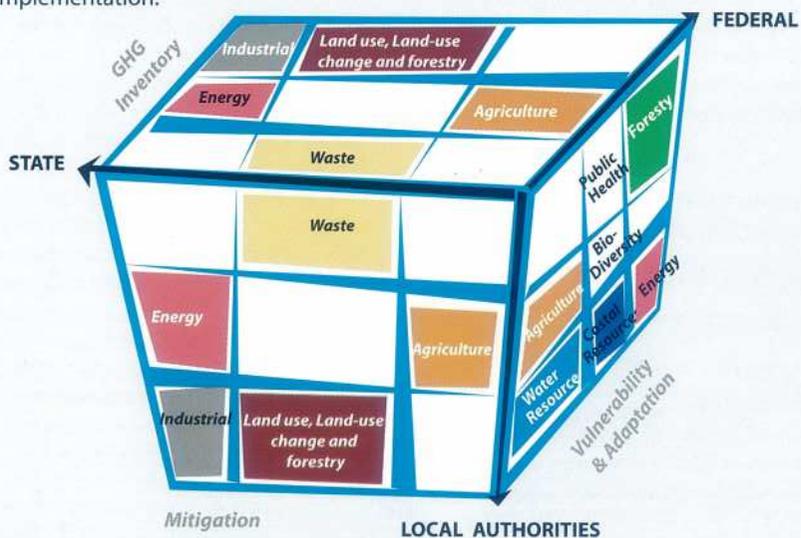
- Environment Quality Act 1974
  - EQ (Clean Air) Regulation 1978
  - EQ (Prescribed Activities) (EIA) Order 1987
- National Forestry Act 1984
- Fisheries Act 1985
  - Fisheries Maritime Regulations, 1967 (Amended 1987)
  - Fisheries (Marine Culture System) Regulation
- Town and Country Planning Act 1976
- Petroleum Mining Act 1986 (Rev. 1972)
- Petroleum Development Act 1974
- Land Conservation Act 1960
- National Parks Act 1980

15. The protection of forests must be supported by sustainable development in surrounding areas. Photo by: WWF-Malaysia / Azwad MN.

# The Approach

Malaysia's approach to climate change fits the existing trend in ensuring coordination at various levels. Previous policies and plans by the Government involved representatives of the different institutions simply because it was critical to engage the relevant parties to ensure successful implementation.

This approach was not only clear from the INC, but also from other national responses thus far. It is this model that will apply for the activities identified in dealing with climate change.



## Montreal Protocol – an example of working together

Malaysia's experience in implementing the Montreal Protocol, signed in 1989 to reduce and eventually phase out the production and consumption of chlorofluorocarbons (CFCs) and other ozone depleting substances (ODS), has received international accolades. The success story is mainly attributed to the Government's early response to establish a National Steering Committee (NSC) to oversee the development and implementation of the National Action Plan on ODS.

The NSC is composed of representatives from various ministries, including MOSTE, MITI, MIDA (Malaysian Industrial Development Authority) and the Customs Department. Industrial working groups were also formed in close consultation with experts from key ODS industries. The Government's involvement and support were critical to gain confidence of CFC manufacturers and consumers to participate in the phase-out programme.

16

16. Forest management is part of an effective climate change policy. Photo by: WWF-Malaysia / David Bowden.



# Commitments and opportunities

## *Fulfilling Malaysia's Obligations*

### National Communication

Signatories to the UNFCCC are required to submit regular reports or National Communications to the UNFCCC Secretariat. One thing to note is that the reporting timeline and content is different for the Annex 1 Parties and non-Annex 1 Parties, because of the principle of "common but differentiated responsibilities" enshrined in the Convention.

In 2000, Malaysia submitted its Initial National Communication (INC) comprising the national inventory of GHGs and the assessment of the possible impacts of climate change as well as suggestions for possible initiatives. It detailed the policies and plans in place that represent the national sustainable development agenda of the country.

The Government has now initiated the process for the preparation of the Second National Communication that will use 2000 as the baseline for the documentation of GHG inventories from various sectors, and plans to mitigate or adapt to climate change.

### GHG inventories

Much has been said about inventories, but few appreciate the importance of an accurate and proper database on GHG emissions in Malaysia. According to the UNFCCC, inventories are important for:

- Assessing the international community's collective and individual efforts to address climate change and progress toward meeting the Convention's ultimate objectives
- Evaluating mitigating options
- Assessing the effectiveness of policies and measures
- Making long term emission projections
- Providing the foundation for emission trading schemes

Work is ongoing in this area. For example, Pusat Tenaga Malaysia, with funding from the Danish International Development Agency (DANIDA), has conducted a study on the GHG inventory for the energy sector for 2002. The results are still preliminary, but generally show a significant increase in carbon dioxide emissions per capita from the energy sector, compared to the findings in 1994. Under the 8<sup>th</sup> Malaysia Plan, NRE has tasked PTM to carry out GHG Inventory Study and The Forest Research Institute of Malaysia to estimate carbon sequestration potential of Malaysia's natural forest, rubber and forest plantations.

### Vulnerability to climate change: adaptation measures

There is no direct explanation to adaptation, but the UNFCCC considers it from the perspective of the impacts of climate change. However, it basically focuses on taking steps to make social and environmental systems more resilient to the effects of climate. Article 2 of the Convention talks about the need to allow ecosystems to adapt naturally to climate change to stabilise GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner. In this regard, the Convention has called for cooperation among the Parties to prepare for adaptation to the impacts of climate change. It has been shown that certain sectors or segments of society are more vulnerable to the adverse impacts of climate change. Often, the affected groups do not have the technical or financial resources to cope with these impacts.

Hence, a significant part of the national response to climate change is to assess the vulnerability of sectors like agriculture, biodiversity, forestry, water and coastal resources, public health and energy, and to identify policies or measures for adaptation. For example, the Health Ministry's emergency plans could be reviewed to prepare for outbreaks that could occur due to climate change, or plans to strengthen and integrate conservation of protected areas as well as setting up a national seed bank collection for the forestry sector.

### GHG mitigation

Mitigation refers to actual description of plans to reduce GHG emissions or capturing and sequestering those emissions, with respect to some baseline scenario.

In Malaysia, the Government has implemented several projects aimed at capacity building to reduce emissions of GHG through energy efficiency and renewable energy as well as demand side management in the energy sector.



17. Industries can help mitigate climate change by using energy efficiently. Photo by: WWF-Malaysia / M. Kavanagh.

The focus on energy is because this sector accounts for a bulk of the emissions. Projects funded by the United Nations Development Programme/Global Environment Facility have targeted the industrial sector to improve energy efficiency and explore renewable sources through the biomass-based power generation and co-generation in the palm oil industry and photovoltaic application for buildings.

## Research and systematic observation

Central to planning any strategies is the availability of scientific, accurate and reliable information that could form the basis of the decision-making process. Information is needed from all levels to ascertain the actual extent of the problems associated with climate change and the measures that can be put in place to address them. Hence, it is necessary to have a comprehensive research and systematic observation mechanism that will certainly involve more than one agency or institution.

### Key Agencies

- Malaysian Meteorological Services Department (MMS)
- Drainage and Irrigation Department (DID)
- Malaysian Centre for Remote Sensing (MACRES)
- Malaysian Department of Survey and Mapping
- Regionally, Malaysian scientists are involved in the IGBP/START/SARCS regional programmes on climate change

## Education and awareness

Malaysians are becoming more and more conscious about the need to preserve the environment, and this is clearly reflected by the positive response to campaigns organised by the public and private sectors and non-governmental organisations. From residential communities to schools and businesses, environment has become an important agenda that requires wide participation. Media coverage of various issues like the haze, El Nino and the La Nina have also exposed the public to the delicate environment.

Yet, the response to climate change is still lukewarm. This could be due to the lack of consistent information on trends and developments in this area that reach the public, or the deep rooted perceptions that individuals cannot do much to change the situation.

Several agencies and groups have embarked on education and awareness programmes with the help of non-governmental organisations like CETDEM and MNS, involving the public as well as the media.

## Malaysian Industrial Energy Efficiency Improvement Project: Case study in mitigation

The industrial sector, being the second largest consumer of energy, has vast potentials to reduce emissions of GHGs. In a four-year project commissioned by the Government and jointly funded with the Global Environment Facility and the United Nations Development Programme, eight energy-intensive sectors were targeted for GHG reductions.

The project used an integrated approach to make energy efficiency an attractive possibility for the industrial sector by providing capacity building, legal and financial support, and implementing pilot projects to spur interest among industries.

The top eight energy consumers are from cement, ceramic, food, glass, iron and steel, pulp and paper, rubber and wood. Based on energy audits, the project found potentials to reduce emissions of carbon dioxide, and a significant improvement in energy use as well as productivity through zero-, low- and high-cost investments in energy efficiency.

18. Public authorities must have an adequate database on emissions before drawing up plans to tackle the problem.  
Photo by: WWF-Malaysia / Ishak Ariffin.

19. Changes in land use must be widely explained to prevent irresponsible practices like slash-and-burn and illegal logging.  
Photo by: WWF-Malaysia / M. Kavanagh.



## Clean Development Mechanism (CDM)

The CDM is one of the mechanisms identified in the Kyoto Protocol which provides for emission reduction activities for developing countries in collaboration with Annex 1 countries. The mechanism allows developing countries achieve their sustainable development goals, whilst helping Annex 1 countries meet their reduction targets.

### CDM and Malaysia

A National Committee on CDM was set up in 2002, followed by the establishment of the Designated National Authority (DNA) at the Ministry of Natural Resources and the Environment. The approval structure is already in place, and currently PTM and FRIM are the secretariats for the energy and forestry projects, respectively.

As of 22 July 2005, 16 applications for CDM projects were submitted for approval, although one has been withdrawn. Two have received the final host country approval, involving 1.26 million tonnes of potential Certified Emission Reductions (CERs) per year. More than 60 percent of these emission reductions will result from the avoidance of methane emissions.

## Bilateral and Multilateral Cooperation

Malaysia has also received assistance through bilateral and multilateral cooperation to support activities including capacity building and research related to climate change.

Among them are the United Nations Development Programme (UNDP) with funding from the Global Environment Facility (GEF); the World Bank; the Asian Development Bank; the European Communities-ASEAN Energy Facility (EAEF); the Danish International Development Agency (DANIDA) and Japan International Cooperation Agency, New Energy and Industrial Technology Development Organisation of Ministry of Energy, Trade and Industry, Japan.

### Saving energy to cut emissions by BP – A case study

BP Asia Pacific (Malaysia) is a well-known name in the local petrochemicals industry, and in recent years, as an active partner in the field of environmental conservation. Climate change has been an agenda for the multinational company that has set its own target to minimise threats to the environment.

As early as 1997, BP made a commitment to reduce emissions of GHG at all its plants worldwide by 10 percent by year 2010.

"Instead, we reached that target eight years ahead in 2002, and with the implementation of simple housekeeping rules on energy consumption and minimising waste. We have also seen the results in Malaysia and we want to share this achievement with the rest," said BP programme manager Noraini Hashim.

In Malaysia, BP was the first to sign a partnership agreement with CETDEM on the Mobilising Malaysians for Climate Change (MMCC) project that was penned in August 2002. Under this partnership, BP implemented a series of measures to reduce GHG emissions at two of its plants here. Using no-cost and low-cost energy efficiency measures, BP Petronas Acetyls in

Terengganu was able to reduce emissions of carbon dioxide by 10 percent per tonne of acetic acid produced and in the process saving RM2.6 million, while BP Chemicals (M) Sdn Bhd in Pahang saw its total energy costs down by 10 percent, equivalent to RM16.8 million per annum. The savings were recorded for 2004.



"The message that we want to convey is that the industry can take actions that save money, improve productivity and protect the environment," she added. In addition to implementing the measures, the plants will regularly submit their data on GHG emissions to the MMCC for assessment.

"Under the partnership with CETDEM, we have not only implemented emission reduction measures at our plants, we have also undertaken awareness activities by organising briefings, workshops, essay competition and exhibition, and disseminated information through print materials and CDs," said Noraini.

Before year-end, BP will organise a workshop on Climate Change within the Science Curriculum, targeting teachers and also officers of the Curriculum Development Centre of the education ministry.

20. The private sector has a role to play in tackling climate change. Photo by: BP.

# Challenges ahead

## *Preparing for the Inevitable*

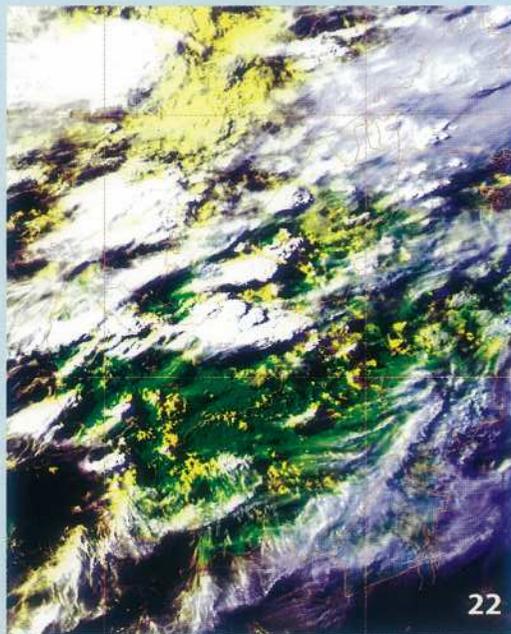
Malaysia's main challenge in dealing with climate change is to introduce adaptation measures for the different sectors to minimise the long term impact of this phenomenon.

Malaysian Meteorological Services Department Director-General Mr. Chow Kok Kee explains that it is far more challenging to come up with adaptation plans than to mitigate the adverse effects of climate change. The latter, he said, has been implemented through various programmes such as encouraging energy efficiency and promoting renewable energy.

"Our greatest challenge really is: how do we prepare for something that we can't see?" Mr. Chow explains that to most Malaysians, it is a subject that is difficult to convince because the impact is not obvious and changes take place very slowly.

Nevertheless, Mr. Chow says that as a phenomenon, climate change is already happening and there is sufficient scientific data to prove it.

"Even the ordinary man on the street is talking about climate change. He says that Cameron Highlands used to be colder before, and the seasons have changed because it doesn't rain as heavily during certain months as it used to. He doesn't realise he is talking about climate change," adds Mr. Chow.



22

21. Chow Kok Kee, who was elected SBSTA Chairman during COP 3, representing Malaysia at international talks on climate change.  
Photo by: Courtesy IISD.

22. Climate change strategies should include regular monitoring of forest fires in the region.  
Photo by: Courtesy MMS.



21

Malaysia has participated in the international scene on negotiating the terms and conditions for climate change, and Mr. Chow who has been Malaysia's climate chief negotiator since the late 1980s, notes that there has been an overall progress in this area.

"We are now more familiar with the opportunities presented, and we have implemented our own policies nationally."

However, there are also gaps that need to be filled in order to tackle climate change. Firstly, he said, is the need to have sufficient and relevant data. This can be expected for the Second National Communication as better and more accurate data modelling tools are now available.

Secondly, is the need to raise public awareness especially at the ground level where local authorities should emphasise programmes on conservation and sustainable development.

Among them are the Local Agenda 21, which requires the participation of the local authorities as well as members of the public who must work together to promote a better environment.



# Making Sense of Climate Change

## Agenda for business

Changes in climactic conditions are bound to affect the way businesses are run. Higher temperatures mean that demand for cooling will be on the rise, while offshore operations could suffer from a rise in the sea level. Environment projects have started making business sense around the world where investors have seen increases in productivity, reduced losses due to inefficiencies and damages, and a better reputation among stakeholders.

The Business Council for Sustainable Development Malaysia (BCSDM) is a proponent for sustainable development initiatives for the private sector. From environmental management systems to the CDM, the Council aims to steer the private sector towards adopting the best practices when it comes to sustainable development.

While many local companies are still unclear about what the concept entails, BCSDM executive secretary Dato' Ghazali Dato'



Yusof says there is vast potential for the private sector to gain from these best practices.

"We have clear examples of companies that have adopted good environmental practices that not only saved a lot of money, but also increased their profitability.

"Multinational companies in Malaysia are ahead of the local players when it comes to meeting targets that incorporate productivity, environmental practices and good governance," he explained.

For the time being, Dato' Ghazali believes that there is an information gap that discourages the private sector from responding to calls for sustainable development.

"This is where the Council comes in: we can be the link between the decision makers and the industry. One way is to disseminate relevant information to the private sector and this is made possible because of our close cooperation with industrial associations such as the Federation of Malaysian Manufacturers and the Small and Medium Industries Association."

Dato' Ghazali noted that the international treaties and conventions on environment and climate change are indeed relevant to the business sector because of the globalising trends in conducting operations.

As such, he said it is important to keep the business sector in the loop of national and international developments to ensure that references to milestones like the Kyoto Protocol and policies on sustainable development become the norm in the private sector.

## Civil society role in climate change

In 2002, a number of non-governmental organisations working on environmental and conservation issues formed the Malaysian Climate Change Group (MCCG) to educate members of the public on the need to reduce GHG emissions.

With support from the DANCED (Malaysian- Danish Country Programme for Cooperation in Environment and Sustainable Development, 2002-2006), now known as DANIDA, the NGOs completed a project on Mobilising Malaysians on Climate Change in May 2005.

The NGO members include the Centre for Environment, Technology and Development, Malaysia (CETDEM), Environmental Protection Society of Malaysia (EPSM), Malaysian Nature Society (MNS) and the Perak Consumers' Association (PCA).

According to executive director Gurmit Singh K.S., the MCCG, through a series of stakeholder meetings, has come up with an action plan on climate change that looks at a possible holistic approach towards addressing the problem with a view of achieving sustainable development and the Vision 2020 goals.

"Malaysia has generally performed well at the international negotiations. We need to do more, otherwise the efforts so far will be frustrated.

"This action plan can serve as a guide to the different agencies on how to tackle climate change. We include suggestions on who should be responsible for the different actions such as coordinating the inventories," said Gurmit.

Among others, the action plan lists adaptation and mitigation activities, data collection, public awareness and building capacities for local implementation and international negotiations.

The action plan is available for viewing at CETDEM's website at this URL address: [http://www.cetdem.org.my/climate\\_change/mcap.html](http://www.cetdem.org.my/climate_change/mcap.html).

CETDEM administered this project as the coordinating secretariat until January 2005, and has since been replaced by the MNS.

23. Various group in Malaysia have initiated public awareness campaigns, especially for children, to understand the importance of preserving the environment. Photo by: WWF-Malaysia / Stephen Hogg.



# Climate change related projects: Malaysia

Various agencies have started work on compiling the GHG inventories and studying possibilities in mitigation and adaptation measures. Below are some of the projects, which were initiated and carried out by the Government of Malaysia. The list also includes

projects that have been or are being implemented with the support of multilateral and bilateral organisations such as the UNDP/GEF and DANIDA. Information on the specific projects can be obtained from the respective authorities as indicated.

## Sector : Energy

- Projects :
- Malaysian Industrial Energy Efficiency Improvement Project (Pusat Tenaga Malaysia, Ministry of Energy, Water and Communication)
  - Biomass-based Power Generation and Co-generation in the Palm Oil Industry (Pusat Tenaga Malaysia, Ministry of Energy, Water and Communication)
  - Malaysian Building Integrated Photovoltaic Project (Pusat Tenaga Malaysia, Ministry of Energy, Water and Communication)
  - Renewable Energy and Energy Efficiency (REEE) (Economic Planning Unit, Ministry of Energy, Water and Communication, Pusat Tenaga Malaysia)
  - Demand Side Management (Energy Commission)

## Sector : Environment

- Projects :
- Conserving Marine Biodiversity through Enhanced Marine Park Management and Inclusive Sustainable Island Development (by Marine Parks Unit, Ministry of Natural Resources and Environment)
  - Conservation and Sustainable Use of Peat Swamp Forests and Associated Wetlands (Forest Research Institute of Malaysia, Ministry of Natural Resources and Environment)
  - Study for the Sustainable Development of Highlands of Peninsular Malaysia (Economic Planning Unit)
  - Multipurpose Forestry in a Changing Society (Twinning between Malaysian and Danish Institutions)
  - Management for Conservation and Sustainable Use of Peat Swamp Forests & Associated Water Regimes in Malaysia (Forestry Departments in Pahang and Sabah)
  - Integrated River Basin Management in Peninsular Malaysia (Drainage and Irrigation Department, Ministry of Natural Resources and Environment)
  - Enhancement of Role of Environmental Journalism in Malaysia (Universiti Sains Malaysia)

## Sector : Coastal Management

- Projects :
- Preliminary Coastal Vulnerability Index Study (Drainage and Irrigation Department, Ministry of Natural Resources and Environment)
  - Integrated Shoreline Management Plan (Drainage and Irrigation Department, Ministry of Natural Resources and Environment)

## Sector : Water Resources

- Project :
- The Impact of Climate Change on the Hydraulic Regime and Water Resources of Peninsular Malaysia (National Hydraulic Research Institute Malaysia, Ministry of Natural Resources and Environment)

## Sector : Health

- Project :
- Public Health and Climate Change (Institute of Medical Research, Ministry of Health)

# Contacts

## Ministry of Natural Resources and Environment (NRE)

Lot 4G3, Presint 4,  
Federal Government  
Administrative Centre,  
62574 Putrajaya.  
Tel : 603-8886 1111  
URL : <http://www.nre.gov.my>

## Conservation and Environmental Management Division (CEMD), NRE

Level 6, Tower Block,  
Lot 4G3, Presint 4,  
Federal Government  
Administrative Centre,  
62574 Putrajaya.  
Tel : 603-8886 1126  
URL : <http://www.nre.gov.my>

## Economic Planning Unit (EPU)

Prime Minister's Department,  
Block B5 & B6,  
Federal Government  
Administrative Centre,  
62502 Putrajaya.  
Tel : 603-8888 3333  
Fax : 603-8888 3755  
URL : <http://www.epu.jpm.my>

## Ministry of Energy, Water and Communication

Block E4/5, Parcel E,  
Federal Government  
Administrative Centre,  
62668 Putrajaya.  
Tel : 603-8883 6000  
Fax : 603-8889 3712  
URL : <http://www.ktak.gov.my>

## Malaysian Meteorological Services Department (MMS)

Jalan Sultan,  
46667 Petaling Jaya.  
Tel : 603-7967 8000  
Fax : 603-7955 0964  
URL : <http://www.kjc.gov.my>

## Department of Wildlife and National Parks

KM 10, Jalan Cheras,  
56100 Kuala Lumpur.  
Tel : 603-9075 2872  
Fax : 603-9075 2873  
URL : <http://www.wildlife.gov.my>

## Drainage and Irrigation Department (DID)

Jalan Sultan Salahuddin,  
50626 Kuala Lumpur.  
Tel : 603-2697 2828  
Fax : 603-2693 0752  
URL : <http://www.water.gov.my>

## Pusat Tenaga Malaysia (PTM)

Level 8, Bangunan SAPURA@MINES,  
7, Jalan Tasik, The Mines Resort City,  
43300 Seri Kembangan.  
Tel : 603-8943 4300  
Fax : 603-8941 1121  
URL : <http://www.ptm.org.my>

## Forest Research Institute Malaysia (FRIM)

52109 Kepong.  
Tel : 603-6279 7000  
Fax : 603-6273 1314 / 603-6280 4624  
URL : <http://www.frim.gov.my>

## Malaysian Timber Council (MTC)

18th Floor Menara PGRM,  
8 Jalan Pudu Ulu, Cheras,  
56100 Kuala Lumpur.  
Tel : 603-9281 1999  
Fax : 603-9282 8999  
URL : <http://www.mtc.com.my>

## Danish International Development Agency (DANIDA)

Royal Danish Embassy,  
22nd Floor, Wisma Denmark,  
86 Jalan Ampang,  
50450 Kuala Lumpur.  
Tel : 603-2032 2001  
Fax : 603-2032 2012  
URL : <http://www.ambkualalumpur.um.dk>

## Centre for Environment Technology and Development Malaysia (CETDEM)

17, Jalan SS2/53,  
Petaling Jaya.  
Tel : 603-7875 7767  
Fax : 603-7875 4039  
URL : <http://www.cetdem.org.my>

## Malaysian Nature Society (MNS)

JKR 641 Jalan Kelantan,  
Bukit Persekutuan,  
50480 Kuala Lumpur.  
Tel : 603-2287 9422  
Fax : 603-2287 8773  
e-mail : [mns@mns.org.my](mailto:mns@mns.org.my)  
URL : <http://www.mns.org.my>

## Institute of Environment and Development (LESTARI)

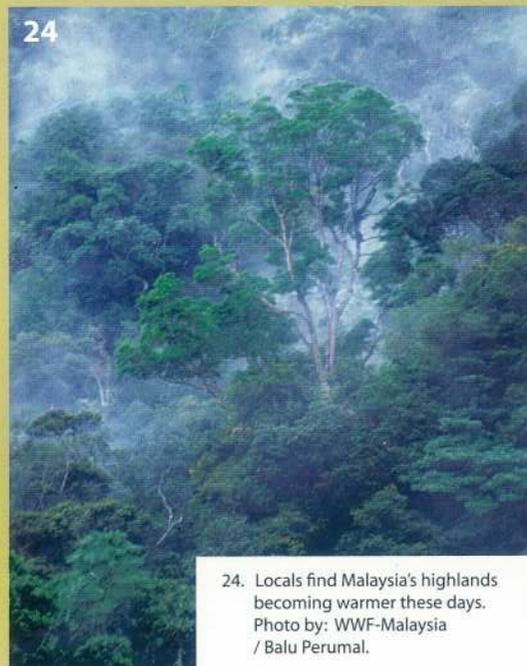
Universiti Kebangsaan Malaysia,  
43600 Bangi.  
Tel : 603-8921 4149  
Fax : 603-8925 5104

## Business Council for Sustainable Development Malaysia (BCSDM)

79-2 Medan Setia 1,  
Plaza Damansara,  
Bukit Damansara,  
50490 Kuala Lumpur.  
Tel : 603-2092 2566  
Fax : 603-2093 2566  
URL : <http://www.bcsdm.com.my>

## Other useful websites:

United Nations Framework Convention on Climate Change	<a href="http://unfccc.int/">http://unfccc.int/</a>
Intergovernmental Panel on Climate Change	<a href="http://www.ipcc.ch/">http://www.ipcc.ch/</a>
World Meteorological Organization	<a href="http://www.wmo.ch/">http://www.wmo.ch/</a>
International Institute for Sustainable Development	<a href="http://www.iisd.ca/">http://www.iisd.ca/</a>
United Nations Development Programme	<a href="http://www.undp.org/">http://www.undp.org/</a>
United Nations Environment Programme	<a href="http://www.unep.org/">http://www.unep.org/</a>



24. Locals find Malaysia's highlands becoming warmer these days.  
Photo by: WWF-Malaysia / Balu Perumal.

# Abbreviations

BCSDM	Business Council for Sustainable Development Malaysia
CDM	Clean Development Mechanism
CEMD	Conservation and Environmental Management Division
CO <sub>2</sub>	Carbon dioxide
COP	Conference of Parties
DANIDA	Danish International Development Agency (previously known as DANCED)
DID	Drainage and Irrigation Department
DNA	Designated National Authority
GCM	Global Climate Model
GEF	Global Environment Fund
GHG	Greenhouse gas
INC	Initial National Communication
IPCC	Intergovernmental Panel on Climate Change
LULUCF	Land Use, Land-use Change and Forestry
MCCG	Malaysian Climate Change Group
MEA	Multilateral Environmental Agreement
MMS	Malaysian Meteorological Services Department
NCC	National Climate Committee
NRE	Ministry of Natural Resources and Environment
PTM	Pusat Tenaga Malaysia
SBSTA	Subsidiary Body for Scientific and Technological Advice of UNFCCC
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

25



25. Urban areas are exposed to flash floods with changes in the weather patterns.  
Photo by: WWF-Malaysia / Balu Perumal.

## Acknowledgement

The Project Team would like to thank the following people for their assistance and support in preparing this booklet:

Datin Huzaimah Mohd. Yusoff and her team in the Conservation and Environmental Management Division (CEMD) at the Ministry of Natural Resources and Environment, for their inputs and final approval and the DANIDA for funding this output;

Mr. Chow Kok Kee, the Director-General of the Malaysian Meteorological Services Department; Mr. Gurmit Singh K.S., the Executive Director of the Centre for Environment, Technology and Development, Malaysia (CETDEM); Dato' Ghazali Dato' Yusoff, Executive Director, Business Council for Sustainable Development Malaysia; and Noraini Hashim, Project Manager BP Malaysia Sdn Bhd for kindly agreeing to the interviews; and the Malaysian Nature Society; WWF Malaysia; and Wetlands International Malaysia for allowing us to use their resources.

As the booklet is designed to raise awareness, information contained in this publication may be copied or reproduced for study, research, information or educational purposes, subject to inclusion of an acknowledgment of the source.

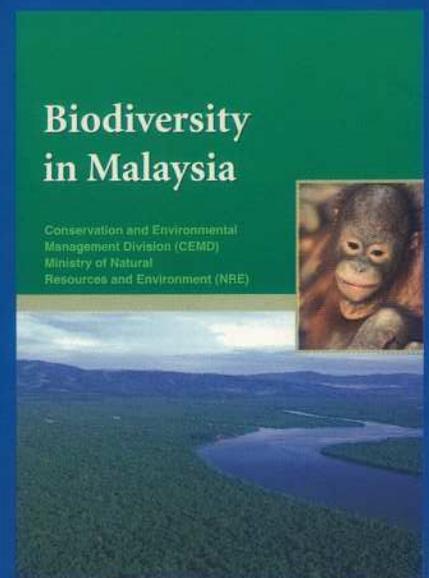
This booklet is published for the Multilateral Environment Agreement (MEA) Project: Capacity Building and Implementation at the Conservation and Environmental Management Division (CEMD), Ministry of Natural Resources and Environment, in collaboration with the Danish International Development Agency (DANIDA).

*Please forward all inquiries and feedback to:*

**Conservation and Environmental  
Management Division (CEMD)  
Ministry of Natural  
Resources and Environment (NRE)**

Level 6, Tower Block,  
Lot 4G3, Presint 4,  
Federal Government  
Administrative Centre,  
62574 Putrajaya.

Tel : 603-8886 1111  
Fax : 603-8888 4473



*Also available with this booklet is the publication entitled Biodiversity in Malaysia. This twin publication covers key issues on biodiversity and Malaysia's efforts in line with international conventions on protecting the biodiversity of a country.*