Third ASEAN State of the Environment Report 2006

Towards an Environmentally Sustainable ASEAN Community

UNEP

Hanns Seidel Foundation

Third ASEAN State of the Environment Report 2006

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The fern, a common plant in ASEAN, transforming into flying birds against a blue background denotes the richness and vitality of biodiversity and a clean and green ASEAN.

FOREWORD

I am pleased to present the ASEAN State of the Environment Report 2006, the third in the series. The first report was published in 1997 and the second report in 2000.

The ASEAN region faces several challenges in protecting the environment and ensuring the sustainability of its natural resources. The ASEAN State of the Environment Reports highlight key characteristics and developments concerning the condition of the environment. These include what ASEAN is doing to address the challenges at the national and regional level.

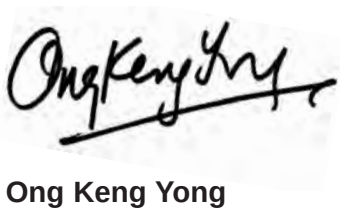
An ASEAN Community is envisioned by the year 2020. Therefore, this report has paid special attention to our community building efforts toward an environmentally sustainable ASEAN Community. The Vientiane Action Programme 2004–2010, the current roadmap, demonstrates our commitment through concrete measures and milestones to achieve this goal. The environmental programmes and measures in the VAP are situated within the context of sustainable development to ensure full integration and mutually supportive development of the various inter-related sectors.

Measures of environmental sustainability from reputable independent studies have placed the region at a level above the world average. However, the challenges foreseen call for even greater effort to ensure further improvement in environmental sustainability of the ASEAN region.

National, regional and global environmental issues cannot be set apart from one another. It is our hope that through the publication of the ASEAN State of the Environment Report, the global community will better appreciate the issues and concerns faced by the ASEAN region, and join hands to address them collectively.

I would like to congratulate all those who have been involved in producing this useful report. My sincere appreciation goes to the United Nations Environment Programme and the Hanns Seidel Foundation for the financial and technical support provided during the preparation of this report.

Thank you.



Ong Keng Yong
Secretary-General of ASEAN

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Introduction

The ASEAN Community shall be established comprising three pillars, namely political and security cooperation, economic cooperation, and socio-cultural cooperation that are closely intertwined and mutually reinforcing for the purpose of ensuring durable peace, stability and shared prosperity in the region.

Declaration of ASEAN Concord II
7th October 2003

On 7th October 2003, the Heads of State/Government of ASEAN Member Countries declared that: "an ASEAN Community shall be established comprising three pillars, namely political and security cooperation, economic cooperation, and socio-cultural cooperation that are closely intertwined and mutually reinforcing for the purpose of ensuring durable peace, stability and shared prosperity in the region."

A key concept embodied in this statement is that prosperity in the region shall be both durable and shared. Through sustained economic growth the ASEAN Leaders are determined to attain prosperity for the region. Such prosperity will be durable only if the resources that fuel economic growth are utilised in a sustainable manner. And it will be truly shared only if the benefits are equitably distributed to all sectors of society. The Leaders in effect have declared that sustainable development – where there exists a dynamic and mutually supportive balance between economic growth, social equity and environmental integrity – shall be the guiding principle for the region in its efforts to establish an ASEAN Community. Accordingly, the Leaders envision a "clean and green ASEAN with fully established mechanisms for sustainable development to ensure the protection of the region's environment, the sustainability of its natural resources and the high quality of life of its people."

Challenges

The region faces enormous challenges on the road towards an environmentally sustainable and prosperous ASEAN Community.

The first and most important challenge is to narrow the socio-economic divide among and within countries of the region while ensuring a proper balance between economic development and environmental protection. Technical and development cooperation will be needed to address the development divide and accelerate the economic integration of the less developed countries in the region and of the less developed communities within some countries.

In conceptualising the ASEAN Economic Community, one of the three pillars of the ASEAN Community, the Leaders stated that "deepening and broadening integration of ASEAN shall be accompanied by technical and development cooperation in order to address the development divide and accelerate the economic integration…so that the benefits of ASEAN integration are shared and enable all ASEAN Member Countries to move forward in a unified manner." Regional integration is anchored on economic integration and borderless trading. An environmental challenge resulting from economic integration is the concurrent need to harmonise environmental standards as well as environmental legislation and enforcement to ensure that as tariffs are dismantled, environmental issues does not emerge as non-tariff measures.

The second challenge is to prevent or reduce the occurrence of natural and man-made disasters and minimise the damage caused by them. The region is exposed to typhoons, floods, droughts, landslides, tsunamis, earthquakes, volcanic eruptions, land and forest fires and the resulting smoke haze that may hamper economic development, social cohesion, and political stability of the region. Unless communities and properties are made safer from disasters, the sustainable development of the region may be impeded.

The Indian Ocean earthquake that triggered a devastating tsunami in December 2004 resulting in the death of between 170,000 to 250,000 persons, millions of dollars in environmental and property damages, and immeasurable grief and human suffering illustrates the vulnerability of the region to natural disasters. The recurrent episodes of transboundary haze pollution resulting from forests and land fires and the frequent typhoons and floods that affect many countries of the region are examples of disasters influenced by geo-physical settings, climatological factors, demographic changes, increased human activity. International and regional cooperation, including technical and financial assistance, is required to acquire and install disaster-monitoring technology and equipment, train and mobilise personnel, and mitigate impacts and alleviate suffering when disasters strike.

The third challenge is to address adequately the worsening air pollution, noise and congestion, lack of adequate infrastructures and waste disposal and management in the urban areas of most countries of the region resulting from, among others, increasing energy and materials consumption, worsening traffic conditions, rapid industrialisation, and uncontrolled rural-to-urban migration.

Economic activities are located largely in the urban areas of many countries in the region. In some countries these activities are centred in only two or three of the major cities thus causing a disproportionate increase in the population of these areas. The result is urban congestion, inadequate housing and growth of slum areas and marginal settlements, and inadequate waste management and other social services. Addressing this challenge will require proper planning and management of development activities to address the twin issues of congestion and poverty, on one hand, and development and pollution on the other. Concomitant with this will be the need to develop and apply cleaner production, energy and transport technologies and systems, and promote more sustainable production and consumption patterns.

The fourth challenge is to reverse the trend of land degradation, deforestation, depletion of natural resources and loss of biodiversity in many countries of the region and promote the conservation and sustainable use of biological and genetic resources. There has been increasing exploitation of the rich biological resources of the region for commercial purposes and to sustain a growing population. Habitat fragmentation ensuing from various economic activities and human encroachment, reduced genetic diversity resulting from excessive application of modern agriculture, and depletion of primary forests due to illegal and unmonitored logging and clearing for agriculture are some of the urgent issues that require immediate attention.

The region's natural resources need to be conserved and managed in a sustainable manner and fairly and equitably shared toward enhancing the quality of life of the people in the region. Countries of the region have to intensify the introduction of sustainable forest and agricultural management policies and practices and widen the extent of protected areas in order to arrest the declining trend in biological diversity, land quality and forest cover. For this purpose, stronger international and regional cooperation, wider advocacy and information campaigns, and more vigorous enforcement of existing legislations at the national and local levels will be of paramount importance.

The fifth challenge is to effectively protect the region's freshwater resources and marine and coastal ecosystems. The region's internal freshwater resources are adequate but their management, distribution and quality are facing increasing pressures and signs of deterioration. The region's marine and coastal areas, which are recognised as a global centre for marine, shallow water and tropical diversity, are suffering from physical habitat alteration, pollution from human and economic activities, and unsustainable use and overexploitation.

The quality and availability of clean freshwater will be among the most pressing environmental problems that the region will face in the future. The demand for water will be increasing and competing. The challenge will be how to meet this demand with dwindling supply. Similarly, there will be increasing pressure on the marine and coastal ecosystems since economic and human activities in most countries in the region are most active in coastal zones. This will require more effective planning and management and a shift from advocacy and information gathering to concrete action and vigorous implementation of appropriate programmes and measures.

The sixth challenge is to address global environmental issues while at the same time addressing the immediate and pressing economic, social and environmental issues that confront each country in unique and multifarious ways. Addressing global environmental issues such as ozone depletion and climate change, loss of biodiversity, international trade in endangered species and biosafety, transboundary movement of hazardous wastes and toxic chemicals, and trade in tropical timber, compete for time and resources with addressing immediate and pressing problems such as poverty, hunger and disease, lack of water and sanitation facilities, waste disposal and management and the like.

The region's contribution to greenhouse gases emissions, although still low, is rising due to rapid economic growth, increasing use of coal and other hydrocarbon fuels, and inefficient use of resources. With respect to biodiversity, countries in the region have to address, among others, the problems of extinction of some flora and fauna, transboundary movement of alien species, preservation of wetlands, and protection of endangered and migratory species. On transboundary movement of hazardous wastes and toxic chemicals, the region has to address the challenge of some countries becoming dumping grounds of hazardous wastes from developed countries and other countries becoming themselves producers and exporters of toxic chemicals. On trade

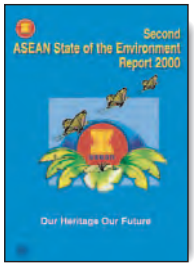
in tropical timber, the challenge for countries that still have wide forest coverage is how to exploit these forest resources to generate national revenue and help alleviate poverty in a manner that is sustainable.

The seventh and most crucial challenge is to further strengthen regional institutional arrangements to make them more effective in promoting environmental sustainability as the region moves toward an integrated, peaceful and caring ASEAN Community. A clean and green ASEAN Community will require the presence of institutions able to make binding decisions, mobilise resources and support worthwhile programmes and projects, engage other international and regional partners in meaningful partnerships, and harness the support of civil society organisations and the private sector.

Regional environmental governance remains an important challenge to countries in the region. Within the context of ASEAN, there is need for more robust interactions among formal and informal institutions in the region as well as the various actors within the societies of each country in order to effectively influence how regional environmental problems are identified and addressed. There is need for national governments and regional institutions to ensure better integration of their development plans and environmental policies, promote more active public involvement in environmental management, and improve regional environmental monitoring and surveillance processes.

ASEAN State of the Environment Reports

ASEAN publishes its State of the Environment Report (SoER) periodically, generally every three years. The First ASEAN State of the Environment Report was published in 1997 and covered only seven countries that were member countries of ASEAN at that time. Three years later, the Second ASEAN State of the Environment Report 2000 was published, which covered the ten member countries of ASEAN.



In 2002, the ASEAN Report to the World Summit on Sustainable Development (WSSD) was published and presented to the WSSD held in South Africa. In view of this publication, ASEAN deferred publication of the Third ASEAN State of the Environment Report to 2006. As with previous reports, it was published with the full participation of and inputs from all ASEAN member countries. The United Nations Environment Programme and the Hanns Seidel Foundation provided financial support for the preparation and publication of this Report. The ASEAN Secretariat provided overall coordination and supervision, and finalised the text of the Report.

The SoERs are published to offer a glimpse of the prospects and challenges facing the region and highlight what ASEAN has done to protect the environment and promote sustainable development. This Report specifically:

- describes the environmental conditions in the region and developments in related sectors by providing and analysing relevant economic, social and environmental data and indicators;
- presents developments in key emerging issues, particularly global environmental issues and developments in socio-economic sectors, in recognition of the dynamics of environmental issues that transcend national borders; and
- highlights ASEAN's initiatives in environmental management and sustainable development, its achievements and constraints, goals for the future, and opportunities for collaboration.

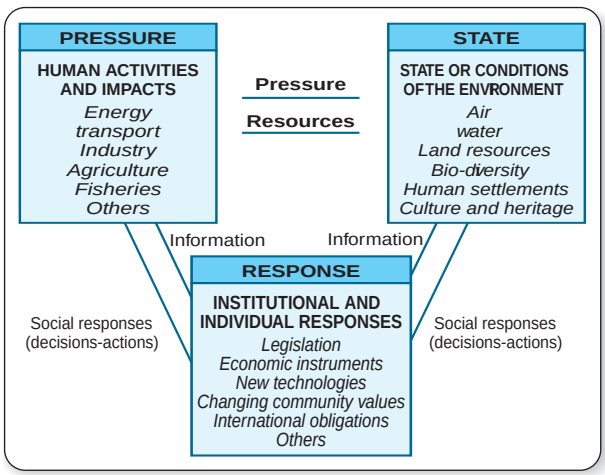
The Report will be useful for a wide range of readers from decision and policy makers in government, relevant staff of international, regional and national organisations, non-governmental organisations, civil society organisations, students, teachers and researchers of various schools and universities, and the general public who are involved or interested in facts and issues pertaining to environment and sustainable development. As such it presents geographic and demographic information about the region, discusses the economic and social development of countries of the region, assesses the terrestrial, freshwater, marine, coastal and atmospheric ecosystems, elaborates the relevant global environmental issues and the region's response to these issues, describes the environmental management framework being used by ASEAN to address environment and sustainable development issues, and analyses the issue of

environmental sustainability as the region moves towards the establishment of an ASEAN Community.

Framework and Organisation of SoER3

The ASEAN State of the Environment Reports have always followed the Pressure-State-Response Model, which states that human activities exert pressure on the environment causing the state (condition) of the environment to change thus requiring a response that affect human activities and the state of the environment as well. In this third report, Chapters 2 to 4 cover the "pressure" factors, Chapters 5 to 7 present the "state" of the environment in the region, and Chapters 8 to 10 discusses the regional "response".

Figure 1.1: Pressure-State-Response Model



Source: *UNEP/EAP-AP*

Table 1.1: PSR Model vis-à-vis the SoER3 Framework

PSR Model	SOER3 Chapters
Pressure	Chapter 2: Geographical Setting, People and Demography Chapter 3: Social Development Chapter 4: Economic Development
State	Chapter 5: Freshwater and Marine Ecosystems Chapter 6: Terrestrial Ecosystems Chapter 7: Atmosphere
Response	Chapter 8: Global Environmental Issues Chapter 9: ASEAN Environmental Management Framework Chapter 10: *Towards An Environmentally Sustainable ASEAN Community*

Chapter 1: Introduction presents the key environmental issues, the objectives and organisation of the report. It provides an overview of ASEAN's vision to achieve an environmentally sustainable ASEAN Community by 2020. However, ASEAN must address a number of environmental problems and challenges that may emerge as hindrances to the accomplishment of ASEAN Vision 2020.

Chapter 2: Geographical Setting, People and Demography reviews the geo-physical setting and demographics of the region. These factors characterises the unique common and transboundary environmental problems faced the region, and describes how regional cooperation is imperative to resolve this issues.

Chapter 3: Social Development considers social trends emphasing the link between environment and poverty, the impact of poverty on environmental health, and the high degree of vulnerability of the poor to natural disasters including those exacerbated by human activities.

Chapter 4: Economic Development reviews recent patterns of economic growth, examines how certain sectors such as mining and agriculture could exert stress on the environment if not sustainably managed, while at the same time higher income levels as a result of economic growth are necessary to reduce poverty, and to accord better care for the environment.

Chapter 5: Freshwater and Marine Ecosystems assesses the state of freshwater and marine ecosystems in the region. The region's water resources were under increasing pressure. The challenge would be to adequately meet competing demands and avoid conflict over the allocation and use of the region's shared water resources.

Chapter 6: Terrestrial Ecosystems investigates the state of the terrestrial ecosystems in the region. While the rate of deforestation in the region was highest in the world, there was a declining trend as the production and consumption of forest wood products also declined. Despite a receding forest cover, the region remained among the most biologically diverse regions in the world and has made good effort to protect its rich biodiversity.

Chapter 7: Atmosphere evaluates air quality and atmospheric conditions in the region. The quality of the air in the region as a whole was generally good although it varied considerably across the region deteriorating significantly in highly urbanised and industrialised areas. The region had two major air pollution concerns, namely transboundary air pollution resulting from land and forest fires, and the deterioration of urban air quality arising from increased energy use by the transport and industry sectors.

Chapter 8: Global Environmental Issues assesses the participation of member countries in addressing global environmental issues. Member countries have been actively engaged in addressing these global issues as they impact significantly on the region, even though they are not the major contributors to these global environmental issues.

Chapter 9: ASEAN Environmental Management Framework reviews the salient features of ASEAN policy and institutional framework, and the major programmes and activities undertaken in the region, and shows how it is closely integrated with the social and economic sectors, principally through the ASEAN Socio-Cultural Community pillar.

Chapter 10: Towards an Environmentally Sustainable ASEAN Community concludes by highlighting efforts to achieve an ASEAN Community that is environmentally sustainable. It assesses some measures of environmental sustainability which show that the region has achieved higher than average scores that the world average. It also offers insights into how ASEAN is committed to enhancing environmental sustainability as it pursues its overall goal of establishing an ASEAN Community by 2020.

Source of Information

Data gathering, as in any publication, has been the most difficult phase in the preparation of this Report. Even though ASEAN has been trying to generate their own data and share such information, however there is no mechanism to ensure this is done on a systematic and regular basis. This problem is not unique to ASEAN. However, in the process of preparing this publication, it became clear that it is important to institute a mechanism to regularly share information, harmonise databases, and mutually support preparation of national and regional reports. Such a mechanism will also facilitate reporting obligations to outside bodies. ASEAN will continue to pursue this matter based on the experiences gained from national and regional reporting.

As much as possible, ASEAN-sourced data were employed in this report. Sources were from the various databases and publications of ASEAN Secretariat (e.g., Environment and Disaster Management Unit, Natural Resources Unit, Human Development Unit, Bureau of Economic Integration, Bureau of Finance and Integration Support, Finance and Macroeconomic Surveillance Unit, Tourism Unit, etc.) and other ASEAN-affiliated institutions (e.g., ASEAN Centre for Biodiversity, and ASEAN Centre for Energy). The national State of the Environment Reports of member countries provided valuable information for the preparation of this report.

Where ASEAN data is not available, the relevant information was sourced from reputable sources. These include:

- International organisations – UN agencies (i.e., United Nations Environment Programme, Food and Agriculture Organisation, United Nations Development Programme, World Health Organisation, UN Economic and Social Commission for Asia and the Pacific, United Nations Industrial and Development Organisation, United Nations Educational, Scientific and Cultural Organisation, UN Department of Economic and Social Affairs, UN Commission on Sustainable Development, Intergovernmental Panel on Climate Change, UNEP-Global Resource Information Database, various MEA Secretariats, etc.), World Trade Organisation, World Tourism Organisation.
- International development/finance institutions – Asian Development Bank, World Bank, International Monetary Fund, etc.
- Environmental NGOs/other organisations – World Resources Institute, World Conservation Union or IUCN, Conservation International, Basel Action Network, BirdLife International, TRAFFIC Southeast Asia, World Wildlife Fund, and others.

CHAPTER 2
Geographical Setting, People and Demography

ASEAN Vision 2020 envisions ASEAN as a concert of Southeast Asian Nations, outward looking, living in peace, stability and prosperity, bonded together in partnership in dynamic development and in a community of caring societies.

Vientiane Action Programme

The geo-physical and climatic conditions of the ASEAN region have endowed it with rich natural resources, sustaining a myriad of economic activities and livelihoods, and providing critical life support systems such as fresh water and clean air. However, the region has one of the highest population densities in the world with about 125 people per square kilometre, compared with the world average of 43 people per square kilometre. The region also has high urban population density, particularly in the mega cities of Bangkok, Jakarta and Manila. The rural-urban migration rate and urban-rural population are projected to increase steadily by an average of 15% and 10% respectively by 2020. The large population exerts increasing pressure on the natural resources of the region, in addition to exacerbating urban environmental degradation. The geo-physical and climatic conditions of the region also unleashes a number of natural hazards, the most common are typhoons, floods, earthquake and tsunamis, landslides, volcanic eruptions, droughts and wild fires. These natural hazards interacting with prevailing vulnerabilities in countries have caused disasters that seriously impaired economic activities, social development and the environmental conditions of the region. The common and shared geo-physical and climatic conditions bring about common or transboundary environmental issues such as air, water and land pollution, urban environmental degradation, transboundary haze pollution, and depletion of natural resources, particularly biological diversity. ASEAN, recognising the importance of regional collaboration to tackle these issues collectively, has forged effective cooperation in these areas.

ASEAN FACTS AND FIGURES

Extent	3,300 km North to South 5,600 km West to East
Land area	4.47 million sq. km. 3% of the world's total
Climate	Tropical (monsoon-influenced)
Temperature	Annual range typically 25 – 30 ºC
Rainfall	828 to 3280 mm. per year
Population (mid 2005)	558 million
ASEAN population as % of world total (mid 2004)	7.7%
Projected population in 2020	651 million
Population density (2005)	125 people per sq. km.

Geographical Setting

The ten member countries of the Association of Southeast Asian Nations (ASEAN), namely, Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Viet Nam, lie on the waters of the Pacific Ocean, Indian Ocean, Andaman Sea, and South China Sea. They occupy a geographical space commonly referred to as "Southeast Asia"[1] that stretches more than 3,300 km from north to south (latitudes 30° North to 11° South) and 5,600 km from west to east (longitudes 92° West to 142° East).

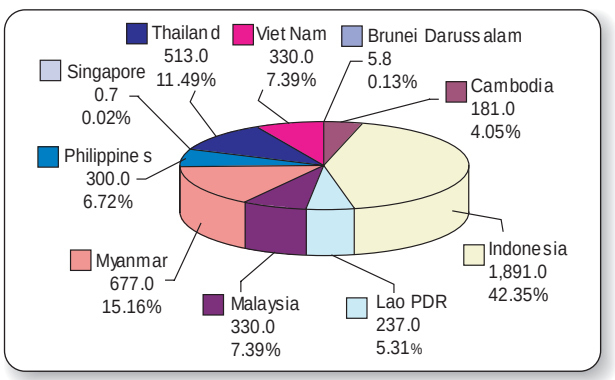
Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam are located in the Indochina sub-region (commonly referred to as Mainland Southeast Asia), while Brunei Darussalam, Indonesia, Malaysia, the Philippines and Singapore are located in a sub-region commonly referred to as the Malay archipelago (also known as Maritime Southeast Asia). Of the ten member countries, only Lao PDR is landlocked, while all others have direct access to the sea.

The ASEAN Region

Country Sizes and Terrains

The ten member countries have a combined land area of approximately 4.47 million square kilometres or about 3% of the world's total land area of 136 million sq km. The land areas vary widely from Singapore (0.7 sq. km.) to Indonesia (1,891 sq. km.), the latter accounting for about 40% of the land area of the region

Figure 2.1: Land Area of Member Countries



Source: *ASEAN Statistical Pocketbook (2006)*
Note: *Land areas in '000 sq. km.*

Countries with water borders or coastlines are endowed with natural ports that enable them to harvest rich and diverse marine resources, and with many beautiful white sand beaches that draw multitudes of visitors into the region.

Inland water bodies, like the meandering Mekong River running through Myanmar, Thailand, Lao PDR, Cambodia and Viet Nam, provide these riparian countries with freshwater resources, transportation, and hydropower. Mangrove swamps and waterfalls abound in the region. Other well-known inland water bodies include the Inle Lake in Myanmar, Tonle Sap in Cambodia, Lake Toba in Indonesia, and Laguna de Bay in the Philippines.

The region has alluvial plains and fertile deltas that serve either as arable land for farming and pasturing or as residential and industrial areas. Cambodia, for example, has a lacustrine plain,[2] measuring about 2,590 sq. km. during dry season and 24,600 sq. km. during wet season, that is used for wet rice cultivation. Forests and jungles abound that serve as breeding grounds for various types of flora and fauna. Rainforests in the region contain

about 200 tree species in one single hectare, making the region the most biologically diverse in the world. The island of Borneo, which has extensive tropical rainforest cover, typifies an island blessed with a bounty of wildlife animals, plants, trees and birds.

Land bulges in the form of volcanoes, mountains, valleys, hills, plateaus and caves abound in the region. Among the most notable are Mount Mayon in the Philippines, Mount Kinabalu in Malaysia, Hkakabo Razi in Myanmar, and Puncak Jaya in Indonesia.

Oceans, Seas, and Gulfs

There are three major seas and two gulfs[3] that provide the region with abundant marine resources, energy reservoirs, and shipping lanes that permit inter- and intra-ASEAN trade. These are the South China Sea, Andaman Sea, the Philippine Sea, Gulf of Thailand, and Gulf of Tonkin. The South China Sea is the biggest water body within the region with an area of 3.5 million sq. km., followed by the Andaman Sea with 798,000 sq. km. The Gulf of Thailand has an area of 320,000 sq. km., while the Gulf of Tonkin has 115,200 sq. km.

The South China Sea is an enclave of the Philippines, Malaysia, Brunei Darussalam, Indonesia, Singapore, Thailand, Cambodia and Viet Nam. On its western side lies the Gulf of Thailand and the Gulf of Tonkin. The Andaman Sea is located south of Myanmar and west of Thailand and is part of the Indian Ocean. The Philippine Sea is part of the Pacific Ocean bordering the Philippines. The Gulf of Thailand is surrounded by northern Malaysia, southern and eastern parts of Thailand, south-western Cambodia, and south-western Viet Nam. The Gulf of Tonkin lies along the coastal areas of eastern Viet Nam. The South China Sea is the deepest among the region's water bodies, with a depth of 5,020 metres below sea level, followed by the Andaman Sea, 3,780 metres deep. The two gulfs have shallow waters. The Gulf of Thailand has a depth of 80 metres while the Gulf of Tonkin is only about 20 metres deep.

Marine and mineral resources abound in these water bodies. Molluscs and about 250 edible fishes can be harvested and caught in the Andaman Sea. The Philippine Sea is host to hard and soft corals and about 20% of the world's shellfish. Sea turtles, sharks, moray eels, octopuses, sea snakes, tuna, and a number of whale species are just some of the marine animals that live in this sea. The shallow waters of the Gulf of Thailand and Gulf of Tonkin are important fishing grounds for its riparian countries. Coral reefs also abound in these two gulfs. The South China Sea has economically important species such as crustaceans, coastal fishes, pelagic fishes, herring, sardines, and anchovies. There are large reservoirs of oil and natural gas deep within the South China Sea and the Gulf of Thailand.

The shipping lanes in the seas within and around the region are as important to the region as the marine resources. The Andaman Sea allows Myanmar to trade with its neighbouring nations while the Gulf of Thailand has harbours that are used for commercial fishing and trading by Cambodia, Thailand and Viet Nam. Haiphong in Viet Nam is a major port in the Gulf of Tonkin. The Straits of Malacca and the South China Sea are among the busiest sea lanes in the world.

Climate and Natural Hazards

A major part of the region experiences relatively warm temperatures throughout the year typically ranging from 25°C to 30°C, as it straddles the equator. Monsoons affect the climate in the region. The Northeast Monsoon, on one hand, brings typhoons and severe weather with winds ranging from 10 to 30 knots. This usually occurs between the months of November and March. The Southwest Monsoon, on the other hand, causes moderately strong dry winds and rains during the months of May to September. There are two months, April and October, called the inter-monsoon season, during which the region experiences light winds and little variation in temperature. The average humidity ranges from 70% to 90% and the average precipitation is from 828 mm. to 3,280 mm.

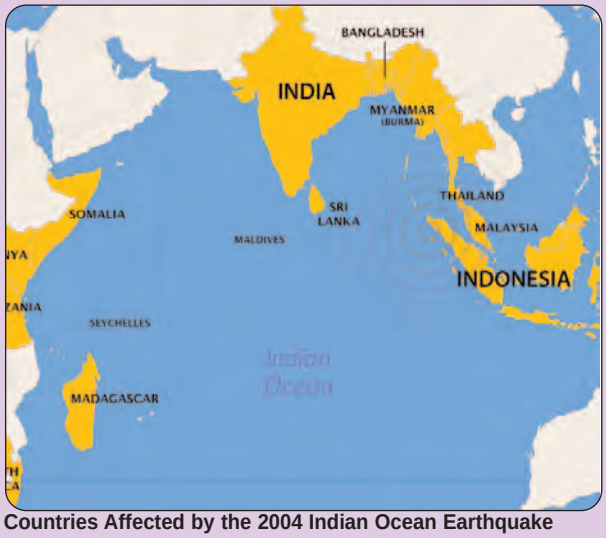
Because of its geology and geographical location, the region suffers from climatic abnormalities and natural hazards such as typhoons, floods, droughts and accompanying wild fires, earthquakes and tsunamis, volcanic eruptions, storm surges and tidal waves. The region has experienced recently major disasters among which were the earthquake and tsunami of December in 2004 and the recurring land and forest fires and transboundary haze pollution.

Box 2.1: The Sumatra-Andaman earthquake and tsunami of 26 December 2004

The tsunami of 26 December 2004 was caused by an earthquake in the Indian Ocean, also known as the Sumatra-Andaman Earthquake, located at 3.298ºN and 95.779ºE northwest of Sumatra Island in Indonesia. Measuring 8.9 in the Richter Scale, the tectonic earthquake and the following tsunamis had claimed the lives of about 170,000 to 250,000 people and devastated many coastal communities in Indonesia, Thailand, Myanmar and Malaysia and other countries outside the region such as Bangladesh, Sri Lanka, India and the Maldives.

In Indonesia, the disaster resulted in about 174,000 deaths and displaced over 420,000 people, mainly from the provinces of North Sumatra and Nanggroe Aceh Darussalam. In Nanggroe Aceh Darussalam, 389 school buildings were completely destroyed and 621 school buildings were heavily damaged. The total damages and losses were estimated to exceed 41 trillion Rupiah.

In Thailand, the tsunami hit the southern part comprised of six provinces along the Andaman coast, namely, Phang-nga, Krabi, Phuket, Ranong, Trang and Satul. Almost 60,000 people were severely affected by the tsunami, resulting in the death of 5,395 people. The total damage was valued at approximately 16 billion Baht. The damage on the environment and natural resources includes coral reefs especially at the diving spots, beaches and coastal areas, and deep and shallow water wells as well as water piping systems, loss of mangrove forest, occurrence of sinkholes and landslides in 16 provinces, and problems of soil erosion, soil salinity and solid wastes.



Countries Affected by the 2004 Indian Ocean Earthquake

Height of the Tsunami Wave

Source: *State of the Environment in Indonesia 2004; State of the Environment in Thailand 2005*

Population and Demography

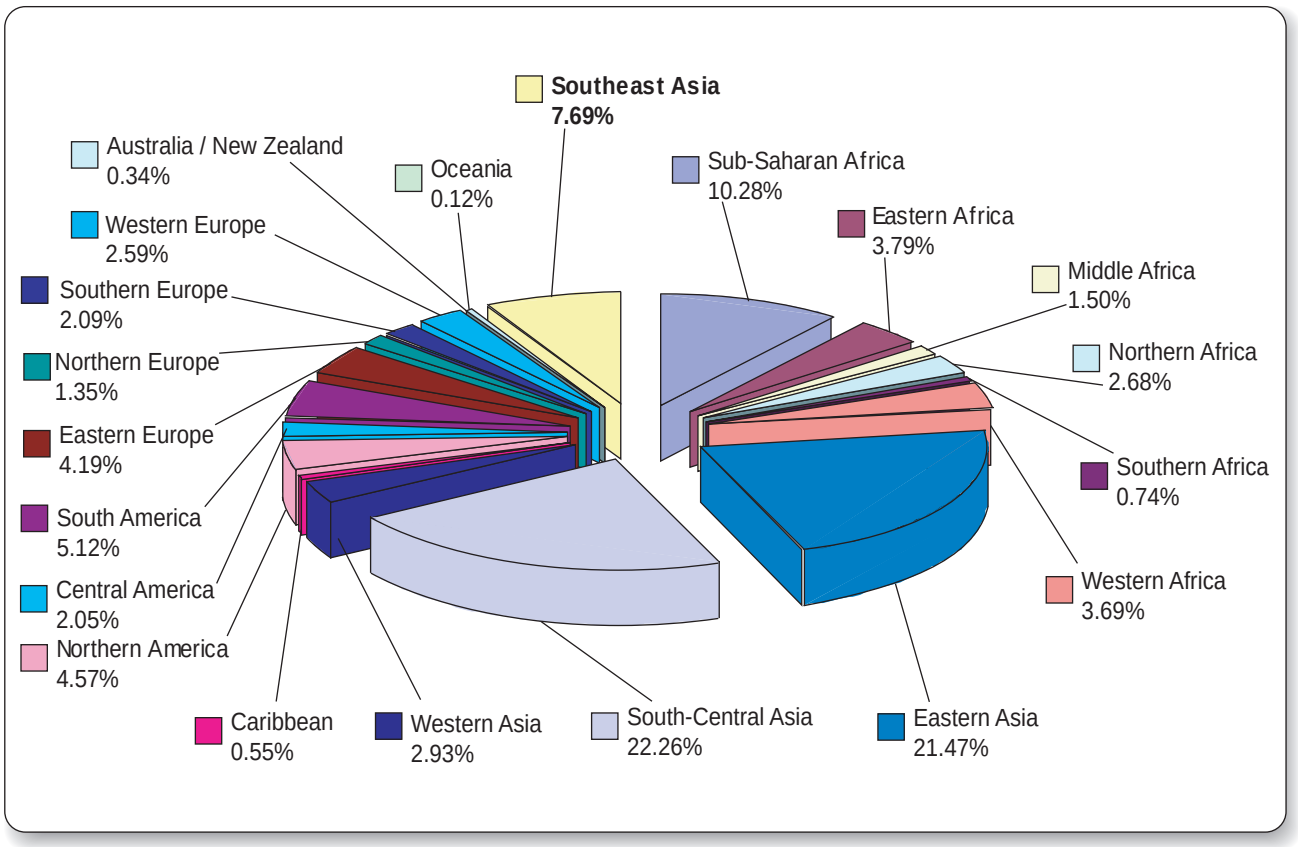
The population of ASEAN member countries in mid-2005 was approximately 558 million people, which comprises about 7.7% of the world's total population. In terms of regional distribution, the ASEAN region has the fourth largest population after South-Central Asia, Eastern Asia, and Sub-Saharan Africa. Indonesia is the most populous country in the region with about 40% or 220 million people. It is the fourth most populous country in the world after China, India, and the United States. Six ASEAN countries are among the top 50 most populous countries in the world, namely, Indonesia, Philippines, Viet Nam, Thailand, Myanmar and Malaysia.

Table 2.1: Population (mid-2005)

Country	Population (millions)	Percent of Total
Brunei Darussalam	0.4	0.07
Cambodia	13.7	2.45
Indonesia	219.9	39.37
Lao PDR	6.0	1.07
Malaysia	26.1	4.67
Myanmar	53.22	9.67
Philippines	84.2	15.07
Singapore	4.4	0.79
Thailand	64.8	11.60
Viet Nam	83.1	14.88
TOTAL	**558.5**	**100.00**

Source: *ASEAN Statistical Pocketbook (2006)*

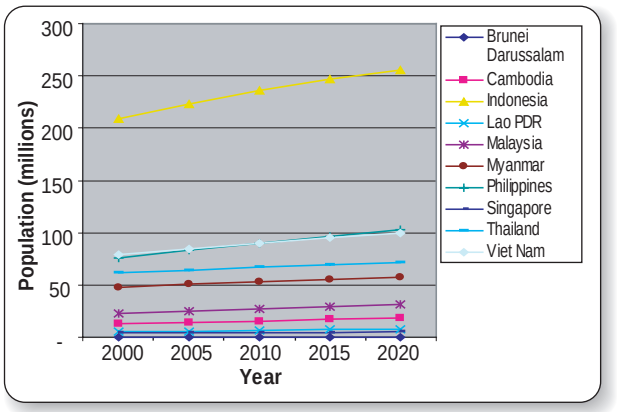
Figure 2.2: ASEAN's Population Compared to Other Regions, (Mid-2004)



Source: *Population Reference Bureau (2005).*

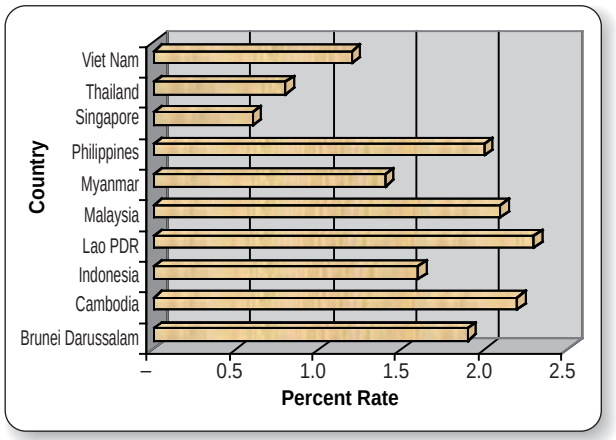
The region's population is expected to grow from 558 million in 2005 to around 650 million in 2020. Crude birth rate will outpace crude death rate resulting in a rate of natural increase ranging from 0.6% to 2.3%. The ratio of births and deaths in the ten ASEAN member countries is estimated between 2:1 and 7:1, in other words, there will be about two to seven babies born for every one person who dies in the region.

Figure 2.3: Projected Population, 2000 – 2020



Source: *UN-ESA Population Division (2005)*

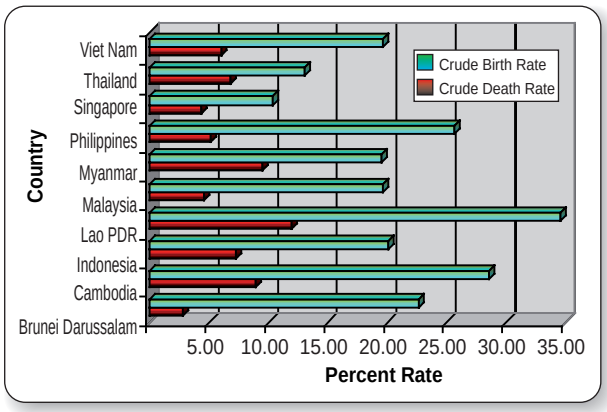
Figure 2.4: Rate of Natural Increase in Population (%), 2004



Source: *UN-ESA Population Division (2005).*

Lao PDR and Cambodia are among the countries with the highest rates of natural increase, 2.3% and 2.2%, respectively. Lao PDR also has the highest crude birth and death rates, 34.5% and 11.9% in 2005, respectively, which means that even though there are more babies being born, relatively more deaths also occur. Both countries have experienced baby boom after peace was restored in the 1970s as reflected in the high fertility rates. In more affluent countries, the fertility rate is lower. For example, Singapore's fertility rate remains low at 1.3% or one child per mother, in spite of the pro-natal policy of its government. Singapore has the lowest crude birth rate (10.4% in 2005) while Brunei Darussalam has the lowest crude death rate (2.8% in 2005).

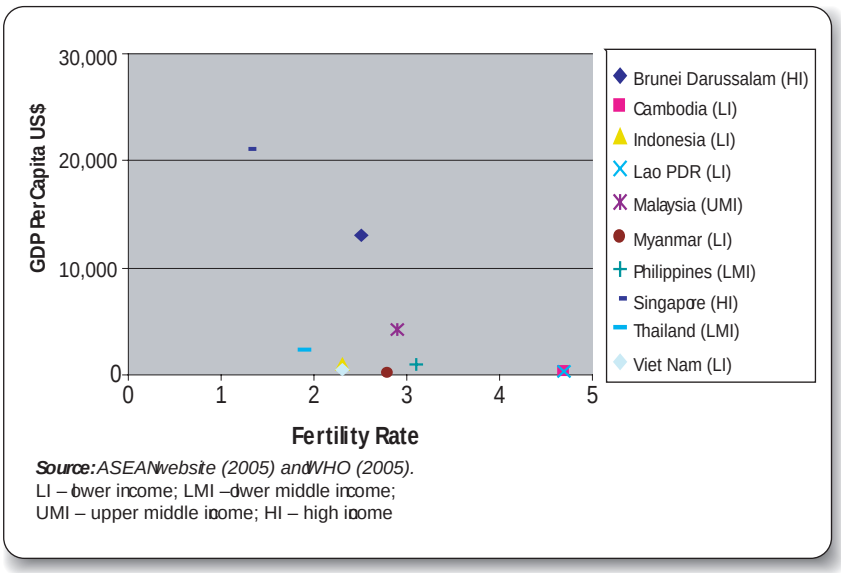
Figure 2.5: Crude Birth and Death Rates (%), 2005



Source: *ASEAN Statistical Pocketbook (2006)*

The region's age structure is relatively young as a consequence of high fertility and mortality rates. High fertility results in having more segments of the population of ages 0 to 14 compared to other age groups. Similarly, high mortality rate results in substantially reduced number of old people. This situation produces population pyramids (if age-groups are plotted in ascending order along the Y-axis, and population in each age-group along the X-axis) that are much wider at the bottom. Since 2000 the region's population within the age bracket 0 – 4 years has began to decline and this trend is expected to continue till 2020. Accordingly, while the region's population will continue to grow, there will be a

Figure 2.6: Scatter Plot for Fertility and Income, 2003

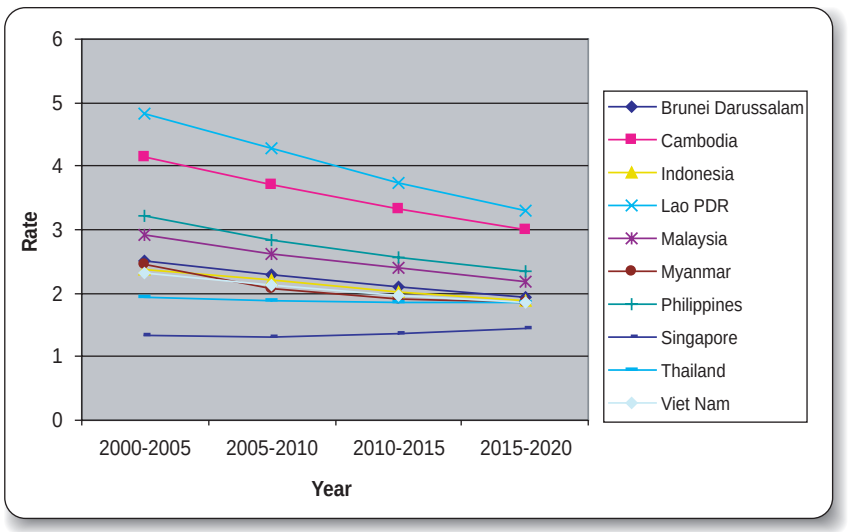


Source: *ASEAN website (2005) and WHO (2005).*
LI – lower income; LMI – lower middle income;
UMI – upper middle income; HI – high income

diminution in the number of young people as the fertility rates in the region continue its downward trend from an average of 2.5% in 2000 – 2005 to 2.0% in 2015 – 2020. Singapore is the only country in the region that is expected to have an increased fertility rate, from 1.35% in 2000 – 2005 to 1.44% in 2015 – 2020, owing to the government's pro-natal policy to arrest the growth of its ageing society.

As a result of declining fertility, the population pyramids show that the "youth bulges" in the 5 – 9 and 15 – 19 age brackets, that started to protrude in 2000, will be reflected in the 10 – 14 and 20 – 24 age brackets in 2005. In 2020, these bulges will still be present but not as prominently as in 2000. These youth bulges reflect temporary increases in the proportion of young people in a population resulting from a transition from high to low fertility. They generally belong to the age group 15 – 24 representing 20% or more of the population. Youth bulges are good news for countries faced with an ageing population (e.g., Singapore) because more productive young people will be available to support the economy.

Figure 2.7: Projected Fertility Rates 2000 – 2020



Source: *UN-ESA Population Division (2005).*

Singapore has the highest population density in the region with 6,164 persons per sq. km. of land area in 2005 while Lao PDR has the lowest population density with only 25 persons per sq. km. The average population density in the region is 125 persons per sq. km. (2005).[4] All countries of the region with the exception of Lao PDR exceed the world's average population density of 43 people per sq. km.

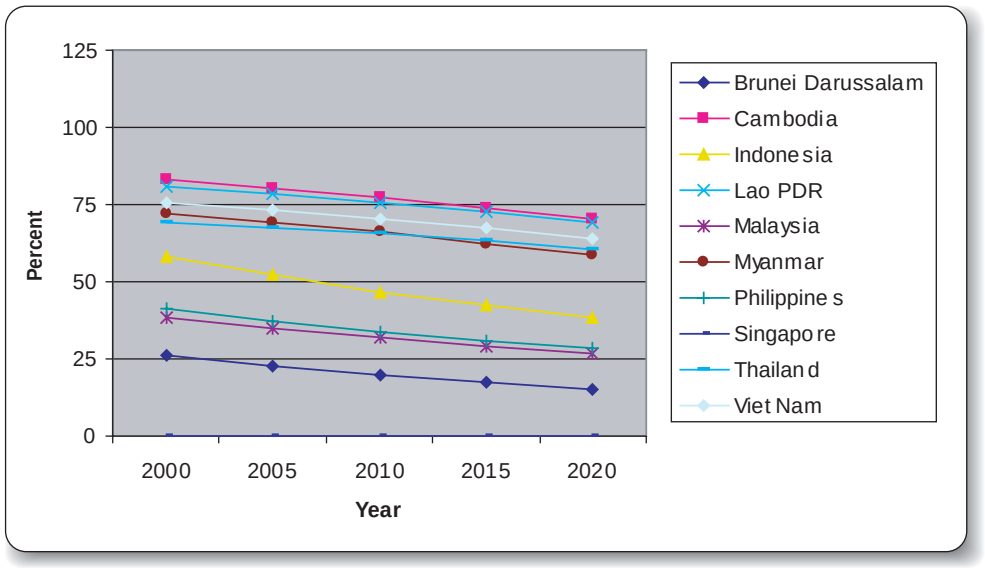
Table 2.2: Population Density, 2005 (persons/sq.km.)

Country	Population Density (persons/sq.km.)
Singapore	6,164
Philippines	281
Viet Nam	252
Thailand	127
Indonesia	116
Cambodia	77
Malaysia	79
Brunei Darussalam	67
Myanmar	83
Lao PDR	25
ASEAN	**125**

The region experienced a gradual diminution in the share of rural population from 54% in 2000 to 52% in 2005, despite the increase in rural population density from 1987 to 2001. The biggest decrease in rural population occurred in Indonesia and the Philippines. Indonesia's rural population in 2000 was 58% of the total population, but it declined to 52% in 2005. The Philippines, similarly, had a rural population of 42% in 2000, which decreased to only 37% in 2005. However, in Cambodia, Lao PDR, Malaysia and Thailand rural population densities increased for various reasons such as high fertility among rural women and decrease in rural land areas due to changes in political or geographical classification of boundaries

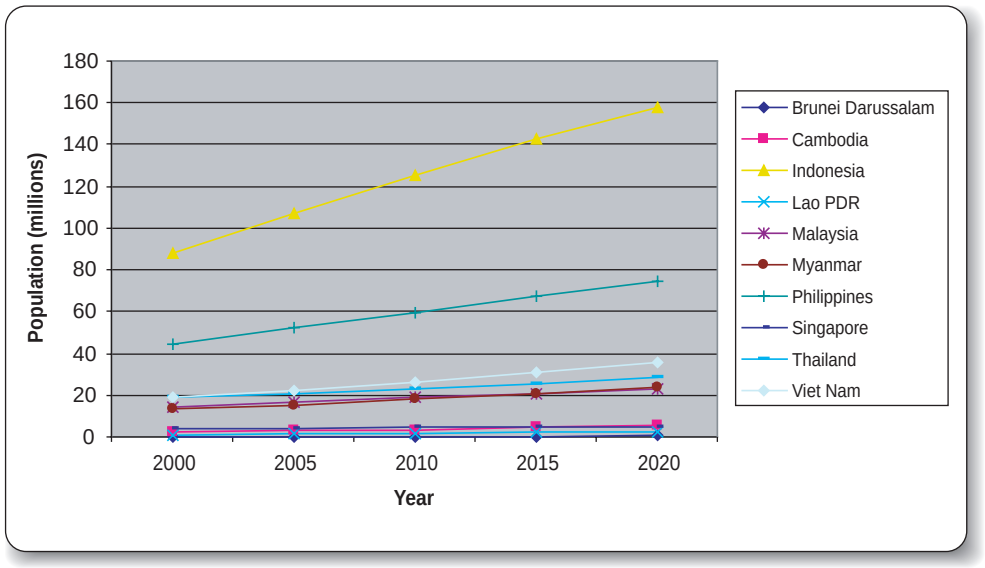
There is a general trend in the region of rural-to-urban migration. Indonesia had the biggest rural-to-urban exodus of people of around 18.8 million, followed by the Philippines with 7.6 million. Brunei Darussalam had the smallest exodus of 43,000 people. The exodus of rural population is not always to the largest city of each country. In many countries the migration is towards urban areas other than the capital cities.

Figure 2.8: Projected Share of Rural Population to Total Population, 2000 – 2020



Source: *UN-ESA Population Division (2005).*

Figure 2.9: Urbanisation Projections, 2000 – 2020



Source: *UN-ESA Population Division (2005).*

End Notes

1 In this report, the word "region" refers to the "ASEAN region" rather than "Southeast Asian region." This is to avoid confusion where some publications include non-ASEAN countries in the geographical term "Southeast Asia."

2 Lacustrine denotes a sedimentary environment of a lake. Lacustrine deposition thus means sedimentation into a lake.

3 There are other water bodies worth mentioning, and these are: Indonesian Sea, Seram Sea, Moluca Sea, Celebes Sea, and Sulu Sea.

4 ASEAN Statistical Pocketbook (2006)

CHAPTER 3
Social Development

The hallmark of a strong and resilient community of caring societies is its commitment and capability to address the core issues of poverty, equity and health.

Vientiane Action Programme

The level of social and human development – measured broadly in terms of income, health, literacy, longevity – goes hand-in-hand with environmental health. For example, the poor, individually, are not the main cause of environmental degradation, but widespread poverty, a symptom of lack of viable economic activities, often leads to heavy exploitation of natural resources for livelihood. On the other hand, the poor can be caught is a vicious cycle of bad environmental conditions causing widespread diseases. The people need to be lifted out of the poverty line to ensure better quality of life and care for the environment. In this respect, the UNDP Human Development Index has shown encouraging improvements in member countries, with Singapore and Brunei Darussalam ranked "high", and the rest "medium". Despite the robust economic recovery after the financial crisis, income poverty in some countries remained high. On average, about 20% of the people in the region live below the national poverty line. Efforts to reduce the gap between the rich and the poor in some countries had limited success for a variety of reasons, including limited employment opportunities. However, the region's economic growth had been accompanied by some improvement in health and education. The literacy level increased to around 90% of the total population, and most countries have achieved the MDG target of reducing child mortality by two-thirds. Immunisation coverage against measles and DPT was good for most countries ranging from 42% to 100%. The prevalence of HIV/AIDS was relatively low in most countries but remains a source of concern for some countries with 1.5% to 2.6% prevalence rate among 15 – 24 year-olds. Access to clean and safe water increased to an average of 77% for the entire region but access to improved sanitation facilities remained lower at 64%. For some countries, the advantages of economic growth had not filtered down to all levels of society and poverty. Regional cooperation has therefore being aimed at developing and enhancing human resources, raising the standard of living of disadvantaged communities, generating employment and alleviating poverty and socio-economic disparities.

ASEAN FACTS AND FIGURES

Human Development Index ranking (2005) *(of 177 countries evaluated; lower is better)*	**High:** Singapore (25), Brunei Darussalam (33) **Medium:** Malaysia (61), Thailand (73), Philippines (84), Viet Nam (108), Indonesia (110), Myanmar (129), Cambodia (130), Lao PDR (133)
Poverty Incidence *(% of population living below respective national poverty line) (latest national estimates)*	Cambodia (36%), Indonesia (17%), Lao PDR (32%), Malaysia (5%), Myanmar (27%), Philippines (30%), Thailand (12%), Viet Nam (27%)
Longevity (2000 – 2003)	
Adult mortality rate	Men (257), women (186) per 1000
Survival to age 65	Men (61%), women (70%)
Infant deaths	41 per 1000 live births
Health (1998 – 2003)	
Babies born underweight(1998 – 2003)	12% under 2.5 kg
Underweight children (1995 – 2003)	31%
Immunisation: DPT (2003)	42% to 99% coverage
Immunisation: Measles (2000)	52.8% to 100% coverage
Incidence of HIV/AIDS (2003)	less than 0.1% to 2.6% among 15 – 24 year-olds (high estimate)
Access to water (2002)	77%
Access to improved sanitation facilities (2002)	64%
Literacy rate (2004)	over 90%

Human Development

A good indicator of the level of human development in the region may be obtained using the Human Development Index (HDI) of the United Nations Development Programme (UNDP). It is a composite measure of standard of living (measured by real GDP per capita, adjusted for purchasing power), longevity (measured by life expectancy), and knowledge (measured by adult literacy and mean years of schooling). The HDI ranks countries at three levels: high, medium and low.

Two countries in the region, namely Singapore and Brunei Darussalam, were consistently placed in the "high human development" group from 2001 to 2005. Singapore had been the perennial frontrunner among the ten ASEAN Member Countries by making it within the top 25 to 28 among 160 to 170 plus countries (varies each year) included in the study. It was followed by Brunei Darussalam between 32 and 35. The other eight countries were placed in the "medium human development" level, with the exception of Lao PDR which, until 2003, was at "low human development" level.

Poverty

The latest available national estimates of poverty incidence based on national poverty line show that 36 % of the population of Cambodia was below its national poverty line, Indonesia (17%), Lao PDR (32%), Malaysia (5%), Myanmar (27%), Philippines (30%), Thailand (12%), and Viet Nam (27%). It is to be noted that as the national poverty line varies among countries, the level of poverty incidence cannot be compared among ASEAN

Table 3.2: Poverty Incidence (based on respective national poverty line)

Country	Latest Available National Estimates (%)
Brunei Darussalam	–
Cambodia	36 (1999)
Indonesia	17 (2003)
Lao PDR	32 (2003)
Malaysia	5 (2002)
Myanmar	27 (2001)
Philippines	30 (2003)
Singapore	–
Thailand	12 (2004)
Viet Nam	27 (2004)

Source: *Adapted from "Towards an ASEAN Millennium Development Compact", ASEAN Secretariat, (2006)*

****Notes:*** *Brunei Darussalam and Singapore does not have explicit national poverty line*

Table 3.1: Rank in Human Development Reports, 2001 – 2005

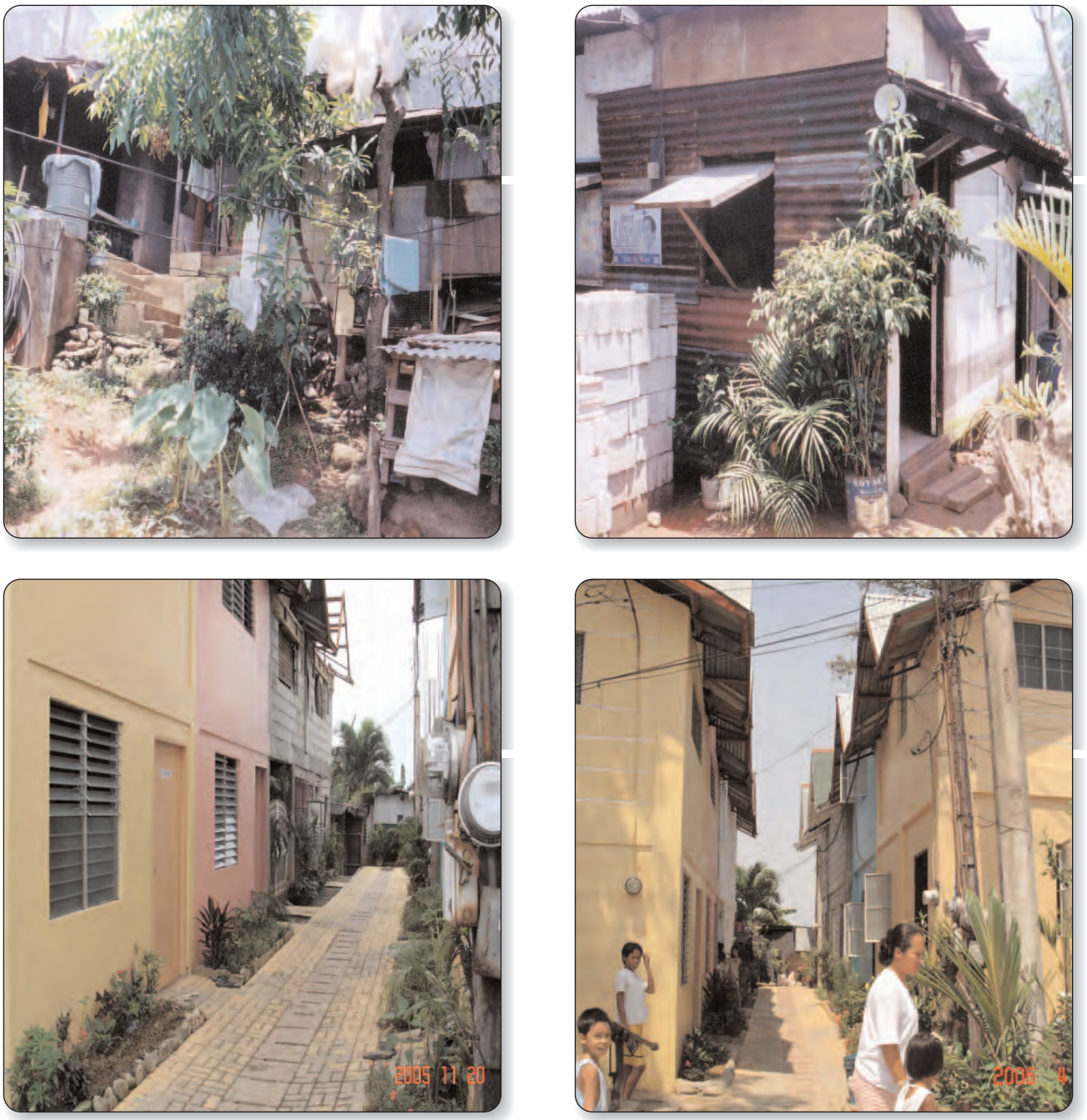
Rank	Country (grouped using 2005 HDI ranking)	Human Development Level (using 2005 grouping)	Year				
			2001	2002	2003	2004	2005
1	Singapore	High	26	25	28	25	25
2	Brunei Darussalam		32	32	31	33	33
3	Malaysia	Medium	56	59	58	59	61
4	Thailand		66	70	74	76	73
5	Philippines		70	77	85	83	84
6	Viet Nam		101	109	109	112	108
7	Indonesia		102	110	112	111	110
8	Myanmar		118	127	131	132	129
9	Cambodia		121	130	130	130	130
10	Lao PDR		131	143	135	135	133
No. of Countries Evaluated Each Year			162	173	174	177	177

Source: *United Nations Development Programme (UNDP) (2001 – 2005), Human Development Report (New York and Oxford: Oxford University Press).*

Member Countries. On average, about 20 % of the people in ASEAN still live below the national poverty line.

The Gini Index (a measure of income equality where zero means perfect equality and 100 the opposite) of countries in the region revealed that the countries with the highest GDP were not necessarily the most egalitarian. For example, Indonesia, Lao PDR and Viet Nam had lower Gini Indices compared to Malaysia, Philippines, Thailand and Singapore. Available data on the distribution of income also showed that the highest 20% or highest 10% income/consumption groups comprising the economic elites in each country amassed almost half and a third, respectively, of the national GDP. This finding was consistent with the "inequality" finding using the Gini Index.

Poverty alleviation is the most important socio-

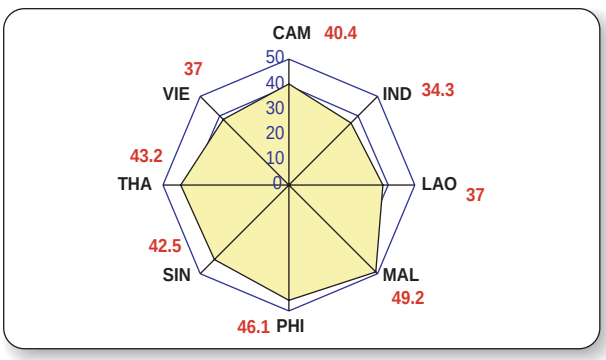


Top photos show the dilapidated structures of housing used by the urban poor in one of the slum areas in Metro Manila, Philippines. Bottom photos show the new houses built from voluntary contributions of a faith-based organisation and sweat equity of both the beneficiaries and members of the organisation.

economic concern of many countries in the region. In the Philippines, for example, the task of poverty reduction is hindered by the inability of the economy to generate jobs for a rapidly growing labour force. In Cambodia, Lao PDR and Myanmar, poverty reduction will require strengthening of the agricultural sector and intensification of efforts in rural development. In these countries, rural sector development is generally hampered by remoteness and lack of necessary transport services. However, the most visible manifestation of poverty in some counties of the region is the presence of numerous slums and marginal settlements in the capital cities (e.g., Manila in the Philippines, Jakarta in Indonesia). For this reason, the provision of decent housing to slum dwellers has become a priority concern not only of the government but, more significantly, of some civil society organisations. An example is the *Gawad Kalinga* (meaning giving care) programme, which a faith-based organisation started in the Philippines in 2003 and is now also present in Indonesia and Cambodia.

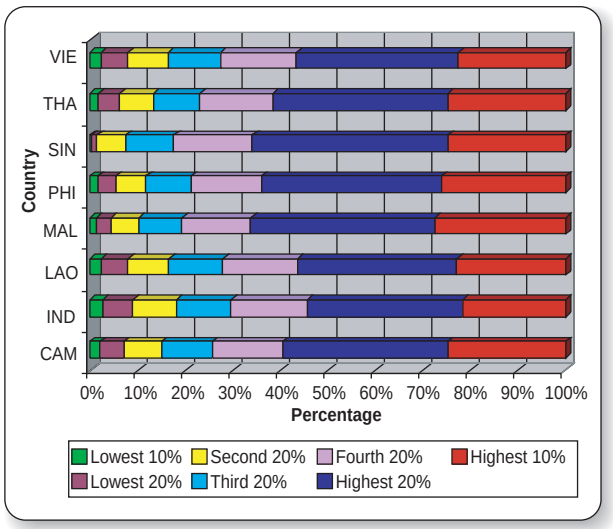
A number of countries in the region were successful in significantly reducing poverty. Latest available data (released in 2005 but using various survey years) revealed that Viet Nam, Thailand and Indonesia had managed to successfully reduce by half – ahead of the MDG target year of 2015 – the proportion of people living below US$1 a day. Viet Nam in particular exited from a three-year Poverty Reduction and Growth Facility arrangement with IMF in April 2004 and was commended for the pro-poor orientation of its public investment. On the other hand, other countries like the Philippines were still trying their best to meet the MDG target of reducing poverty by at least half by 2015.

Figure 3.1: Gini Indices of selected ASEAN Member Countries



Source: *WB (2005)*

Figure 3.2: Percentage Share of Income/Consumption in selected Member Countries, Various Survey Years (1997 – 2002)

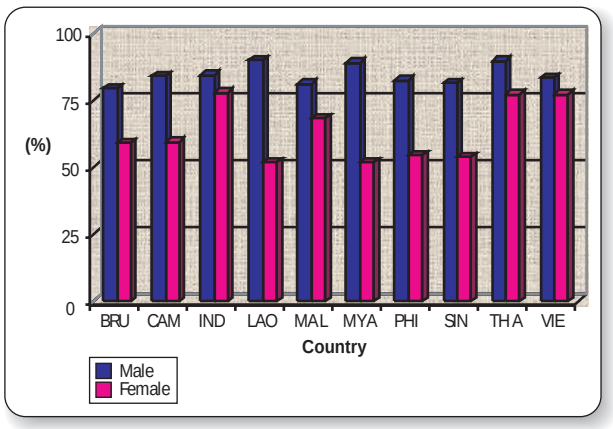


Source: *WB (2005)*

Employment

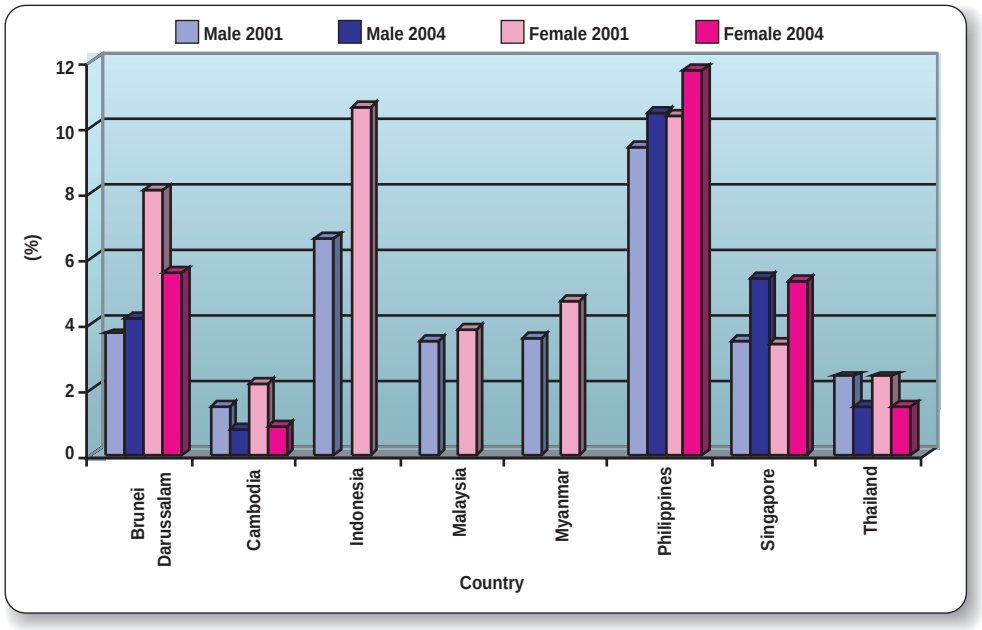
The labour force in the region comprised around 46% of the total population in 2004 or 261 million people. Employment would help alleviate poverty if income is sufficient to provide the basic necessities of life like food, water, clothing and shelter. Around 85% of the region's males (i.e. males of employment age) and about 66% of females were employed in 2003. Among people 15 years and above, unemployment in 2004 was highest in the Philippines with 11.7% females and 10.4% males unemployed. These levels were higher than the unemployment figures reported in 2001, with 9.4% male unemployment and 10.3% female unemployment.

Figure 3.3: Labour Force Participation Rate in Member Countries, 2003



Source: *WB (2005)*

Figure 3.4: Unemployment Rate of People 15 Years and Above, 2001 and 2004



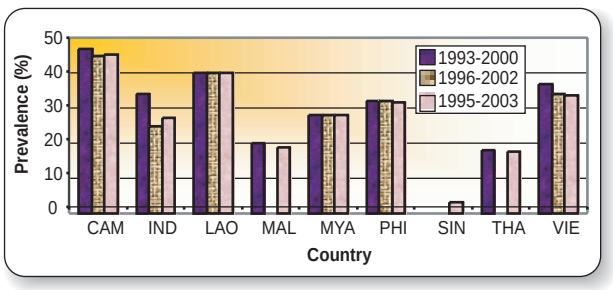
Source: *ASEAN Statistical Pocketbook (2006)*

Health

Longevity should not be just about having a long life but also about having a healthy life free from hunger and sickness or diseases throughout one's lifetime. Unfortunately, statistics showed that many children in the region, right from the very day they were born, had to cope with lack of sufficient nourishment to sustain their growth. On the other hand, many adults were afflicted with sickness and diseases by their own choice (e.g., lung disease from cigarette smoking) or negligence (e.g., HIV/AIDS from unprotected sex). But a far greater number, due to poverty or lack of access to suitable medical and social services, suffered or died from diseases that medical science and technology had long eradicated or made easily preventable (e.g., malaria or cholera).

An average of 12% of babies born in the region between 1998 and 2003 suffered from low birth weight, weighing less than 2,500 grams before significant postnatal weight loss had occurred. In the Philippines, the percentage was higher at 20%, followed by Myanmar (15%), and Lao PDR (14%). On the other hand, an average of 31% children were found to be underweight, that is, the weights for their ages were not within accepted international standard, during the period 1995 – 2003. Many of them were in Cambodia (45%), Viet Nam (34%), Philippines (32%) and Myanmar (28%). In the same period, 1993 – 2005, the average number of children in the entire region whose growth was stunted (the heights for their ages were not within accepted international standard) was 36%. Most of them were in Cambodia (45%), Indonesia (42%), Myanmar (42%) and Lao PDR (41%).[1]

Figure 3.5: Prevalence of Underweight Children in Member Countries, 1993 – 2003

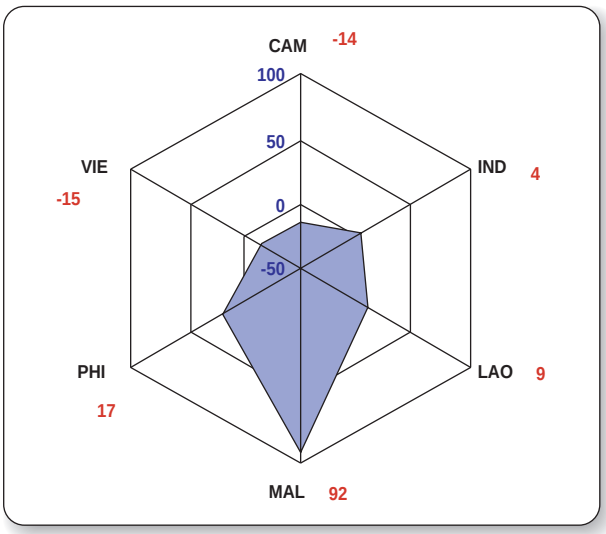


Source: *WB (2003 to 2005).*
Note: *Data are for most recent year available*

In support of the MDGs, many governments in the region achieved significant improvements in providing nourishment and appropriate medical care to babies. For example, on the MDG target of reducing hunger among under 5-year old children and undernourished people, many countries have already met the target of reducing by half the proportion of babies suffering from malnutrition. Malaysia surpassed this target with a 92% reduction in the number of under-5 malnourished children. But

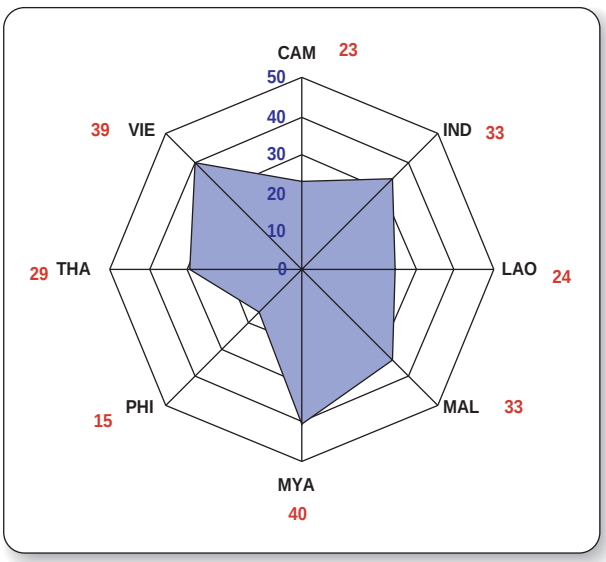
other countries would have to work harder as the number of under-5 malnourished babies had increased. On the MDG target of reducing child mortality by two-thirds, most countries, namely, Brunei Darussalam, Indonesia, Lao PDR, Malaysia, Philippines, Singapore, Thailand and Viet Nam had also already achieved it.

Figure 3.6: Reduction in Proportion of Children Under-5 Moderately or Severely Underweight (%) (MDG Goal 1, Target 2) Baseline Data (1990 – 1995) vs. Latest Data (1996 – 2004)



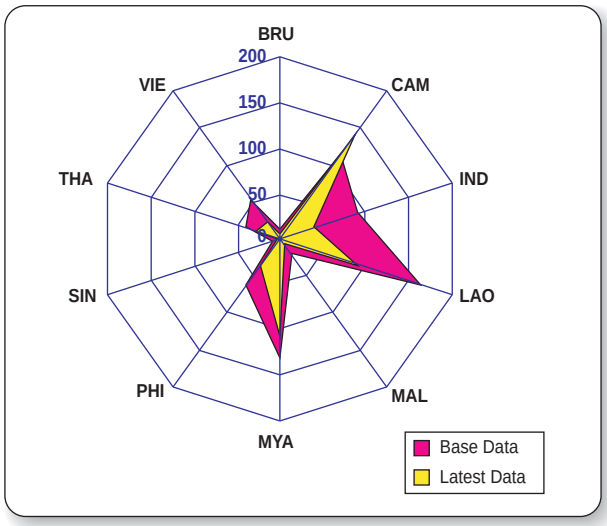
Source: *UNESCAP-UNDP-ADB (2005)*
Note: *No available comparative data for other AMCs.*

Figure 3.7: Reduction in Under-nourishment as Percentage of Total Population (MDG Goal 1, Target 2) Baseline Data (1990 – 1995) vs. Latest Data (1996 – 2004)



Source: *UNESCAP-UNDP-ADB (2005)*
Note: *No available comparative data for other AMCs.*

Figure 3.8: Reduction in Child Mortality (MDG Goal 4, Target 5) Baseline Data (1990 – 1995) vs. Latest Data (1996 – 2004)



Source: *UNESCAP-UNDP-ADB (2005)*
Note: *No available comparative data for other AMCs.*

The rate of immunisation for measles was already high in the region in 2000 ranging from 43.1% in Lao PDR and 55.4% in Cambodia to 97% in Viet Nam and 99% in Brunei Darussalam. In 2003, coverage of immunisation further improved for most countries, for example, Cambodia from 55.4% to 65%, Malaysia from 88% to 92%. In the case of DPT, Brunei had 100% immunisation coverage in 2000 while Cambodia had 48.8%.

Table 3.3: Immunisation against Measles and DPT among One-Year Old Children (%)

Country	Measles			DPT
	2000	2002	2003	2000
Brunei Darussalam	99.0	99.0	99.0	100.0
Cambodia	55.4	52.0	65.0	48.8
Indonesia	72.0	72.0	72.0	–
Lao PDR	43.1	55.0	42.0	52.8
Malaysia	88.0	92.0	92.0	–
Myanmar	84.0	75.0	75.0	82.0
Philippines	81.0	80.0	80.0	–
Singapore	91.0	91.0	88.0	91.0
Thailand	94.0	94.0	94.0	–
Viet Nam	97.0	96.0	93.0	97.8

Source: *ASEAN Statistical Pocketbook (2006)*

The HIV/AIDS prevalence rate among 15 – 24 year-old people in the region was still relatively low in 2003, ranging from less than 0.1% in Brunei Darussalam and the Philippines to 1.5% in Thailand and 2.6% in Cambodia. Although the prevalence was low, most countries in the region had recognised the problem and were implementing some measures in cooperation with United Nations agencies and non-governmental organisations.

Table 3.4: HIV Prevalence among 15 – 24 Year Old People, Both Sexes (%)

Country	HIV Prevalence (%)
Brunei Darussalam	< 0.1
Cambodia	2.6
Indonesia	0.1
Lao PDR	0.1
Malaysia	0.4
Myanmar	1.2
Philippines	< 0.1
Singapore	0.2
Thailand	1.5
Viet Nam	0.4

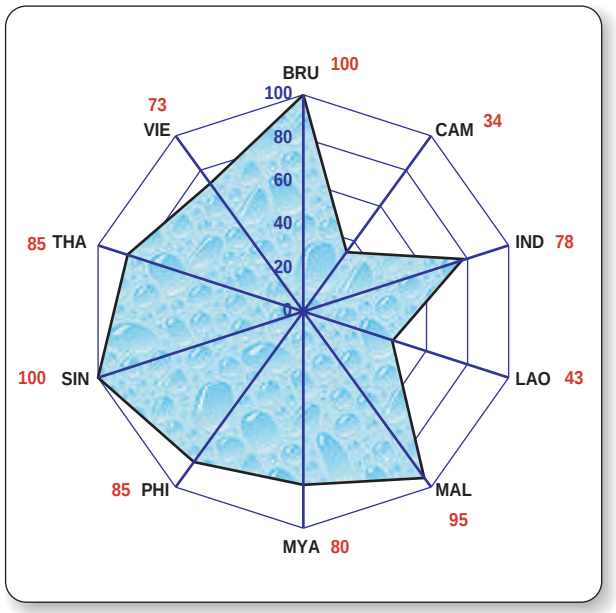
Source: *ASEAN Statistical Pocketbook (2006)*

Access to clean water supply and appropriate sanitation had improved steadily throughout the region and a majority of residents could get clean and safe water for their everyday needs. However, Cambodia and Lao PDR would need to install more water supply and distribution facilities because they had low water accessibility rate at 34% and 43%, respectively. In general, access to improved sanitation facilities was lower compared to water accessibility throughout the region. The regional average in 2002 was only 64% with Cambodia, Lao PDR and Viet Nam having sanitation accessibility rates of only 16%, 24% and 41%, respectively.

Literacy

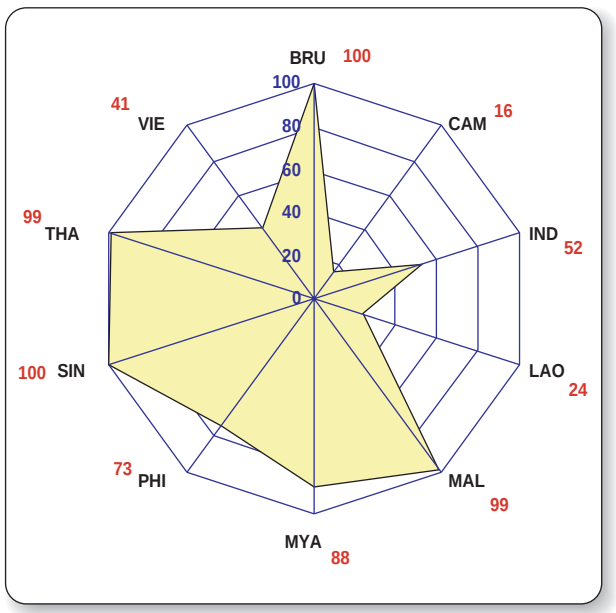
The level of literacy among the people in the ASEAN region has also been improving steadily. In 2004, over 90% of the population in the region could understand, read and write simple statements about their everyday lives. Literacy rates were particularly high in Brunei Darussalam, Philippines, Thailand and Singapore reaching 95% to 99% in 2004. On the other hand, gross enrolment in primary, secondary and tertiary schools in the region averaged a mere 67.8% in 2000 – 2003, increasing from 65% in the period 2000 – 2001 to 69% in 2002 – 2003.

Figure 3.9: Population with Access to Water (%), 2002



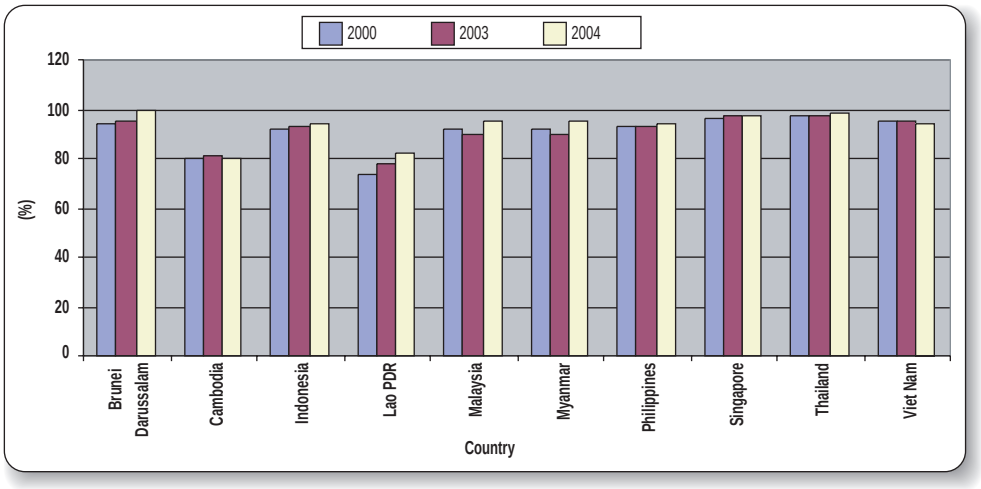
Source: *ASEAN (2004) and WB (2002 and 2005)*

Figure 3.10: Population with Access to Sanitation (%), 2002



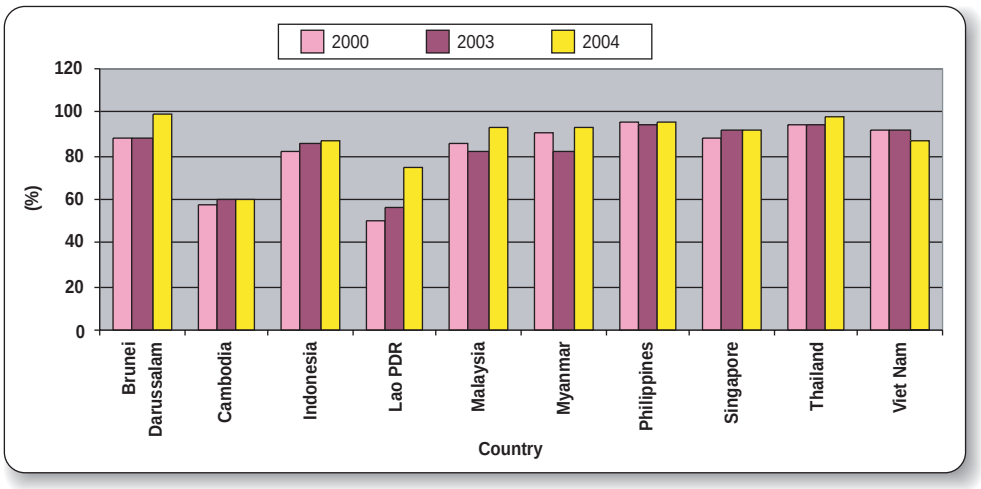
Source: *ASEAN (2004) and WB (2002 and 2005)*

Figure 3.11: Adult Literacy Rate among Males



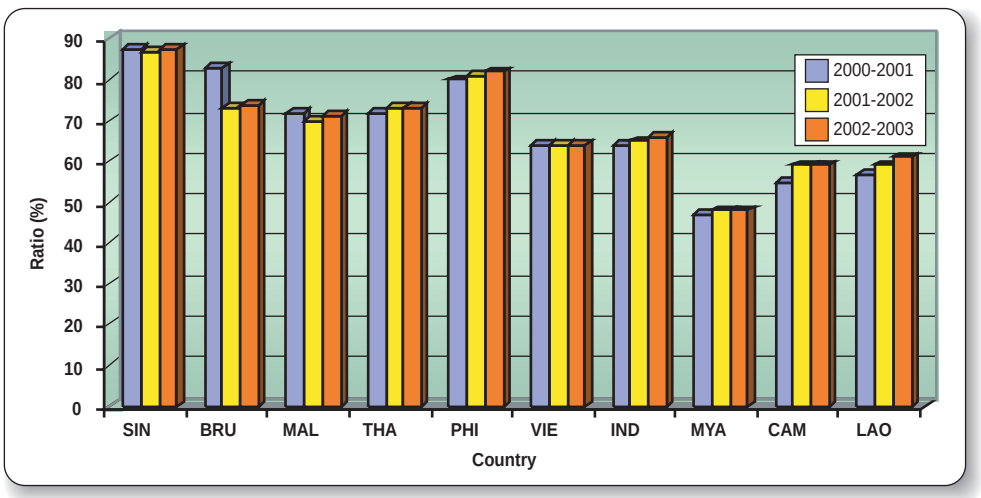
Source: *ASEAN Statistical Pocketbook (2006)*

Figure 3.12: Adult Literacy Rate among Females



Source: *ASEAN Statistical Pocketbook (2006)*

Figure 3.13: Gross Enrolment in Schools, 2000 – 2003



Source: *UNDP (2000–2005) and WB (2005b)*

Note: *(1) AMCs were arranged according to their HDI 2005 ranks, and (2) Data are for the most recent year available.*

Poverty and Environment

There is a causal link between poverty and environmental degradation. Poverty poses a threat to the environment if poor people exploit fragile ecosystems and natural resources to meet their daily needs. In the urban setting, slums and marginal settlements that are usually located near the river banks contribute to the pollution of urban rivers. Due to severe congestion in these areas, proper disposal of solid wastes is also difficult. Conversely, environmental degradation poses a threat to poor people since most poor people depend on their surrounding natural resources for livelihood. In addition, the poor are the most vulnerable to environmental hazards and natural disasters. A study on the consequences of forest denudation to farming and to women's lives in poor rural areas in the Philippines shows the tight nexus between poverty and environment.

Box 3.1: Consequences of Environmental Degradation on Irrigated Rice Production, Households, Population, and Women: A Case Study from the Philippines

The degradation of irrigation infrastructure, exacerbated by high electricity costs of irrigation, has expanded the area used for partially-irrigated and rain-fed farms, which has led to a massive decline in rice production. This leads to greater poverty for smallholder rice farmers. In many areas, the low income from rice has led to the conversion of land to industrial, recreational or residential use. Due to unemployment and the inability of rice farming to absorb the available labour force, plus the higher wages and greater opportunities offered by non-farm employment, male farmers migrate to the cities, particularly during the dry season. Unless technologies are forthcoming to increase crop productivity and cropping intensity by growing drought-tolerant crops, male migration will continue, leaving women as the sole managers of their animals, minor crops, and all household responsibilities.

Lack of irrigation that would enable farmers to grow two to three crops of rice per year tends to intensify land use and increase the yield per hectare through the use of modern varieties. This is supported by a study that stated that rice production is characterised by long-term stagnation or declines in yields under intensive irrigated rice production. The degradation of the paddy environment can occur due to one or more causes: pest pressure, rapid depletion of micro-nutrients and changes in soil chemistry brought about by intensive cropping and increased reliance on low quality irrigation water.

Rural women who do not have access to alternative and remunerative employment in the village have to work as hired labourers in transplanting and harvesting operations, where they are paid either in cash or in-kind (i.e., a share of the paddy). Their wages depend on their farming skills and speed. In transplanting, greater competition results in smaller take-home wages. Such rural women suffer from low returns on their labour and from low self-esteem in maintaining family food security.

Low incomes, lack of employment opportunities, increased indebtedness, and diminishing sources of home-produced foods – all these lead to less available food for a family with an average of six children. The poor quality of food and reduced mother's time in food preparation lead to child malnutrition and high infant mortality. In the absence of alternative support systems, the greater time mothers are obliged to spend outside the home leads to the neglect of child care, less time for breast-feeding, and poorer feeding habits.

Environmental and economic pressures in the lowland, rain-fed areas result in the loss of sustainable livelihood and reduced employment. This has led to greater and growing migration from the lowlands to the upland areas, thereby merely transferring the environmental and economic pressures to higher zones. Conflicts consequently arise between the lowland migrants and the upland farmers and indigenous tribal communities. The resulting population pressure exacerbates the poverty and survival needs of the uplands people, including both migrant and indigenous communities. This, in turn, feeds further, denuding forest lands and environmental degradation, as the resources of nature become the only accessible goods that can be exploited. Resource depletion, poverty and unemployment lead to rural-urban migration, and the proliferation of city slums and squatter settlements, also imposing various negative environmental penalties.

Source: *Excerpts from Food and Agriculture Organisation (FAO) (2005), "Environment, Women and Population: Interrelated Issues in Rural Development in Southeast Asia" 4 Oct 2005.*

In general, efforts to reduce poverty and generate more jobs in the region have met with difficult challenges. This situation underscores the need to strengthen pro-poor growth strategies and delivery of basic services to the poorer sector of society. In general, for economic growth to be pro-poor, it must have two characteristics: first, growth must be rapid enough to have an immediate effect in reducing income poverty; and second, growth must result in greater equity in income and better access to a wide range of social services. This twin challenge should therefore be given utmost priority in the policy agenda of countries in the region.

Social equity must accompany economic growth if development is to become sustainable. Growth that does not generate decent employment opportunities to a wide sector of the population is not a very desirable economic growth pattern. To avoid this type of growth will require, among others, the provision of needed investments that generate jobs, and the strengthening of institutions and capacity to deliver social services such as education and health to the entire population. This is an important challenge to the region. Unless this is adequately and effectively addressed, there will be disparities in the social development of many countries in the region.

Box 3.2: ASEAN Millennium Development Compact

"Poverty alleviation, equity and human development lie at the core of a strong and resilient ASEAN Community. These are also principles underscored in the United Nations Millennium Declaration. ASEAN Member Countries are part of the global compact formed by the Millennium Declaration which laid out the Millennium Development Goals. ASEAN Leaders have reaffirmed their commitment to work together to achieve the Millennium Development Goals, emphasising partnerships and mutual support"

(**Ong Keng Yong** , Secretary-General of ASEAN)

An ASEAN workshop on regional cooperation and MDGs, convened with support from the UNDP Regional Bureau for Asia and the Pacific on 1 – 2 August 2005, provided a forum for peer-learning on approaches to mainstream poverty into national development agendas and policy measures for poverty monitoring and reduction, bearing in mind priorities for sustainable development. The workshop's key outcome was the agreement to develop an "ASEAN Millennium Development Compact" (AMDC) to serve as the ASEAN value-add to ongoing efforts of ASEAN Member Countries to implement the MDGs. The AMDC's objective of narrowing the development gap between ASEAN Member Countries is also in ASEAN's action agenda for rural development and poverty eradication.

While the AMDC and its proposed cooperation modalities would focus on MDG Goal 1, which is to eradicate extreme poverty and hunger, there is a recognition of the need for greater advocacy and inter-sectoral collaboration, citing the importance of a comprehensive approach to addressing the MDG goals. Poverty is the cornerstone to which the targets for education, health, environmental sustainability and gender equality would be linked. The AMDC would thus provide the framework under which the different ASEAN bodies addressing these priorities could meet, share respective experiences and challenges, and reach solutions in a larger forum.

For example, universal education cannot be accomplished if poverty keeps children out of school. Providing adequate education and employment opportunities for girls and young women is an important consideration for helping families out of poverty. Providing the poor with basic healthcare and affordable drugs for treatment of AIDS, malaria, tuberculosis and other infectious diseases contribute to overall improvements in human well-being. Environmental factors also play a crucial role in the health of the population. Having access to safe drinking water and proper sanitation will help reduce maternal and child mortality and prevent the spread of diseases. Adequacy of habitat is also vital to maintaining a decent standard of living. Development assistance can help accelerate efforts to achieve these goals. Developed countries can assist the less developed through aid, technology transfer and helping to create more employment opportunities, especially for youth.

The AMDC thus demonstrates ASEAN's "Prosper Thy Neighbours" policy, which is a win-win solution to bridging the different levels of economic development among the ASEAN Member Countries.

The AMDC initiative was highlighted to, and welcomed by Ministers attending the "Asia Pacific Regional Ministerial Meeting on MDGs: The Way Forward 2015" on 3 – 5 August 2005 in Jakarta. The Jakarta Declaration issued on this occasion stated that the Ministers were "*encouraged to learn of the pioneering step taken by the Association of Southeast Asian Nations (ASEAN) to prepare an ASEAN Millennium Development Compact which will catalyse many inter-country initiatives to plan for effective collective action at all levels in achieving the MDGs*."

The ASEAN Ministers on Rural Development and Poverty Eradication (AMRDPE) will discuss how the AMDC can be an effective tool for ASEAN Member Countries to achieve economic growth with equity, through partnerships and mutual support.

End Notes

1 World Bank (2003 – 2005)

CHAPTER 4
Economic Development

The ASEAN Economic Community (AEC) to be achieved by the year 2020 embodies the realisation of ASEAN's aspiration of a stable, prosperous and highly competitive region, functioning as a single market and production base by 2020, in which there is a free flow of goods, services and skilled labour, and a freer flow of capital, along with equitable economic development and reduced poverty and socio-economic disparities within and across its Member Countries

Vientiane Action Programme

Sustained economic growth is essential to improve the standard of living and to provide better care for the environment. As a resource-rich region, the economy of the region is heavily dependent on its natural resources. Nevertheless it is comforting to note that the economy of the region was predominantly service (44.4%) and industry-based (40.9%), with agriculture accounting for only 14.7% of the region's economic production. However, the contribution of agriculture and mining to GDP was at 27%, compared to manufacturing at 25% and financial services sector at 10% in 2003. Mining was the fastest-growing sector posting a 58% increase from 1998 to 2000 and continuing its robust growth in 2003. There was an overall decrease in the region's primary energy production, with new and renewable energy accounting for only 3% of oil-based power. In view of the steep escalation of oil prices, many countries in the region are investing in renewable sources of energy such as bio-diesel. Fisheries production experienced a similar growth with exports of fishery products outpacing imports. Tourism arrivals recorded an impressive growth of 28% in 2004 compared to the slump in 2003, and eco-tourism offers great potential for the countries of the region. The challenge to the region would be to ensure sustainable management practices in many of these resource-based industries/services so that it not only helps conserve the natural capital for the long term, but at the same time minimises detrimental local and transboundary pollution. With the increased awareness on environment, the demand for green products/services offers unique opportunities to diversify the market by offering niche products. Also green-growth or green-productivity has been shown to support the triple bottom-line, i.e. profitability, social responsibility and environmental protection, and therefore should be widely adopted in the region.

ASEAN FACTS AND FIGURES

ASEAN Economic Growth

2001	2002	2003	2004	2005
3.4%	5.0%	5.6%	6.1%	5.5%

ASEAN GDP per capita (nominal)

2001	2002	2003	2004	2005
US$ 1,096	US$ 1,209	US$ 1,322	US$ 1,440	US$ 1,569

ASEAN GDP/capita (2005)

Range (among member countries – nominal) US$ 106 – 26,821

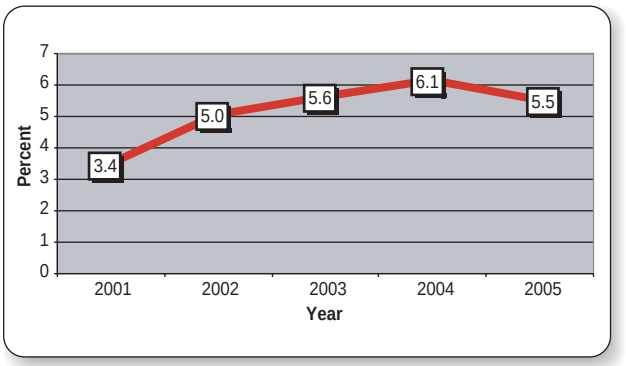
Trade (2004)	
Exports	US$ 552 billion
Imports	US$ 492 billion
Economic Structure	
Service-based	ASEAN (44.4%); most service-oriented (2004): Singapore (63.7%)
Industry-based	ASEAN (40.9%); most industry-oriented (2004): Brunei Darussalam (58.4%)
Agriculture-based	ASEAN (14.7%); most agriculture-oriented (2004): Lao PDR (50.2%), Myanmar (42.9%) and Cambodia (32.8%),

Economic Growth and Performance

The economy of ASEAN as a whole experienced modest average growth of 5.1% from 2001 to 2005, rising steadily from 3.4% in 2001 to a high of 6.1% in 2004 before declining slightly to 5.5% in 2005. This was the result of stronger consumer demand and renewed consumer confidence, sharp revival in tourism after the 2003 SARS scare, increased trade and exports, and a general revival of the business environment.

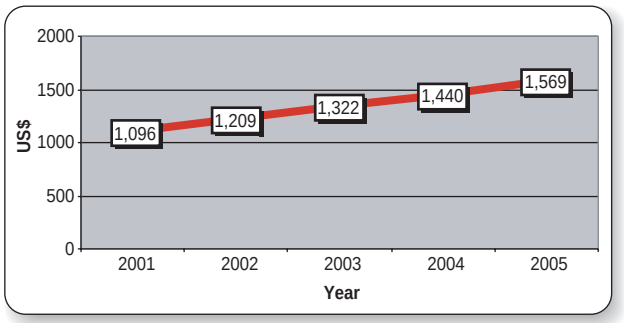
The average GDP per capita increased moderately by about 43%, from US$1,096 in 2001 to US$1,569 in 2005. Singapore and Brunei Darussalam posted the highest GDP per capita in 2005 at US$26,821 and US$16,882, respectively, and were among the high-income countries of the world. Malaysia, on the other hand, is the only ASEAN country that belongs to the upper-middle income bracket, with a GDP per capita of $5,001 in 2005. Indonesia moved up from the low-income category to join the rank of the Philippines and Thailand. Cambodia, Lao PDR, Myanmar and Viet Nam were listed in the low-income category. Almost all countries in the region experienced steady growth in GDP per capita during the period 2001 to 2005. For example, Lao PDR increased its per capita GDP by over 91% from US$326 to US$623, Viet Nam by 53% from US$415 to US$635, and Cambodia by about 40% from US$288 to US$404.

Figure 4.1: Rate of Economic Growth in ASEAN



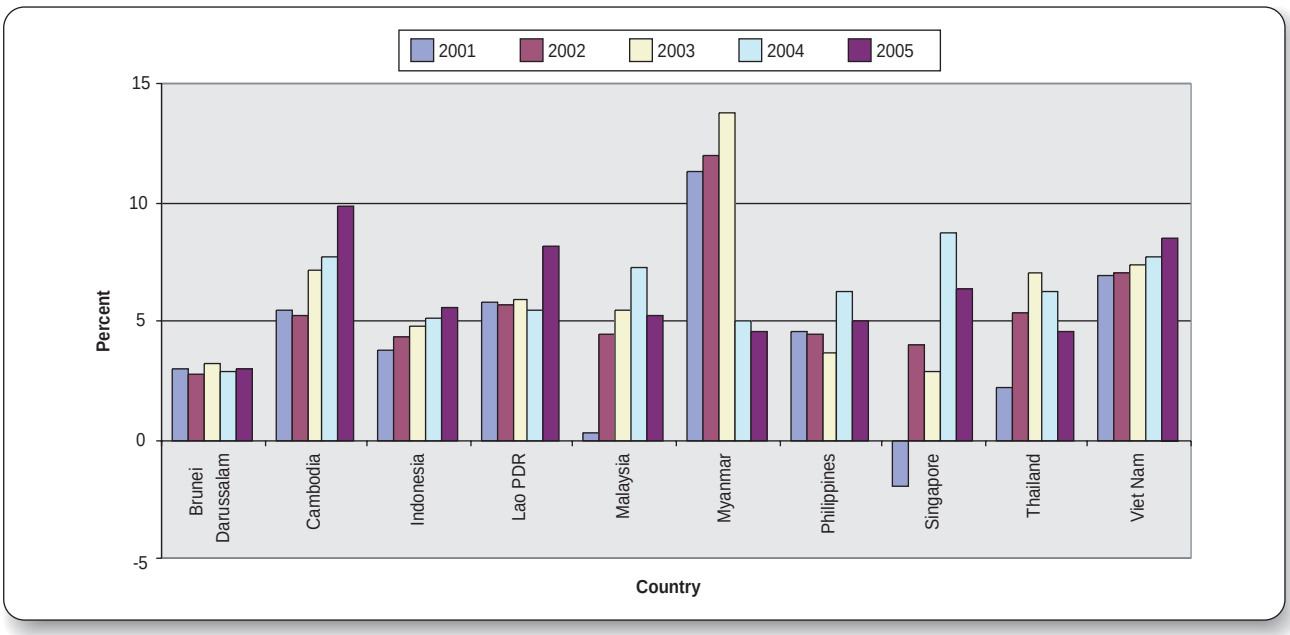
Source: *ASEAN Statistical Pocketbook (2006)*

Figure 4.3: GDP per capita in ASEAN at Current Market Prices (US$)



Source: *ASEAN Statistical Pocketbook (2006)*

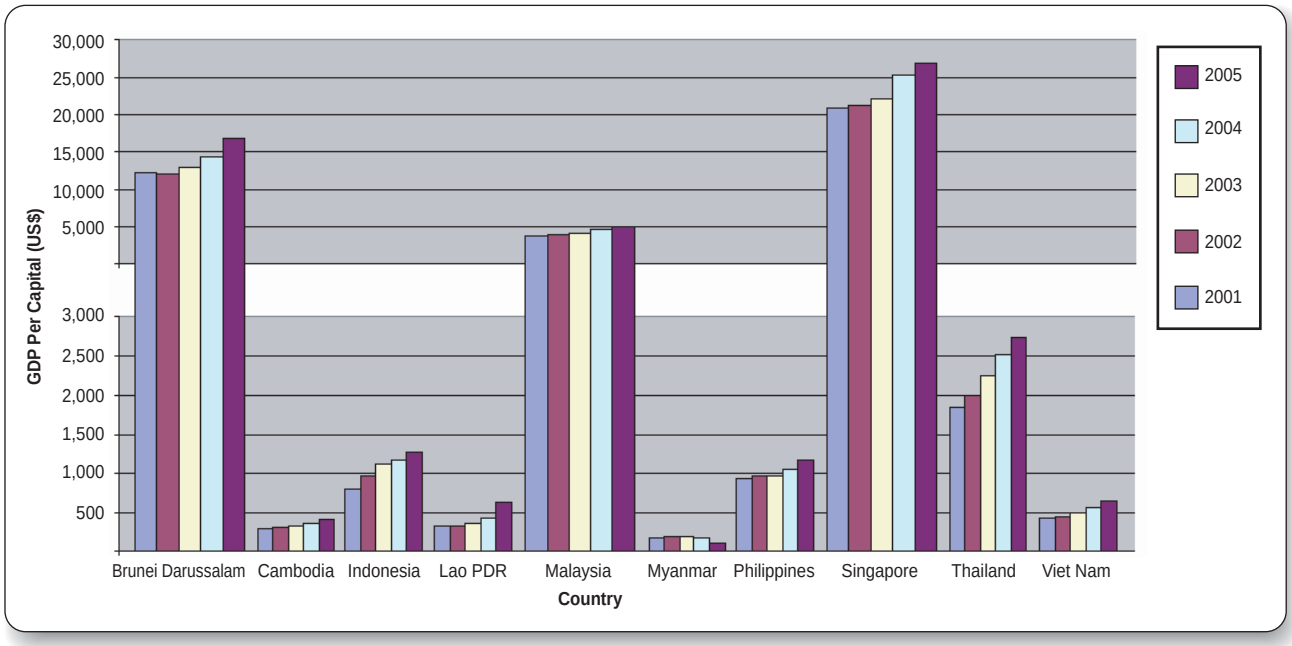
Figure 4.2: Rate of Economic Growth



Source: *ASEAN Statistical Pocketbook (2006)*

Note: *Singapore rebased its National Accounts using the year 2000 as the base year.*

Figure 4.4: GDP per capita in Selected Member Countries at Current Market Prices (US$)

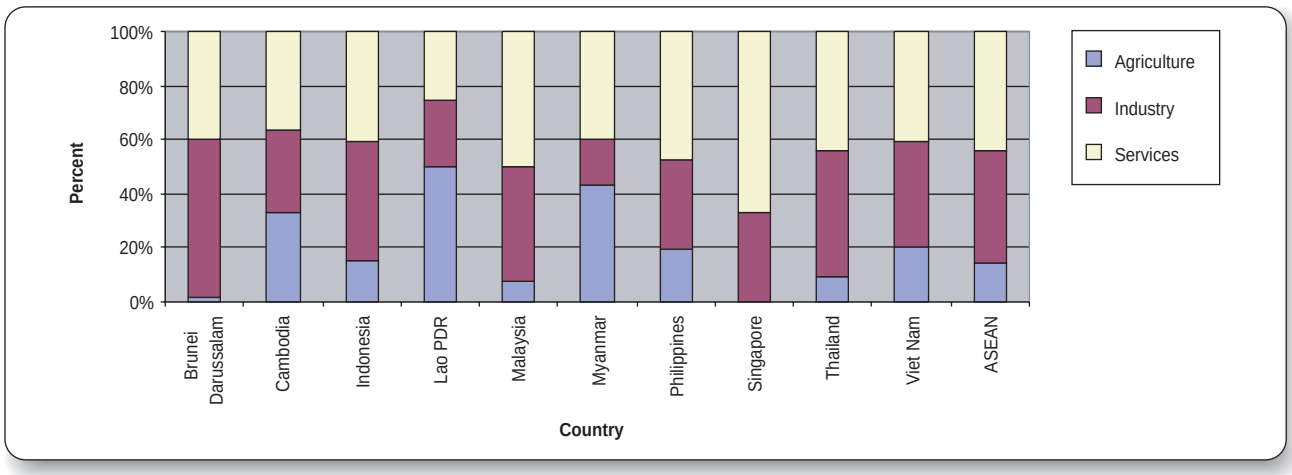


Source: *ASEAN Statistical Pocketbook (2006)*
Notes: *1. Computed using period exchange rates.*
2. Indonesia and Singapore rebased its National Accounts using the year 2000 as the base year.

Economic Structure

Data for 2004 showed that the economy of the region was predominantly service- (44.4%) and industry-based (40.9%), with agriculture accounting for only 14.7% of the region's economic production. The service-based economic activities included wholesale and retail trade; restaurants and hotels; transport, storage and communications; financing, insurance, real estate and business services; and community, social and personal services. Industry-based activities included mining, quarrying, manufacturing, construction and public utilities (electricity, gas, and water). Agricultural activities, on the other hand, consisted of farming, hunting, forestry, fishing and livestock raising. In 2004 the most service-oriented economies were that of Singapore (63.7%) and Malaysia (49.7%), the most industry-oriented economies were that of Brunei Darussalam (58.4%) and Thailand (46.7%), and the most agriculturally-oriented economies were that of Lao PDR (50.2%) and Myanmar (42.9%)

Figure 4.5: GDP Share of Major Groups, 2004



Source: *ASEAN Statistical Pocketbook (2006)*
Note: *Computed based on GDP at constant prices.*

Agriculture and Fishery Products

While the share of agriculture in the overall economy of the region was only 14.7% in 2004, it remained an important factor in the utilisation of the region's natural resources (e.g. use of water for irrigation) and in determining the quality of the environment (e.g. presence of pesticide residuals). Paddy, maize, soybean, sugarcane and cassava were the five major agricultural crops produced in the region. Between 2003 and 2004, there was a slight to moderate increase in the production of paddy (3.9%), maize (11.3%) and cassava (0.8%) but the production of sugarcane declined significantly (12.1%) and of soybean slightly (1.7%). Between 2001 and 2004, the production of paddy and maize grew steadily but soybean and sugarcane suffered significant declines in 2001 and 2004, respectively.

Table 4.1: Production of Five Major Food Crops in ASEAN, 2003 – 2004 ('000 metric tons)

Food Crop	2003	2004
Paddy	160,350	166,579
Maize	22,724	25,301
Soybean	1,376	1,353
Sugarcane	141,433	124,264
Cassava	29,575	29,800

Source: *ASEAN Statistical Pocketbook (2006)*

Table 4.2: Growth of ASEAN's Five Major Food Commodities

Food Crop	2001	2002	2003	2004
Paddy	1.1	1.0	3.5	3.9
Maize	0.4	0.8	5.3	11.3
Soybean	(10.7)	(8.1)	4.7	(1.7)
Sugarcane	5.9	12.6	20.1	(12.1)
Cassava	5.0	(3.0)	16.5	0.8

Source: *ASEAN Statistical Pocketbook (2006)*

The region is also a major producer of fishery products namely, fish, crustaceans, and aquatic invertebrates. Fish is exported live, chilled, frozen, dried and salted or in the form of fish fillet and other types of fish meat. In 2001, the total value of the region's exports of fish and fish products, crustaceans, molluscs and other invertebrates amounted to over $4.1 billion and increased steadily to nearly $6.2 billion in 2004. The region also imported fishery products amounting to about $1.6 billion in 2001 and almost $2.4 billion in 2004. The region remains a net exporter of fish and other fishery products into the world market.

Table 4.3: ASEAN Exports and Imports of Fishery Products (Million US$)

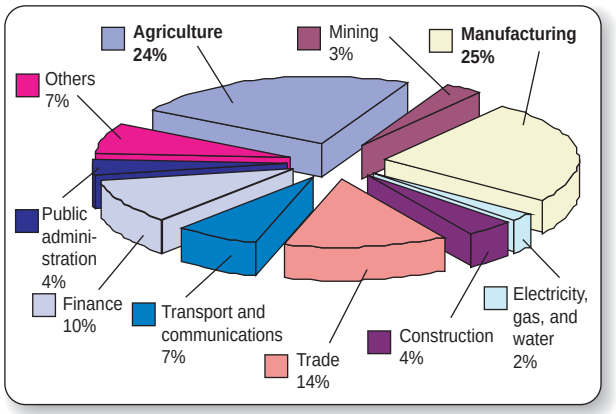
	2001	2002	2003	2004
EXPORTS				
Fish and fish products	1,003	1,085	1,373	1,841
Crustaceans	2,709	2,180	2,328	3,507
Molluscs	429	462	563	809
IMPORTS				
Fish and fish products	1,170	988	1,330	1,605
Crustaceans	336	274	373	600
Molluscs	152	89	156	172

Source: *ASEAN Statistical Pocketbook (2006)*

Industry

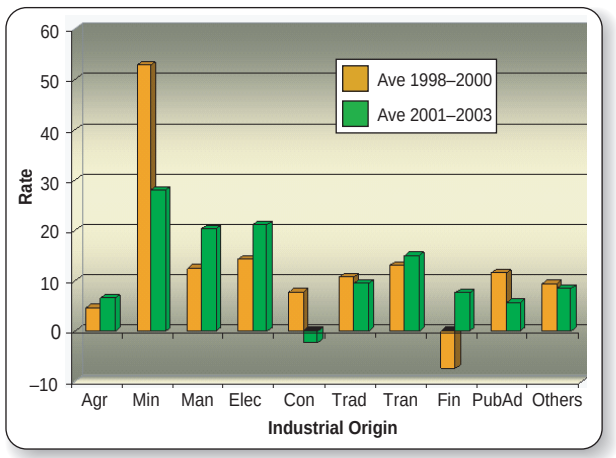
Although most of the countries in the region were promoting growth in the industry and services sector, the Asian Development Bank data (2003) showed that the agriculture sector contribution to the overall GDP remained significant. The share of the manufacturing sector was 25% while that of the financial services sector was 10%. In terms of growth, mining was the fastest-rising sector posting a 58% increase from 1998 to 2000 and continuing its robust growth in 2003. The rate declined in 2001 – 2003 to 28% but still had the highest growth rate. The phenomenal rise of the GDP contribution of the mining sector was strongly felt in 1998 – 2000 in Lao PDR, when it registered a phenomenal 305% growth. This was followed in 2001 – 2003 by Myanmar and the Philippines when the GDP contributions of their mining sectors grew by 74% and 77%, respectively.

Figure 4.6: GDP Contribution by Sector, 2003



Source: *ADB (2004).*
Note: *Computed.*

Figure 4.7: Growth Rate of the Industrial Sectors in terms of GDP Contribution, 1998 – 2000 and 2001 – 2003



Agr – agriculture; Min – mining; Man – manufacturing; Elec – electricity, gas, and water; Con – Construction; Trad – trade; Tran – transportation and communication; Fin – Finance; PubAd – Public Administration.

Energy

Between 1999 and 2000, there was a slight increase in the production of primary energy in the region, with coal production increasing by 3%, crude oil by 3%, natural gas by almost 6%, hydropower by 2%, and geothermal energy by nearly 14%. With only partial data available for 2001, the trend showed an overall decrease in the region's primary energy production, although there appeared to be a significant increase in the production of other energy sources.

In terms of GDP per unit of energy use, the Philippines was the most efficient user of energy with a ratio of 6.8 in 2001 and 7.6 in 2002. In comparison, Singapore's GDP per unit of energy grew from 2.9 in 2001 to 3.8 in 2002. The improvement in the GDP-energy use ratios reflects structural changes, improvement in energy efficiency of some economic sectors, and more favourable fuel mixes in the country.

In 2000 the region had a total installed power capacity of 95,900 megawatts (MW) mostly from oil-based power plants. Indonesia had 36% of the total installed capacity in the region, followed by Viet Nam (20%), and Malaysia (14%). An additional 12,330 MW had been installed by 2005, and by 2010 the capacity would increase by 48% to 142,300 MW. On the other hand, the total installed capacity from new and renewable sources (NRES) (wind, solar, biomass, etc.) was only 2,870 MW in 2000, a mere 3% of oil-based power.

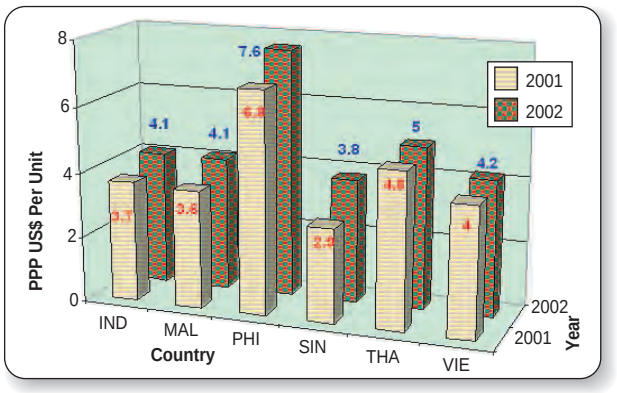
The regional average utilisation of NRES was 9% in 2000 with Lao PDR and Myanmar leading the region with 24% and 22%, respectively. It was expected that the share of NRES would increase by 25% to 3,610 MW in 2010. Nevertheless, since many countries of the region are still dependent on oil for their energy requirements, particularly, the Philippines, Thailand and Singapore, these countries were hit hard by the global oil price increase that started in 2005.

Table 4.4: ASEAN Primary Energy Production (1999 – 2001)

	Unit	1999	2000	2001
COAL	KTON	114,000	118,000	
CRUDE OIL, NGL & CONDENSATE	KBBL	947,000	971,000	
NATURAL GAS	MNCUFT	5,370,000	5,680,000	2,990,000
BIOMASS	KTON	136,000	145,000	60,300
HYDRO	GWH	61,400	62,800	48,800
GEOTHERMAL	GWH	14,500	16,500	10,400
OTHER SOURCES	GWH	630	630	20,900

Source: *ASEAN Centre for Energy website < http://www.aseanenergy.org >*
Abbreviations: *KTON – kilo tonne; KBBL – kilo barrel; MNCUFT – million cubic feet; GWH – gigawatthour*

Figure 4.8: GDP per Unit of Energy Use in Selected Member Countries, 2001 – 2002



Tourism

Tourism in the region was steadily rising from 2000 to 2002 until it slumped in 2003 due to the combined global effects of the Iraq war, SARS, and a persistently weak global economy.[1] The region welcomed about 39 million tourists in 2000, 42 million in 2001, 44 million in 2002, and decreased by 12% in 2003. But the tourist arrivals quickly recovered in 2004 with an impressive 28% increase in tourist arrivals, which translated to about 50 million visitors or 12 million visitors more compared to that of 2003.

Box 4.1: Major Renewable Energy Programmes in ASEAN Countries

Brunei Darussalam	Focus on hydropower and solar.
Cambodia	Focus on biomass, solar, and micro hydro.
Indonesia	Small power purchase tariff and pre-electrification programme promotion of local manufacturing capability; and focus on hydro biomass, solar, geothermal, and hybrid.
Lao PDR	Focus on biomass, solar, wind, and microhydro.
Malaysia	Renewable Energy (RE) as fifth fuel; promote small-scale grid connected and decentralized RE systems for rural electrification; R&D on solar, hydro and systems manufacturing; and focus on biomass cogen.
Myanmar	Commercialisation of solar, wind, biomass, and micro-hydro systems for rural applications.
Philippines	Village rural electrification; credit programmes; and focus on solar, wind, biomass, and micro hydro.
Singapore	Efficient use of municipal solid wastes for large-scale power generation.
Thailand	ENCON Fund; full-scale demonstration projects for proven RE technologies and promotion of industrial applications; grid-connected RE systems through the small power producer programme; and manufacturing schemes for biomass energy.
Vietnam	R&D on RE systems for rural applications; and market models for stand-alone/hybrid.
ASEAN (ACE / NRSESSN)	Develop ASEAN manufacturing capabilities in RE; create a policy and institutional framework for RE; promote intra-ASEAN cooperation on ASEAN made products; establish ASEAN NRSE standards; promote the application of renewable energy for rural electrification; and promote AEAN-EU PRESSEA

Source: *Guillermo R.Balce (2001), "Energy Security and Sustainable Development – ASEAN Region, "a Powerpoint presentation presented at the 7th ASCOPE Conferencwe and Exhibition 2001, Putra World Trade Centre (PWTC), Kuala Lumpur, Malaysia*

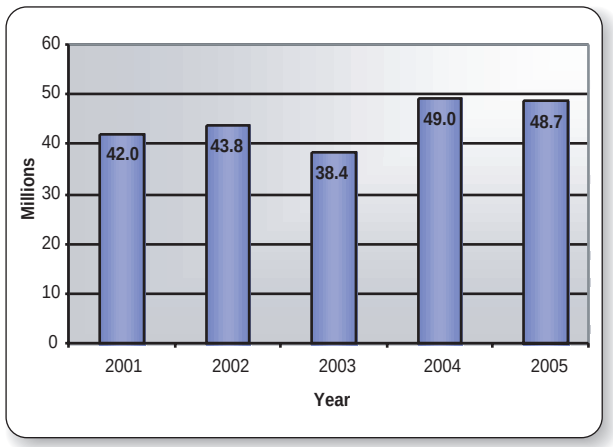
Acronyms: *ACE – ASEAN Centre for Energy; ENCON Fund – Energy Conservation Promotion Fund; NRSE-SSN – New and Renewable Sources of Energy-Subsector Netwok; PRESSEA – Promotion of Renewable Energy Sources in Southeast Asia*

All countries in the region, except Myanmar, received fewer tourists in 2003 with Malaysia having the largest percentage drop of 20%, followed by Singapore (19%) and Lao PDR (14%). Although Myanmar's tourist arrivals did not reach the million mark, and was just 2% of the region's total in 2003, it posted a hefty 175% increase. In 2002 only 217 thousand international visitors visited Myanmar, but in 2005 there was a big influx of 660 thousand visitors (an increase of 200%). Tourists headed to Myanmar to see the "old Asia", visiting the Shwedagon Pagoda and other 11th and 12th century Buddhist monuments.

Tourists visit the Shwedagon Pagoda in Myanmar, the Grand Palace in Thailand, and a private beach in the Philippines (top-to-bottom)

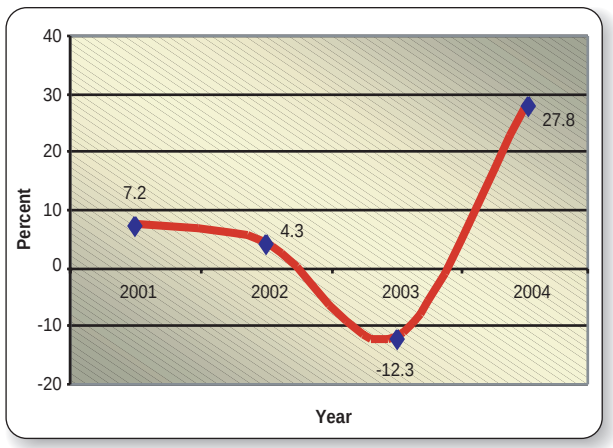
In terms of total head count, Malaysia was still the top tourist destination in the region with 16.4 million visitors (2005), about 34% of the region, followed by Thailand (18%) and Singapore (18%). Tourists from Singapore numbered 12 million, followed by Japan, Malaysia and China with more than 3 million visitors each. The rest, ranging from 1.7 million to 2.8 million visitors, came from Indonesia, Thailand, South Korea, US, Australia, and Taiwan. Four out of the top ten countries from which tourists originated were from the ASEAN region, indicating the healthy growth of intra-ASEAN tourism. An estimated $26 billion each year were spent by tourists in the region from 2000 to 2003. Thailand and Malaysia earned the most in 2003, around $10 billion and $8 billion respectively. The two were also the only countries in the region whose tourism receipts increased between 2000 and 2003.

Figure 4.9: Intra-ASEAN Visitor Arrivals (Millions)



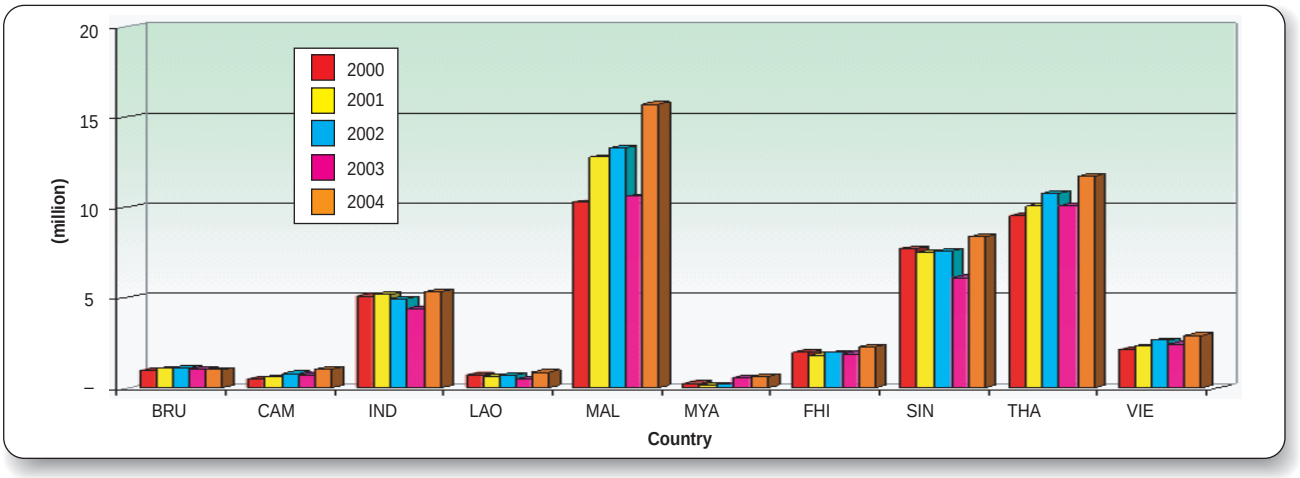
Source: *ASEAN Statistical Pocketbook (2006)*

Figure 4.10: Growth Rate of Tourist Arrivals in the ASEAN Region, 2001 – 2004



Source: *ASEAN Statistical Pocketbook (2006)*

Figure 4.11: Tourist Arrivals in Member Countries, 2001 – 2004



Source: *ASEAN (2004) and ASEAN Website (2005)*

Economic Development and Environmental Protection

The vital economic signs in the region as a whole were generally positive during the period under review with GDP per capita climbing steadily and growth rates remaining positive during the entire period. Since 2002, the performance of FDI was also positive and growing steadily. Positive net exports (over imports) boosted the economies of most countries in the region despite the global threats of terrorism and epidemics, among others.

The increased international tourist arrivals and tourism receipts is good news for the region as a whole. If properly planned and managed a robust tourism industry could put pressure on both the government and the community to improve the cleanliness of surroundings and intensify the conservation of natural resources through the designation of protected areas for the benefit of tourists. However, the negative impacts of tourism should be given appropriate attention ensuring that fragile ecosystems were not harmed, pristine beaches and other tourist destinations were not polluted, and local social and cultural practices and beliefs were recognised and respected.

In terms of energy, there was a growing consumption of fossil fuels in the region and some countries suffered from energy deficits, with power supply unable to cope with rapidly growing economies. These countries should therefore focus more attention and resources in developing and utilising renewable energy resources and technologies as well as improve energy efficiencies and demand side management (e.g. energy conservation) to improve energy security and reduce vulnerability to global oil price increases.

There are positive signs in a number of countries indicating greater awareness among the general public of the inextricable link between economic growth and the consumption of goods, on one hand, and environmental protection and resource conservation, on the other. Consumers are becoming increasingly aware of the need to purchase products that are energy efficient and packaged in an environmentally-friendly manner. With the promotion of environmental labelling, this trend will result in significant reductions in the consumption of energy and raw materials, thus promoting environmentally sustainable economic growth and sustainable consumerism.

Sound economic development could ultimately become beneficial to the environment if, at the national and local levels, the rising incomes could lead to improved access to health and environmental services and more resources being allocated to environmental protection and conservation. The increase in national GDP and income should lead to more sophisticated environmental policies, better training of environmental personnel, and higher investments in appropriate pollution abatement technologies and equipment. The greening of economic development will be a continuing challenge to all countries in the region. This means maintaining the rising trend in economic growth while consuming less non-renewable resources and producing less residual. The promotion of green growth will help ensure the sustainability of the region's future.

Box 4.2: Green Corners Programme in Singapore

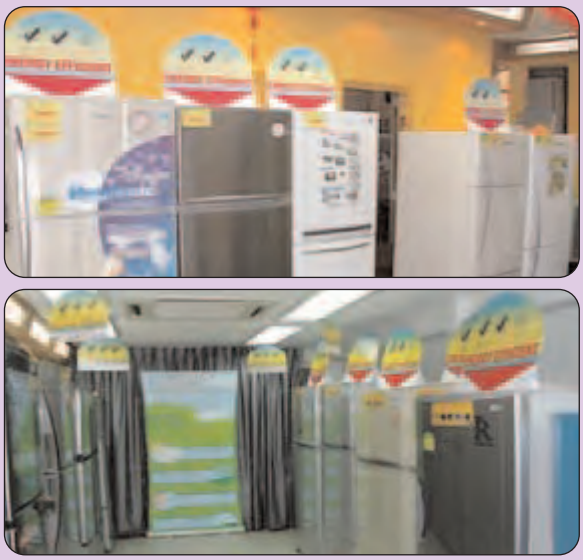
In Singapore, electricity is generated from the burning of natural gas and oil in power plants, 20% of which is consumed by the household sector. To promote energy conservation among consumers, the National Energy Efficiency Committee (NEEC) launched the voluntary Energy Labelling Scheme (ELS) for household appliances in April 2002. Administered by the Singapore Environment Council (SEC) and supported by the National Environment Agency (NEA), the ELS aims to encourage consumers to choose, and thereby increase demand for energy-efficient appliances.

At present, the ELS covers two appliance categories, namely refrigerators and air conditioners, which typically account for 45% – 65% of household electricity consumption. To date, 101 air conditioner and 76 refrigerator models have been labelled under the scheme.

Energy Labels

Labels are carried on appliance models in retail stores. To increase the visibility of these models, NEA and SEC launched the Green Corners programme in March 2003. Under this voluntary programme, participating retail shops would dedicate an area or corner in their showrooms to showcase energy-labelled appliance models. Educational posters and standees publicising the Energy Label would be placed alongside these appliance models for added impact.

To date, nine stores owned by four retailers are participating in the Green Corners programme. Green Corners are gaining popularity because shoppers are becoming more aware of the need to save energy. NEA and SEC will continue to collaborate and encourage more retailers to set up Green Corners.



Green Corner

Source: *Ministry of the Environment and Water Resources, Singapore (2006)*

The economy of the region continues to grow at a moderate pace driven by an expanding global and regional consumption of goods and utilisation of services. This implies increasing use of natural resources (e.g. minerals, fossil fuels, timber, and other biological resources) with the concomitant generation of residuals (e.g. wastewater effluents and air emissions) and wastes (e.g. used appliances, discarded packaging materials). The extraction and processing of raw materials as inputs to industrial production, construction of infrastructures and generation of energy, and the poor management of wastes and other externalities resulting from economic activities are the principal sources of pressures on the environment. The challenge for the region is to enhance or maintain this economic growth in a manner that will have a minimum of adverse impact on the various ecosystems of the region. This will require, among others, the promotion of cleaner production technologies, resource recovery and waste minimisation, and consumer education to favour the consumption of environmentally-friendly products.

The other challenge is to narrow the gap between the level of development among countries in the region. This will require, among others, further strengthening regional cooperation and promoting increased foreign direct investments and tourism into the region, in particular, intra-ASEAN trade, investment and tourism. Related to this is the economic divide within countries, particularly between the rural and urban areas. This can be addressed by, among others, instituting policies that make economic growth more pro-poor.

End Note

1 World Tourism Organisation (2004), *Tourism Highlights: Edition 2004* (Madrid: WTO), p. 2.

CHAPTER 5

Freshwater and Marine Ecosystems

Ensure ASEAN's coastal and marine environment are sustainably managed; representative ecosystems, pristine areas and species protected; economic activities sustainably managed, and public awareness of the coastal and marine environment instilled.

Promote sustainability of water resources to ensure sufficient water quantity of acceptable quality to meet the needs of the people of ASEAN in terms of health, food security, the economy and the environment, taking into consideration the strong linkage between water, health and poverty.

Vientiane Action Programme

Water is an important environmental resource; it sustains life and economic activities, and is used extensively as a waste sink. The overall availability of freshwater in the region is good, but some countries experience seasonal scarcity. The region's water resources were under increasing pressure as economic and human activities exerted tremendous stress on fragile coastal and marine ecosystems. The withdrawal of freshwater from rivers, lakes, reservoirs and underground aquifers had grown at rates faster than replenishment resulting in reduced river and lake levels, depleted aquifers and lowered water tables. Agricultural use, mainly for irrigation, accounted for the major part of water withdrawals but the effect of water development programmes for hydropower and domestic and industrial requirements was also significant. Contamination by pollutants from industrial and domestic sources, urban and agricultural run-off, and saline intrusion had also seriously degraded water quality. Growing population, increasing use of agro-chemicals, and rising demand from agriculture and industry combined with contamination of water resources from a range of sources would imply lower per capita availability of clean freshwater in the future. Marine fisheries production had increased with the introduction of modern fishing methods and expansion of fishing activities. Excessive land reclamation and coastal development for residential and commercial use, the discharge of domestic and industrial wastes into rivers and nearby seas, oil spills and other contaminants from shipping and other maritime activities, and surface run-off and drainage from port and surrounding areas all contributed to the continuing destruction of coral reefs, depletion of mangrove areas, contamination of coastal waters, and deterioration of marine and coastal ecosystems. There is a need for a more effective and integrated management system that strikes a delicate balance between current social and economic needs and conservation for future needs. The ASEAN Strategic Plan of Action on Water Resources Management, the ASEAN Marine Water Quality Criteria and the ASEAN Criteria for National Marine Protected Areas and Marine Heritage Areas are some of the regional responses that complement and support actions at the national level.

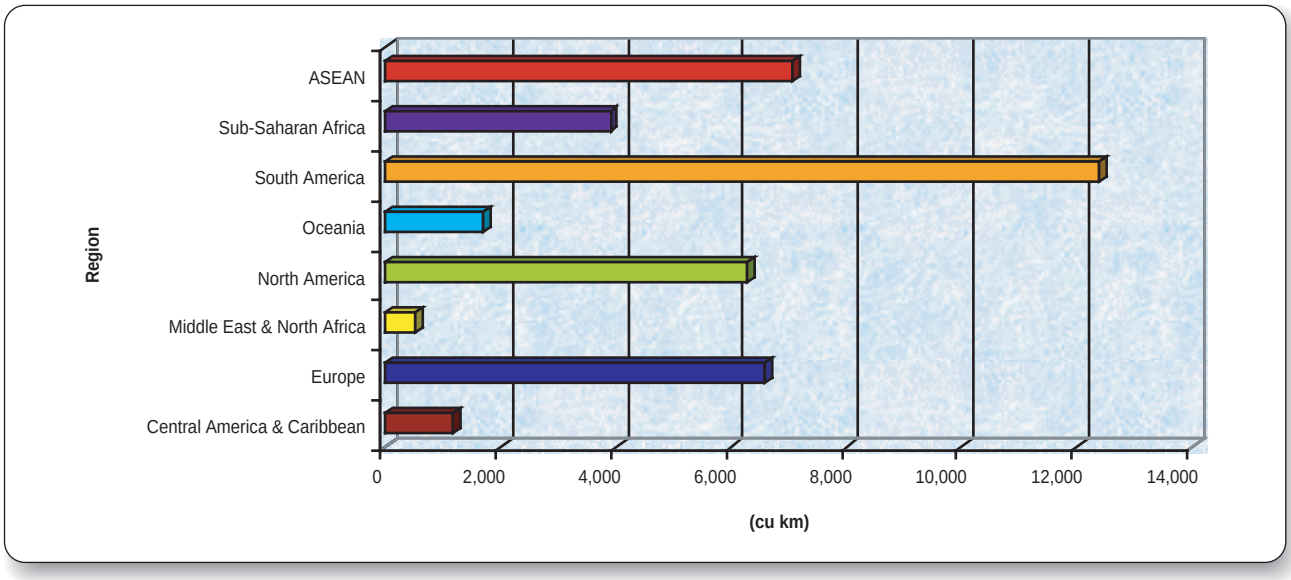
ASEAN FACTS AND FIGURES

ASEAN Coastline	173,000 kilometres (11% of world total)
ASEAN Renewable Water Resources	7,062 cubic kilometres (16% of world total, 1997 – 2001)
ASEAN Marine Fish Production	12.5 million metric tonnes (15% of world total, 2002)
ASEAN Overall Fish Exports **ASEAN Overall Fish Imports**	$6.16 billion (2004) $2.38 billion (2004)
ASEAN Mangrove Forests	34% of world total
ASEAN Mangrove Species	5 – 45 species (7 – 64% of world total)
Coral Reefs at Risk Global ASEAN	 58% (27% at high/very high risk) 80% (55% at high/very high risk)
Ramsar Wetland Sites in ASEAN	26 sites covering 811,000 hectares

Freshwater Resources

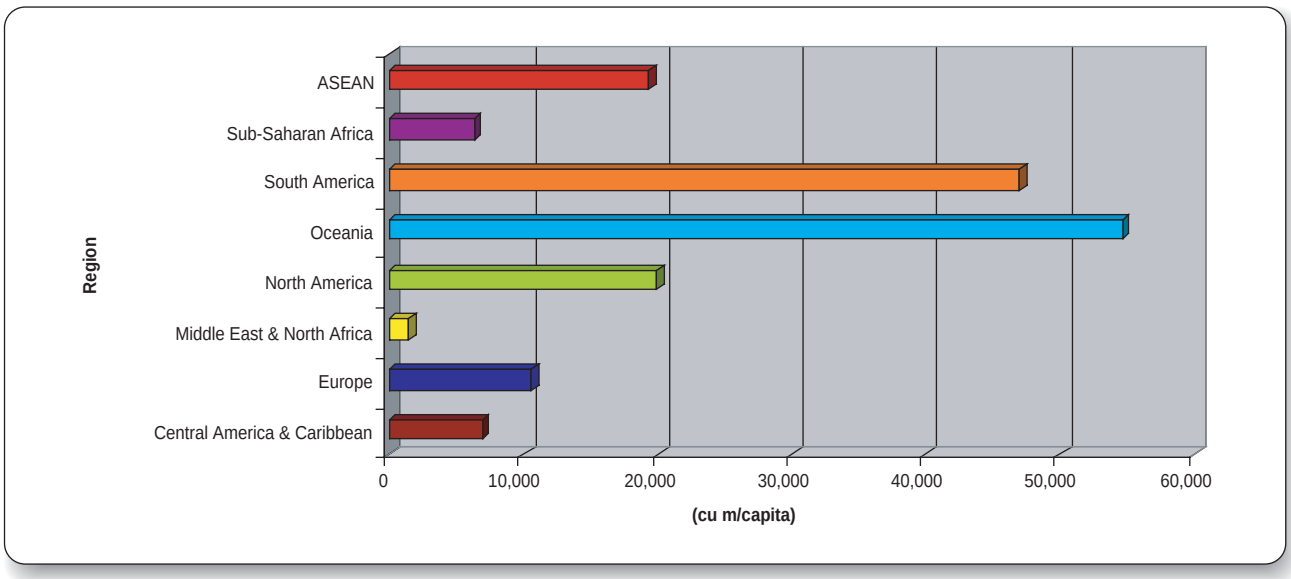
The availability and quality of freshwater will be among the most pressing environmental problems that many ASEAN countries will face in the future. Data up to 2001 show that the region had about 7,000 cubic kilometres of internal renewable fresh water resources which comprised of average annual flow of rivers and recharge of groundwater (aquifers) generated from endogenous (internal) precipitation. Available data indicate that the amount of internal renewable freshwater resources of the region was next only to South America but exceeded that of Africa and North America for the period 1997 – 2001. The region's annual per capita supply of freshwater increased at an average rate of 38% from 1996 to 1999 but started to decrease at an average rate of 17% beginning from 2000 to 2004, partly as a result of the continuing increase in the region's population and development activities. The supply peaked at a level of over 22,000 cu m/capita in 1999 – 2000 and declined significantly to just over 12,000 cu m/capita in 2004.

Figure 5.1: Total Internal Renewable Freshwater Resources of Selected Regions, 1997 – 2001



Source: *WRI (2005) based on FAO 2003 data*

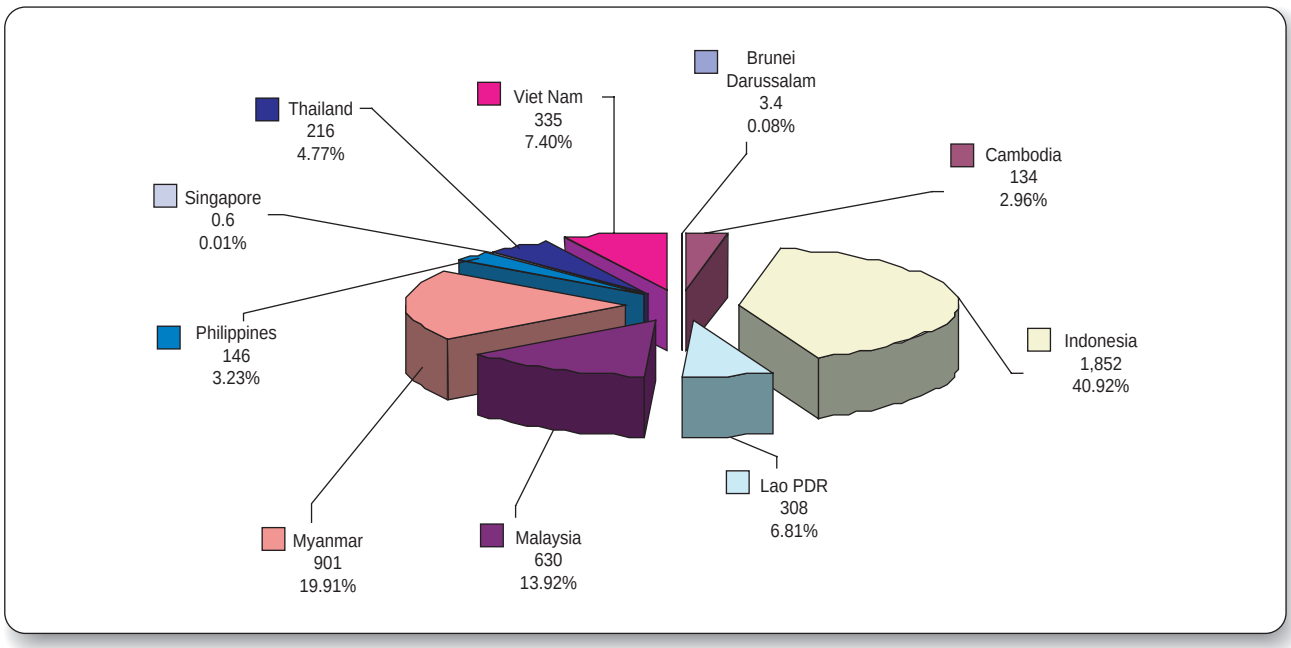
Figure 5.2: Per Capita Internal Renewable Freshwater Resources of Selected Regions



Source: *WRI (2005) based on FAO 2003 data*

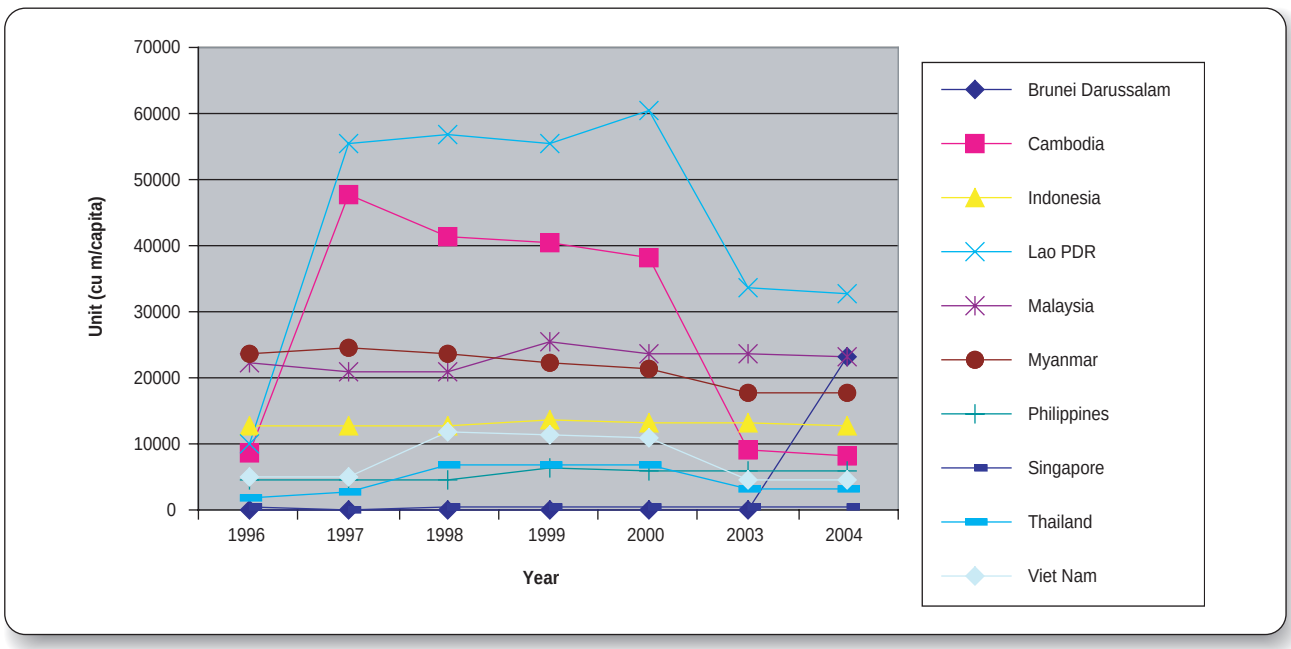
Owing to their different sizes, geographic locations and natural resources endowments, the availability of internal freshwater resources in each ASEAN Member Country varies considerably. In 2004, the region's total available internal water resources was estimated to be approximately 4,500 cu km annually. Indonesia produced the largest amount of freshwater in the region accounting for about 41% of the region's total. It is followed by Myanmar (20%) and Malaysia (14%). Brunei Darussalam (0.08%) and Singapore (0.01%) had the smallest volume of freshwater resources.

Figure 5.3: ASEAN's Total Available Internal Water Resources ('000 cu km), 2004



Source: *State of Water Resources Management in ASEAN, ASEAN Secretariat (2005)*

Figure 5.4: Per Capita Supply of Annual Internal Renewable Freshwater Resources, 1996 – 2004



Source: *WB (1998 – 2005) and WRI (2005)*

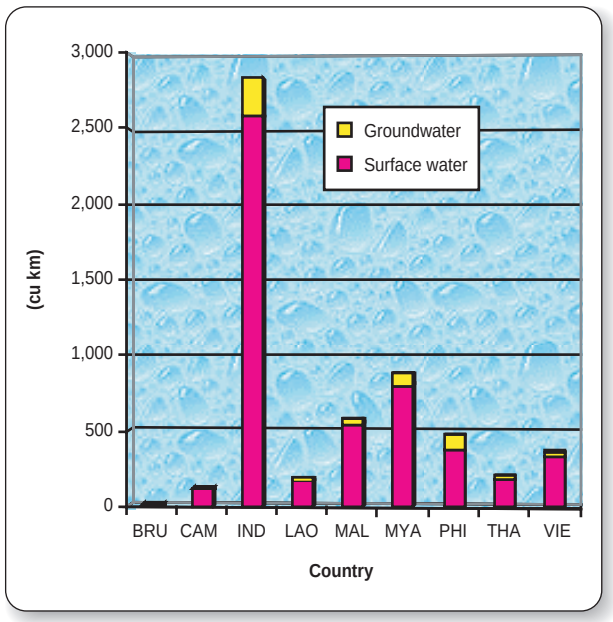
While there was seasonal variations in per capita water supply in some countries, overall there was a progressive slight decline over the years from 1996 to 2004 in most member countries.

Freshwater comes from two main sources namely, surface water and groundwater. Surface water originates from rivers, lakes, and natural or man-made reservoirs. In the ASEAN region, there are more internal bodies of water in the archipelagic countries such as Indonesia and the Philippines than in the continental countries such as Myanmar, Lao PDR and Thailand. However, the continental rivers are longer, with larger drainage areas, and lower runoff yields. The Mekong River is the largest and most important river in the region. Its rich aquatic resources support the livelihoods of the people of the riparian states of Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam. Aside from rivers, lakes are also sources of freshwater in the region. The most popular among them in the region are the Tonle Sap in Cambodia, Lake Toba in Indonesia, Laguna de Bay in the Philippines, and Songkhla Lake in Thailand.

The second source of freshwater is groundwater. In the region, substantial volumes of groundwater can be found at various depths, with yields ranging from small volumes in shallow weathered and jointed layers of ancient crystalline basement rock to enormous volumes at several hundred-metre depths in alluvial plain sediment.

Ninety percent of the region's freshwater comes from surface water and ten percent from groundwater. Freshwater in Brunei Darussalam is 99% extracted from surface water, the highest in the region. On the other hand, one-fifth of the Philippines' total freshwater is sourced from groundwater, the highest in the region.

Figure 5.5: Sources of Freshwater in Member Countries



Source: *FAO (2005)*

Note: *For this graph, the volumes of overlapping water were equally divided between the groundwater and surface water in each AMC*

In the ASEAN region, on average 78% of freshwater is used for agricultural purposes, while 11% each are used for domestic and industrial purposes. From 1987 to 2003 Cambodia used 94% of its freshwater for agricultural purposes, the highest percentage in the region. Agriculture also consumed most of the freshwater supply in Indonesia, Thailand and Myanmar accounting for 90% or more of the total. In Singapore, however, the industrial and domestic sectors accounted for 50% each of its freshwater demand. Overall, there had not been much change in the pattern of freshwater utilisation by the various sectors in the region during the past decade. However, in terms of the rate of water accessibility, on the average, only 77% of ASEAN residents could get clean safe water for their everyday needs. Cambodia and Lao PDR had the lowest accessibility rates of 34% and 43%, respectively.

The region as a whole is not expected to suffer from any severe and widespread water shortage up to the year 2025.[1] On average, the ASEAN region will only be able to use 10% of its internal renewable freshwater resources. However, in the case of Singapore, besides diversifying its water supply resources, Singapore also manages its water demand as an integral part of the overall strategy to ensure adequate supply. In Singapore, water demand management is achieved through proper water accounting, control of unaccounted for water and adoption of water conservation measures. This has enabled domestic per capita consumption to be kept at 160 litres per capita per day in 2005.

Box 5.1: ASEAN Strategic Plan of Action on Water Resources Management

The vision for water resources management in ASEAN was initially defined in the ASEAN Long Term Strategic Plan for Water Resources Management endorsed by the ASEAN environment ministers in 2003. The vision calls for "the attainment of sustainability of water resources to ensure sufficient water quantity of acceptable quality to meet the needs of the people of Southeast Asia in terms of health, food security, economy and environment." It stipulates concern for four major aspects of water management: (a) access to safe, adequate and affordable water supply, hygiene and sanitation; (b) provision of sufficient water that will ensure food security for the region; (c) provision of sufficient water to spur and sustain the economies of the region; and (d) protection of the water environment to preserve flow regimes, biodiversity and cultural heritage as well as the mitigation of water-related hazards.

The ASEAN Long Term Strategic Plan of Action identified five challenges and a number of actions for the attainment of the long term vision.

Challenge 1: Improve access to safe drinking water and sanitation

Actions:
- Reduce by 50% inadequate access to safe drinking water by 2015
- Reduce by 50% inadequate access to sanitation by 2015

Challenge 2: Managing water resources efficiently and effectively

Actions:
- Review water policies and legislation Institute demand and supply management techniques in water supply
- Institute demand and supply management techniques in irrigation
- Undertake research and development programmes

Challenge 3: Moving towards integrated river basin management

Actions:
- Establish river basin management organisations
- Develop decision support systems
- Promote equitable sharing among water users and the environment
- Mitigate water related hazards and maintain ecological balance

Challenge 4: Promote awareness for improved governance and participation

Actions:
- Improve governance
- Encourage multi-stockholder participation in water resources development and management
- Mainstream gender concerns in the framework for action
- Develop, enhance and strengthen institutions on a decentralised and participatory manner
- Build individual capacities

Challenge 5: Moving towards adequate and affordable water services

Actions:
- Enhance public-private partnerships
- Recognise that water is a natural asset and has social, cultural and economic functions and values

The ASEAN Strategic Plan of Action on Water Resources Management is predicated upon the fact that population and economic growth in the region will require sustainable management of available water resources. There will be increasing demand for water from industry and domestic users, while at the same time food production will also need to increase. Given this context, the Plan has the following objectives:

- To define the governing principles that ASEAN Member Countries want recognised with respect to sustainable development of their water resources.
- To define the key challenges and issues confronting ASEAN with respect to sustainable water resources management.
- To define the key actions that will facilitate the rapid attainment of improved integrated water resources management across ASEAN.

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- To define a set of project activities that will build knowledge and capacity with respect to integrated water resources management across the ASEAN region.

The report on the "State of Water Resources Management in ASEAN" produced in conjunction with the Plan identified a number of significant challenges and issues including the following:

- Overall demand for water is expected to increase by about one-third over the next 20 years.
- While most Southeast Asian countries do not have a physical scarcity of water, seasonal scarcity does occur.
- Although there is no physical water scarcity across ASEAN (except Singapore), potentially rapid rates of economic development may put considerable pressure on countries in terms of financing the sustainable development of water supply and sanitation schemes.
- The need to ensure that data of the highest quality is obtained to facilitate integrated water resources management.
- As a response to seasonal water scarcity and growing urban centers, demand for groundwater will increase and management plans will need to be developed to ensure the sustainable exploitation of this critical resource and to maintain its quality.
- Given good overall water availability, most countries are in a strong position to plan how water will be managed for environmental purposes including the maintenance of key inland fisheries.
- Protection of the quality of water supplies is and will be a significant activity for all countries over the next 20 years.
- Several countries are unlikely to meet the Millennium Development Goals relating to drinking water and sanitation based on current rates of progress.
- In many countries it is considered that the impacts of extreme events and climate change and variability will be of as much concern to governments as many of the above issues, since subsistence farmers and the poor are generally more severely impacted by such factors and consequently they may increase poverty levels and risks of starvation unless adequately planned for.
- With respect to governance of water resources, while many countries are aware of the need for change to improve water resources management, there is need for continued support at all levels to ensure that his happens.
- Fragmentation of the management of water between several agencies within countries need to be examined to determine if improved institutional arrangements can be developed.
- The fragmentation of water resources management impacts negatively on the need to harmonise monitoring programmes for water quantity and quality.
- Capacity building at a range of levels is also a universal requirement with the probable exception of Singapore.

Source: *ASEAN Strategic Plan of Action on Water Resources Management, ASEAN Secretariat (2005)*

Water Quality Management

The countries of the region have established pollution control strategies to arrest the further deterioration of the quality of its freshwater resources. The enactment and enforcement of water pollution control laws is the mechanism most commonly used by governments in the region, although some economic-related mechanisms are also in place in a few countries.

All countries in the region have systematised their water source classification. Water source classification involves categorising watercourses into classes, and then managing those watercourses according to goals or standards set for each class. Brunei Darussalam has established a water management committee to formulate standards, monitoring requirements, and mitigation plans to control pollution. The Philippines, on the other hand, has classified inland freshwater reservoirs into five classes through an administrative order. In Singapore, run-offs from both protected and unprotected catchments are collected in its reservoirs which serve as drinking water sources.

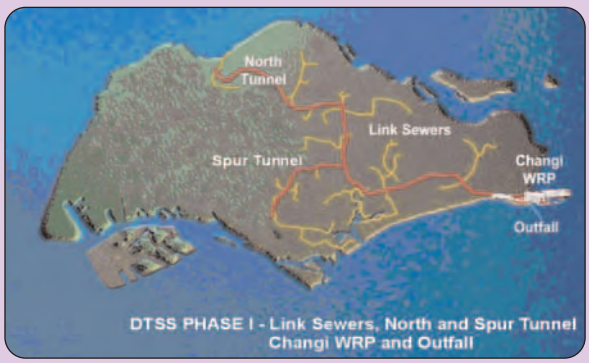
The establishment of sewerage and sewage treatment systems and the construction of central wastewater treatment facilities in a number of countries are concrete manifestations of their governments' concern to prevent water pollution.

Singapore has the most well-developed sewerage infrastructure composed of six centralised sewage treatment facilities (also known as Water Reclamation Plants) and a network of 3,100 kilometres of sewer pipes. These six Water Reclamation Plants treat 1.34 millon cubic metres per day of used water that is collected by underground sewers. Only a very small amount of used water is treated by sewage treatment plants (STPs) in a few isolated areas. These STPs will be phased out with the development of these areas.

Box 5.2: The Deep Tunnel Sewerage System in Singapore

The Deep Tunnel Sewerage System (DTSS) is an efficient and cost-effective engineering solution to meet Singapore's long term needs for used water collection, treatment and disposal. Presently Singapore has a sewerage system comprising six water reclamation plants (WRPs) serving six catchment areas together with the network of 3100 km of sewers and 130 pumping stations. With increasing population and industrial growth, one option is to simply continue expanding the treatment capacity of the plants and adding on more pumping stations. This will not be a sustainable solution in land scarce Singapore. To overcome this constraint, the DTSS was conceived.

The concept of the DTSS is to replace the existing sewerage system with an entirely new system consisting of cross-island deep tunnels and a network of link-sewers to intercept used water from the existing sewers. The link-sewers and tunnels will channel all used water by gravity to a new large water reclamation plant located at the eastern end of Singapore. The treated effluent will then be discharged into the Straits of Singapore in the south.



DTSS PHASE I - Link Sewers, North and Spur Tunnel Changi WRP and Outfall

The DTSS is an integral part of the water loop, allowing Public Utilities Board (PUB) to channel used water to the Changi WRP and then onto NEWater factories, where high grade reclaimed water is produced for use in industries and also to add to Singapore's drinking water supply after treatment. By collecting and treating every drop of used water, DTSS helps to "close the water loop".

Upon completion of the DTSS, the land currently occupied by the six existing water reclamation plants and the 130 pumping stations and the surrounding buffer areas can be released for higher value development. This is estimated to be 1000 hectares. The roof of Changi WRP is also designed to cater for other usage (e.g. factories for light industries and NEWater factories). In the long run, due to economies of scale, the centralisation of WRPs into a single huge WRP will be more cost-effective in terms of construction and operation cost.

The DTSS conveys used water to Changi WRP by gravity without the need for intermediate pumping stations and pumping mains. Hence, there will no longer be the risk of sewage overflow which would otherwise cause serious concerns over public health and contamination of water sources.

Source: *Ministry of the Environment and Water Resources, Singapore (2006)*

Aside from water pollution, there are many other issues and problems that revolve around water quality management ranging from diminishing freshwater sources, low water accessibility rate to high cost of the maintenance of water supply and sewerage facilities. These are addressed in various ways and at different levels by the governments of ASEAN countries. In the area of capacity building and governance, for example, some countries have managed to start very promising new initiatives in the areas of community involvement, awareness raising, and coordination between government departments and statutory bodies.

Some of the most common initiatives and measures related to capacity building and governance include the following:

- Creation of national body for coordination and policy development;
- Creation of separate water resources agency not associated with ministries responsible for water development;
- Attempts to coordinate and/or integrate water and environmental agencies;
- Devolution of management to decentralised operations;
- Increased recognition of the advantages of managing water at a basin and catchment level;
- Programmes to raise public awareness of water issues, followed by forms of public participation;
- Participatory irrigation management in various forms;
- Attempts at integrated land and water management in the face of recognition of the consequences of degraded catchments and watersheds;
- The potential for water use rights to assist in the equitable allocation of water between competing demands in the face of growing water use; and
- A range of reforms aimed at financial sustainability ranging from cost recovery to private sector involvement.[2]

The overall availability of freshwater in the region is good but some countries experience seasonal scarcity, and freshwater resources are under increasing pressures due to rapidly rising demand from industrial activities, agricultural use, and a growing population. Overall demand for freshwater is expected to increase by about a third over the next twenty years. To address these pressures, there is need for a more effective and integrated management system that strikes a delicate balance between the economic need to exploit these resources to supply current economic and human requirements and need to protect these resources for the benefit of future generations. The ASEAN Strategic Plan of Action on Water Resources Management is a significant regional response to this challenge that complements and supports the actions at the national and local levels.

Wetlands

In the ASEAN region, there are 26 Ramsar Convention-listed wetlands in seven countries (Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand and Viet Nam). The 26 wetlands cover 811,000 hectares. Being designated as a Ramsar wetlands of international importance, however, does not insulate these wetlands from destructive forces or development activities. These include:

- Illegal fishing/overfishing
- Dynamite fishing/fish poisoning/cyanide fishing
- Land use conversion/land clearing/burning/ reclamations
- Mekong development/irrigation projects/dikes and drainage construction
- Illegal hunting/pouching
- Illegal logging/cutting of trees for livelihood or firewoods
- Dumping of garbage and wastewater/chemicals or pollution from nearby resorts and residential areas
- Tourism/souvenir hunting and trading
- Human migration

In the case of the Xuan Thuy Natural Wetland Reserve in Viet Nam, the main threat is the construction of sea dykes and reclamation of mangroves and mudflats for aquaculture ponds and agricultural land. On the other hand, the Naujan Lake National Park in the Philippines suffers from high fishing pressure, encroachment on the fish sanctuary, harvesting of protected endemic and migratory fish species, land use conversion and settlement, poaching, hunting and harvesting of forest products, contamination with agricultural chemicals, and water resource use conflicts. In a similar manner, the Doi Hoi Lot wetland in Thailand is subjected, among others, to water pollution from upriver industries, tourism activities, and urban and agricultural runoff; construction of earthen dams along riverbanks; and spreading of lime on mudflats resulting in the depletion of molluscs.

With or without the Ramsar designation, most governments in the region have not been remiss in their duties to protect their wetlands. Cambodia, Indonesia, Malaysia, Philippines, Thailand and Viet Nam use various measures and implement a number of programmes to protect the biodiversity of their wetlands. National and local laws were passed designating them as national protected areas or parks, where harvesting and hunting are partially or completely

prohibited. Research laboratories, such as those in the University of San Carlos in the Philippines, assist in protecting the endemic and endangered species in wetlands.

In general, an existing national government agency is designated to lead the wetlands conservation efforts, and when there is no technically capable agency, a new one is created. In Malaysia, Philippines and Thailand the local governments and civil society groups are active partners of the national government in conservation measures. For example, some NGOs in the Philippines provide assistance in protecting the Tubbataha reefs, and in Thailand, the private Don Mor Thong Monastery helps to protect the birds and fishes of a small area of the Bung Khong Long Non-Hunting Area.

Box 5.3: Ramsar Sites in Indonesia

Two of Indonesia's wetlands have been chosen as Ramsar sites, namely, Berbak National Park in Jambi and Danau Sentarum National Park in West Kalimantan.

Berbak National Park

Berbak National Park is Southeast Asia's largest natural conservation area that has not been exploited by humans. The uniqueness of this national park is characterised by the combination of wetland forest and fresh water swamp forest. It is also known as the park that has the largest variety of palms in Indonesia, including very rare varieties such as *Johaneteijmannia altiforons* and the latest discovered species such as *Lapidonia kingi* (Lorantaceae). Berbak's wetland ecosystem is the habitat of Sumatra's rhino (*Dicerorhinus sumatrensis*), Sumatera's tiger (*Panthera tigris sumatrae*) and other animals including 300 kinds of birds. It is also home to hundreds of thousands of migratory birds.

Danau Sentarum National Park

Danau Sentarum National Park in Kalimantan is representative of a lake wetland ecosystem, fresh water swamp forests and tropical rain forests. Danau Sentarum's water is characteristically reddish black because it contains tannin from the wetlands' surrounding. This national park is the home of a specific flora called tambesu or tengkawang (*Shorea beccariana*) and other kinds of lowland plain forest plants. The area is the habitat of various plants that were used for generations by the local communities as sources of their herbal medicine. Danau Sentarum is among the world's most valuable wetlands due to its unique fish species, such as red arwana (*Scleropagea formosus*), belida (*Notopterus chitala*), to mention a few of about 120 species. The other animals that live in the park are the long nose prosbitus–"bekantan" (*Nasalis sarvatus*) and the orang utan (*Pongo satyrus*)

Source: *Ministry of the Environment, Indonesia (2006)*

Table 5.1: List of Wetlands of International Importance in ASEAN Countries (as of 12 October 2005)

Site	Date of Designation	Region, Country	Area (ha)
Boeng Chhmar and Associated River System and Floodplain	23/06/99	Kampong Thom province, Cambodia	28,000
Koh Kapik and Associated Islets	23/06/99	Koh Kong province, Cambodia	12,000
Middle Stretches of the Mekong River north of Stoeng Treng	23/06/99	Stoeng Treng, Cambodia	14,600
Berbak	08/04/92	Jambi, Indonesia	162,700
Danau Sentarum	30/08/94	Kalimantan Barat, Indonesia	80,000
Pulau Kukup	31/01/03	Johor, Malaysia	647
Sungai Pulai	31/01/03	Johor, Malaysia	9,120
Tanjung Piai	31/01/03	Johor, Malaysia	526
Tasek Bera	10/11/94	Pahang, Malaysia	38,400
Moyingyi Wetland Wildlife Sanctuary	17/11/04	Southern Bago, Myanmar	10,240
Agusan Marsh Wildlife Sanctuary	12/11/99	Mindanao, Philippines	14,840
Naujan Lake National Park	12/11/99	Oriental Mindoro, Philippines	14,570
Olango Island Wildlife Sanctuary	01/07/94	Cebu, Philippines	5,800
Tubbataha Reefs National Marine Park	12/11/99	Sulu Sea, Philippines	33,200
Bung Khong Long Non-Hunting Area	05/07/01	Nong Khai Province, Thailand	2,210
Don Hoi Lot	05/07/01	Samut Songkhram Province, Thailand	87,500
Had Chao Mai National Park, Mu Koh Libong Non-Hunting Area, Trang River Estuaries	14/08/02	Trang Province, Thailand	66,300
Kaper Estuary, Laemson Marine National Park, Kraburi Estuary	14/08/02	Ranong Province, Thailand	122,000
Krabi Estuary	05/07/01	Krabi Province, Thailand	21,300
Kuan Ki Sian of the Thale Noi Non-Hunting Area	13/05/98	Songkhla Province, Thailand	494
Mu Koh Ang Thong National Park	14/08/02	Surathani Province, Thailand	10,200
Nong Bong Kai Non-Hunting Area	05/07/01	Chiang Rai Province, Thailand	434
Pang Nga Bay National Park	14/08/02	Pang Nga Province, Thailand	40,000
Princess Sirindhorn Wildlife Sanctuary (Pru To Daeng Wildlife Sanctuary)	05/07/01	Narathiwas Province, Thailand	20,100
Bau Sau (Crocodile Lake) Wetlands and Seasonal Floodplains	04/08/05	Dong Nai, Viet Nam	13,760
Xuan Thuy Natural Wetland Reserve	20/09/88	Nam Ha, Viet Nam	12,000

Source: *Ramsar Convention website (2005) with updates from member countries (Aug 2006)*

Coastal and Marine Resources

With almost all countries in the region (except Lao PDR) having coastlines, the region's rich marine and coastal resources have always been central to the region's economic development. These resources have, however, been subjected to tremendous environmental pressures. The following problems associated with declining marine and coastal resources have been identified and are

expected to pose a challenge to ASEAN region in the next 50 years:

- Food security undermined;
- Economic dislocation for those whose jobs are related to the coastal and marine sector;
- Public health compromised by toxins and hazardous compounds in edible marine products and by increased dangerous waste levels in coastal waters used by the public;
- Some coastal areas will be made uninhabitable due to rising sea levels and intensified severe weather systems from climate change;
- More pollution incidents as greater shipping congestion and other marine activities lead to more maritime accidents;
- Infrastructure will deteriorate as pressures of urbanisation undermine ability to provide adequate infrastructure levels for population;
- Aesthetic and recreational values will be lost;
- Conflicts on the use of resources will escalate; and
- Economic development unable to compensate for irreversible damage.[3]

Coastal Resources

The aggregate coastline of the ten ASEAN countries is approximately 173,000 kilometres, with Indonesia having the longest coastline. Over two-thirds (70%) of the population in the region live within 100 km of the coasts because of the livelihood, food, and water provisions they extract from coastal resources. The presence of large human settlements and extensive economic activities in coastal areas pose great danger to fragile coastal ecosystems. On the other hand, living near coastal areas also poses danger to human beings when tidal surges and tsunamis are triggered by natural phenomena.

The coastal resources in the region suffer from physical habitat alteration, including the destruction of mangrove forests for aquaculture; pollution from industrial, domestic, and agricultural sources; destructive fishing methods such as fishing with dynamite and use of cyanide, and shallow-water fisheries overexploitation.[4] The economic activities of people living near or in coastal areas can be a cause of serious depletion of some coastal resources. For example, shrimp farming became a quick profit "boom-and-bust" enterprise. Shrimp farms were constructed from productive coastal mangroves. However, as production grew rapidly, stress-induced diseases and reduced water quality rendered the farms non-productive and, in due time, the shrimp farms were abandoned. As a result the once productive mangrove habitats were left deteriorating.[5]

Healthy estuary lined with a thick growth of mangroves in Quezon Province, the Philippines

Global warming and sea level rise are predicted to have negative impacts on the coastal areas in the region in the future. It is forecasted that global warming, through higher evaporation rates, will cause more frequent severe weather systems (monsoons, typhoons) to batter the coastal areas. The warm waters will also detrimentally affect the chances of survival of marine organisms with low thermal tolerance such as coral reefs. Finally, the rise of sea level will inundate low-lying coastal wetlands, and other flat, low elevation coastal areas. Aside from the economic and natural causes, there are transboundary environmental management problems related to coastal management which confront the region, including the weak implementation of regulations and other measures to prevent overexploitation of coastal and marine fisheries, especially shared stocks and endangered and threatened species.

Management failure is also among the causes of declining coastal resources. This problem is effectively addressed through the application of a holistic Integrated Coastal Zone Management (ICZM). This approach uses horizontal and vertical dimensions of management. In the horizontal dimension, the different sectors which exploit coastal resources, e.g., industries, tourism, fisheries, forestry, etc., are integrated or involved in management. In the vertical dimension, the different levels of government, e.g., district, municipal, city, provincial, and national, are aligned and have to be mutually supportive of each other in the area of coastal resources conservation.[6]

Box 5.4: Integrated Coastal and Marine Management in Indonesia

Integrated coastal and marine management is of paramount importance in an archipelagic country like Indonesia where more than 75% of the national area is sea and the 24% that is land is fragmented amongst more than 17,000 islands. Coastal and marine industries such as oil and gas production, transportation, fisheries and tourism account for a quarter of Gross Domestic Product and employ more than 15% of Indonesia's workforce. Some 140 million Indonesians live within 60 kilometres of the coast; most of them within the large coastal cities that occupy a predominant position in the national economy.

Under the framework of GEF/UNDP/IMO Regional Programme of Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) and supervision of Ministry of Environment as the Indonesia focal point for PEMSEA, the Provincial Government of Bali has completed most of the full-cycle of ICM programme development and implementation. The project started in 2000 and is jointly funded by PEMSEA and Bali Provincial Government. The project site is located in Bali's south eastern coast that includes one municipality and four regencies, namely Denpasar Municipality, Badung Regency, Gianyar Regency, Karangasem Regency, and Klungkung Regency.

With better understanding on the benefits of ICM, the local government leaders have initiated integrating the ICM programmes into the Bali Strategic Development Plan. The ICM programme has also enabled various stakeholders to learn the benefits of working together in addressing their concerns and interest related to the multiple-use of coastal areas, in particular for sustainable tourism development. For example, the multiple-use conflicts in Benoa Bay, Bali were addressed through multi-stakeholder consultation and partnerships. Consensus was reached among the Provincial Government, Regency and Municipality Government, Legislative Assembly, and local stakeholders to review the planning of the airport expansion, Benoa port expansion and Bali Tourism Development Corporation activities in the Benoa Bay, which was identified as a potential threat to Benoa Bay's ecosystem and resources that also affects the overall environment in Bali. Indeed, the ICM framework and processes had provided a platform for these stakeholders to share their concerns, knowledge and experiences as well as resources toward achieving the common goals of sustainable development.

The implementation of Bali's ICM project has also inspired the scalling-up of ICM programme to cover all the coastal regencies in Bali Island as well as replication of ICM experiences in the other coastal areas in Indonesia. Sukabumi Regency has developed an initiative to implement the ICM programme since February 2003. As a parallel project, implementation of ICM programme in Sukabumi is funded by the local government of Sukabumi Regency and technical assistance is provided by PEMSEA Regional Programme and the Ministry of Environment. Strong commitment and support of local government and stakeholders have played an important role in ensuring the development and implementation of ICM programmes using local resource. A sense of ownership by local government is critical to ensure project implementation.

The objective of the Sukabumi ICM Programme is to strengthen local capacity in establishing a framework for coastal integrated development and management of the regency. The project covers 4 subdistricts namely:

(continued next page)

(continued from previous page)

Pelabuhan Ratu, Simpenan, Gadobangkong and Citepus sub-district.

Based on the experience of implementing the ICM programmes in Indonesia, the following key elements in achieving sustainable coastal management need to be fulfilled: 1) intersectoral and interagency coordination, 2) policy and functional integration, 3) stakeholders' consultation and participation, 4) institutional and legal arrangement, and 5) local capacity to plan and manage. The effectiveness of coastal management depends on the technical and managerial skills which are critical in achieving sustainable use of the resource. The role of science is also critical to the advancement of coastal management wherein possible management measures must be based on good scientific advice.

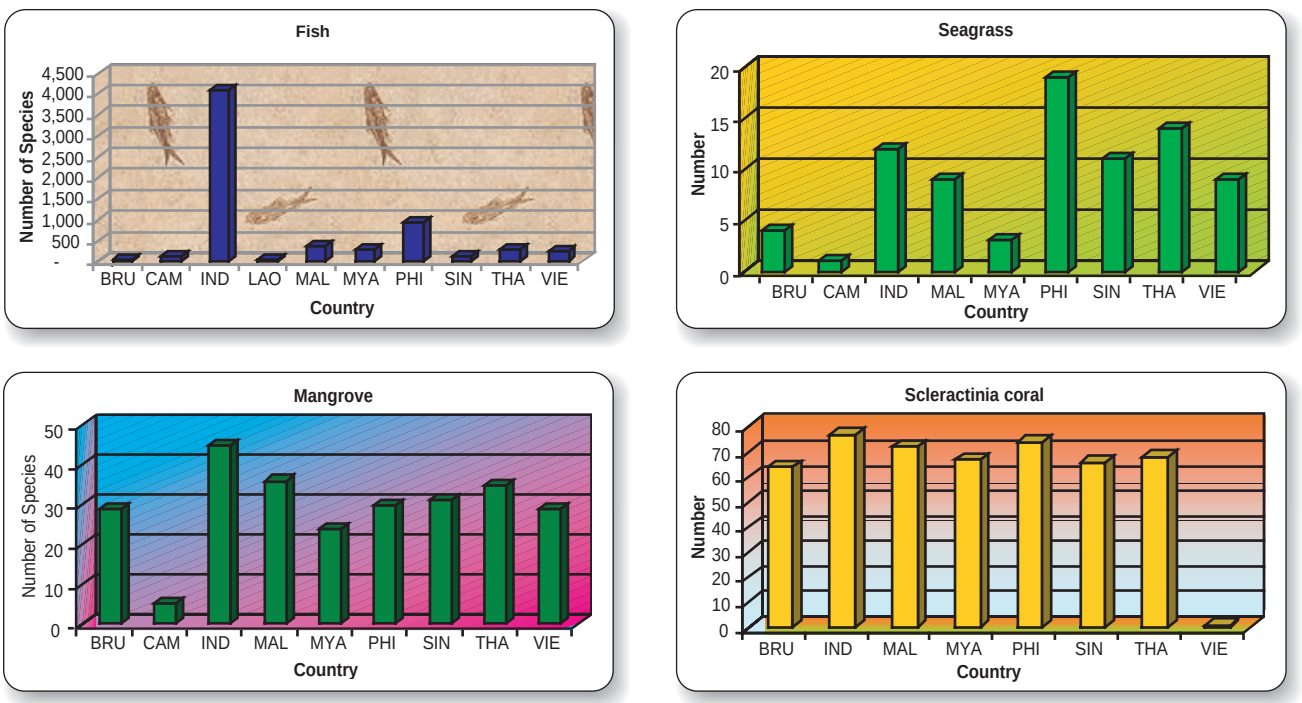
Source: *Ministry of the Environment, Indonesia (2006)*

Marine Resources

The ASEAN region is noted for its rich marine biodiversity and abundant coral reefs. There are up to 4,080 species of fish, 45 species of mangrove, 19 species of sea grass, and 77 species of *Scleractinia* coral in the region. Indonesia, Philippines and Malaysia have the most diverse marine species. Indonesia has about 62% of the region's fish species. The Philippines, on the other hand, has about 23% of the region's sea-grass species. Compared to the rest of the world, the region has 34% of the total mangrove forest area, 64% of mangrove species, 31% of coral reef area, and 33% of sea grass species.[7]

The ASEAN region has extensive mangrove forest areas comprising a significant portion of the world's total. These mangrove areas are found mostly in Indonesia. Because of the range of essential services provided by mangroves, it is essential that the region pursues various strategies for their sustainable utilisation. With respect to sea-grass, there are about 58 to 60 species worldwide with an estimated one-third of these in the region, most of which can be found in the Philippines. The leaves of sea-grass slow down water currents while their roots stabilise the seabed. For small marine species, the sea-grass serve as habitat, while for coastal zones, it provides a number of ecological goods and ecological services, for instance fishing grounds, wave protection, oxygen production and protection against coastal erosion.

Figure 5.6: Number of Marine Species in the ASEAN Region

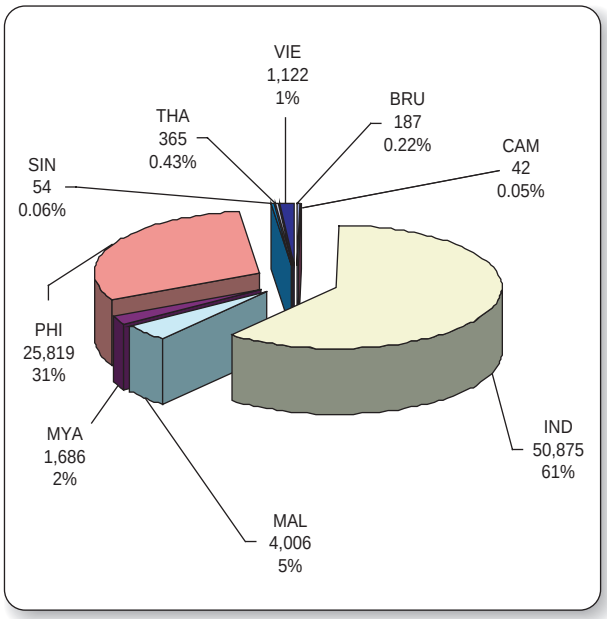


Source: *WRI (2005)*

Note: *Data are from the most recent year between 1992 and 2003*

It is estimated that there are 284,000 sq km of coral reefs in the world of which almost a third can be found in the ASEAN region. Indonesia has the most number of coral reefs with 50,875 sq km (61%), followed by the Philippines with 25,819 sq km (31%). Singapore has 54 sq km of coral reefs (0.06%). The *Scleractinia* corals, also known as Stony star corals, are colonial corals found in abundance in the clear, shallow tropical waters of the region. They are the world's primary reef-builders. The calcareous skeletons of these corals accumulate and are cemented with the help of algae, sponges, other corals, thus forming coral reefs.

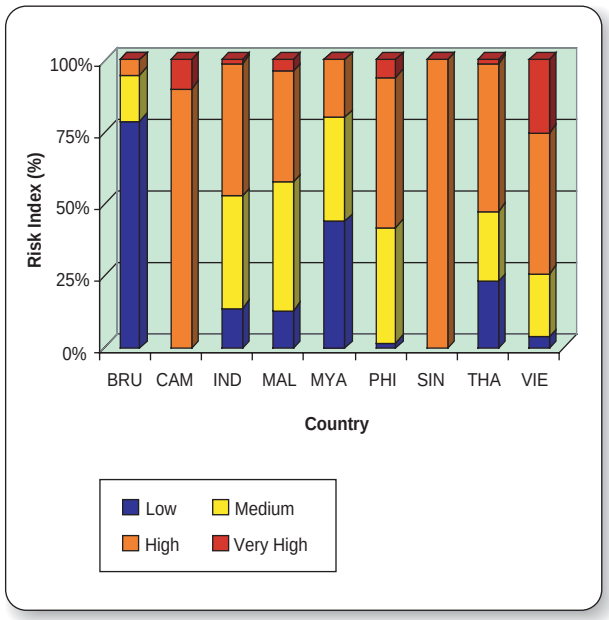
Figure 5.7: Coral Reef Areas (in sq km) of Member Countries



Source: *Adapted from Burke et al. (2002)*

Coral reefs in the ASEAN region have the highest levels of biodiversity in the world. They provide livelihood for fishermen as a source of decorative stones and fashion jewelry as well as construction materials. But destructive activities such as over fishing, discharge of sediments and pollution, and unsustainable tourism are resulting in the rapid deterioration of this fragile ecosystem. The condition of about 50% of the coral reefs in the region, on the average, are already in the "high" risk level and about 5% are in the "very high" risk level. Singapore's coral reefs are in "high" risk level while nearly 90% of those in Cambodia are in the same risk level. Brunei Darussalam's coral reefs are the most protected in the region with nearly 80% of them in the "low" risk level.

Figure 5.8: Reefs at Risk Summary by Country



Source: *Adapted from Burke et al. (2002)*

In the Philippines and Indonesia a major threat to coral reefs is blast and dynamite fishing, which can destroy the reefs directly or drive away the fishes that live in them. Two species of fishes have already been driven away from these two countries' reefs, namely, Groupers and Snappers. There are other fishing techniques in the region that cause serious damage to coral reefs. These are *muro-ami* and *pa-aling*[8] in the Philippines and illegal trawling in Malaysia and Thailand.[9]

Coral bleaching is another significant threat to corals. It occurs when the photosynthetic algae *zooxanthellae* are expelled from the corals' polyps. With the algae gone, the corals lose their pigments. The algae are expelled when corals suffer from stresses brought about by increased water temperature (global warming) and solar irradiance (photosynthetically active radiation and ultraviolet band light).

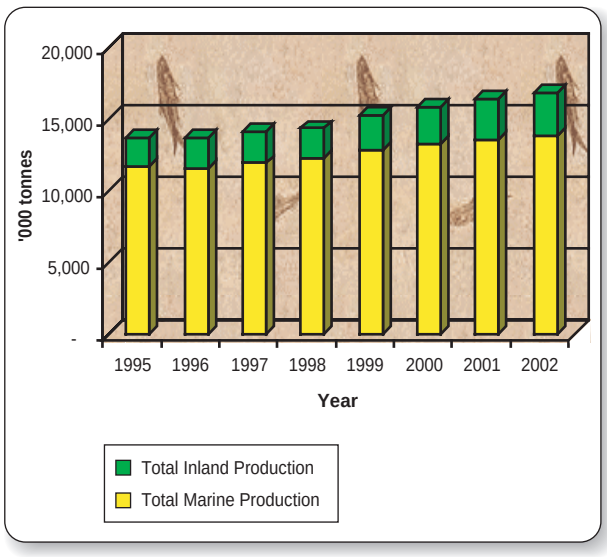
Fishery Resources

The ASEAN region falls within the Western Central Pacific marine statistical area of the Food and Agriculture Organisation. The area is dominated by large continental shelf that lies within the Exclusive Economic Zone (EEZ) of the ASEAN countries. The Western Central Pacific area is rich in demersal marine fish, molluscs, pelagic marine fish, cephalopods, crustaceans, and others. The

seas of the ASEAN region teem with an estimated 4,080 species of fish. Freshwater and marine fishes are major sources of protein and of income for the people of the region. From 1995 to 2002, the production of fishes from aquaculture and fisheries grew by 32% from 13,698 tonnes in 1995 to 16,887 tonnes in 2002. This accounted for 13% of the world's production. In 2002, Indonesia and Thailand were among the top ten producing countries of marine and inland fisheries. Indonesia was fourth behind the United States, while Thailand was ninth behind the Russian Federation. In inland fishery production, Cambodia, Indonesia, and Myanmar ranked fourth, fifth, and sixth, respectively, in the same year.

World fish trade has grown considerably in terms of both value and quantity over the last decades. Trade tends to flow from less developed to more developed countries, but also between developed countries. Measured in terms of live weight, 38% of all fishery products in 2002 were traded internationally. In the ASEAN region, fish exports increased from $4.14 billion in 2001 to $6.16 billion in 2004. Likewise, fish imports increased from $1.66 billion in 2001 to $2.38 billion in 2004.[10]

Figure 5.9: Fishery and Aquaculture Productions in the ASEAN Region, 1995 – 2002

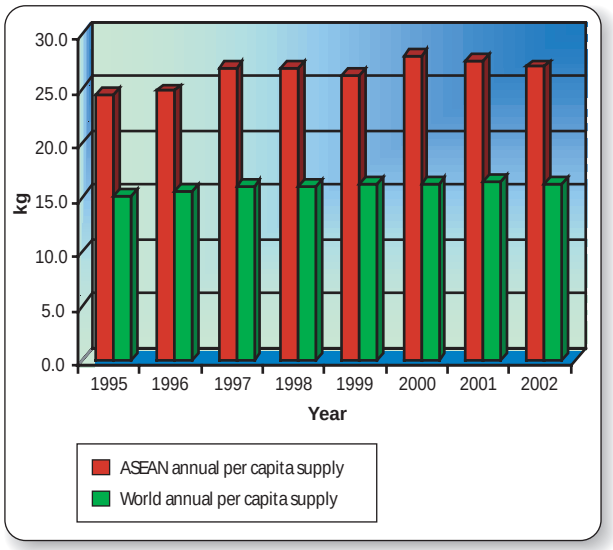


Source: *WRI (2005)*

The increase in the fisheries production from 1995 to 2002 helped increase the food supply in the region from 10.8 million metric tonnes in 1995 to 12.9 million metric tonnes in 2002. In 2002, the total food supply in the region represented a sizable chunk of 12.8% of the world's total supply. ASEAN's annual rate of increase of food supply per capita of 10.2% during the same period exceeded the world's rate of 7.2%. The region's average annual food supply per capita from 1995 to 2002 was 26 kg, which was 10 kg higher than the world's average supply.

Fish protein is an important nutritional requirement as it contains all the essential amino acids necessary for physical growth and maintenance. The intake of fish as part of the region's daily animal protein started to increase in 1999. From 1995 to 1998, the percentage of fish protein consumed hovered between 37% to 38%. But starting 1999, it went up to 40% and stayed at that level up to 2002. The region's 37% to 40% fish protein intake exceeded the world's level of 15% to 16% during the same period.

Figure 5.10: World and ASEAN's Annual Per Capita Food Supply, 1995 – 2002



Source: *WRI (2005)*

Marine Protected Areas

Marine protected areas (MPAs) are those areas reserved by national or local governments to protect, maintain, or restore natural and cultural resources in coastal and marine waters. MPAs in the ASEAN region refer primarily to protected areas with substantial marine areas, while mangrove reserves with little marine areas are not included. The region has over 310 MPAs. The Philippines has the highest official MPA listing of over 180, followed by Malaysia with over 40.[11] Due to their

relatively short coastlines, Brunei Darussalam, Cambodia, and Singapore have few MPAs (between 2 to 4). Indonesia, Thailand, and Viet Nam have 22 to 29 MPAs each.

Table 5.2: Marine Protected Areas in Member Countries

Country	Declared MPAs	Proposed MPAs
Brunei Darussalam	6	2 +
Cambodia	4	1
Indonesia	29	14 +
Malaysia	40 +	3 +
Myanmar	4	1
Philippines	180 +	100 +
Singapore	2	4
Thailand	23	0
Viet Nam	22	7

Source: *ARCBC et. al. (2002)*
Note: *Proposed MPAs include both official and unofficial proposals.*

The MPAs are also classified according to funding prioritisation. Those that are graded "A" receive prioritised funding from international organisations. They contain high biodiversity values with a good chance of being successfully conserved, and hence, contribute effectively to global diversity conservation. Those graded "B" are MPAs that are nationally important that will be provided with greater national efforts, with or without foreign assistance. MPAs of local importance are those that are essential in forming a healthy network of sites needed for marine conservation nationally and regionally, as well as for sustaining fisheries resources that local villagers depend upon.[12]

Environmental degradation is the single most important factor causing negative impacts on marine environment and in marine protected areas. Rapid coastal development and economic growth, as well as pollution from vessel discharges, are the main causes of coastal environmental degradation. For example, Malaysia, Singapore and Indonesia as the littoral states of one of the busiest shipping lanes in the world, the Malacca Straits, constantly face threats from oil pollution and shipping-based pollution.

In February 2004, during the Seventh Conference of Parties Meeting of the Convention on Biological Diversity, the governments of Indonesia, Malaysia and the Philippines signed a Memorandum of Understanding to take up joint leadership in the conservation, planning and management of the Sulu-Sulawesi Marine Ecoregion as part of their contribution to the Convention on Biological Diversity and the Johannesburg Plan of Implementation adopted at the World Summit on Sustainable Development 2002.

On the managerial aspect, 46% of the region's MPAs have none or very little management, 28% are under moderate management, and only a handful are well managed.[13] To solve the problems associated with managing MPAs, three types of actions can be implemented: (a) actions to strengthen MPA management, (b) actions to fill gaps in MPA system establishment, and (c) actions on regional cooperation.

Table 5.3: Number of Priority MPAs of Global/ Regional (A) and National (B) Significance

Country/ Territory	Regional/ Global "A"	National "B"	Total
Brunei Darussalam	No Info	1	1 +
Cambodia	2	2	4
Indonesia	10	7	17
Malaysia	2	6	8
Myanmar	2	2	4
Philippines	5	17	22
Thailand	4	7	11
Viet Nam	1	8	9
Singapore	1	1	2

Source: *ARCBC et. al. (2002)*
Note: *Both declared and proposed MPAs are included.*

The multifarious economic and human activities have also exerted stresses on the region's fragile coastal and marine ecosystems. To help alleviate these stresses, more marine sites are targeted to be nominated as protected areas and heritage sites. At the same time, ASEAN continues to promote collaboration with various organisations involved in national and regional activities on coastal and marine environment in the region. In

addition, capacity building activities are being undertaken to expeditiously implement the ASEAN Marine Water Quality Criteria, including reviewing national laws, regulations and standards to harmonise them with ASEAN criteria, and training on analytical, inter-calibration and monitoring techniques. These regional efforts are directed towards promoting awareness on the importance of these ecosystems and ensuring that the coastal and marine environment are managed in a sustainable manner.

End Notes

1 ASEAN Secretariat (2005) "Report on the State of Water Resources Management in ASEAN," (Jakarta: ASEAN Secretariat)

2 ASEAN Secretariat (2005) "Report on the State of Water Resources Management in ASEAN," (Jakarta: ASEAN Secretariat) .

3 Asian Development Bank (ADB) (2002), *Southeast Asia Subregional Report for the World Summit on Sustainable Development* (Manila: ADB), p. 80.

4 *Ibid*., p. 79.

5 *Ibid*., pp. 80 – 81.

6 *Ibid*.

7 Computed from the databases of the World Resources Institute (2006), *EarthTrends*,
< http://earthtrends.wri.org/index.php > 25 Jan 2006

8 *Muro ami* is done by pounding and crushing corals underwater to scare the fishes and luring them towards the nets. *Pa-aling* uses air bubbles instead of weights to drive fish into nets. See Rene Abesamis (n.d.), "*Muro Ami* and *Pa-Aling*," in World Resources Institute (2006), "Muro Ami and Pa-Aling,"
< http://newsroom.wri.org/mediakits_text.cfm?ContentID=123 > 27 Jan 2006.

9 ARCBC et. al. (2002),"Marine Protected Areas in Southeast Asia," (Los Banos; pp. 3 – 4).

10 ASEAN Statistical Pocketbook 2006 (Jakarta: The ASEAN Secretariat)

11 According to ARCBC et. al. (2002), there are still unaccounted MPAs in Indonesia and in the Philippines.

12 ARCBC et. al. (2002) , p. 10.

13 *Ibid*., p. 9.

CHAPTER 6
Terrestrial Ecosystems

Ensure ASEAN's rich biological diversity is conserved, and sustainably managed, and the benefits arising from these biological and genetic resources are fairly and equitably shared toward enhancing social, economic and environmental well-being.

Ensure sustainable management of land-based resources while enhancing optimum agricultural production.

Promote sustainable management of forest resources and critical ecosystems through the eradication of unsustainable practices as well as strengthening of the ASEAN Heritage Parks.

Vientiane Action Programme

Of the total land area of the region of 447 million hectares, over 45% are covered with forests and woodlands, equivalent to around 13.5 billion cubic metres of forest wood volume and 23 billion tonnes of wood biomass. While the rate of deforestation at 1.35% in the region is the highest in the world, there was a declining trend as the production and consumption of forest wood products declined. Despite a receding forest cover, the region remained among the most biologically diverse regions in the world as it had 20% of the world's known species while occupying only 3% of the world's total area. There are over 27,000 endemic species in the region of which 86% are endemic plants. However, out of over 64,800 known species in the region, about 2% were endangered while the region had 7 of the world's recognised biodiversity hotspots. The region had made good efforts to protect its rich biodiversity, designating 1,523 IUCN-category protected areas and declaring 27 areas as ASEAN Heritage Parks. Still the region experienced various types of land degradation-related disasters such as forest fires, floods, droughts and landslides causing the loss of thousand of lives and displacement of communities. Per capita solid waste production ranged from 0.3 to 1.86 kg/capita/day most of which were disposed of in landfills. The disposal of solid and other wastes and the unsustainable harvesting and utilisation of forest products would remain a serious challenge to sustaining the environmental integrity of the region's terrestrial ecosystems.

ASEAN FACTS AND FIGURES

Megadiverse Countries	Indonesia, Malaysia, Philippines (of 17 countries globally)	
Number of Endemic Species in ASEAN	27,000	
Number of Protected Areas		
IUCN category	1,523	
ASEAN Heritage Parks	27	
Forest Cover (2005) (percent of land area)		
World	30.3%	
ASEAN	45.0%	
Forest Loss in ASEAN (average annual decrease in sq. km./year)	1990 – 2000	2000 – 2005
	2,777	*2,751*
Deforestation Rate, 2000 – 2005		
World	0.20% per year	
ASEAN	1.35% per year	
Asia Overall	0.20% per year	
Municipal Solid Waste Generation	0.3 – 1.86 kg/capita/day	

Land Resources

The ASEAN region has land area of approximately 4.47 million sq km (447 million hectares). Indonesia occupies 42% of this land area, followed by Myanmar (15%) and Thailand (11%). The total forest cover in the region in 2005 was 203 million ha which is 45% of the region's total land area. Brunei Darussalam is the only country in the region that has over 78% of its land still covered with forests. Indonesia, on the other hand, has the largest expanse of forest cover (88.5 million ha) in the region. Eight of the ten ASEAN countries have 100% tropical forests. Only Myanmar and Viet Nam have sub-tropical type forest comprising 1% and 2% of the total, respectively.

In 2002, the region had around 13.5 billion cubic metres of forest wood volume, the largest in Indonesia with around 61% of the total wood volume. The wood biomass in the region, on the other hand, amounted to a total of 23 billion tonnes in 2002 with Indonesia again having the largest share of 61% of the total biomass.

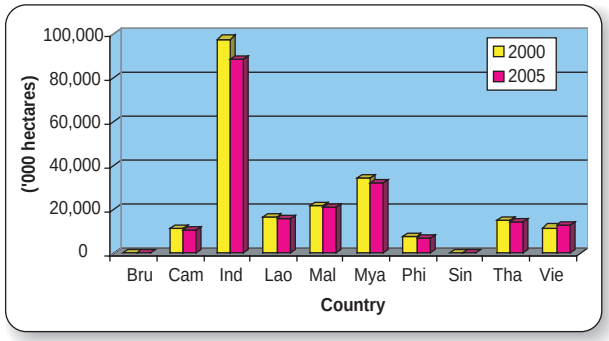
Table 6.1: Land Areas

Country	Land Area ('000 sq km)	Country	Land Area ('000 sq km)
Brunei Darussalam	5.8	Myanmar	677
Cambodia	181	Philippines	300
Indonesia	1,891	Singapore	0.697
Lao PDR	237	Thailand	513
Malaysia	330	Viet Nam	330

Source: *ASEAN Statistical Pocketbook (2006)*

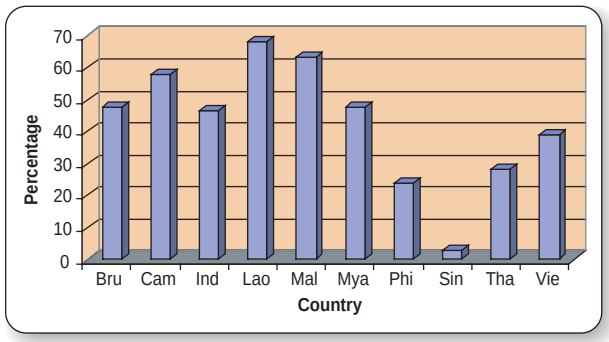
A variety of forest types abound in the ASEAN region – evergreen forests, semi-evergreen forests, deciduous dry dipterocarp forests, mangrove forests, pine forests, canopy forests, tropical moist forests, etc. Aside from timber, non-timber products such as rattan, bamboo, lianas, resins (especially from the dipterocarp species), honey, medicinal plants, benzoin, latex, bark resin and gum can be gathered or harvested. Deep in the heart of these forests roam wild animals like elephants, wild cows, buffalos and others. However, deforestation threatens to destroy all of these. The average annual rate of deforestation in the region from 2000 to 2005 was 2.75 million hectares or 1.35%. In 1990 about 55% of the land area of the region was still blanketed by forests but in 2005 this decreased to only 45%.

Figure 6.1: Total Forest Area



Source: *ASEAN Statistical Pocketbook (2006)*
Note: ** Forest Department, Myanmar (data for 2000)*

Figure 6.2: Ratio of Forest to Land Area (%), 2005



Source: *ASEAN Statistical Pocketbook (2006)*
Note: ** Department of Environment, Brunei Darussalam (Sept. 2006)*

A thriving forest in Indonesia *(Centre for Southeast Asian Studies)*

Table 6.2: Wood Volume and Wood Biomass in Forests

Country	Wood Volume		Wood Biomass	
	m^3/ha	million m^3	tons/ha	million tonnes
Brunei Darussalam	119	52	205	90
Cambodia	40	376	69	648
Indonesia	79	8,240	136	14,200
Lao PDR	29	359	31	390
Malaysia	119	2,290	205	3,950
Myanmar	80[a]	2,869[a]	121[a]	8,252[a]
Philippines	66	383	114	660
Singapore	119	0[b]	205	0[b]
Thailand	17	252	29	434
Viet Nam	38	372	66	643
ASEAN Total	**706**	**15,193**	**1,181**	**29,267**

Source: *State of the World's Forests 2005 (Rome: FAO), Table 3, p. 139.*
Note: [a] *– Forest Department, Myanmar,* [b] *– not significant value*

Forest Products Production, Trade and Consumption

In general, the production of wood-fuel and industrial round-wood in the region decreased by 34.2% and 2.6%, respectively, from 1998 to 2002 but sawn-wood production increased by 54% during the same period. Exports and imports continued to increase for industrial round-wood and sawn-wood ranging from 57% to 91% (no trade data available for wood-fuel). The demand for wood-fuel and sawn-wood rose by almost 50% and 51%, respectively, but the demand for industrial round-wood dropped by 2%.

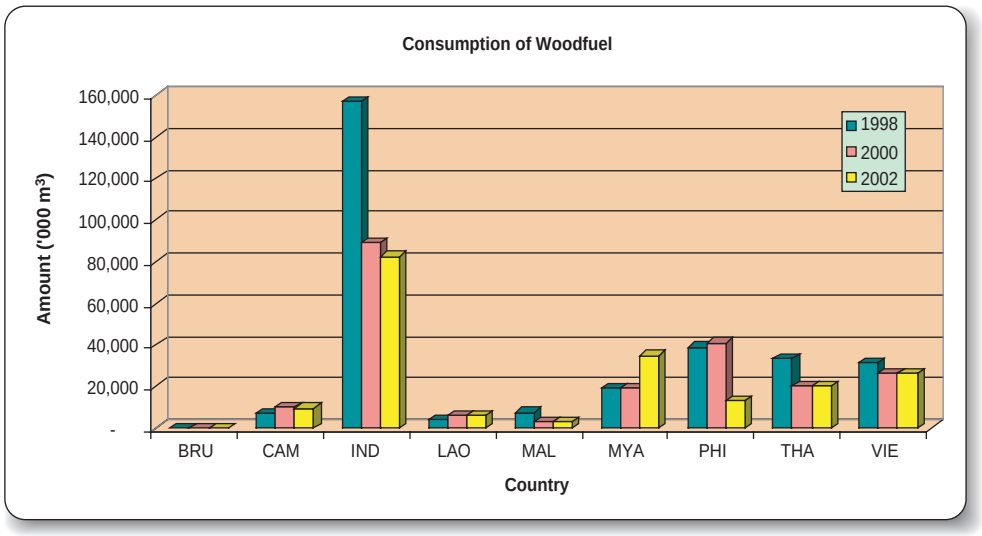
Indonesia was the leading producer of wood fuel, industrial round-wood, and sawn-wood from 1998 to 2002, followed by Malaysia. In terms of imports, Malaysia led the region followed by Thailand and Philippines. Malaysia was also the largest wood product exporting country in the region during the same period, followed by Indonesia and Thailand. In terms of consumption, Indonesia topped the list, followed by Malaysia. From 1998 to 2002, there was a declining trend in the production, trading and consumption of forest wood products. Nevertheless, the amount of wood-fuel and industrial round wood products produced, traded and consumed still reached the level of tens of million tonnes, while those of sawn woods to million tonnes annually.

Sustainable Forest Management in Selected ASEAN Member Countries

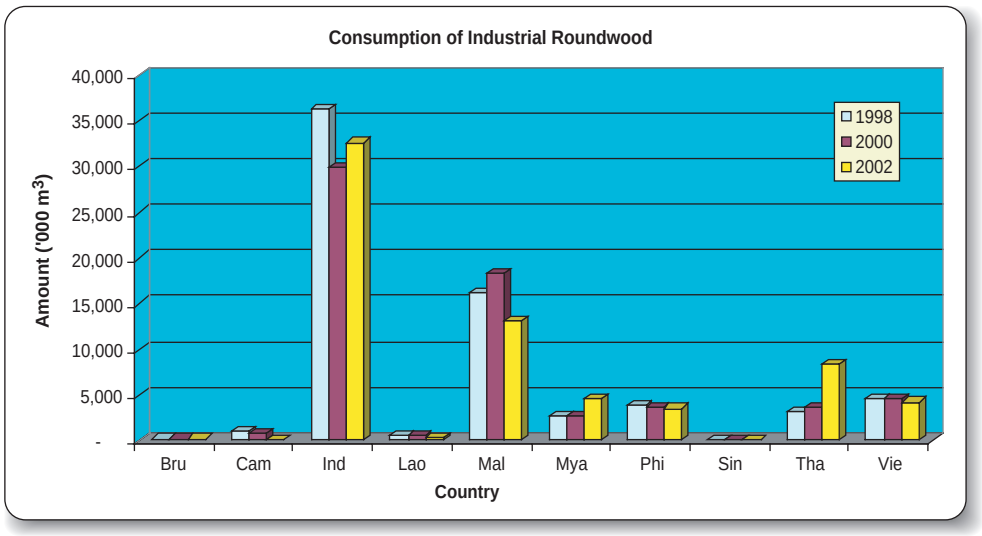
Brunei Darussalam

The administration of forest resources has been under the legal authority of Forestry Department, Ministry of Industry and Primary Resources since 1934. As outlined in the National Forest Policy, 1989 Brunei Darussalam continues to commit itself to conserve, develop and manage its forest resources for the promotion and upliftment of the quality of life; the promotion of social, political and economic well-being of the people, and technological progress of the country; and for bringing about environmental amenity and ecological equilibrium over time continuum. Long- and short-term forest strategic plan and national forest development programmes have been formulated to ensure the optimum utilisation of the limited forest resources taking into consideration the enhancement of multi services of the forest resources and the need to balance with economic development, and the protection of biological resources and environment amid the incremental need to diversify the national economy.

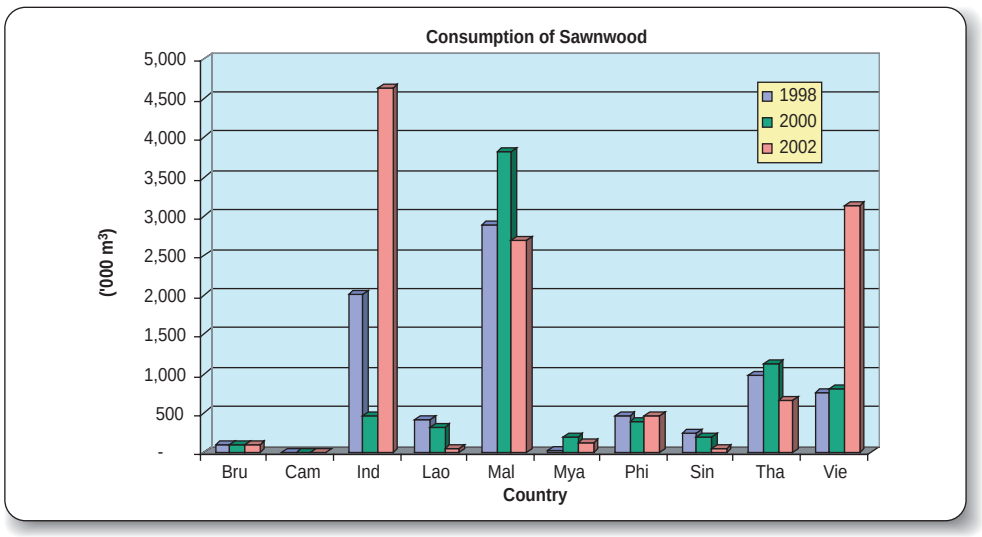
Figure 6.3: Consumption of Forest Wood Products 1998 – 2002



Source: *FAO (2001, 2003, and 2005b)*



Source: *FAO (2001, 2003, and 2005b)*



Source: *FAO (2001, 2003, and 2005b)*

Cambodia

In 1997 forests covered about 60% of the total land area of Cambodia. In the late 1960s, about 13% of the forests were lost due to deforestation and forest degradation resulting from forest land encroachment, conversion of forests into other land uses, and illegal logging. To reverse this trend, the Government of Cambodia is implementing a long term, comprehensive national forest management programme in line with the framework of the Intergovernmental Panel on Forest and Intergovernmental Forum on Forest. The development of forest policy takes into account the relevant social and cultural aspects, and appropriate criteria and indicators for sustainable forest management that are being developed.

Indonesia

Sustainable forest management is the central focus of the Indonesian forest policy framework and measures. Its key priorities include combating illegal logging and its associated trade, conservation of forest resources, empowering communities living within and surrounding the forest areas, and promoting and strengthening sustainable forest management. The implementation of its National Forest Programme (NFP) is progressing well with the establishment of a number of NFP working groups within the Ministry of Forestry for various tasks ranging from collecting and distributing data and information, public consultation, facilitating NFP-related activities and updating NFP policy. The NFP Secretariat has been strengthened, workshops on NFP have been held, and a national forest policy statement developed.

Lao PDR

The Government of Lao PDR is committed to achieve a sizable and robust forestry sector that can contribute significantly to the economic and social development of the country. It has given much attention to its forest policy and has achieved a number of important milestones during the past few years including the current legislative framework, which supports sustainable forest development and the formulation of a national forest strategy to year 2020. Lao PDR is also strongly committed to comply with its obligations under various international agreements and conventions related to forestry, including the UNFCCC, UNCCD, CBD, Kyoto Protocol and CITES. The Government is currently considering ratifying the Ramsar Convention.

Malaysia

The Ministry of Natural Resources and Environment, recently established by the Government of Malaysia oversees the management, research and conservation activities of forestry related agencies in Peninsular Malaysia (while the jurisdiction of the forestry agencies in the states of Sarawak and Sabah continues to be under the respective state governments). Coordination over forestry matters among the various state governments is undertaken through the National Forestry Council, which is chaired by the Deputy Prime Minister. With this new set-up, a more holistic, multi-disciplinary and cross-sectoral approach will be adopted to address forests and forest-related matters. This will also further enhance the attainment of sustainable forest management and implementation of the International Panel on Forest/International Forest Forum (IPF/IFF) Proposals for Action in Malaysia. To facilitate the implementation and assessment of progress at national and sub-national levels, the Malaysian Assessment on the Implementation of the IPF/IFF Proposals for Action was established in April 2001 and completed in January 2002. Prior to this, the Malaysia Timber Certification Council (MTCC) with stakeholder consultation helped formulate the Malaysian Criteria, Indicators, Activities and Standards of Performance (MC&I) for forest management certification. To date a total of 4.1 million ha forest has been certified under the scheme. Meanwhile three other areas (77,000 ha) has been certified under the international certification scheme – the Forest Stewardship Council (FSC).

Thailand

Thailand's new Constitution, which was adopted in 1997, stresses the right of the people to have access to its natural resources and supports a forest management regime that promotes community involvement. In line with this development, the Ministry of Natural Resources and Environment was established in 2002. It issued a directive emphasising the importance of people participation in natural resources management. Thailand is fully committed to sustainable forest management and conservation, being one of the founding members of

the World Conservation Union and host to its Asia Regional Office. Thailand has hosted numerous international and regional forest conservation and management conferences and events, including the successful holding of the 13*th* COP of CITES and the 3*rd* IUCN World Conservation Congress and SBSTTA-10 and WGABS-3 in Bangkok.

Viet Nam

Viet Nam's National Forest Development Strategy for the period 2001 to 2010 was approved by its Ministry of Agriculture and Rural Development in 2001. Efforts are now focused on formulating an updated version that will harmonise it with other related strategies such as the Comprehensive Poverty Reduction and Growth Strategy (2006 – 2020), taking into account a number of recent major policy initiatives and changes. Viet Nam has ratified several international agreements related to forestry, including UNCCD, RAMSAR, CITES, UNFCCC and CBD. It is also an active member of various regional organisations and initiatives that promote sustainable forestry management, including AFP, APFC, INBAR, CIFOR and RECOFTC.

Box 6.1: ASEAN-German Regional Forest Programme for Southeast Asia (ReFOP)

The ASEAN-German Regional Forest Programme for Southeast Asia (ReFOP), commissioned on 1 April 2003, is a development cooperation project between the Federal Republic of Germany and ASEAN. The programme aims to facilitate communication and cooperation among the ASEAN Member Countries in order to implement the Strategic Forestry Plan as part of the Vientiane Action Programme.

Initial phase of ReFOP project was set for 2 years with the objective to support the ASEAN Secretariat and AMCs in enhancing regional cooperation in forestry, particularly in timber certification, establishment of forest clearing house mechanism, strategic monitoring, regional positioning and resource mobilisation through forest trust fund mechanism. The Programme was extended for one more year, and was officially completed in July 2006.

The 4-year ReFOP phase II (August 2006 – July 2010) with revised objectives, project management structure and targeted outputs was agreed in principle by ASEAN in August 2005. The official agreement on the implementation of ReFOP phase II is expected to be finalised and signed soon.

ACHIEVEMENTS OF REFOP PHASE I

The achievements of ReFOP phase I for the period from April 2003 to July 2006 are as follows:

- A web-based communication platform entitled "ASEAN Forest Clearing House Mechanism" was established as part of promoting information and knowledge management in forestry. Three rounds of e-discussion were organised on the issues of timber tracking, national forest policy development and forest certification.
- Technical expertise and logistic support was provided in developing "ASEAN Criteria and Indicators for sustainable management of tropical forest" and "ASEAN Guidelines for implementation of proposals for action of the Intergovernmental Panel and Forum on Forests". ASEAN's performance in terms of forest policy coordination and cooperation has substantially improved.
- The introduction of OECD-like peer review process was agreed, in principle, by ASOF and 3 member countries have voluntarily agreed to undertake the peer review trial.
- The specific inputs for developing phased approach to forest certification have also progressed particularly in defining legality of timber.
- The formation of an integrated Forestry Desk under the Natural Resources Unit of the ASEAN Secretariat, in place of the Project Management Unit, was perceived as a significant progress towards institutional sustainability.

Box 6.2: ASEAN-Korea Environmental Cooperation Project on Restoration of Degraded Forest Ecosystems in the Southeast Asian Tropical Regions

The Restoration of Degraded Forest Ecosystems in the Southeast Asian Tropical Regions was a flagship ASEAN project supported by Republic of Korea (ROK). The 1st phase commenced in 1 July 2000 and ended on 30 June 2005 with a budget of US $ 2.45 million. The goal of the project was to contribute to the sustainable and equitable forest management and rehabilitation of deforested areas in the tropical forest ecosystems of

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ASEAN Member Countries through partnership in research, capacity building and sharing of scientific and technical information. This project was coordinated by the National Instrumentation Centre for Environmental Management (NICEM), College of Agriculture and Life Sciences of Seoul National University, and involved approximately 20 institutions in ROK and ASEAN.

Major activities of the project included:

- Regional research activities on forest ecosystems in member countries on issues of relevance to them.
- On-site field research in particular in the Philippines dealing with 3 major research themes: restoration, agroforestry and biodiversity.
- An education programme which includes a graduate programme, short-term individual and group training courses in various institutions in ROK; and
- Workshops and conferences on related topics to provide opportunities for participating researchers to improve scientific research skills and to share in-depth knowledge of tropical forests through the exchange of experiences and site visits.

Upon the completion of the project and in order to capitalise on the strong momentum gained, the ROK agreed to further expand and support the project for another 3 years (Phase II: 1 July 2006 – 30 June 2008). The main goal of Phase II is 'to consolidate and strengthen the collaborative research mechanism dealing with regional as well as global concerns on sustainable forest management'. This will be also achieved through collaborative partnership in research, capacity building, and sharing of scientific and technical information.

Land Degradation and Contamination

Land use and land cover have been changing drastically throughout the region due to deforestation and forest degradation resulting from the rapid rate of economic development, demographic changes, and widening socio-economic disparities. One of the consequences of this is the increasing vulnerability of the region to disasters such as fires, floods, droughts and landslides that are made more severe by land degradation. Soil erosion can occur during logging operations (road construction, skidding, etc.) and landslips (less than 1 metre), and deep-seated landslides (more than 3 metres) can happen in the absence of well-developed forest cover.[1] In 2000, floods affected 3.5 million people in Cambodia (or one-third of its population) and 5 million in Viet Nam. The floods caused an estimated damage worth US$145 million and US$285 million, respectively. Land degradation and soil erosion resulting from poor land-use practices were identified as the main factors aggravating the severity of these floods. To address this problem, among the many initiatives, the ASEAN-ROK project on Restoration of Degraded Forest Ecosystems in the Southeast Asian Tropical Region is strengthening partnerships in research, capacity building, and sharing of scientific and technical information to ensure sustainable and equitable forest management and rehabilitation of deforested areas.

Two kinds of soils in the coastal lowland areas of the region are particularly vulnerable to degradation due to extensive reclamation activities for human use. These are the soils in coastal mangrove areas and those in freshwater swamp forests.[2] The reclamation of coastal mangrove areas leads to strong soil acidity when the sulphuric mangrove mud is exposed to air. It may also induce aluminium (Al) and iron (Fe) toxicities and phosphate (P) deficiency. Lands with high concentration of these elements become unsuitable and are abandoned after a short period of use.

Reclaimed tropical peat, on the other hand, poses three serious problems: land subsidence, underlying sulphuric sediments, and the extreme oligotrophy of peat, including micronutrient deficiencies. The drying, compaction and decomposition of the peat through land subsidence expose sulphuric elements of shallow peat layers. Strong acidity from oligotrophy, together with copper deficiency, causes sterility in rice and other crops.[3]

Soil is vulnerable to pollution and is easily contaminated. It is affected by human sewage, industrial waste products, agricultural and milling wastes, and natural contaminants. The most serious of these is when toxic chemicals, found in pesticides and fertilisers, get mixed with soil. The range of possibilities of damage to humans and ecological health are endless. Hence, it is

imperative that their production, trading, and consumption be monitored. Unfortunately, updated data on the production and consumption of pesticides and fertilisers in the whole region are not available. Only trade data are available. The ASEAN Trade Statistics Database shows that for 2004, the region's exports of fertilisers and pesticides amounted to US$296 million and US$127 million respectively, while fertiliser and pesticides imports amounted to US$254 million and US$87 million respectively.

A unique case of land "contamination" or "degradation" occurred in Cambodia where an estimated 0.1 million hectares of land or 0.6% of its total land area was rendered unsuitable for agriculture and other uses due to the presence of landmines and unexploded ordnance (UXO). The unseen presence of these dangerous explosives underneath a significant portion of Cambodia's land area remains a major challenge to the productive use of this terrestrial resource.

Box 6.3: The Challenge of Landmine and Unexploded Ordinance (UXO) in Cambodia

Since 1993, the Cambodian Mine Action Centre (CMAC), Halo Trust, and Mine Advisory Group (MAG) have been actively involved in mine and UXO clearance. These organisations now operate under the umbrella of the Cambodian Mine Action and Victim Assistance Authority (CMAA). The land affected by mines and UXOs accounts for about 0.6% of Cambodia's total land area. Between 1979 and March 2002, 52,967 mine accidents were reported, with about 16,950 or 32% of these incidents resulting in death. A significant decline in UXO casualties has occurred from several thousand incidents per year (3,276 in 1996) to several hundred per year (279 in 2002) due to a combination of de-mining activities, on-the-ground demarcation of existing mined areas, and awareness-raising among villagers.

In 1994, UNDP estimated that 40% of Cambodia's arable land was mined, with particular concentration in the northwest region of Battambang province, an area of some of the most fertile land. In March 2003, CMAA estimated that 15% of Cambodia's arable or 405,000 hectares remained inaccessible due to landmines. This may be an overestimate, however, as it contradicts other recent CMAA numbers in which the total landmine/UXO restricted area, not just arable land, was calculated for each province, and amounted to 109,700 hectares. As the latter figure is more inclusive, considerably less than 4% of the arable land (perhaps about 1%) would be restricted.

Regardless of the figure, the unseen underground threat of UXO remains a major factor in the agricultural land use of certain areas. It has taken 10 years for 15,520 hectares of mine-contaminated areas to be cleared and there remains approximately 109,000 hectares of mine-contaminated areas to be cleared.

Source: *State of the Environment Report 2004, Ministry of Environment, Cambodia*

Biological Diversity

Although the region occupies only 3% of the world's total surface, 20% of all known species live deep in its mountains, jungles, rivers, lakes and seas. It also has three of the world's 17 megadiversity countries, namely, Indonesia, Malaysia and Philippines. However, the ASEAN region also has seven of the world's 25 recognised biodiversity hotspots. Biodiversity hotspots are biologically rich areas under greatest threat of destruction.

Table 6.3: World Rank in Total Diversity

Country	Total Higher Plants	Total Mammals	Total Birds	Total Reptiles	Total Amphibians
Indonesia	3	2	5	4	6
Malaysia	14	11	15	14	14
Philippines	17	16	16	17	17

Source: *Conservation International (2003b).*

Note: *A ranking of 1 indicates the country with the most biological diversity in the world.*

Table 6.4: Richness of ASEAN by Taxa

Taxon	Recorded ASEAN Species	Listed World Totals	% of World Total
Birds	2,400	9,700	25
Mammals	945	4,680	20
Amphibians	655	4,780	14
Reptiles	1,650	7,870	21
Freshwater fish	1,995	10,000	20
Butterflies	2,730	15,000	18
Dragonflies	1,350	6,000	22
Flowering plants	45,000	250,000	18

Source: *ARCBC (2004)*

There are 27,100 endemic species in the region. Of this total, 86% are endemic plants, followed by butterflies (4%), and freshwater fish (3%). The rest (7%) are birds, amphibians, mammals, reptiles, and dragonflies/damselflies. Nine countries of the region share many species that are biologically distinct from the rest of the world because these countries share common land or water borders. Among the most commonly shared species are macaques, hornbills, palm civet, sambar deer, barking deer and sun bear. Out of the 64,800 known species in the region, 2% or 1,312 species are endangered. The countries that have the most endangered species are Malaysia (358 species), Indonesia (349 species) and Philippines (151 species). As a percentage of their total number of species, Brunei Darussalam and Viet Nam, with 3%, have the most number of species endangered.

Box 6.4: ASEAN Centre for Biodiversity (ACB)

The ASEAN CENTRE FOR BIODIVERSITY (ACB) is an international inter-governmental organisation established by ASEAN to support policy formulation, capacity development, promote public awareness and education, and enhance collaboration with the international community for the conservation, sustainable use, and to facilitate access and equitable sharing of benefits of the rich and diverse biological diversity of the region. The ACB was established by agreement among the governments of ASEAN Member Countries on 27 September, 2005. The establishment of the ACB and numerous other programmes in the region demonstrates the commitment of ASEAN towards biodiversity conservation, in particular on meeting the target of significantly reducing the rate of biodiversity loss by 2010. The initial three-and-half years of operation of the Centre will be mainly financed by the European Union. The Centre will further promote the successful work undertaken on networking, training, research, and biodiversity database management by the ASEAN Regional Centre for Biodiversity Conservation Project (ARCBC) 1999 – 2004, – a joint cooperation project between ASEAN and the European Union.

A Host Country Agreement for ACB was signed on 8 August 2006, at the Malacanan Palace, Manila, Philippines by the Honorable Alberto Romulo, Secretary of Foreign Affairs, representing the host Country, and Hj. Mohd. Said Bin Pehin Dato Hj. Hashim, Permanent Secretary, Ministry of Development, Brunei Darussalam, representing ASEAN as Chair of the ACB Governing Board. The Host Country Agreement, among others, accords various privileges and immunities to enable smooth and effective operations of the Centre.

Her Excellency President Gloria Macapagal-Arroyo witnessed the signing and handing over of the Host Country Agreement (HCA) of the ASEAN Centre for Biodiversity (ACB) on 08 August 2006 in Malacanan Palace, Manila, Philippines.

The diverse species of the region are commonly found in six main types of natural habitat – high mountains, evergreen tropical forests, monsoon forests, limestone formations, wetlands and marine waters. Most of these sites have either World Heritage Site or ASEAN Heritage Park inscription. If deforestation in the region continues at current rates, it is expected that the region will lose up to three-quarters of its forests, and up to 42% of its biodiversity by 2100.[4]

Box 6.5: The ASEAN Wildlife Enforcement Network (ASEAN-WEN)

The ASEAN Ministers responsible for the implementation of CITES officially launched the establishment of the ASEAN Wildlife Enforcement Network (ASEAN-WEN) on 1st December 2005. This follows the adoption and endorsement of the ASEAN Regional Action Plan on Trade in Wild Fauna and Flora (2005 – 2010), in particular to fulfil the second objective of the Action Plan which aims "to promote networking amongst relevant law enforcement authorities in ASEAN countries to curb illegal trade in wild fauna and flora".

ASEAN-WEN aims to address illegal exploitation and trade in CITES-listed species within the ASEAN region. It is an integrated network among law enforcement agencies and involves the CITES authorities, customs, police, prosecutors, specialised governmental wildlife-law enforcement organisations and other relevant national law enforcement agencies.

In principle, ASEAN-WEN will:

- conduct awareness raising programmes, such as the production of publications and other promotional materials to raise awareness of wildlife crime and illicit trade in wild fauna and flora;
- produce training materials on combating wildlife crime and illicit trade in wild fauna and flora, and organise training activities for wildlife and other law enforcement officers;
- establish and implement measures to improve collaboration, cooperation and information exchange between and among law enforcement agencies and CITES management authorities.

ASEAN Member Countries at the 1st Meeting of ASEAN-WEN on 25 May 2006 agreed to allocate necessary financial and human resources, and to collaborate in cross-border cooperation and coordination to ensure the effective enforcement of legislation governing conservation, trade and sustainable use of wild fauna and flora.

Source: *ASEAN Secretariat (2006)*

Table 6.5: Inventory of Endemic Species

Details	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
Amphibians	0	5	176	2	64	36[a]	78	0	7[c]	54
Birds	0	0	515	0	9	4[a]	181	0	2[c]	8
Butterflies	28	0	340	7	117	186[a]	406	0	41	204
Dragonflies/Damselflies	0	0	0	0	0	0	139	0	0	0
Freshwater Fish	0	1	456	106	55	124[a]	109	10	72[c]	82
Mammals	0	0	251	1	6	5[a]	112	1	5[c]	2
Plants	585	7	6,994	45	6,784	2,233[a]	6,371	1[b]	757[c]	488
Reptiles	0	0	52	0	17	11[a]	168	0	47[c]	4
Total Endemic Species	**613**	**13**	**8,784**	**161**	**7,052**	**2,599**	**7,564**	**12**	**931**	**842**

Source: *ARCBC (2004).*

Notes: *[a] – Forest Department, Myanmar, [b] – the Ministry of Environment, Singapore, [c] – the Ministry of Natural Resources and Environment, Thailand*

Table 6.6: Inventory of Endangered Species

Details	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
Species List	4,466	2,147	17,378	2,553	15,653	8,232[a]	11,262	1,657	8,783[b]	4,344
Endangered Species	130	75	349	56	358	157[a]	151	37	282[b]	120
Endangered Species as % of Total Species	3	3	2	2	2	2[a]	1	2	3[b]	3

Source: *ARCBC (2004).*

Notes: *[a] – Forest Department, Myanmar, [b] – the Ministry of Natural Resources and Environment, Thailand*

Box 6.6: Conserving the Tiger

The tiger (*Panthera tigris*) has long dominated the landscape of South East Asia and is associated in terms of bravery and courage in the local folktales. It has also decorated the traditional arts and crafts and decorates the national emblem of Malaysia. There may have been 100,000 tigers, at the end of the 19th century ranging continental Asia and the Indonesian island of Sumatra. However, the Species Survival Group of IUCN estimates that the present maximum number of wild tigers is probably no more than 7,700. Of these, an estimated 1,450 to 2,150 tigers are found in AMCs, with the exception being Philippines, Brunei and Singapore. Based from various government records, about 450 tigers are found in Thailand, 500 tigers in the Peninsula Malaysia and another 400 – 600 in Sumatra.

Habitat destruction and indiscriminate hunting have led to the drastic decline in the tiger population. As a result, IUCN considers the tiger as an endangered species and is legally protected under the respective national legislation of AMCs. In addition to legislative actions, AMCs have also designation large protected areas to conserve some of the existing tiger populations. Among them, tigers have been recorded in the Lomphat Reserve, Cambodia; Taman Negara National Park and Endau Rompin National Park in Peninsular Malaysia; Huai Kha Khaeng Wildlife Reserve and Khao Yai National Park in Thailand; and Muong Nhe Reserve, Viet Nam. Indonesia has undertaken a Population and Habitat Viability Analysis (PHVA) exercise which has identified the Gunung Leuser National Park; Kerinci Seblat and Wei Kambas as important conservation areas for tigers. To ensure the tigers continues to dominate the ASEAN landscape and play its ecological role more tiger habitats have to be protected and the poaching of tigers curtailed.

Panthera tigris

Source: *IUCN cat Specialist Group: http://lynx.uio.no/lynx/catsgportal/cat-website/20_cat-website/home/index_en.htm & DWNP Malaysia*

Box 6.7: Conserving Orang Utan

The orang utan is one of the great apes that is facing extinction largely due to loss of their natural habitats and hunting pressure. In Sabah, Malaysia, one estimate is that there are only 5,000 to 10,000 of orang utans left, mainly concentrated in forests along the Kinabatangan River. The Sepilok Rehabilitation Centre in Sabah was established to help the conservation of the orang utan displaced by habitat destruction and hunting. Although orang utans are fruit eaters, there is recent evidence showing that they are adapting their diet and eating a larger amount of leaves in logged-over forest areas of Kinabatangan. It is estimated that there may be only 2,000 orang utans left in Sarawak and they are mainly found in the Batang Ai National Park and Lanjak Entimau Wildlife Sanctuary. The orang utans are also found in Kalimantan, Indonesia. The transboundary conservation area comprising the Lanjak-Entimau Wildlife Sanctuary and the Betung Karihun National Park located at the Malaysia-Indonesia border is among the biggest protected area in ASEAN that provides among the best in-situ conservation site for the orang utan and other biodiversity resources.

Orang Utan

Source: *Biodiversity in Malaysia, Ministry of Natural Resources and Environment, Malaysia (2006)*

To conserve biodiversity and wildlife, a "protected area" (PA) may be created, which can be an area of land or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means (as defined by IUCN). These protected areas vary in terms of the level of protection and the enabling laws that created them. They can be created either by countries or by international or regional organisations. The IUCN has six PA classifications: strict nature reserve/wilderness area, national park, natural monument, habitat/species management area, protected landscape/seascape, and managed resource protected area. Almost 50% of the region's PAs are managed resource protected areas and most of them are located in Indonesia. The region has 595,700 sq km of designated protected areas comprising about 13% of its total land area. Of this expanse 345,000 sq km or 58% are in Indonesia, followed by Thailand (14%) and Lao PDR (6%). At present, the region has a total of 1,524 IUCN-category protected areas with Indonesia having the most at 1,069 or 70% of the total.

Box 6.8: Transboundary Conservation Areas

Indonesia-Malaysia Transboundary Conservation Area

The Lanjak-Entimau Wildlife Sanctuary (187,000 ha) in Sarawak and Betung Kerihun National Park (800,000 ha) in West Kalimantan was proposed as a transboundary conservation area (TBCA) as they shared many landscape features as well as a common ethnographic history. Later, the Batang Ai National Park of Sarawak was added making the 1.1 million hectares TBCA one of the biggest conservation areas in Southeast Asia. The first phase was implemented in 1995. In 2004, another conservation area between Sarawak and Kalimantan was proposed and this was the Pulong Tau National Park in Sarawak and the Kayan Mentarang National Park in East Kalimantan. The 165,000 hectares in Sarawak and 1.4 million hectares in Indonesia would also make this conservation area one of the largest in the region.

Heart of Borneo Conservation Area of Indonesia, Brunei Darussalam and Malaysia

This proposed transboundary conservation area is one of the most ambitious in the region. The proposed area is 22 million hectares in size or about one quarter

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the land area of Borneo. It would involve the more hilly terrain of Brunei Darussalam, East Malaysia and Indonesia. The island of Borneo is home to some of the world's most diverse ecosystems with about 15,000 species of plants. Borneo is also home to rare, large mammals such as orang utans, elephants and the Sumatran rhinoceros. The Indonesian and Brunei governments, the Sabah Wildlife Department and the WWF have a team of researchers working on this project. In the last decade, over 350 new species have been found, including 30 freshwater fishes. This transboundary conservation area is expected to be implemented in 2006.

The Turtle Islands Heritage Protected Area Between Philippines and Malaysia

While concentrating on turtle conservation, this bilateral agreement signed in May 1996 recognises that turtle populations are dependent on the marine environment. It looks at preserving coral reefs and other marine flora and fauna as well as important nesting sites for the Green and Hawksbill turtles in Philippines and Malaysia. This is one of the success stories on the conservation of the green turtle.

Green Turtle

Source: *Biodiversity in Malaysia, Ministry of Natural Resources and Environment, Malaysia (2006)*

Table 6.7: IUCN-Classified Protected Areas

Country	National Park	National Monument	Mgmt Area	Wilderness	Land/ Seascape	Managed Resource Protected Area
Brunei Darussalam	1	0	0	24	6	0
Cambodia	7	0	8	5	3	0
Indonesia	36	15	47	154	79	738
Lao PDR	0	0	17	0	0	0
Malaysia	17	1	12	113	1	0
Myanmar	2[a]	0	0	0	2	0
Philippines	5	0	1	2	11	0
Singapore	0	0	1	0	4	0
Thailand	74	46	37	0	1	0
Viet Nam	9	0	45	0	0	0
ASEAN Total	**151**	**62**	**168**	**298**	**107**	**738**

Source: *ARCBC (2004).*

Note: [a] *– Forest Department, Myanmar*

Table 6.8: Protected Areas (based on national classification)

	Number	Size (km^2)	PA/Land area (%)
Brunei Darussalam	41	1,212	21.00
Cambodia	23	31,900[a]	17.60
Indonesia	1,320	345,000	18.20
Lao PDR	22[a]	33,900[a]	14.30[a]
Malaysia	306	35,000[a]	10.60[a]
Myanmar	n.a.	26,613[a]	3.93[a]
Philippines	347	14,540	4.80
Singapore	16	29	4.20
Thailand	224	82,100[a]	16.00[a]
Viet Nam	65	25,400[a]	7.60[a]

Source: *ARCBC (2004).*

Notes*: Countries differ in their classification of protected areas. [a] – data updated by respective member countries (Aug 2006), n.a. – not available*

ASEAN is promoting a regional network of national protected areas, known as the "ASEAN Heritage Parks" which are protected areas of high conservation importance aimed at preserving in total a complete spectrum of representative ecosystems of the region. The overall objectives of designating the ASEAN Heritage Parks are to generate greater awareness, pride, appreciation, enjoyment, conservation of ASEAN's rich natural heritage; and generate greater collaboration among ASEAN Member Countries as well as with its partners on conserving the shared natural heritage.

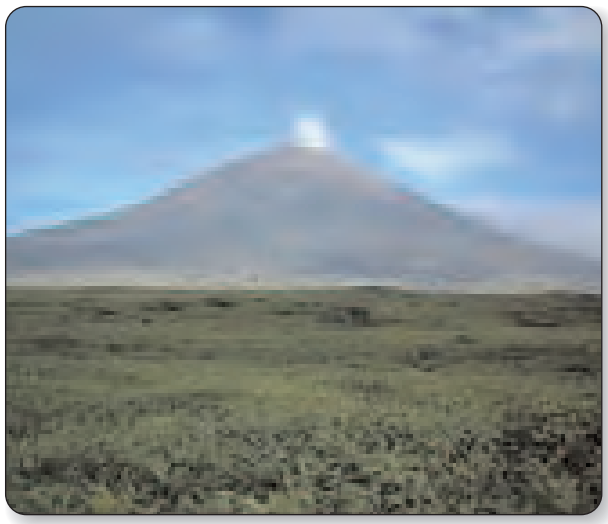
The Park is recognised by ASEAN as a showcase of best practice for conservation and wise use of biological resources. It is the country's responsibility to ensure that the best possible level of protection is afforded to the site. However, the Park will benefit from increased attention and support from the ASEAN Heritage Parks Programme and the international community.

Box 6.9: The ASEAN Heritage Parks (AHP) Programme

The ASEAN Heritage Parks (AHP) Programme aims to ensure that the ASEAN Heritage Parks benefit from the best practices of management available, while encouraging further listing of protected areas through:

- Capacity development
- Information sharing network
- Technical exchange programme
- Prioritised access to international funding
- Tourism promotion
- Joint research programme
- Regular conferences of park managers
- Management improvement programme
- Synergistic reporting to World Heritage and other related programmes

ASEAN Heritage Park:
Khao Yai National Park in Thailand



ASEAN Heritage Park:
Gunung Leuser National Park in Indonesia

In general, an ASEAN Heritage Park must embody a variety of ecosystems or species represented or typical of the region. It must demonstrate wholesome ecological processes and must have the capability to regenerate with minimum human intervention. ASEAN uses ten criteria in designating an ASEAN Heritage Park. These are: ecological completeness, representativeness, naturalness, high conservation importance, legally gazetted conservation areas, approved management plan, transboundary, uniqueness, high ethno-biological significance, and importance for endangered or precious biodiversity. The World Heritage Sites are different from ASEAN Heritage Parks although some of the latter are also designated as World Heritage Sites. World Heritage Sites are selected as globally outstanding sites while ASEAN Heritage Parks are selected as regionally representative sites.

The ASEAN Environment Ministers increased the number of ASEAN Heritage Parks from 11 to 27 when they adopted the ASEAN Declaration on Heritage Parks in 2003 superseding the 1984 ASEAN Declaration on Heritage Parks and Reserves. Continuous efforts are being made to list more national protected areas as ASEAN Heritage Parks.

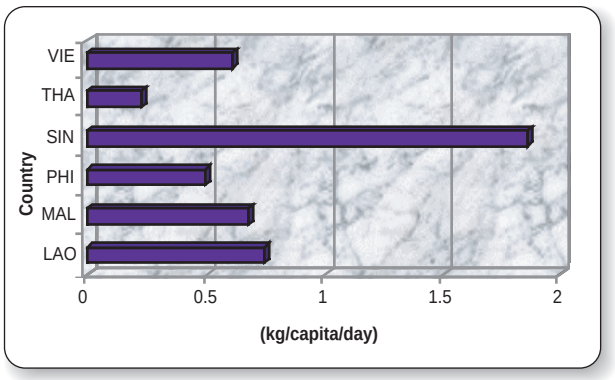
Waste Management

The land is usually the final receptor of solid wastes generated by human activities. In 2001, the five countries in the region (where data was available) generated over 71.3 million tonnes of municipal solid wastes (MSW). Among these countries, Philippines generated almost 36.2 million tonnes followed by Thailand, Viet Nam, Malaysia and Singapore with 14.1 million tonnes, 12.7 million tonnes, 5.5 million tonnes and 2.8 million tonnes respectively. Brunei Darussalam produced and disposed the least amount of solid waste with only 1.28 million tonnes. However, on a per capita basis, Singapore has the highest rate at 1.86 kg per capita per day, followed by Brunei Darussalam (1.4kg/cap/day), Thailand (1.0 kg/cap/day in urban areas), Lao PDR (0.75 kg/cap/day), Malaysia (0.68 kg/cap/day), Viet Nam (0.61 kg/cap/day), and Philippines (0.30 kg/cap/day in rural areas, 0.50 kg/cap/day in urban areas).

There are wastes generated by various manufacturing industries that are not identified separately from municipal solid wastes coming from domestic and commercial activities. These include waste paper, plastics and packaging

materials, housekeeping wastes, food wastes from the factory's cafeteria, scrap glass, rubber, ceramic and other materials and other off-specification materials that are discarded with office wastes. There are variations in the composition of solid wastes produced in the capital cities of ASEAN countries. Organic materials constitute the major portion of wastes in Jakarta, Indonesia (about 74%), Kuala Lumpur, Malaysia (about 65%), Manila, Philippines (about 62%) and Brunei Darussalam (60%), but comprise less than half in Bangkok, Thailand (44% – 48%) and Singapore (about 56%). Waste plastics constitute from 10% to 30% of the municipal solid waste of various capital cities in the region.

Figure 6.4: Waste Generation in Selected Countries (kg/cap/day), 2001



Source: *UNEP-DTIE-IETC (2004); the Ministry of Environment, Singapore (Aug 2006)*

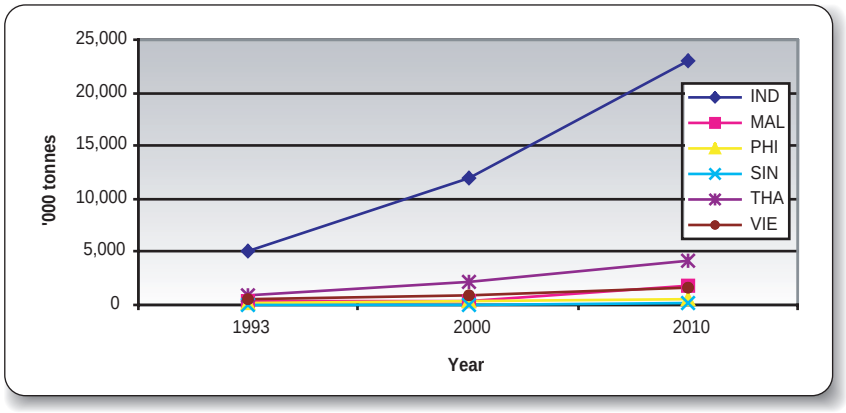
As the economies of countries in the region shift from agriculture-based to industry-based, the characteristics of the wastes discharged into terrestrial ecosystems are expected to change with increasing toxic and hazardous wastes content. Hazardous wastes are also generated by agricultural activities from the use of pesticides and herbicides But as manufacturing activities intensify, more hazardous and toxic wastes are bound to be produced from metal finishing, metallurgical and electroplating plants, chemical and electronics factories, textile mills, pulp and paper mills and others. Hazardous wastes are also produced by non-industrial sources like domestic households and hospitals. Domestic households routinely discard waste paints and flammable solvents, caustic cleaners, batteries and mercury from broken thermometers. Hospitals produce and discard wastes contaminated with blood and tissue wastes, used needles, scalpels and broken glass wares, expired and unused drugs, and chemical and radioactive isotopes wastes. These materials are hazardous because they pose substantial or potential threats to public health or the environment. They have the characteristics of ignitability, corrosivity, reactivity (explosive) and toxicity.

As a result of industrialisation a number of countries in the region like Indonesia, Malaysia, Philippines, Singapore, Thailand and Viet Nam face growing management and disposal problems of toxic and hazardous wastes. In 1993 these countries produced only 6.86 million tonnes but it was predicted that by the year 2010 production of toxic and hazardous waste would rise to 31 million tonnes or an increase of over 350%. Indonesia led the six countries in terms of volume of production, while Singapore produced about 49,000 tonnes in 1993.

An industrial sector which is fast becoming a source of hazardous wastes in the region is the outsourcing of the fabrication and production of electrical components and spare parts. Among the ASEAN Member Countries, Malaysia, Philippines, Singapore and Thailand are at the forefront of producing electrical and electronic equipment. Among the four countries, Singapore had the highest total electrical and electronic products, followed by Malaysia, Thailand and Philippines.

The disposal and management of the wastes from the electronics industry constitutes a new and special challenge to the region. The use of toxic and hazardous chemicals in the various production processes of the electronics manufacturing plants poses danger both to the workers and the environment. During the production process, workers may inhale or have direct skin contact with the toxic fumes. If disposed of into the ground without the needed control measures, the toxic substances of electronic wastes may leach to the soil and contaminate land and water resources. Even at the recycling stage, unprotected workers may get exposed to high levels of toxicity from these types of wastes. Exposure to toxic chemicals and wastes from electronic manufacturing plants may lead to health problems ranging from minor skin diseases to long-term physical and mental deformities depending on the severity and length of exposure and the nature of the chemical or waste.

Figure 6.5: Estimated Annual Generation of Hazardous Waste in Selected Member Countries ('000 tonnes)



Source: *UNEP-DTIE-IETC (2004), p. 9*

Waste Management Practices, Policies and Institutions

Solid waste collection is expensive because of the high cost of fuel for transportation. In many countries in the region (Singapore, Malaysia, Thailand, Philippines, and Indonesia) solid waste collection and transport is contracted out to private companies. Collection is done door-to-door or using communal containers and bins. The most common method of final disposal is either by using open dumps, controlled landfills, or sanitary landfills. A few countries have solid waste treatment systems like incineration or composting.

Recycling and resource recovery from municipal solid wastes is practiced widely in the region, although informally in many cases. The following materials, among others, are considered recyclables: ferrous and non-ferrous metals, scrap tires, paper, cardboard, plastics, textiles (including cloth and leather), glass, animal bones and feathers, and waste oil and grease. In the middle-income to low-income cities in the region, there exists a long-standing practice of informal separation and recycling of materials, which is carried out during storage (by itinerant scavengers), during collection and transport (by the workers and collectors), and during final disposal (by disposal site scavengers). This has led to the development of enterprises for the gathering, trading, and reprocessing of materials in Bangkok, Manila, Ho Chi Minh City and Jakarta.

Waste plastics are washed in a creek…

and dried under the sun before selling

Wastes are segregated during collection

Scavengers at the disposal site

Composting is not well practiced in the region for a number of reasons, e.g., high operating and maintenance costs, poor maintenance and operation of facilities, odour, and uncompetitive cost of compost compared to commercial fertilisers. However, incineration is widely practiced in Singapore as a means of treating municipal solid waste and drastically reducing its volume. The four government-owned and operated incineration plants in Singapore have a total capacity of 8,200 tonnes per day. In 2005 the plants processed 6,242 tonnes of solid waste per day, generated 938 million KWH of electricity from waste heat, and recovered 14,000 tonnes of scrap metal, which were sold to a local steel mill for reprocessing into steel for the construction industry. Advanced air pollution control equipment such as dry lime reactors, electrostatic precipitators and catalytic bag filters are installed to ensure compliance with emission standards.

Box 6.10: Singapore's Strategy on Waste Management

Singapore has a total land area of about 699 sq km and a population of 4.2 million. Due to scarcity of land, Singapore disposes its solid waste by incineration which reduces its volume by 90%. Waste which cannot be burnt like construction debris and residual ash from incineration plants are disposed of at the offshore Semakau Landfill.

Tuas South Incineration Plant

Over the last 30 years, with increasing population, industrialisation and economic growth, Singapore experienced a six-fold increase of waste output, from 1,260 tonnes/day in 1970 to an average of 6,800 tonnes/day in 2004. If waste continues to increase at this rate, Singapore would need a new incineration plant every 5 – 7 years and a landfill every 25 – 30 years. For a small city-state, this is not sustainable.

The long term strategy and solution is to strive for waste minimisation and recycling. Hence, under the Singapore Green Plan, the target is to raise the overall recycling rate to 60% by 2012 and to strive towards achieving the vision of "Zero Landfill and Zero Waste" in the long run.

Semakau Landfill

Source: *Ministry of the Environment and Water Resources, Singapore (2006)*

However, in some countries, for example in Thailand and Philippines, there is strong opposition to the use of incinerators for solid waste treatment because of fears of air pollution (e.g., particulates and dioxins). In Philippines, legislation has banned the use of incinerators (Republic Act. 9003). Landfills are the most common methods of final disposal of solid wastes in the region. Many landfills are uncontrolled open dumps but the general trend is towards controlled landfills (with soil cover) and sanitary landfills (with daily soil cover and landfill lining). In some countries, industrial solid wastes are also being disposed of in landfills together with municipal solid wastes, although the landfills may not be designed for co-disposal.

Table 6.9: Disposal Methods for Municipal Solid Waste in Selected Member Countries

Country	Disposal Methods (%)				
	Composting	Open dumping	Land-filling	Incineration	Others
Brunei Darussalam	2[a]	0[a]	70[a]	0[a]	28[a]
Indonesia	15	60	10	2	13
Malaysia	10	50	30	5	5
Myanmar	5	80	10	–	5
Philippines	10	75	10	–	5
Singapore	–	–	10	90	–
Thailand	10 (0 in 2001)	65 (67 in 2001)	5 (32 in 2001)	5 (1 in 2001)	15 (0 in 2001)
Viet Nam	10	70	–	–	20

Source: *UNEP-DTIE-IETC (2004)*
Note: [a] *– the Department of Environment, Brunei Darussalam (Sept. 2006)*

The more affluent countries in the region (e.g., Singapore) have sewer and drainage systems that collect wastewater from homes through lateral pipes that are connected to the main sewers that bring the wastewater to a treatment plant or to an ocean outfall. In many cities, public storm water drainage systems also serve to carry domestic and industrial wastewater effluents. Unfortunately, there are instances in most towns and cities where untreated wastewater effluents are discharged directly to rivers and lakes. The most common domestic sewage handling and treatment systems used in the region are the following:

On-site:
- ventilated improved pit latrine (no water)
- pour flush latrine/flush toilet with septic tank
- soakway/soakage pits for septic tank effluent
- communal/shared facilities for squatter areas

Off-site:
- small-bore sewer
- septage cartage and treatment in multi-stage lagoons
- simplified condominial (low cost) local sewers
- dry weather flow interceptors
- conventional trunk sewers and pumping stations
- treatment of collected wastewater by low cost means including multi-stage lagoons
- basic primary treatment and disposal through marine outfalls with diffusers or directly onto the land

There are various industrial wastewater treatment systems being used in the region. In Singapore most industries have facilities for pre-treatment before effluents are discharged into the combined sewer system. Singapore has 2,438 industrial wastewater treatment plants. The other industrial wastewater treatment systems being used in the region are as follows:

- Oil interceptors
- Balancing/equalisation
- Sedimentation/setting/clarifying systems
- Neutralisation systems
- Chemical treatment
- Activated sludge systems
- Biological filtration systems
- Ion exchange systems
- Activated carbon absorption
- Other aerobic and anaerobic systems

In the case of hazardous wastes,[5] at least four strategies to control and manage them are found in the region. These are: (a) “cradle-to-grave” system of hazardous waste generation, collection, transport, treatment and final disposal; (b) provision of hazardous waste inventory, manifest system, and proper facilities for the treatment, recovery, and final disposal of residues; (c) promotion of waste minimisation, recycling, exchange, reuse and recovery either in-house or at off-site facilities; and (d) use of non-legislative control measures.

As of August 2005, eight out of ten countries in the region have ratified the Basel Convention on

the Control of Transboundary Movements of Hazardous Wastes and Their Disposal and two have ratified its Basel Amendment. However, many countries have yet to ratify the accompanying Ban Amendment to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, and the Basel Protocol on Liability and Compensation for Damage Resulting from Transboundary Movements of Hazardous Wastes and their Disposal. Various strategies have been adopted by Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore, Thailand and Viet Nam to manage toxic and hazardous wastes and prevent them from harming terrestrial ecosystems, including requiring environmental impact assessment, promoting public awareness, implementation of industrial zoning, and control in granting licenses for operators. Many countries have constructed hazardous wastes treatment facilities, particularly Singapore and Malaysia.[6]

Box 6.11: Kualiti Alam Integrated Hazardous Waste Treatment Plant, Malaysia

The treatment facility was officially opened in November 1998. Modelled after the Danish hazardous waste processing plant, Kommunekemi in Nyborg, it is the first integrated facility for the processing of hazardous wastes in Malaysia. The owners, Kualiti Alam Sdn. Bhd, hold a concession for treatment of all hazardous wastes in Peninsular Malaysia for 15 years. More than $70 million has been invested in the facility.

The facility receives all types of hazardous wastes except hospital and radioactive wastes. Organic wastes are burned in the incineration plant. Acidic and basic organic fluids are chemically treated to neutralise them. The residues from chemical treatment and other solid inorganic residues are bound with lime and cement before being disposed in a double membrane-lined landfill, which has a capacity for storing waste residues up to 20 years.

Companies are required by law to inform the authorities on the types and quantities of hazardous wastes they generate and the associated collection, storage, and processing methods used. In addition, the companies have to pay for the services on the basis of the polluter-pay-principle.

Source: *UNEP-DTIE-IETC (2004)*

Singapore has off-site hazardous waste management facilities that are capable of recovering about 65% of the waste. In Philippines, there are facilities for the treatment of metal finishing wastewater (in Cebu) and medical wastes (in Laguna). In Thailand, the government's hazardous waste treatment plant is managed by the Industrial Estate Authority. In addition, Thailand has five existing central facilities for industrial hazardous waste recovery and disposal that are duly licensed by the Department of Industrial Works. In Indonesia, there is a centralised hazardous waste treatment facility in West Java, which is capable of treating 10 to 30 tonnes of wastes from Jakarta, Tangerang and Bekasi.[7] Malaysia has established industry-specific industrial parks, e.g., Bukit Kemuning Electroplating Park in the state of Selangor, equipped with centralised wastewater treatment facilities. Prior to discharge, the industries are expected to reduce waste which helps to promote cleaner production options, such as waste minimisation, resource conservation, reuse and recycling.

Waste Management Policies and Strategies

There are various laws, regulations, and standards in the ASEAN region for waste management. Many are municipal or city planning regulations that are related to sewerage. The most recent among them are Malaysia's regulations concerning the handling of urban storm water and the Philippine's solid waste management law. However, implementation is constrained by inadequate funding. For example, in Indonesia, the budget for waste management was only 1% from the overall budget of the environmental sector in 2001 and 2002.[8]

Waste management is normally the concern of national government agencies dealing with environment, science and technology, industry, public works, transportation/public utilities, and the local government. There are also bureaus, commissions or departments for specific waste management problems, such as for soil, hazardous substances, etc. In Myanmar, it is interesting to

note that the city development offices have been made in charge of waste management. Overlapping or duplication of functions is a concern in some countries that need some attention. Many institutions responsible for solid waste management lack the required personnel with adequate training and expertise. In many cases, there is also very limited private sector or community participation in solid waste management activities. Accurate data on the production, handling and disposal of domestic, industrial, and toxic and hazardous wastes are often not available or difficult to obtain.

End Notes

1 Food and Agriculture Organisation (FAO) and Centre for International Forestry Research (CIFOR) (2005), *Forests and Floods: Drowning in Fiction or Thriving on Facts?* (Indonesia: Indonesia Printer), pp. 1 and 6 – 7.

2 Kazutake Kyuma (2003), "Soil Degradation in the Coastal Lowlands of Southeast Asia" < http://www.fftc.agnet.org/library/article/eb537.html#0 > 15 Nov 2005.

3 *Ibid.*

4 See Navjot S. Sodhi *et al.* (2004), "Southeast Asian Biodiversity: An Impending Disaster," *Trends in Ecology & Evolution* 19 (December): 654 – 660.

5 Unless otherwise indicated, this section was derived mostly from Pollution Control Department (2002), *ASEAN Achievements and Future Directions in Pollution Control* (Bangkok, Thailand: Ministry of Science, Technology, and Environment).

6 United Nations Environment Programme-Division of Technology, Industry and Economics-International Environmental Technology Centre (UNEP-DTIE-IETC) (2004), *State of Waste Management in South East Asia* (Japan: UNEP-DTIE-IETC), p. 18.

7 *Ibid.,* pp. 18 – 19.

8 *Ibid.,* p. 27.

CHAPTER 7
Atmosphere

Prevent transbounday haze pollution as a result of land and/or forest fires through concerted national efforts and intensified regional action and international cooperation, pursued in accordance with the provisions of the ASEAN Agreement on Transboundary Haze Pollution.

Ensure cities/urban areas in ASEAN are environmentally sustainable, while meeting the social and economic needs of the people.

Vientiane Action Programme

The quality of the air in the region as a whole was generally good. The region faces two major air pollution concerns, namely transboundary haze pollution resulting from land and forest fires, and the deterioration of urban air quality arising mainly from industries and transportation. The almost annual haze episode does affect air quality during certain days of the year especially from May – September. While the region has been steadfastly addressing this issue over the years, the imperative of economic development mainly agriculture activities compounded by adverse weather and climatic conditions poses a serious challenge to national and regional efforts. The region has about 25 million hectares of peatlands, about 60% of world total, from which most of the smoke haze originate. In the highly urbanised and industrialised areas, particularly in the capital cities, there was a general worsening trend in air quality due primarily to escalating energy consumption resulting from domestic, industrial and transport activities. Transportation contributed a large share of air pollution to the urban environment. National and regional efforts to improve air quality such as efficient public transportation, increasing use of cleaner fuels especially natural gas and biofuels, implementation of the ASEAN Agreement on Transboundary Haze Pollution, and the ASEAN Sustainable Cities Initiative are being pursued to continuously improve the overall air quality of the region.

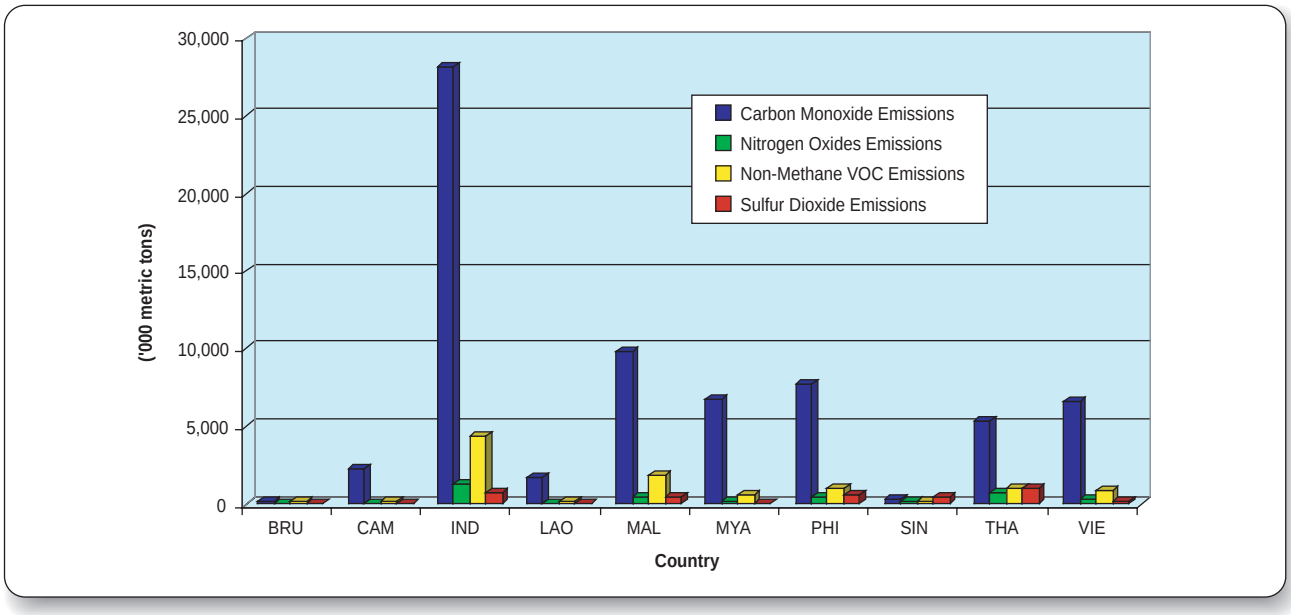
ASEAN FACTS AND FIGURES

Peatlands in ASEAN (major source of smoke haze)	25 million hectares (60% of world total)			
Hotspot Counts (Sumatra, Borneo, Peninsular Malaysia)	**2002**	**2003**	**2004**	**2005**
	32,059	13,227	26,661	61,790
Air Quality in 2005 *(number of days)*	**Good**	**Moderate**	**Unhealthy**	**No data**
Brunei Darussalam	267	7	0	91
Indonesia				
Jakarta	29	270	18	48
Palangkaraya	215	15	17	118
Malaysia				
Kuala Lumpur	64	234	67	0
Singapore	322	43	0	0

Air Quality

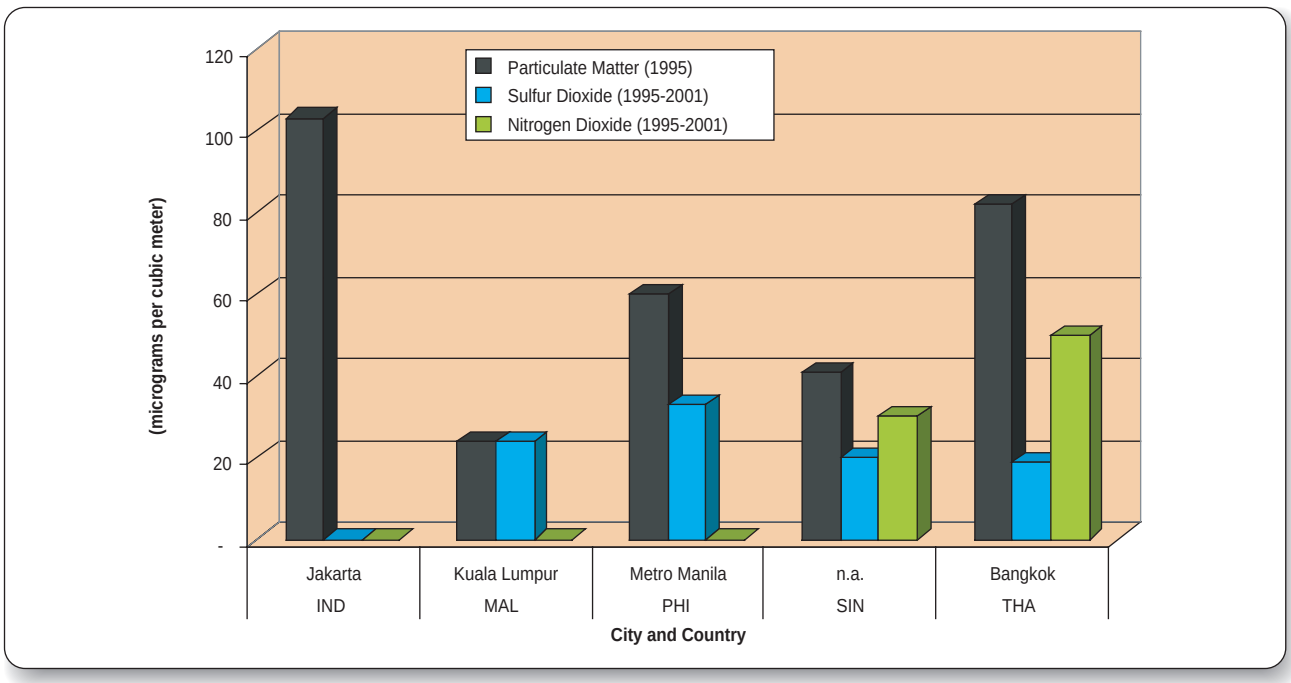
The overall quality of air in the region was generally good. However, atmospheric pollution in the urban areas of most countries has increased dramatically, primarily due to growing energy consumption and increasing number of motor vehicles. The air, particularly in capital cities, is contaminated by various types of pollutants from inefficient or wasteful use of fuel, poor running condition of vehicles, traffic congestion, and open burning. Almost all countries in the region are affected by air pollutants such as carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen oxides (NOx) and volative organic compounds (VOC). Data for 2000 indicated that Indonesia had the highest level of air pollution involving all the four contaminants. Brunei Darussalam and Singapore enjoyed relatively clean air among all the countries in the region. Lao PDR, being a predominantly rural economy with low population density, also enjoyed the benefits of clean and healthy atmosphere.

Figure 7.1: Air Pollution Emissions



Source: *WRI (2005)*

Figure 7.2: Air Pollution in selected Capital Cities of Member Countries



Source: *World Bank (2005)*
Note: *Data are averages of the inclusive years, except for Particulate Matter. Data for SO_2 and NO_2 of Bangkok updated by Thailand (Aug 2006).*

Data for 1999 showed that Indonesia's capital city of Jakarta had the highest concentration of particulate matter (PM) measuring 103 micrograms per cubic metre (µg/cu m). It was followed by Bangkok (74 µg/cu m), Metro Manila (60 µg/cu m), Kuala Lumpur (24 µg/cu m) and Singapore (41 µg/cu m).

The same air pollution data (1995 – 2001) for cities reveal that Metro Manila, Philippines had the highest average concentration of SO_2 in the region at 33 µg/cu m, followed by Kuala Lumpur (24 µg/cu m), Singapore (20 µg/cu m) and Bangkok (1-hr average of 19 µg/cu m). A major portion of sulphur dioxide emissions comes from power plants

that burn coal and petroleum fuel. When gaseous sulphur dioxide combines with water and atmospheric oxygen, it forms sulphuric acid (H_2SO_4), which causes "acid rain" that corrodes buildings and monuments and affects flora and fauna.

In the case of nitrogen oxide emissions, Singapore had an average concentration of 30 µg/cu m in 1995 – 2001 while Bangkok had a concentration (1-hr average) of 50 µg/cu m. The main source of nitrogen oxides are from motor vehicles. Severe traffic congestion adds to this problem with car engines running idle for long periods during the rush hours in the morning and evening.

In the Philippines, a study conducted for the Asian Development Bank found that the widely used three-wheeled passenger vehicle called "tricycle" contributed to air pollution in two cities due to poor maintenance of old engines and improper driving habits of tricycle drivers.

Box 7.1: Air Pollution from Tricycles in the Philippines

Vehicular emissions are predominantly severe in the Philippines where one third of vehicles consist of three-wheeled (tricycles) vehicles. These tricycles are major contributors to air pollution as they usually operate with old engines and are poorly maintained.

On-the-spot emission tests of a number of tricycles in Quezon City (in Metro Manila) and Puerto Princesa City (in Palawan Island) were conducted in April 2004. It is interesting to note that the carbon monoxide (CO) concentrations, for both idle and higher speeds, of 4-stroke engines have higher values on the average, compared with those of 2-stroke engines. The tests also showed that CO concentration, regardless of the type of tricycle engines, is higher at higher speed. This indicates that acceleration, both gradual and abrupt, produces more CO pollutants. Nevertheless, it is interesting to note that all the tricycles tested passed the 4% standard set by the Clean Air Act (i.e., Republic Act 8749).

Comparison of CO concentrations in Tricycles, Quezon City and Puerto Princesa City, Philippines, April 2004

Type of Engine	Quezon City		Puerto Princesa City	
	Condition	CO, %	Condition	CO, %
2-stroke	Idle 2,000 rpm	1.97 2.24	Idle 2,000 rpm	1.77 2.08
4-stroke	Idle 2,000 rpm	2.19 2.87	Idle 2,000 rpm	2.32 2.81

rpm – revolutions per minute

The emission tests indicate that the average hydrocarbon (HC) emissions of tricycles both in Quezon City and Puerto Princesa City are below the maximum Clean Air Act standard of 7,800 ppm. However, 4-stroke engines emit substantially lower levels of hydrocarbons, both in idle and higher speed conditions.

Comparisons of HC Concentrations in Tricycles, Quezon City and Puerto Princesa City, Philippines, April 2004

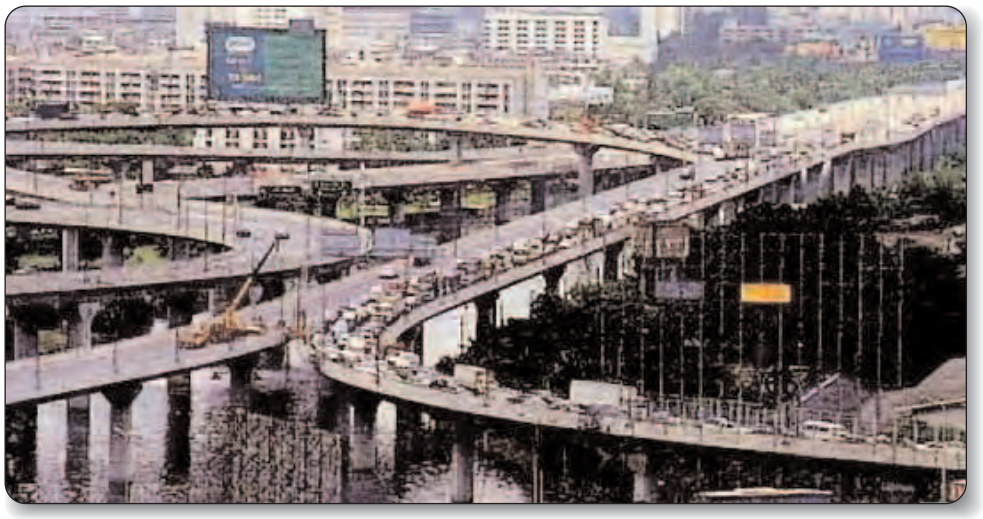
Type of Engine	Quezon City		Puerto Princesa City	
	Condition	HC, ppm	Condition	HC, ppm
2-stroke	Idle 2,000 rpm	4,140 4,580	Idle 2,000 rpm	6,610 5,340
4-stroke	Idle 2,000 rpm	1,145 863	Idle 2,000 rpm	670 386

ppm – parts per million

Source: *Excerpts from Asian Development Bank (2005), Air and Noise Pollution from Tricycles: A Strategic Plan for Quezon City and Puerto Princesa City, Philippines (Manila: ADB).*

Traffic Congestion …

in Metro Manila



Bangkok

and Jakarta.

Improving Air Quality in ASEAN Member Countries

ASEAN member countries have taken various measures to deal with air pollution by enacting air pollution control laws and implementing air pollution control strategies, ambient air quality standards, and air quality monitoring programmes.[1]

Measures and guidelines are in place for the enforcement of air quality standards, emission standards for mobile and stationary sources, and fuel quality standards. Some examples of the most recent air pollution control legislations are as follows:

- **Cambodia** – "The Control of Air Pollution and Noise Disturbance 2000" aims to protect the quality of the environment and protect public health from air pollutants and noise disturbance through monitoring, control and mitigating activities.
- **Malaysia** – "Environmental Quality (Control of Emission from Motorcycles) Regulations 2003" which sets limits on gaseous emissions from current and new models motorcycles, specifies operating requirements and requires the manufacturer to conduct verification tests on both models as well as providing for enforcement mechanism.
- **Singapore** – "Environmental Pollution Control (Air Impurities) Regulations 2000" requires industries and power generation plants to be equipped with pollution control equipment to comply with the air emission standards.

Environmental impact assessment is widely used in the region to control and mitigate air pollution that may arise as a result of large development projects. It provides a means to identify the potential impacts, design mitigation measures, and recommend monitoring programmes to maintain the quality of the ambient air. Malaysia, Philippines and Thailand are known to have effective EIA processes in the region. The implementation of well thought-out land use plans is another means to minimise the impact of air pollution on people, particularly those pollutants generated from stationary sources such as power plants and other industrial processes. In Singapore, for example, the strict implementation of zoning regulations where manufacturing plants are allowed only in areas designated as industrial zones help minimise the possible adverse impacts of air pollution resulting from normal operations as well as industrial accidents.

Box 7.2: ASEAN's Initiative on Environmentally Sustainable Cities (AIESC)

In 2003, the ASEAN Environment Ministers, recognising the scope for regional cooperation in terms of addressing the environmental challenges of increasing urbanisation in the region, agreed to form an ASEAN Working Group on Environmentally Sustainable Cities (AWGESC). Principally, the AWGESC is assigned to:

- develop a framework for sustainable cities in ASEAN;
- develop strategies and action plans to realise the vision of sustainable cities in ASEAN;
- promote the sharing of information and expertise in environmental protection and management to further environmental sustainability in ASEAN cities;
- recommend common targets and indicators to assess "sustainability" for cities in ASEAN
- facilitate and organise activities, including seminars, workshops, etc. to promote inter-city environmental cooperation and facilitating transfer of know-how and expertise
- foster better understanding and closer cooperation amongst relevant agencies of ASEAN member countries, and international and community-based organisations in the areas of urban environmental management and monitoring; and
- promote public awareness and encourage 3P (Private, Public and People) Sectors' participation in implementing the action programmes to achieve the vision of sustainable cities in ASEAN

The Framework for Environmentally Sustainable Cities in ASEAN was developed in December 2003, with the vision "Towards Environmentally Sustainable Cities in ASEAN". Member countries have since then nominated 24 cities to participate in the implementation of the Framework. In 2005, the ASEAN Environment Ministers endorsed the ASEAN Initiative on Environmentally Sustainable Cities (AIESC), which replaces the Regional Environmentally Sustainable Cities Programme (RESCP) and serves as an overarching mechanism for ASEAN cities to pursue environmental sustainability and goes beyond the scope of Clean Air, Clean Water and Clean Land, to include green and blue issues in the future. In the scope of Clean Air, ASEAN principally aims to achieve ASEAN long-term goal of maintaining good ambient air quality of PSI (Pollutant Standard Index) < 100 to safeguard public health.

Table 7.1: Air Quality Regulations in Selected Member Countries

Brunei Darussalam • Petroleum (Pipelines) Act of 1920 • Municipal Boards Act 1920 (Revised 1984) • Penal Code 1951	• Atmosphere (Sec. 278) • Petroleum Mining Act 1963 • Emergency Penal Code 1998
Indonesia • Act No. 23 of 1997 on Environmental Management • Government Regulation (GR) No. 41 of 1999 on Air Pollution Control • Minister of Environmental Decree No. 35 of 1993 on Emission Standards on Motor Vehicles	• Minister of Environment Decree No. 13 of 1995 on Emission Standards on Stationary Sources • Minister of Environment Decree No. 45 of 1997 on Air Pollution Index
Malaysia[a] • Environmental Quality Act 1974 • Environmental Quality (Licensing) Regulations 1977 • Environmental Quality (Clean Air) Regulations 1978 • Environmental Quality (Control of Lead Concentration in Motor Gasoline) Regulations 1985 • Environmental Quality (Motor Vehicle Noise) Regulations 1987 • Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987 • Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Regulations 1989 • Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order 1989 • Environmental Quality (Prohibition on the Use of Chlorofluorocarbons and Other Gases as Propellants and Blowing Agents) Order 1993 • Environmental Quality (Control of Emission from Diesel Engines) Regulations 1996 • Environmental Quality (Control of Emission from Petrol Engines) Regulations 1996 • Environmental Quality (Refrigerant Management) Regulations 1999	• Environmental Quality (Halon Management) Regulations 1999 • Environmental Quality (Prescribed Activities) (Open Burning) Order 2000 • Environmental Quality (Clean Air) (Amendment) Regulations 2000 • Environmental Quality (Compounding of Offences) (Open Burning) Order 2000 • Environmental Quality (Delegation of Powers) (Investigation of Open Burning) Order 2000 • Environmental Quality (Control of Emission from Diesel Engines) (Amendment) Rules 2000 • Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) (Amendment) Order 2000 • Environmental Quality (Delegation of Powers) (Halon Management) Order 2000 • Environmental Quality (Declared Activities) (Open Burning) Order 2003 • Environmental Quality (Control of Emission from Motorcycles) Regulations 2003 • Environmental Quality (Dioxin and Furan) Regulations 2004 • Environmental Quality (Scheduled Wastes) Regulations 2005
Myanmar[b] • Pollution Control and Cleansing Rules (1999) on Air Pollution Control	
Philippines • P.D. 984 – Pollution Control Law • Air Quality Management (P.D. 1152) Establishing Air Quality to Protect Public Health and Damage to Living Things and Property • Air Pollution from Motor Vehicles (P.D. 1181) Prescribing for Allowable Emission Levels for Motor Vehicles	• P.D. 1152 Establishing standards on Noise Producing Equipment • Memorandum circular No. 29 Prescribing Applicable Air Quality Standards for Thermal Power Plants • DAO 14 and 14-A of 1993 on Air Quality Standards that Prescribes Allowable Emissions from Different Sources
Singapore • Environmental Pollution Control Act • Environmental Pollution Control (Air Impurities) Regulations • Environmental Pollution Control (Prohibition on the Use of Open Fires) Order	• Maritime and Port Authority of Singapore (Port) Regulations • The Environmental Public Health Act • Environmental Pollution Control (Vehicular Emissions) Regulations • Environmental Pollution Control (Ozone Depletion Substances) Regulations
Thailand • Factory Act of 1992 • Public Health Act of 1992 • The Enhancement and Conservation of the National Environmental Quality act of 1992 • Industrial Estate Authority of Thailand Act of 1979	• Land Transportation Act of 1979 • Industrial Products Standards of 1968 • The Petrol Act of 1978 • Land Traffic act of 1992 • Highway Act of 1992
Viet Nam • National Law on Environmental Protection (NLEP) of 1993 • Decree 175/CP of 1994 • Provincial Regulations	• Directive No 199/TTg of 1997 • Law on People's Health Protection of 1989 • Ordinance on Radiation Safety and Control of 1996 • Directive No – TT406 on Prohibition on Production, Trading and Using of Firecrackers of 1994

Source: *ASEAN Secretariat (2005)*

Notes: *[a] – data supplied by Malaysia (Aug 2006), [b] – data supplied by Myanmar (Aug 2006)*

Air Quality Standards and Monitoring

Air emission standards for both stationary and mobile sources are already in place in most member countries. In some countries, an Air Quality Index or Air Pollution Index is used to determine overall air quality. Among the parameters measured and monitored include total suspended particulates (TSP), Particulate Matter$_{10}$ (PM_{10}), lead (Pb), carbon monoxide (CO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), and ground ozone (O_3). In measuring these parameters, the region follows internationally accepted norms and procedures. In most cases they are based on durations of one hour, eight hours, one day, and one year. The maximum permissible values of these parameters do not differ significantly from one country to another.[2]

Seven countries have installed nation-wide or city-wide air quality monitoring networks to keep track of air quality in various places such as residential areas, industrial areas, commercial areas, roadside areas, and reference areas. These include Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore, Thailand, and Viet Nam.[3] In Brunei Darussalam, Ambient Air Quality Monitoring Stations (AAQMS) are located in all Brunei Districts (Brunei Muara, Tutong, Temburong, and Kuala Berait) which are placed in ideal residential areas. In Indonesia, 33 air quality monitoring stations and four continuous stations are placed in strategic recreational, industrial, and mixed use areas. National air quality monitoring in Malaysia is contracted out by the government to a private company, Alam Sekitar Malaysia Sdn. Bhd (ASMA). The company provides continuous ambient air and manual air quality monitoring using 51 continuous and 25 manual monitoring stations. In addition, Malaysia's Department of Environment, with assistance from Germany, has designated 4 "hotspots" in Kuala Lumpur where air quality is measured by a MiniVol Portable Air Sampler.[4]

In the Philippines, Air Quality Monitoring Display Boards (AIRBoards) can be seen in the capital region of Metro Manila as well as in other cities such as Cebu, Cagayan de Oro, Davao, Naga, and Baguio to give the public real time information on air quality.[5] Thailand has 51 continuous and 21 temporary monitoring stations (2005 data) – since they started installing them in 1983.[6] In Singapore, there are 16 island-wide Air Quality Monitoring Networks (AQMN) to measure ambient and roadside air quality. In Viet Nam, 20 continuous air quality monitoring stations have been set up in the major cities of Hanoi, Hai Phong, Danang, Ho Chi Minh City as well as in some selected provinces since 2000.[7]

To further ensure the protection of ambient air, most countries have taken steps to ensure that fuels used in industries and motor vehicles do not produce or only produce the minimum of harmful air pollutants that may adversely affect the health of people and the quality of the environment. Accordingly, limits have been set on the maximum sulphur and lead contents of coal and petroleum fuels. In industrial fuel, sulphur content is limited to a maximum of 2% – 3% by weight, while in automotive diesel, the maximum limit is 0.05% – 0.5% by weight. In the Philippines, the sulphur content of coal is limited to 1% by weight while in Thailand coal used for thermal power plants are restricted to within 0.5% – 3% sulphur content by weight, depending on the sources.[8]

Box 7.3: Dedicated Busway System to Improve Traffic and Reduce Air Pollution in Jakarta

Motor vehicles are the main contributors of air pollution in big cities. In Jakarta, the number of motor vehicles in 2004 numbered over 6.5 million units, mostly passenger vehicles or buses. Traffic jams in Jakarta are a daily occurrence particularly in the central business district of the city. Traffic jams result in inefficient use of fuel resulting in more emissions that pollutes the environment. A well-managed transportation system is needed to reduce traffic jams. This system includes limiting the number of vehicles, and improving public transportation planning making it systematic and orderly to reduce traffic bottlenecks and reduce air pollution.

The improvement in traffic management has been implemented by the city government of Jakarta through a comprehensive programme called "Macro Transportation 2003 – 2010", which includes the "three-in-one programme" in central Jakarta, the "Trans Jakarta" ("Busway" Programme), provision of areas for pedestrians, development of water transportation, and a planned 27-kilometre monorail.

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The Busway programme commenced implementation in January 2004. It provides a lane (normally the inner lane) for the exclusive use of passenger buses in the main thoroughfares of the city. These busways not only minimise congestion but improve the comfort and speed of travelling, thus convincing private vehicle owners to use public transportation. The significant reduction in traffic jams in Jakarta was noticeable after the implementation of this programme. It is planned to have a total of 14 corridors of busway throughout Jakarta.

To support the implementation of the busway system, a pedestrian lane along Sudirman-Thamrin, the main city roads leading to central Jakarta will be provided. Every building will be required to provide an area 6 m wide for pedestrians, without fences between the building and the pedestrian lane.

Busway at "Karet Station", Jakarta

Source: *Adapted from the State of the Environment Report, Indonesia (2004)*

Box 7.4: Air Quality Monitoring Programme in Malaysia

To date, the National Air Quality Monitoring Network comprises 76 sites with 51 continuous air monitoring stations and 25 manual air quality monitoring stations. These stations are operated continuously to detect any significant change in the air quality which may be harmful to human health and the environment. Most of the stations are located in residential areas to monitor exposure to air pollution, while others are located within industrial areas. The manual air quality monitoring stations measure air pollutants such as total suspended solids, particulate matter and several heavy metals (e.g., lead) once every six days. The air quality is reported based on the Air Pollution Index (API) computed from five criteria parameters, namely, PM_{10}, carbon monoxide, nitrogen dioxide, ozone and sulphur dioxide. The main sources of air pollution identified were stationary sources (e.g., industries), mobile sources (e.g., motor vehicles) and open burning. Transboundary haze pollution is another significant source of air pollution.

Control of emissions

Resulting in clear blue sky

Air is continuously monitored

Source: *Ministry of Natural Resources and the Environment, Malaysia (2006)*

Seven countries have already completed the introduction of unleaded gasoline. These are Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore, Thailand and Viet Nam. At the same time, efforts are being made by several countries to promote the widespread use of ethanol-blended gasoline to a level of 5% to 15% as well as diesel fuel blended with 1% to 2% coconut or palm methyl ester. Another recent development is the production of microemulsified biodiesel fuel (BDF) from a mixture of vegetable oil (palm oil or coconut oil) and diesel fuel ranging from 30% to 60%. The use of microemulsified BDF is currently being tested in the Philippines by the private sector with promising results.

Table 7.2: Phase Out of Leaded Gasoline in Member Countries (as of 2005)

Country	Introduced	Completed
Brunei Darussalam	1993	2000
Indonesia	1997/1998	ongoing
Malaysia	1991	1998
Philippines	1993	2001
Singapore	1991	1998
Thailand	1991	1996
Viet Nam	2000	2002

Source: *ASEAN Secretariat (2005)*

Transboundary Haze Pollution

Transboundary haze pollution is one of the most pressing environmental problems facing ASEAN today. Transboundary haze pollution is caused by uncontrolled land and forest fires, mostly resulting from human activities such as clearing of forests by open burning for plantation crops, and agricultural activities by farmers and shifting cultivators. The spread and intensity of fires is compounded by natural causes such as the El Niño Southern Oscillation conditions or during inter-monsoon seasons which brings periods of prolonged droughts. Widespread fires and transboundary haze pollution therefore usually occur during the months of February-March and July-October in the southern part of the region.

The smoke haze is made up mostly of particulate matter ($PM_{2.5}$ and PM_{10}), carbon monoxide (CO), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), methane, hydrocarbons, methyl chloride, polycyclic and other chemicals. Major episodes of transboundary haze pollution occurred in 1982 – 1983, 1987, 1991, 1994, and 1997 – 1998. The blaze of 1997 – 1998 was among the most damaging in recorded history. More than 9 million hectares were burnt, 6.5 million of which was forest area. The 1997 – 1998 haze episodes affected the southern part of the region, including Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore and Thailand. Plantation, aviation and tourism industries were affected. Other losses came from lower crop productivity and yields from plantation, which were greatly affected due to the reduced sunlight. The fires resulted in many thousand cases of hospitalisation, over half a million outpatients, and 2.95 – 27.9 million workdays lost[9]. Airports in Sumatra and Kalimantan were closed for extended periods and a total of 1,108 flights were cancelled in Indonesia, Singapore and Malaysia. In addition, it impacted significantly on tourism revenues. Over 3% of children under 5 years of age living on or near degraded peatlands in Central Kalimantan suffered from respiratory diseases and inhibited growth as a result of smoke haze, indicating a continued, serious and longer-term impact on public health. The estimated loss in this fire episode was more than US$ 9 billion in economic and large-scale environmental losses, including the release of an estimated 1 – 2 billion tonnes of carbon[10].

Southeast Asia has more than 25 million hectares of peatlands, comprising 60% of the global tropical peatland resource. The majority of the peatlands in Southeast Asia is in Indonesia, which has over 70% of total peatland areas. Peatlands are usually found in low altitude, sub-coastal areas extending inland for distances up to 300 km. The depth of peat varies from 0.5m to more than 10m. Due to its ecological nature (i.e. comprising non-fully decomposed soil), peatland fires are the most difficult fire to suppress. Peatland fires usually produce very thick smoke haze, occur underneath the surface and release very high amount of carbon. The land and forest fires of 1997 – 1998, 2002 and 2005 in Southeast Asia have destroyed more than 3 million hectares of peatlands. Fires in peat soils were identified as the major contributors (about 60% of particulates) to the smoke haze that enveloped a major part of the region.

However, peatlands are also a haven for biodiversity conservation, and one of the best resource for carbon sequestration or carbon sinks. Peatlands are also important for socio-economic development and provide support for the livelihoods of local communities. Peatlands can support the sustainable harvesting of timber and non-timber forest products as well as provide other important goods and services such as water supply, flood control, fishery support, and offers great potential for tourism and recreation.

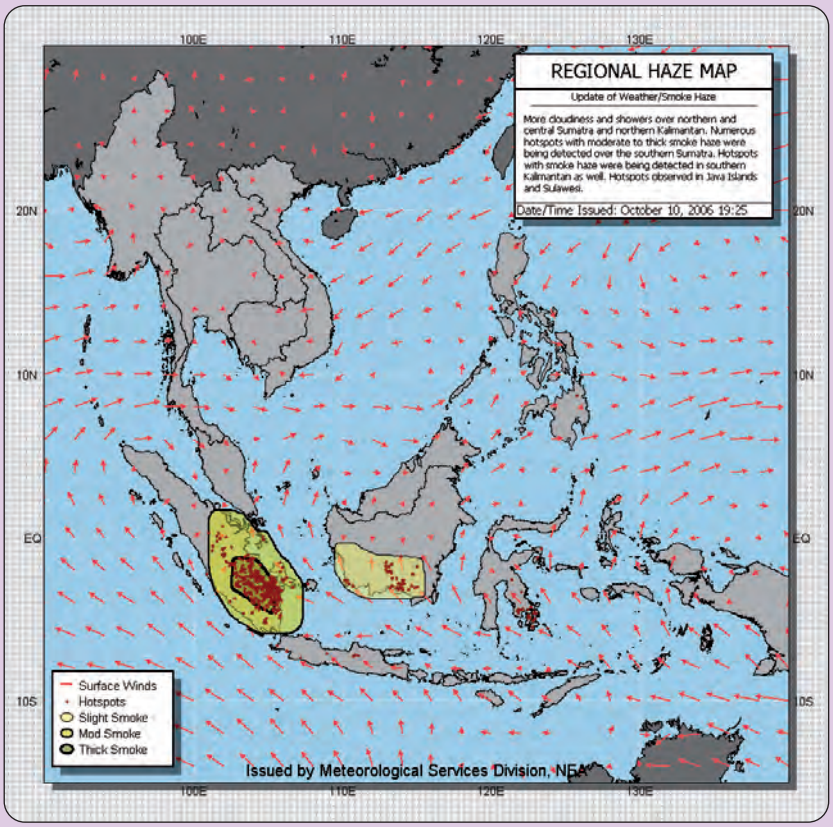
Transboundary haze pollution caused by land and forest fires is episodic. The latest incidence of transboudary haze pollution affected the southern part of the region in mid- August 2005.

Box 7.5: Transboundary Haze Episode in Malaysia (August 2005)

On 11 August 2005 the Air Pollution Index (API) in some areas in Malaysia reached dangerous level. The API reading in the morning of 11 August 2005 was relatively high, but worsened in the afternoon. At 1700 hrs more than 6 stations in Peninsular Malaysia recorded hazardous levels, whereas 7 other stations recorded unhealthy to very unhealthy condition of air pollution.

Kuala Selangor, SELANGOR	527	Country Heights, Kajang, SELANGOR	204
Pelabuhan Kelang, SELANGOR	486	Nilai, N.SEMBILAN	175
Shah Alam, SELANGOR	430	Seremban, N.SEMBILAN	140
Putrajaya, W.PERSEKUTUAN	354	Tanjung Malim, PERAK	127
Petaling Jaya, SELANGOR	326	Jerantut, PAHANG	116
Gombak, SELANGOR	305	Bukit Rambai, MELAKA	113
Kuala Lumpur, W.PERSEKUTUAN	295		

Notes: *101 – 200: Unhealthy, 201 – 300;Very Unhealthy and >300: Hazardous*
Source: *Website of Department of Environment, Malaysia, http://www.doe.gov.my*



Source: *ASEAN Secretariat (2005), ASEAN Haze Action Online website*

Hotspots have been used as one of the indicators to determine the occurrence of land and forest fires. Based on aerial surveillance, about 82% of hotspots were confirmed as fires. The ASEAN Specialised Meteorological Centre (ASMC) in Singapore has been monitoring hotspots since March 1998. Initially, ASMC monitored the areas of Sumatra and Peninsular Malaysia, and Borneo (comprising the provinces of Kalimantan in Indonesia, Sabah and Sarawak states of Malaysia, and Brunei Darussalam). In late 2003, ASMC extended the coverage to include Cambodia, Lao PDR, Myanmar, Philippines, Thailand and Viet Nam.

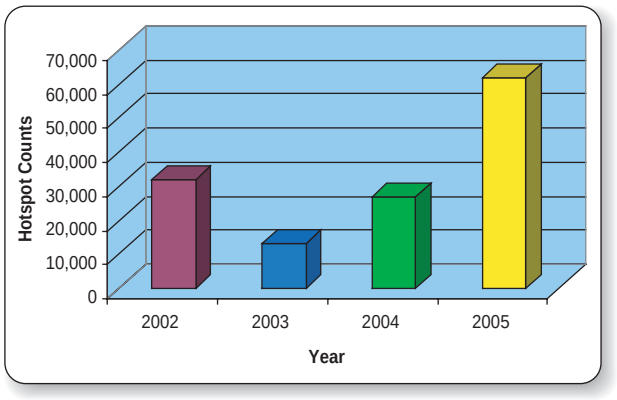
ASMC provides member countries with weather and climate assessment, early warning on the occurrence of land and forest fires and the potential of transboundary haze pollution. Other elements being monitored to predict the occurrence of transboundary haze pollution include wind direction and speed, drought, and fuel conditions. Some of these are obtained by using satellite data from the National Oceanic and Atmospheric Administration (NOAA) satellites (NOAA-12 and NOAA-18), and the National Aeronautics and Space Administration (NASA) Earth Observing System (EOS) – AQUA and TERRA. When the number of hotspots increases significantly and other factors such as wind direction indicate the probability of a haze episode developing, the ASMC would notify the member countries and the ASEAN Secretariat for appropriate actions to be taken.

The years 2002 and 2005 had exceptionally high number of hotspot counts due to the droughts caused or aggravated by the El Niño Southern Oscillation (ENSO) and possibly global warming[11] in those years. The hotspot counts in Sumatra, Borneo and Peninsular Malaysia ranged from a low of just over 11,000 in 2003 to a high of over 70,000 in 2005.

Land and forest fires in the southern part of ASEAN region usually appear from May to September each year resulting in an increase in the number of hotspots detected, normally reaching the highest point during the months of August and September. During the Southwest Monsoon season when traditionally dry season in the southern part of the ASEAN region occurs, land clearing activities are regularly being carried out. During active land and forest fire periods, the prevailing winds occasionally transport the smoke haze to neighbouring countries.

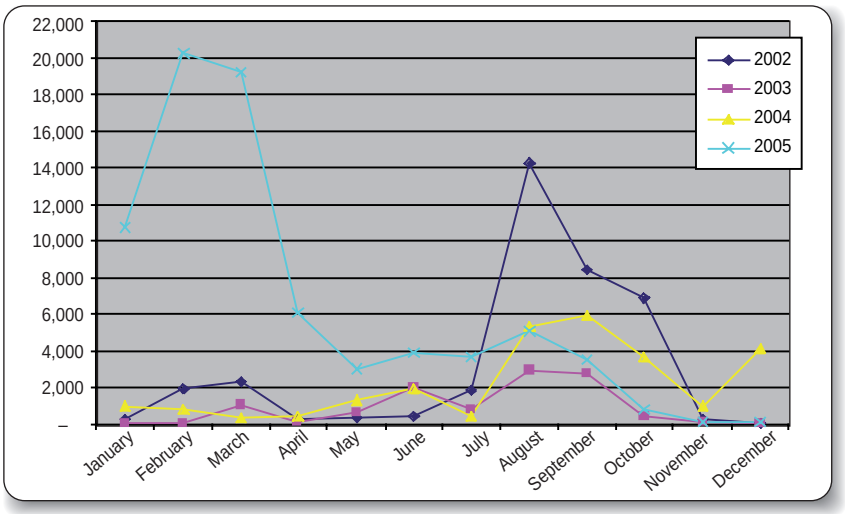
However, in 2005 there were an exceptionally high number of hotspots detected during the months of January to April reaching a total of more than 6,000 hotspot counts in Sumatra, Borneo and Peninsular Malaysia due to a prolonged dry spell. The number of hotspots detected in the northern part of the region reached the highest point sometime in February, with more than 16,000 hotspots detected. Drought, agricultural losses, and famine were reported in some ASEAN countries including Thailand, Indonesia, Viet Nam and the Philippines.

Figure 7.3: Hotspot Counts



Source: *ASMC (2005). Hotspot counts by NOAA-12 satellite*

Figure 7.4: Monthly Hotspot Counts in the ASEAN Region



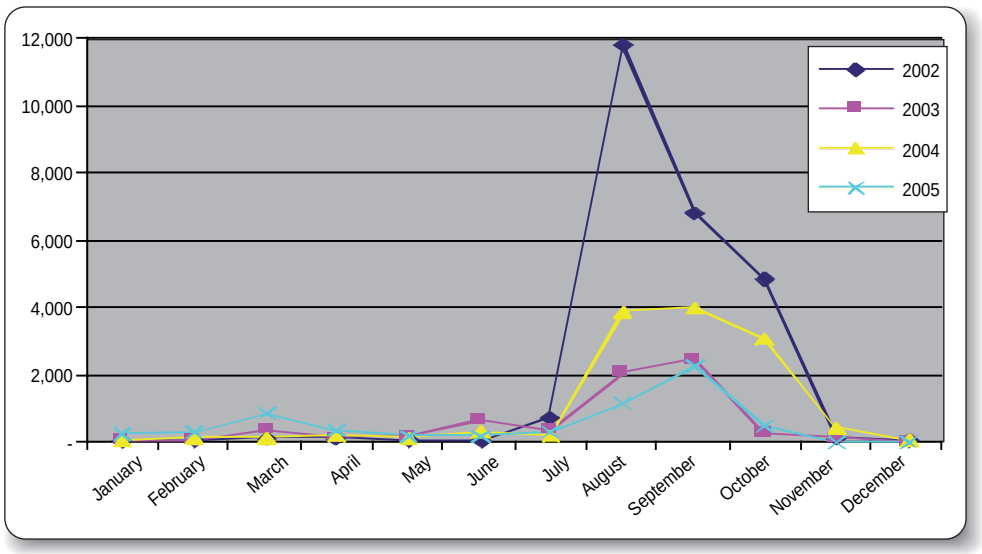
Source: *ASMC (2005). Hotspot counts by NOAA-12 satellite*

The hotspot counts in Borneo are generally much higher than those of Peninsular Malaysia and Sumatra. In 2002, for instance, the peak hotspot counts in Borneo reached over 11,000 while that in Sumatra and Peninsular Malaysia was just over 2,400. The same general pattern was recorded in 2003 to 2004. In 2005 the trend reversed, with the hotspot counts in Peninsular Malaysia and Sumatra higher than that of Borneo.

With respect to the hotspot counts of other areas in the region such as the Mekong region and the Philippines, the 2005 data show that hotspots count peaked during January to April, the traditional dry season in the northern part of the ASEAN region. Moreover, the maximum hotspot counts in this sub-region even exceeded the hotspot counts in Sumatra and Peninsular Malaysia.

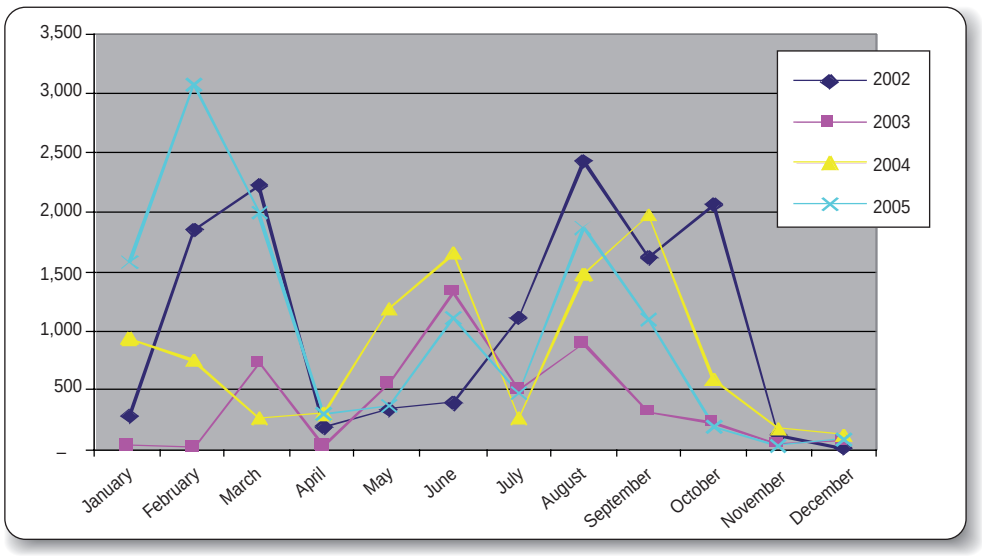
It is likely that the countries in the Mekong region could also experience episodes of transboundary haze pollution. In 2005, PM-10 concentrations observed from the ambient air quality monitoring stations in the northern part of Thailand during January to April were found to be relatively higher than in other periods of the year. In March, the concentrations exceeded the National Ambient Air Quality standard of Thailand (120 microgram per cubic metre) for several days.

Figure 7.5: Hotspot Counts in Borneo



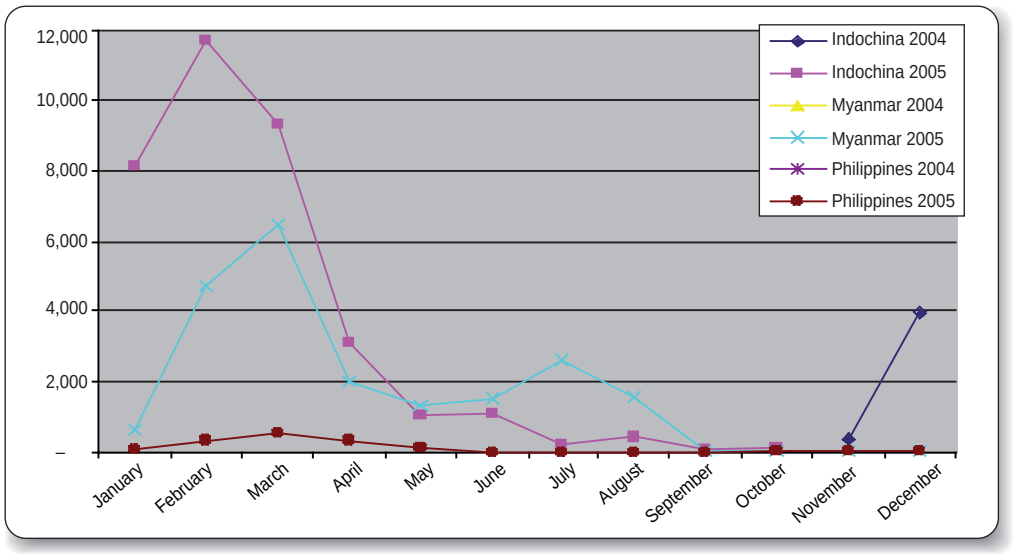
Source: *ASMC (2005). Hotspot counts by NOAA-12 satellite*

Figure 7.6: Hotspot Counts in Sumatra and Peninsular Malaysia



Source: *ASMC (2005). Hotspot counts by NOAA-12 satellite*

Figure 7.7: Hotspot Counts in the Mekong Region* and the Philippines (2005)



Source: *ASMC (2005). Hotspot counts by NOAA-12 satellite*
Note: ** Cambodia, Lao PDR, Thailand and Viet Nam*

There have been a number of activities undertaken at national as well as regional level to address land and forest fires and the resulting transboundary haze pollution. At the end of 1997, the ASEAN Environment Ministers endorsed the Regional Haze Action Plan (RHAP) to undertake joint efforts in monitoring, preventing and mitigating transboundary haze pollution resulting from land and forest fires. To further strengthen these efforts, the ASEAN Agreement on Transboundary Haze Pollution was signed in June 2002, and it entered into force in November 2003. In addition to ongoing activities implemented under the RHAP, there have been substantive developments in the implementation of the ASEAN Agreement on Transboundary Haze Pollution. Details on these developments are elaborated in Chapter 9.

End Notes

1 Unless otherwise indicated, this section was derived mostly from Pollution Control Department (2002), *ASEAN Achievements and Future Directions in Pollution Control* (Bangkok, Thailand: Ministry of Science, Technology, and Environment), with updates from country annual reports and independent studies.

2 *Ibid.,* p. 25.

3 *Ibid.*

4 Document entitled "Proposed List/Types of Environmental Best Practices – Clean Air" obtained from < http://www.aseansec.org/files/bestpractice_clean_air.doc > 7 Jan 2006.

5 Philippine Department of Environment and Natural Resources-Environmental Management Bureau (DENR-EMB) (2002), *2002 National Air Quality Status Report* (Philippines: DENR-EMB), p. 52.

6 Thailand Ministry of Natural Resources and Environment-Pollution Control Department (MNRE-PCD) (2005), "A Partnership for Sustainable Air Quality Improvement in Bangkok," <http://www.pcd.go.th/info_serv/en_air_diesel.html> 7 Jan 2006.

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9 Tacconi, L. 2003. Fires in Indonesia: causes, costs and policy implications. CIFOR Occasional Paper No.38. CIFOR, Bogor. 24p.

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11 Food and Agriculture Organisation (FAO) (2005), "Climate Change Threatens Crop Losses, More Hungry People," < http://www.fao.org/newsroom/en/news/2005/102623/index.html > 11 Oct 2005.

CHAPTER 8

Global Environmental Issues

Effectively address global environmental issues without impinging on competitiveness, or social and economic development based on the principle of common but differentiated responsibility.

Vientiane Action Programme

ASEAN Member Countries continued to be actively engaged in addressing global environmental issues in accordance with the principle of common but differentiated responsibilities. Although the region is not the major source of these environmental problems, it is most vulnerable to their adverse effects, particularly the effects of climate change due to global warming, dumping of toxic and hazardous chemicals, and loss of biodiversity. The countries of the region had been very responsive to many of these issues and had, in fact, accomplished much to meet their commitments. They have high rates of participation (in terms of ratification/accession) to the multilateral environmental agreements compared to the world average. In terms of reduction of ozone-depleting substances, the region achieved reductions of about 50%, 10% and 50 % over the years 1995 – 98, 1998 – 2001, and 2001 – 05 respectively. In terms of CO_2 emissions, the most common of the greenhouse gases, the region contributed only 7% of that of Europe, 10% of Asia, and 12% of North America. However, the CO_2 emissions increased at an average rate of 6% between 1995 and 2002. As a region rich in biodiversity, the conservation of this valuable heritage is high on the agenda of ASEAN, as evidenced by the establishment of the ASEAN Centre for Biodiversity, and the creation of regional network of national protected areas through the ASEAN Heritage Parks Programme. The ASEAN Regional Action Plan on Trade in Wild Fauna and Flora (2005 – 2010) aims to significantly curb the lucrative illegal trade in the region's endangered species, among others, by coordinating enforcement among member countries.

ASEAN FACTS AND FIGURES

Participation in Multilateral Environmental Agreements (ratified/acceded)	**ASEAN**	**World**
Vienna Convention	100%	97%
Montreal Protocol	100%	97%
CITES	100%	86%
UNFCC	90%	96%
Kyoto Protocol	90%	55%
Convention on Biological Diversity	90%	96%
Basel Convention	80%	86%
World Heritage	80%	93%
Ramsar	70%	78%
Stockholm Convention	60%	67%
Cartagena Protocol	60%	69%
Rotterdam Convention	30%	56%

CFC consumption compared with other regions (2001)	*(ODP metric tonnes)*
ASEAN	*12,750*
Developed regions	*3,130*
Commonwealth of Independent States (CIS)	*1,415*

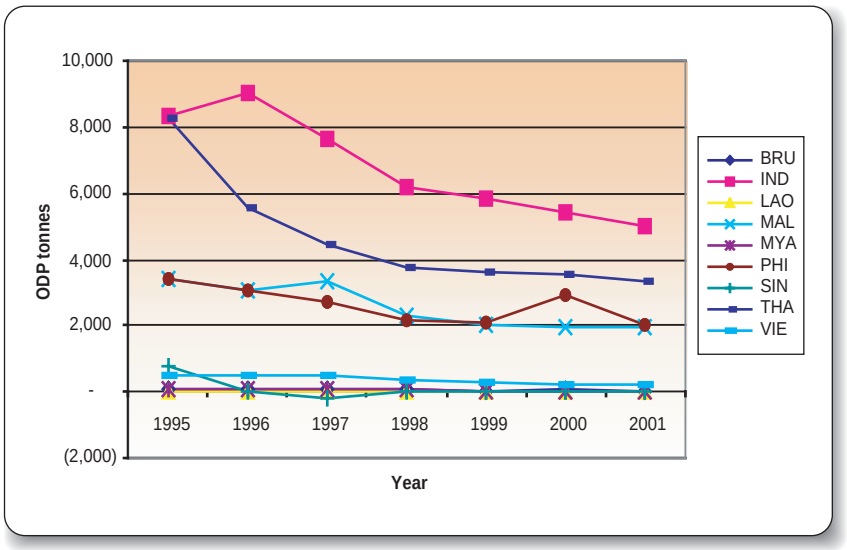
CO_2 Emissions of ASEAN *vis-à-vis* Other Regions (2001)	*(million metric tonnes)*
ASEAN	*784.41*
Europe	*10,771.22*
North America	*6202.28*
Middle East & North Africa	*1455.31*

ASEAN continues to play an active role and to promote common position or understanding in the on-going negotiations and meetings of the various multilateral environmental agreements (MEAs). These include (i) the Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol on Substances That Deplete the Ozone Layer, (ii) the United Nations Framework Convention on Climate Change and its Kyoto Protocol, (iii) the Basel Convention on the Control of the Transboundary Movements of Hazardous Wastes and their Disposal, (iv) the Rotterdam Convention on Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, (v) the Stockholm Convention on Persistent Organic Pollutants, and (vi) conservation and biodiversity related conventions. ASEAN also continues to promote capacity building activities to fulfil national commitments under the various MEAs. In order to appropriately monitor the development and progress of the implementation of MEAs, ASEAN had adopted the lead country mechanism for each major MEA since 2003. Among the functions of the lead country are to monitor developments and issues under the respective MEA, highlight issues of relevance for consideration of ASEAN, and articulate ASEAN's concerns and common position/ understanding at the relevant fora. The lead country mechanism is reviewed every three years for possible assignment to other countries.

Table 8.1: Lead Countries for the MEAs (end of 2005)

MEA	Lead Country
Montreal Protocol on Substances That Deplete the Ozone Layer	Thailand
UN Framework Convention on Climate Change and Kyoto Protocol	Malaysia
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	Singapore
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	Indonesia
Stockholm Convention on Persistent Organic Pollutants	Singapore
Biodiversity-related Conventions (CBD, Cartagena Protocol, CITES, CMS, Ramsar Convention, and World Heritage Convention)	Philippines

Figure 8.1a: Consumption of Ozone-Depleting CFCs, (1995 – 2001) in ODP metric tonnes



Source: *UN-DESA (2005)*

Note: *(1) Data as of 23 April 2003. (2) Note that in 1997, Singapore had a net consumption of –179 ODP metric tonnes. According to UN-DESA, negative numbers occur where destruction exceeds actual production, or if exports are from carry-over stock and exceed imports. Singapore might have experienced one of these.*

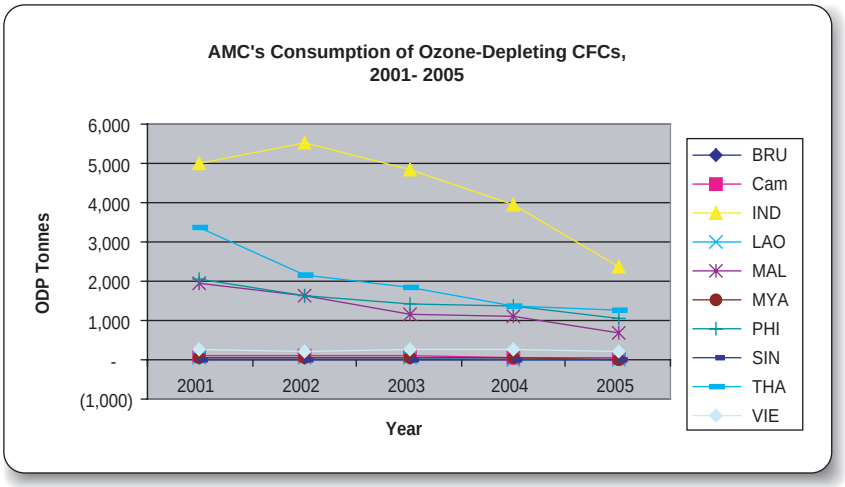
Ozone

All the member countries have ratified/acceded to the Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol on Substances That Deplete the Ozone Layer. The Philippines ratified the Copenhagen Amendment in 2001. Malaysia, Thailand and Viet Nam ratified the Montreal Amendment in 2001, 2003 and 2004, respectively. Malaysia and Viet Nam were the first two ASEAN countries that ratified the Beijing Amendment to the Montreal Protocol, which entered into force on 25 February 2005. Malaysia ratified it in 2001, followed three years later by Viet Nam.

Along with the rest of the world, ASEAN have significantly

reduced the consumption of ozone-depleting substances (measured in terms of ozone-depleting potential or ODP). There was an overall decrease of about 50% between 1995 – 1998, and about 10% thereafter up to 2001. Most of the countries showed a reduction of about 50% between 2001 – 2005. This was partly the result of the individual and collective measures of ASEAN countries to combat illegal trade of ODS. Singapore registered the highest reduction in CFC emission with 97%, followed by Thailand (59%) and Malaysia (55%).

Figure 8.1b: Consumption of Ozone-Depleting CFCs, (2001 – 2005) in ODP metric tonnes



Source: *The Secretariat of the Vienna Convention (http://ozone.unep.org/Data_Access/index.shtml) last update 11/09/2006*

Table 8.2: Participation in the Vienna Convention, Montreal Protocol, and Its Four Amendments (as of 22 July 2005)

Country	Ratification/Accession					
	Vienna Convention	Montreal Protocol	London Amendment	Copenhagen Amendment	Montreal Amendment	Beijing Amendment
	EIF: 22 Oct. 1988	EIF: 1 Jan 1989	EIF: 10 Aug 1992	EIF: 14 Jun 1994	EIF: 10 Nov 1999	EIF: 25 Feb 2002
Brunei Darussalam	26/07/90 A	27/05/93 A	– –	– –		
Cambodia	27/06/01 A	27/06/01 A	– –	– –		
Indonesia	26/06/92 A	26/06/92 R	26/06/92 A	10/12/98 A	– –	
Lao PDR	21/08/98 A	21/08/98 A	– –	– –		
Malaysia	29/08/89 A	29/08/89 A	16/06/93 A	05/08/93 A	26/10/01 R	26/10/01 R
Myanmar	24/11/93 A	24/11/93 A	24/11/93 A	– –	–	
Philippines	17/07/91 A	17/07/91 R	09/08/93 R	15/06/01 R	– –	
Singapore	05/01/89 A	05/01/89 A	02/03/93 A	22/09/00 A	22/09/00 A	–
Thailand	07/07/89 A	07/07/89 R	25/06/92 R	01/12/95 R	23/06/03 R	–
Viet Nam	26/01/94 A	26/01/94 A	26/01/94 A	26/01/94 A	03/12/04 R	03/12/04 R

Source: *Compiled from UNEP Ozone Secretariat (2005).*
Abbreviations: *R – ratification; A – accession; EIF – Entry into force*

Climate Change

All member countries, except Brunei Darussalam, have ratified/acceded to the United Nations Framework Convention on Climate Change and it Kyoto Protocol which aims to reduce the amount of greenhouse gases in order to address global warming.

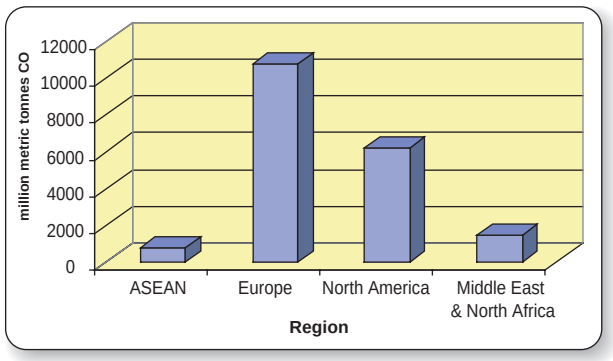
Although the total amount of carbon dioxide emission in the region is still very much lower than most developed countries and other regions, it is however increasing at an average annual rate of 6%. In 1995 the region produced 641 million tonnes of carbon dioxide. In 2002 this rose to 903 million metric tonnes.

Table 8.3: Participation in UNFCCC and Kyoto Protocol (as of 2005)

Country	UNFCCC	Kyoto Protocol
Brunei Darussalam	–	–
Cambodia	18/12/1995 (A)	22/08/2002 (A)
Indonesia	23/08/1994 (R)	03/12/2004 (R)
Lao PDR	14 Jan 1995 (A)	06/02/2003 (A)
Malaysia	13/07/1994 (R)	04/09/2002 (R)
Myanmar	25/11/1994 (R)	13/08/2003 (A)
Philippines	02/08/1994 (R)	20/11/2003 (R)
Singapore	29/05/1997(R)	12/04/2006 (A)
Thailand	28/12/1994 (R)	28/08/2002 (R)
Viet Nam	16/11/1994 (R)	25/09/2002 (R)

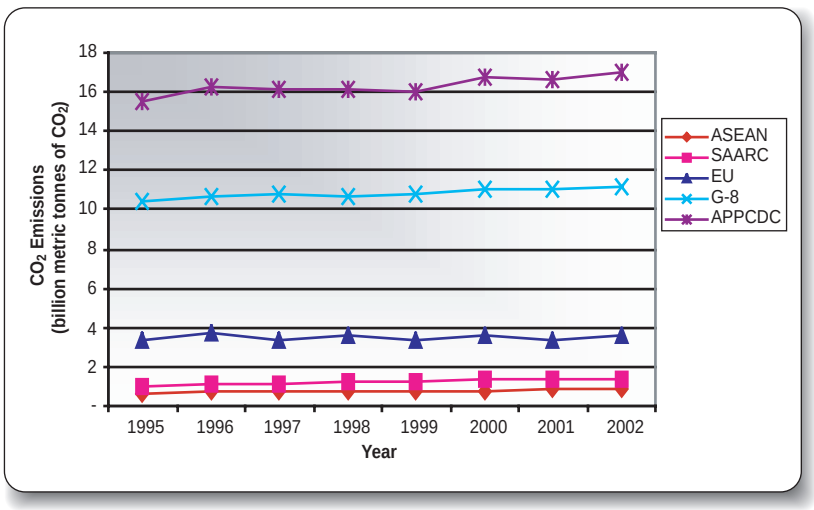
Sources: *UNFCCC (2005a) and UNFCCC (2005b).*
R – ratification, A – accession,

Figure 8.3: CO_2 Emissions of ASEAN and other Regions, 2001



Source: *WRI (2005)*

Figure 8.2: CO_2 Emissions from Regional Organisations/Groups, 1995 – 2002



Source: *UN-DESA (2005)*
Note: *(1) Data as of 22 April 2005. (2) Data were compiled by UN-DESA from the database of the Carbon Dioxide Information Analysis Centre (CDIAC).*
Acronyms: *SAARC-South Asian Association for Regional Cooperation; EU-European Commission; G=-8- Group of 8 countries; APPCDC-Asia-Pasific Partnership for on Clean Development and Climate.*

The amount, nevertheless, was still merely 7% of that of Europe, 12% of North America, and 53% of the combined emissions of Middle East and North Africa. It was also approximately a mere 10% of the total carbon dioxide generated in Asia (excluding the Middle East), which amounted to 7,780 million tonnes (2000), 7,860 million tonnes (2001) and 8,329 million tonnes (2002).

The ASEAN Member Countries have undertaken a number of measures to reduce greenhouse gas emissions such as by improving public transportation and introducing cleaner fuels such as natural gas and bio-fuels (see Chapter 7). Member countries are also actively participating in the Clean Development Mechanism (CDM) under the Kyoto Protocol. The CDM Projects enables investment from developed countries for greenhouse gas reduction projects in developing countries, where the developed countries would acquire carbon credits, while enabling technology transfer and promotion of sustainable development in developing countries.

The CDM is attractive to member countries for the following reasons:

- All countries have programmes towards increasing renewable energy share in their energy mix for energy supply security, rural electrification, poverty alleviation, and environmental impact mitigation;
- All countries have programmes to adopt low CO_2 emission measures and technologies such as replacing oil and coal with natural gas and adopting clean coal technologies;
- All countries will benefit from CDM by reduction in the cost of energy development through GHG emission avoidance on voluntary basis; and
- The right to industrial development is not impaired by the right to sell emission reductions.

Box 8.1: Potential CDM Projects in ASEAN

Environmentally-Sound Energy Infrastructure Development

- Trans-ASEAN Gas Pipeline Project
- GHG Reduction Credits for natural gas substitution of oil and coal for power and transport
- ASEAN Power Grid
- Credits for reduction of electricity demand through transmission efficiency
- Credits for reduction of spinning reserves
- Credit for increase in power generation from grid-connected renewable energy

Small-Scale Renewable Energy Systems

- Credits for hydro, solar, wind, biomass, geothermal and ocean energy systems
- Credits for increase of small-scale renewable energy systems due to local manufacturing of whole systems and component parts resulting in cost reduction and accessibility for commercial installation and maintenance in both urban and rural areas

Greening of Coal-Fired Power Plants

- Credits for immediate and large-scale emission reduction by clean coal technologies in retrofitting old coal-fired power plants with clean coal technologies
- Credits for large-scale emission reduction by adapting clean coal technologies in new coal-fired power plants

Natural Gas Substitution for Oil and Coal

- Credits for substitution of oil and coal use in power, transport and industry

Energy Efficiency and Conservation

- Credits for maximum recovery of energy inputs such as mechanical, heat and chemical energies
- Credits for energy use reduction due to sound energy efficiency management in buildings, industries, transport , households and other human activities

Promotion of Sustainable Energy Development in Forestry, Livestock, and Agricultural Industries

- Credits for biomass and biogas to energy projects
- Credits for use of cogeneration technologies in biomass to energy conversion
- Credits for production of bio-diesel, methanol, ethanol, etc.

Sustainable Development of Hydro Resources

- Credits for development of small-scale run-of-river hydropower stations due to avoidance of methane and CO_2 from large-scale hydro projects.

Source: *ASEAN Centre for Energy, "Opportunities Toward Greening the Energy Industry thru CDM Implementation in the ASEAN Region.*

Box 8.2: Implementation of Clean Development Mechanism (CDM) in Indonesia and Malaysia

CDM implementation in Indonesia

Up to the middle of 2006, 6 CDM Projects have been approved by the National Committee on Clean Development Mechanism in Indonesia, namely:

- *Indocement Alternative Fuels Project* with a potential emission reduction of 2,469,337 tonnes CO_2, within 21 years (2005 – 2025).
- *Indocement Blended Cement Project* with a potential emission reduction of 5,260,470 tonnes CO_2, within 10 years (2005 – 2014).
- *CDM Solar Cooker Project Aceh* with a potential emission reduction of 24,500 tonnes CO_2, within 7 years (2006 – 2012).
- *Multimas Nabati Asahan Biomass 9.7 Mwe Condensing Steam Turbine* with a potential mission reduction of 611,800 tonnes CO_2, within 10 years (2006 – 2016).
- *Murini Sam Sam Biomass 9.7 Mwe Condensing Steam Turbine* with a potential emission reduction of 611,800 tonnes CO_2, within 10 years (2006 – 2012).
- *Methane Capture and Combustion from Swine Manure Treatment Project at PT Indotirta Suaka Bulan Farm in Indonesia* with a potential emission reduction of 1,660,518 tonnes CO_2, within 10 years.

Among these six projects, the *CDM Solar Cooker Project and the Murini Sam Sam Biomass 9.7 Mwe Condensing Steam Turbine have been registered at the* CDM Executive Board. The *Indocement alternative fuels and Methane Capture and Combustion from Swine Manure Treatment Project are awaiting registration by the CDM Executive Board*.

Indocement CDM Project Implementation

PT Indocement Tunggal Prakarsa Tbk (Indocement) was recorded as the first Indonesian industry and the first cement industry in the world to apply for the Clean Development Mechanism. The CDM project was validated on November 2005 by Det Norske Veritas (DNV) and approved by the National Committee for Clean Development Mechanism in December 2005.

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The project consists of two programmes

1. Alternative fuel application using biomass such as rice husk, palm kernel shell and sawdust to replace fossil fuel.
2. Alternative raw material application using natural *pozzolan, volcanic ash* and *fly ash*.

Clean Development Mechanism in Malaysia

A National Committee on CDM was established on 31 May 2002. Sectors relevant to CDM investment are energy (fuel combustion & fugitive emissions from fuels), industrial processes, solvent & other product use, agriculture and waste. In terms percentage, the energy sector contributes the highest (86.7 %).

Malaysia has taken advantage of the provisions of the Clean Development Mechanism (CDM) under the Kyoto Protocol to increase its renewable energy sources.

Currently, in Malaysia there are some fiscal incentives available to encourage the use of renewable energy and to improve energy efficiency. Companies providing energy conservation services can apply for pioneer status with tax exemption of 70 per cent of statutory income for a period of five years or an investment tax allowance (ITA) of 60 per cent on the qualifying capital expenditure incurred within a period of five years. In addition, they will be given import duty and sales tax exemption for equipment used in related projects, which are not produced locally. Equipment purchased from local manufacturers is given sales tax exemption.

For companies which incur capital expenditure for conserving energy for their own consumption, the incentives provided are accelerated capital allowance on related equipment that can be fully written off within a period of one year and import duty and sales tax exemption for equipment used in energy conservation.

To encourage the generation of energy using biomass that is renewable and environmentally friendly, companies that undertake such activities are eligible for pioneer status or ITA. For the purpose of this incentive, “biomass sources” refer to palm oil mill/estate waste, rice mile waste, sugar cane mill waste, timber/sawmill waste, paper recycling mill waste, municipal waste and biogas (from landfill, palm oil mill effluent [POME], animal waste, and others), while energy forms refer to electricity, steam, chilled water, and heat. To further promote the use of renewable energy, the above incentives are also extended to the use of hydropower (not exceeding 10 MW) and solar power.

From 2002 to 2005 a total of 39 CDM applications were received. To date, ten projects have been registered with the CDM Executive Board Malaysia. Out of these, nine involved energy generation through the use of biomass (empty fruit bunches) while one project dealt with fuel switching. The estimated emission reductions from these registered projects are 1,615,972 tCO_2-equivalent/year.

A biomass project in Sabah and a landfill gas project in Malacca were given Final Host Country approval in 2005.

The biomass project is a Kunak Bioenergy project which utilises palm oil residues such as empty fruit bunches (EFB), fibres and shells. The project will install a highly efficient 14 MW bio energy plant, where the energy generated will be used for own consumption and the surplus exported to the grid. The project is the first-of-its-kind in Malaysia utilising a high pressure boiler fired with shells, fibres and EFB from the palm oil mill. The boiler will be manufactured through a joint venture between a local and a Danish company. The project will result in technology transfer and increase the manufacturing capacity of more efficient and high pressure boilers in Malaysia.

The landfill gas project in Malacca is designed as a 2 MW Grid Connected Gas Power Plant project fuelled by land fill gas recovered from the landfill. The project claims to abate methane emissions by installing equipment for landfill gas collection and energy recovery equipment unit. The technology involves a direct gas collection engine installed in the landfill site with a production well to collect the LFG. The gas turbine installed to generate electricity is claimed to be highly efficient with little environmental impact.

Landfill Gas Project in Malacca

Source: *State of the Environment Report Indonesia (2004)*
Malaysia Energy Centre – Achieving the Millennium Development Goals: Success and Challenges (2006)

Conservation and Biodiversity Related Agreements

The major conventions under this category are the following:

- 1971 Convention on Wetlands of International Importance (Ramsar Convention);
- 1972 Convention Concerning the World Cultural and Natural Heritage (World Heritage Convention);
- 1975 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);
- 1983 Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn Convention); and.
- 1993 Convention on Biological Diversity (CBD) and the 2000 Cartegena Protocol on Biodiversity;

Wetlands. Since 1971 the Ramsar Convention has listed 1,229 wetland sites covering 106 million hectares for protection against largely man-made destruction. The list has grown with the increase in member states to 146 in 2004.[1] A total of 26 wetlands in the list are found in the region spanning a total area of 811,000 hectares.

Migratory Species. In November 2004, BirdLife International, a listing authority of Birds for the IUCN Red List,[2] declared that the first comprehensive inventory of Asia's most important places for birds and biodiversity had shown that more than half of them did not have legal designations, or were only partially protected by law. This was alarming because Important Bird Areas (IBAs) in Asia were being threatened by loss or degradation of habitat, pollution, introduced species and wild bird trade. Bird experts were warning of the imminent extinction of Milky Stork Mycteria *cinerea* and Gurney's Pitta *Pitta gurneyi* (both from Malaysia) and Grey-crowned Crocias *Crocias lanbianis* (Viet Nam).[3]

Box 8.3: Important Bird Areas in the ASEAN Region

The most important site for bird conservation in Asia (Indonesia). Pegunungan Sahendaruman, a tiny patch of forest on the small island of Sangihe in eastern Indonesia, is the single most outstanding site for bird conservation in Asia. This important bird area (IBA) supports three critically endangered species that are found nowhere else – Caerulean Paradise-flycatcher *Eutrichomyias rowleyi*, Sangihe Shrike-thrush *Colluricincla sanghirensis* and Sangihe White-eye *Zosterops nehrkorni*. In addition, two endangered species are also confined to the island – Sangihe Hanging-parrot *Loriculus catamene* and Elegant Sunbird *Aethopyga duyvenbodei*. BirdLife Indonesia has a project to work with local communities to improve the conservation prospects of this site.

Best hope for Mindoro's lowland endemics (Philippines). Sablayan is the largest tract of lowland forest on the Philippine island of Mindoro, and is the best hope for the survival of three lowland species that are unique to the island, Mindoro Bleeding-heart *Gallicolumba platenae* and Black-hooded Coucal *Centropus steerii* (both Critically Endangered) and Mindoro Tarictic *Penelopides mindorensis* (Endangered). The Haribon Foundation (BirdLife in the Philippines) has a project to plan forest and land-use in the area, and build support from local communities and other stakeholders including a local penal colony.

Tawi-Tawi, bleeding heart of Sulu Archipelago (Philippines). Tawi-Tawi island is in the Sulu Archipelago in southern Philippines, and supports three critically endangered species (Sulu Bleeding-heart *Gallicolumba menagei*, Tawitawi Brown-dove *Phapitreron cinereiceps* and Sulu Hornbill *Anthracoceros montani*) and one endangered specie (Blue-winged Racquet-tail Prioniturus verticalis) that are unique to the Sulu Archipelago, as well as an important population of the critically endangered Philippine Cockatoo *Cacatua haematuropygia*. The Haribon Foundation has a project to work on with the local university and government to find alternative sustainable ways to promote forest conservation.

Sablayan, Philippines. The Haribon Foundation (BirdLife in the Philippines) has established a partnership that brings together the local government unit, local community organisations, and an open prison (penal farm) to work together to conserve one of the last remaining areas of lowland forest on the island of Mindoro. The site has been identified as one of the most outstanding IBAs in the Philippines, on account of its importance for a number of threatened bird species. The forest area falls under the jurisdiction of the penal farm, which has embarked upon a staff and inmate education programme, forest and wildlife protection patrols, and reforestation with native tree species. The local government unit has prepared forest protection

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ordinances and management plans, and allocated budgets and staff, and Haribon has led in forest mapping, biodiversity surveys, and technical support to the local partners.

Red River Delta, Vietnam. The BirdLife Vietnam Programme has facilitated the establishment of a Site Support Group (SSG) at a key wetland in the Red River Delta. The SSG involves representatives of the local community, local authorities and private aquaculture businesses. Awareness-raising materials have been prepared, a local decree has been passed prohibiting the hunting of water birds and its enforcement has been supported and monitored by the SSG members.

Manupeu-Tanahdaru National Park (Indonesia). BirdLife Indonesia, recently established as an independent national NGO, has collaborated with local communities, local NGOs, and local and provincial government staff to determine the boundaries and zoning for the new Manupeu-Tanahdaru National Park on the island of Sumba. Community groups have been established, and are currently working for forest and wildlife protection, restoration of degraded land, and community development initiatives. Limited national government budgets at this time mean that the national park is without any management unit, or designated staff, hence the SSG's activities are vital for the sustainability of the park.

Source: *BirdLife International (2004), "Important Bird Areas in Asia," <http://www.birdlife.org/news/pr/2004/11/asia_ibas.html> 16 October 2005*

CITES. Roughly 5,000 species of animals and 28,000 species of plants have been included in the CITES lists against over-exploitation through international trade. Many species in the region have also found their way either in the trade ban list or the restricted trade list.[4]

At the 13th COP of CITES in 2004 in Thailand, the ASEAN Ministers responsible for the implementation of CITES issued an *ASEAN Statement on CITES*. The Ministers agreed to develop an ASEAN Regional Action Plan on Trade in Wild Fauna and Flora (2005 – 2010). At the same meeting, Indonesia's proposal to uplist the Ramin tree (from Appendix III to II) was granted. Uplisting was also made for Irrawaddy dolphin (from Appendix II to I). Indonesia's proposal to list the Agarwood tree in Appendix II was sent to a working group for further study and deliberation.

Table 8.4: Number of CITES-Listed Species in Member Countries (as of 2006)

Country	Animals			Plants		
	App. I	App. II	App. III	App. I	App. II	App. III
Brunei Darussalam	18	117	21	0	29	11
Cambodia	48	133	29	3	41	1
Indonesia	76	1,349	40	30	1.027	32
Lao PDR	44	135	238	6	50	1
Malaysia	58	568	44	23	903	31
Myanmar	74	311	52	10	190	3
Philippines	31	832	19	17	205	3
Singapore	21	296	27	0	220	2
Thailand	69	464	46	16	284	2
Viet Nam	69	677	52	15	149	2

Source: *CITES website (http://www.cites.org/eng/resources/species.html) (accessed on 29 Sept 2006)*

Box 8.4: ASEAN Statement on CITES on the Occasion of the Thirteenth Meeting of the Conference of the Parties to CITES, Bangkok, 11 October 2004

We, the ASEAN Ministers responsible for the implementation of CITES, hereby acknowledge the need:

1. to enhance awareness of and to ensure further cooperation and coordination among all national agencies involved in wild fauna and flora trade law enforcement including the sharing of intelligence information and, where appropriate, the establishment of inter-agency committees, task force or coordination groups;
2. to further promote regional cooperation through the establishment of bilateral and multilateral arrangements between enforcement agencies responsible for common boundaries to achieve more effective control of illegal international trade in wild fauna and flora and their products;
3. to strengthen enforcement efforts along key border regions, including further building of capacity and capability;
4. to consider undertaking the review of their respective national legislation to facilitate the implementation of CITES, if deemed necessary;
5. to encourage wider scientific research, wild population assessment and trade monitoring to ensure that sufficient and accurate biological and trade information is available on key wild species in trade so as to ensure that the trade is not detrimental to the wild population;
6. to urge countries, donors and organisations to provide urgent sufficient financial and technical support to ASEAN countries to strengthen the above efforts, in particular related to provision of scientific information on the key species in trade and building capacity and capability for CITES enforcement; and under the auspices of the ASEAN Senior Officials on Forestry (ASOF) through the ASEAN Experts Group on CITES (AEG-CITES), to develop an ASEAN Regional Action Plan on Trade in Wild Fauna and Flora to implement the above commitments and actions.

Box 8.5: ASEAN Regional Action Plan on Trade in Wild Fauna and Flora (2005 – 2010)

Objective 1

To assist ASEAN Member Countries in adopting effective and enforceable legislation for CITES implementation by:

- encouraging all ASEAN countries to enact Category 1 CITES-implementing legislation in order to have the ability to meet evolving CITES requirements, and to address any policy loopholes that may be identified after enactment;
- incorporating in national legislation, where necessary, social and economic incentives to promote and regulate sustainable management as well as responsible trade of wild fauna and flora, and effective implementation and enforcement of CITES;
- promoting awareness programmes for the judiciary and other law enforcement agencies to enable adequate and timely responses to offences.

Objective 2

To promote networking amongst relevant law enforcement authorities in ASEAN countries to curb illegal trade in wild fauna and flora by:

- establishing inter-agency committees at national levels, to ensure co-ordination and collaboration between law enforcement officials on trade in wild fauna and flora (e.g. Customs, police, quarantine, wildlife departments, port/airport authorities, CITES authorities)
- establishing an ASEAN CITES Enforcement Task Force for exchange of law enforcement information regarding trade in wild fauna and flora, and to coordinate regional participation in the Interpol Wildlife Crime Working Group;
- promoting collaborative capacity-building efforts for improved law enforcement.

Objective 3

To promote research, monitoring and information exchange on CITES-related issues by:

- exchanging information on permit issuance, regional market dynamics and trade flows to improve understanding of producer-consumer relationships, including re-exports, in the region;
- encouraging research activities to ensure that sufficient biological and population dynamics information is available on species in trade in order to undertake non-detriment findings (NDFs) and to establish export quotas;
- establishing a mechanism by which information about CITES-listed species may be shared, with a particular focus on illegally traded species found in more than one country.

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Objective 4

To encourage industry groups, trade associations/ traders and local communities to comply with legality and sustainability requirements of CITES and national regulations on trade in wild fauna and flora, and to support research and capacity building on sustainable management of trade in wild fauna and flora by:

- increasing awareness of relevant industry groups about trade in wild fauna and flora and CITES;
- collaborating with industry groups as a source of information about aspects of trade in wild fauna and flora, *inter alia* harvest management, captive breeding/ranching, artificial propagation, and market demand; and
- promoting the re-investment of revenue derived from trade in wild fauna and flora into conservation and associated research of species in trade.

Objective 5

To encourage greater regional cooperation on specific issues by:

- reviewing the current status of the relationship between CITES implementation and other biodiversity related conventions.
- establishing bilateral and multilateral taskforces to address shared concerns within ASEAN, related to the conservation and trade in particular species.

Objective 6

To seek sufficient technical and financial assistance through collaborative initiatives by:

- identifying key partners and engaging international and regional donor agencies, non-governmental organisations and scientific institutions in an advisory and a supporting role in the implementation of projects and activities arising from the action plan;
- engaging international and regional donor agencies and non-governmental organisations to aid in securing adequate funds to implement projects and activities arising from the action plan.

World Heritage. There are currently 830 sites on the World Heritage List (644 are cultural sites, 162 natural sites and 24 mixed sites) located in 138 countries. Of these, 27 are found in the ASEAN region.

Table 8.5: Number of World Heritage Sites in Member Countries

Country	Cultural	Natural
Cambodia	1	0
Indonesia	3	4
Lao PDR	2	0
Malaysia	0	2
Myanmar	0	0
Philippines	3	2
Thailand	3	2
Viet Nam	2	3
Total	**14**	**13**

Source: *UNESCO World Heritage Centre website (http://whc.unesco.org/en/list/).*

Note*: Brunei Darussalam and Singapore have yet to ratify the World Heritage Convention.*

Despite vigorous efforts, many heritage sites in the region had fallen victim to natural and man-made destructions. The State of World Heritage in the Asia-Pacific Region 2003 of the UNESCO World Heritage Centre identifies some of these destructive forces to include: poaching, theft and vandalism, illegal encroachment, intrusive commercial development, insensitive private and public construction works, deforestation, and atmospheric pollution.

Biosafety. The Biosafety Protocol entered into force on 11 September, 2003. The Protocol aims to contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health, and specifically focusing on transboundary movements.

The protection of the region's biodiversity is high on the agenda of ASEAN. Among the measures outlined in the Vientiane Action Programme 2004 – 2010, include efforts to reduce significantly the rate of biodiversity loss by 2010; promote the listing and coordinated management of ASEAN Heritage Parks; approve and implement an ASEAN Framework Agreement on Access to, and Equitable Sharing of Genetic and Biological

Table 8.6: Participation in Conservation and Biodiversity related MEAs

Country	Ramsar Convention	World Heritage	CITES	CBD	Cartagena
Brunei Darussalam	–	–	04/05/90 (A)	–	–
Cambodia	23/10/99	28/11/91 (A)	04/07/97 (R)	09/02/95 (A)	17/09/03 (A)
Indonesia	08/08/92	06/07/89 (A)	28/12/78 (A)	23/08/94 (R)	03/12/04 (R)
Lao PDR	–	20/03/87 (R)	01/03/04 (A)	20/09/96 (A)	03/08/04 (A)
Malaysia	10/03/95	07/12/88 (R)	20/10/77 (A)	24/06/94 (R)	03/09/03 (R)
Myanmar	17/03/05	29/04/94 (A)	13/06/97 (A)	25/11/94 (R)	–
Philippines	08/11/94	19/09/85 (R)	18/08/81 (R)	08/10/93 (R)	–
Singapore	–	–	30/11/86 (A)	21/12/95 (R)	–
Thailand	13/09/98	17/09/87 (A)	21/01/83 (R)	29/01/04 (R)	10/11/05 (A)
Viet Nam	20/01/89	19/10/87 (A)	20/01/94 (A)	16/11/94 (R)	21/01/04 (A)

Source: *UNESCO (2005), World Heritage*
IUCN (2005), Contracting Parties to the Ramsar Convention on Wetlands
UNEP (2005), UNEP Activities in Biodiversity
Acronyms *& Abbreviations: R – Ratification; A – Accession;*

Resources; establish measures to minimise the impacts of GMOs with the use of the ASEAN Guidelines on Risk Assessment of Agricultural GMOs; promote national and regional cooperation for CBD, CITES, and Ramsar Convetion; establish a functional regional database or network of national databases containing inventory of the biological resources of the region; and to establish the ASEAN Centre for Biodiversity.

Chemicals and Hazardous Wastes

Three major MEAs related to the chemicals and hazardous wastes are the:

1. 1989 Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (the Basel Convention);
2. 1998 Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (the Rotterdam Convention or PIC); and
3. 2001 Convention on Persistent Organic Pollutants (the Stockholm Convention or POPs).

Under the chemical and hazardous wastes cluster of MEAs, various framework proposals have been identified as relevant to regional cooperation. At the national level member countries have been active in implementing the chemical and hazard wastes related conventions. In Cambodia, for example, the government has asked various ministries to get involved in the management of POPs. In Singapore, the government has banned the use of the 10 POPs and limited the emissions of dioxins and furans through its Environmental Pollution Control Act and its Regulations even before Singapore acceded to the Stockholm Convention in 2005.[5]

As of end 2005, eight ASEAN countries have ratified the Basel Convention. However, almost half of the ten ASEAN countries have yet to ratify the Rotterdam and Stockholm Conventions. Cambodia, Indonesia and Lao PDR are yet to be parties of both conventions; Malaysia has yet to ratify the Stockholm Convention, while Viet Nam has yet to accede to the Rotterdam Convention.

ASEAN welcomed the establishment of the Basel Convention Regional Centre for Training and Technology Transfer for Southeast Asia (BCRC-SEA) in 2005, which is located in Jakarta, Indonesia. The Centre's main function is to coordinate the implementation of the convention between the Basel Convention Secretariat and the ten ASEAN Member Countries, in particular in terms of capacity building and training.

Table 8.7: Participation in Chemical and Hazardous Waste related Conventions

Country	Basel Convention	Rotterdam Convention	Stockholm Convention
Brunei Darussalam	16/12/02 (A)	–	21/05/02 (A)
Cambodia	02/03/01 (A)	–	–
Indonesia	20/09/93 (A)	–	–
Lao PDR	–	–	–
Malaysia	08/10/93 (A)	04/09/02 (A)	–
Myanmar	–	–	19/04/04 (A)
Philippines	21/10/93 (R)	–	27/02/04 (R)
Singapore	02/01/96 (A)	24/05/05 (A)	24/05/05 (R)
Thailand	24/11/97 (R)	19/02/02 (A)	31/01/05 (R)
Viet Nam	13/03/95 (A)	–	22/07/02 (R)

Source: *Compiled from Basel, Rotterdam and Stockholm Convention Secretariats (2006).*

End Notes

1 *Earth Negotiations Bulletin* (2002), "Summary of the Eighth Meeting of the Conference of the Contracting Parties to Ramsar Convention on Wetlands: 18 – 26 November 2002," 29 Nov 2002.

2 The IUCN Red List is the world's most comprehensive inventory of the global conservation status of plants and animals. It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. There are nine Categories of Threat in the IUCN Red List system: *Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern, Data Deficient,* and *Not Evaluated*. A species is listed as threatened if it falls in the Critically Endangered, Endangered or Vulnerable categories. From the World Conservation Union (IUCN) (2005a), "The IUCN Red List of Threatened Species," < http://www.iucn.org/themes/ssc/redlists/rlindex.htm > 12 Oct 2005.

3 BirdLife International (2004), "Over Half of Asia's Most Important Wildlife Sites Inadequately Protected," < http://www.birdlife.org/news/pr/2004/11/asia_ibas.html > 14 Oct 2005.

4 Appendix I lists species that are the most endangered among CITES-listed animals and plants. These are threatened with extinction and CITES generally prohibits commercial international trade in specimens of these species. Appendix II lists species that are not necessarily now threatened with extinction but may become so unless trade is closely controlled. Appendix III is a list of species included at the request of a Party that already regulates trade in the species and that needs the cooperation of other countries to prevent unsustainable or illegal exploitation. Definitions from CITES (2005), "The CITES Appendices," < http://www.cites.org > 12 Oct 2005.

5 Ministry of the Environment and Water Resources, Singapore (2006)

CHAPTER 9
ASEAN Environmental Management Framework

We shall strengthen further ASEAN's institutional framework both in terms of its structure and process to ensure that it is responsive to the challenges and needs of moving towards an ASEAN Community, including in terms of coordination and efficiency as well as in strengthening its ability to shape events in Southeast Asia and beyond.

Vientiane Action Programme

The Vientiane Action Programme 2004 – 2010, the second in the series of medium-term plans of action to achieve ASEAN Vision 2020, aims to achieve a clean and green ASEAN, with fully developed mechanisms for environmental governance, as a shared goal and responsibility of ASEAN Member Countries. This goal and ASEAN's commitments to the numerous international environmental agreements/conventions/fora have shaped the region's environmental agenda which is now focussed primarily on ten priority areas of interest. The previous chapters described in detail the conditions and status of the environment and natural resources in the region, including the socio-economic settings and external pressures that impinge on the environment. While it falls upon national governments to take actions to address and manage environmental problems, ASEAN has long recognised the synergistic benefits in addressing common and transboundary environmental issues on a regional basis. ASEAN cooperation on environment dates back to 1977, that is over three decades. ASEAN has in place a formal institutional structure, from the expert/technical level to the Ministerial and Summit levels to address environmental issues of concern of the region. The regional environmental policy, strategic thrusts and programme areas are situated within the context of achieving environmental sustainability in an ASEAN Community comprising three pillars, namely political and security community, economic community, and socio-cultural community that are closely intertwined and mutually reinforcing for the purpose of ensuring durable peace, stability and shared prosperity in the region. Collaboration with various relevant parties, particularly with the international organisations, private sector and civil society, is a key aspect of ASEAN's outward-looking, inclusive mode of collaboration to enable us to learn and to share our experiences for mutual benefit.

ASEAN FACTS AND FIGURES

Policy Framework for Environmental Cooperation in ASEAN *(derived from)*	ASEAN Vision 2020 (1999) ASEAN Concord II (October 2003)
Environmental Objectives and Strategic Thrusts	ASEAN Socio-Cultural Plan of Action (Enhancing Environmental Sustainability)
Environmental Programme Areas and Measures	Vientiane Action Programme (2004 – 2010)
Most Recent Ministerial Declaration/Agreement related to environment	• Yangon Resolution on Sustainable Development (December 2003) • ASEAN Declaration on Heritage Parks (December 2003) • Agreement on the Establishment of the ASEAN Centre for Biodiversity (September 2005)

Policy Framework

Recognising the benefits of collective action to address environmental issues, particularly those of a transboundary nature or has region-wide interest, ASEAN has, since 1977, cooperated closely in promoting environmental cooperation among its member countries. In 1997, the Heads of State/Government of ASEAN Member Countries reaffirmed their commitment to the aims and purposes of ASEAN and articulated a long term vision, ASEAN Vision 2020, which reflects the desire of ASEAN to pursue a more sustainable path to development. Among others, the Vision calls for:

"A clean and green ASEAN with fully established mechanisms for sustainable development to ensure the protection of the region's environment, the sustainability of natural resources and the high quality of life of its people."

The ASEAN Leaders further elevated ASEAN's collaborative endeavour by announcing the realisation of an ASEAN Community by the year 2020. The ASEAN Community shall be based on three mutually supporting pillars namely: the ASEAN Security Community, the ASEAN Economic Community and the ASEAN Sociol-Cultural Community. While environmental cooperation essentially falls under the ASEAN Socio-Cultural

Community, there are strong linkages to ensure mutually coordinated development with the other two pillars.

The Leaders in adopting Vision 2020 decided that its goals shall be achieved through a series of medium-term action plans, which will set strategies and specific activities with measurable targets and outputs, including means of implementation and mid-term review mechanisms. The first of such action plans, known as the Ha Noi Plan of Action was implemented from 1999 – 2004. The second action plan, known the Vientiane Action Programme (VAP) is currently being implemented covering the period 2004 – 2010.

ASEAN shares and strongly believes in the global movement towards sustainable development i.e. coordinated and mutually supportive integration of economic growth, social development and environmental protection. ASEAN Vision 2020 and its medium-term plans of action form the sustainable development framework for ASEAN. It reflects ASEAN's responsive integrated policy framework, which weaves together demographic dynamics, social development, economic growth, natural resource conservation and environmental protection, including narrowing the development gap of member countries.

The ASEAN Socio-Cultural Community (ASCC) as elaborated in the Vientiane Action Programme aims to "nurture human, cultural and natural resources for sustained development in a harmonious and people-centred ASEAN". The ASCC represents ASEAN's aspirations to lift the quality of life of its people, sustainably use natural resources and strengthen its cultural identity towards a people-centred ASEAN. The roadmap for the Community focuses on four strategic thrusts to support other ASEAN community goals: strong and functional systems of economic growth; promoting environmental sustainability and sustainable natural resources management that meets current and future needs; social governance that manages impacts of economic integration; and the preservation and promotion of the region's cultural heritage and cultural identity.

The VAP has elaborated 12 strategies and 55 programme areas and measures in order to achieve the twin objective of promoting environmental sustainability and sustainable natural resource management.

Box 9.1: Strategies to Achieve Environmental Sustainability

1. Effectively address global environmental issues without impinging on competitiveness, or social and economic development based on the principle of common but differentiated responsibility;
2. Prevent transboundary haze pollution as a result of land and/or forest fires through concerted national cooperation, pursued in the context of sustainable development and in accordance with the provisions of the ASEAN Agreement on Transboundary Haze Pollution;
3. Establish a clean and green ASEAN, rich in cultural traditions (where the values and practices of the people are in accord with the rhythm and harmony of nature), with citizens who are environmentally literate, imbued with environmental ethics, and willing and capable to ensure the sustainable development of the region through environmental education and public participation efforts;
4. Aim for zero waste and minimal impact on the environment, and promote business opportunities in environmental goods and services, through relevant environmental education and public participation efforts;
5. Ensure cities/urban areas in ASEAN are environmentally sustainable, while meeting the social and economic needs of the people; and
6. Strive for harmonisation of environmental policies, legislation, regulations, standards and databases, taking into account the national circumstances of Member Countries, to support the integration of the environmental, social and economic goals of the region.

Natural Resources Management

1. Ensure ASEAN's coastal and marine environment are sustainably managed; representative ecosystems, pristine areas and species are protected; economic activities are sustainably managed, and public awareness of the coastal and marine environment instilled;
2. Ensure ASEAN's rich biological diversity is conserved, and sustainably managed, and the

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benefits arising from these biological and genetic resources are fairly and equitably shared toward enhancing social, economic and environmental well-being;

3. Promote sustainability of water resources to ensure sufficient water quantity of acceptable quality to meet the needs of the people of ASEAN in terms of health, food security, the economy and the environment, taking into consideration the strong linkage between water, health and poverty;
4. Ensure sustainable management of land-based resources while enhancing optimum agricultural production;
5. Promote the sustainable management of the forest resources and critical ecosystems through the eradication of unsustainable practices as well as strengthening the preservation and management of the ASEAN Heritage Parks; and
6. Promote environmentally sound and socially responsible mineral development practices in the sustainable management and optimum utilisation of mineral resources.

The environmental strategies and measures in the VAP are the product of the wisdom gained and lessons learned from over three decades of environmental protection efforts in ASEAN. They basically articulate the priority needs and interests of the region, taking into consideration the obligation to respond collectively and effectively to global environmental issues outlined in numerous conventions/agreements/fora. Since 1981 ASEAN has promulgated 14 environmental agreements/ declarations beginning with the Manila Declaration on the ASEAN Environment to the more recent Agreement for the Establishment of the ASEAN Centre for Biodiversity in 2005.

Box 9.2: Assessment of Accomplishments of Ha Noi Plan of Action 1999 – 2004

Tangible progress has been attained in achieving closer environmental cooperation in the region within the six-year Ha Noi Plan of Action (HPA) time frame. Environmental consideration has been incorporated into development plans. Concerted effort has been made to coordinate activities with relevant bodies. The ASEAN Secretariat has played a coordinating and enabling role in supporting the achievement of the HPA measures, and in integrating environment into other sectors and development activities. Four out of the 15 HPA initiatives have been fully accomplished, three substantially achieved, and the rest partially achieved. The four pertain to transboundary haze and biodiversity related issues.

Key Achievements

- **Closer Cooperation to Address Land and Forest Fires and Transboundary Haze.** The ASEAN Agreement on Transboundary Haze Pollution was signed in 2002 and entered into force in 2003 following ratification by six countries. It provides for the establishment of a Coordinating Centre for Transboundary Haze Pollution Control to forge closer cooperation in operational activities.
- **Organised Efforts for Nature Conservation and Biodiversity.** The ASEAN Regional Centre for Biodiversity Conservation Project has successfully accomplished its tasks, and paved the way for the establishment of the ASEAN Centre for Biodiversity in 2005.
- **Integrated Protection of the Coastal and Marine Environment.** ASEAN has adopted the Marine Water Quality Criteria for the ASEAN Region, the ASEAN Criteria for National Marine Protected Areas, and the ASEAN Criteria for Marine Heritage Areas.
- **Prominence in Global Environment Initiatives.** ASEAN played an active role in addressing its concerns in the negotiations of multilateral environment agreements.
- **Efforts in Integrated Water Resources Management.** ASEAN established a Working Group on Water Resources Management and has adopted the ASEAN Long Term Strategic Plan for Water Resource Management in 2003. This was further translated into the ASEAN Strategic Plan of Action on Water Resources Management which was endorsed in 2005.
- **Public Awareness:** The ASEAN Environmental Education Action Plan 2000 – 2005 was implemented, and 2003 was designated as the ASEAN Environment Year with the theme: "Together Towards Sustainable Development."
- **Resources Mobilised.** The environment and sustainable development initiatives used a total of US$ 16.5 million during the 6-year time frame of the HPA, the bulk for biodiversity conservation (72%), followed by transboundary pollution (15%).

Box 9.3: ASEAN Environmental Agreements, 1981 – 2005

Agreement for the Establishment of the ASEAN Centre for Biodiversity created the ASEAN Centre for Biodiversity (ACB) to continue the work of the ASEAN Regional Centre for Biodiversity Conservation (ARCBC). The ACB, located at Los Banos, the Philippines is mandated to facilitate ASEAN cooperation and coordination on the conservation and sustainable use of biological diversity and the fair and equitable sharing of benefits arising from the use of such biodiversity. Signed 27 September 2005.

ASEAN Declaration on Heritage Parks listed 27 ASEAN Heritage Parks at the time of the signing. It superseded the *1984 ASEAN Declaration on Heritage Parks and Reserves*. Signed 18 December 2003.

Yangon Resolution on Sustainable Development, *among others,* tasked the ASEAN Senior Officials on the Environment to contribute actively in formulating the Vientiane Action Plan with a view to achieving the ASEAN Socio-Cultural Community, and reaffirmed ASEAN commitment to the World Summit on Sustainable Development and the Millennium Development Goals. Adopted 18 December 2003.

ASEAN Agreement on Transboundary Haze Pollution aims to prevent and monitor transboundary haze pollution through concerted national efforts and intensified regional and international cooperation. Signed 10 July 2002. Entered into force 25 November 2003.

Jakarta Declaration on Environment and Development recognised sustainable development as the framework that integrates economic, environmental and social goals. Adopted 18 September 1997.

Bandar Seri Begawan Resolution on Environment and Development adopted for implementation of the ASEAN Strategic Plan of Action on the Environment. Adopted 26 April 1994.

Singapore Resolution on Environment and Development called for the intensification of cooperation in environmental management and protection in their common pursuit of sustainable development. Adopted 18 February 1992.

Kuala Lumpur Accord on Environment and Development called for the formulation of an ASEAN strategy for sustainable development and a corresponding action programme. Adopted 19 June 1990.

Jakarta Resolution on Sustainable Development adopted the principle of sustainable development to serve as an integrating factor in ASEAN's common efforts. Adopted 30 October 1987.

Agreement on the Conservation of Nature and Natural Resources enjoined member countries to adopt measures necessary to maintain essential ecological process and life-support systems, to preserve genetic diversity, and to ensure the sustainable utilisation of natural resources. Signed 9 July 1985.

Bangkok Declaration on the ASEAN Environment adopted for implementation of the revised ASEAN Environment Programme II (ASEP II). Adopted 29 November 1984.

ASEAN Declaration on Heritage Parks and Reserves declared 11 national heritage sites and parks as ASEAN National Heritage Parks and Reserves. Adopted 29 November 1984.

Manila Declaration on the ASEAN Environment recommended the establishment of an ASEAN Committee on Environment. Adopted 13 April 1981.

Box 9.4: ASEAN Action Plans related to Environment, 1995 – 2005

The **ASEAN Environmental Education Action Plan (AEEAP) 2000 – 2005** was adopted by the Environment Ministers in October 2000. The Plan outlines strategies and actions at the national and regional level in four target areas: (a) formal education; (b) non-formal education; (c) manpower capability building; and (d) networking, collaboration and communication. A successor Action Plan for the period 2006 – 2010 is being formulated.

The **ASEAN Regional Haze Action Plan (RHAP)** was adopted in December 1997 in response to transboundary haze pollution caused by land and forest fires which hit the region in 1997 – 1998 The primary objectives of the Plan are: to prevent land and forest fires through better management policies and enforcement; to establish operational mechanisms to monitor land and forest fires; and to strengthen regional land and forest fire-fighting capability and other mitigating measures.

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The **Strategic Plan of Action on the Environment (SPAE)** was adopted by the Environment Ministrers in April 1994 to: (a) respond to specific recommendations of Agenda 21 requiring priority action in ASEAN; (b) introduce policy measures and promote institutional development that encourage the integration of environmental factors in all developmental processes both at the national and regional level; (c) establish long-term goals on environmental quality and work towards harmonised environmental quality standards for the ASEAN region; (d) harmonise policy directions and enhance operational and technical cooperation on environmental matters, and undertake joint actions to address common environmental problems; and (e) study the implications of ASEAN Free Trade Area (AFTA) on the environment and take steps to integrate sound trade policies with sound environmental policies.

The **ASEAN Cooperation Plan on Transboundary Pollution** was adopted in June 1995 in view of the increasing periodicity and worsening impact of transboundary pollution in the region. The Plan addresses the following three programme areas: (a) transboundary atmospheric pollution; (b) transboundary movement of hazardous wastes; and (c) transboundary ship borne pollution. The ASEAN Senior Officials on the Environment-Haze Technical Task Force (ASOEN-HTTF) was established in 1995. The ASOEN-HTTF subsequently developed the RHAP, and initiated the development of the ASEAN Agreement on Transboundary Haze Pollution.

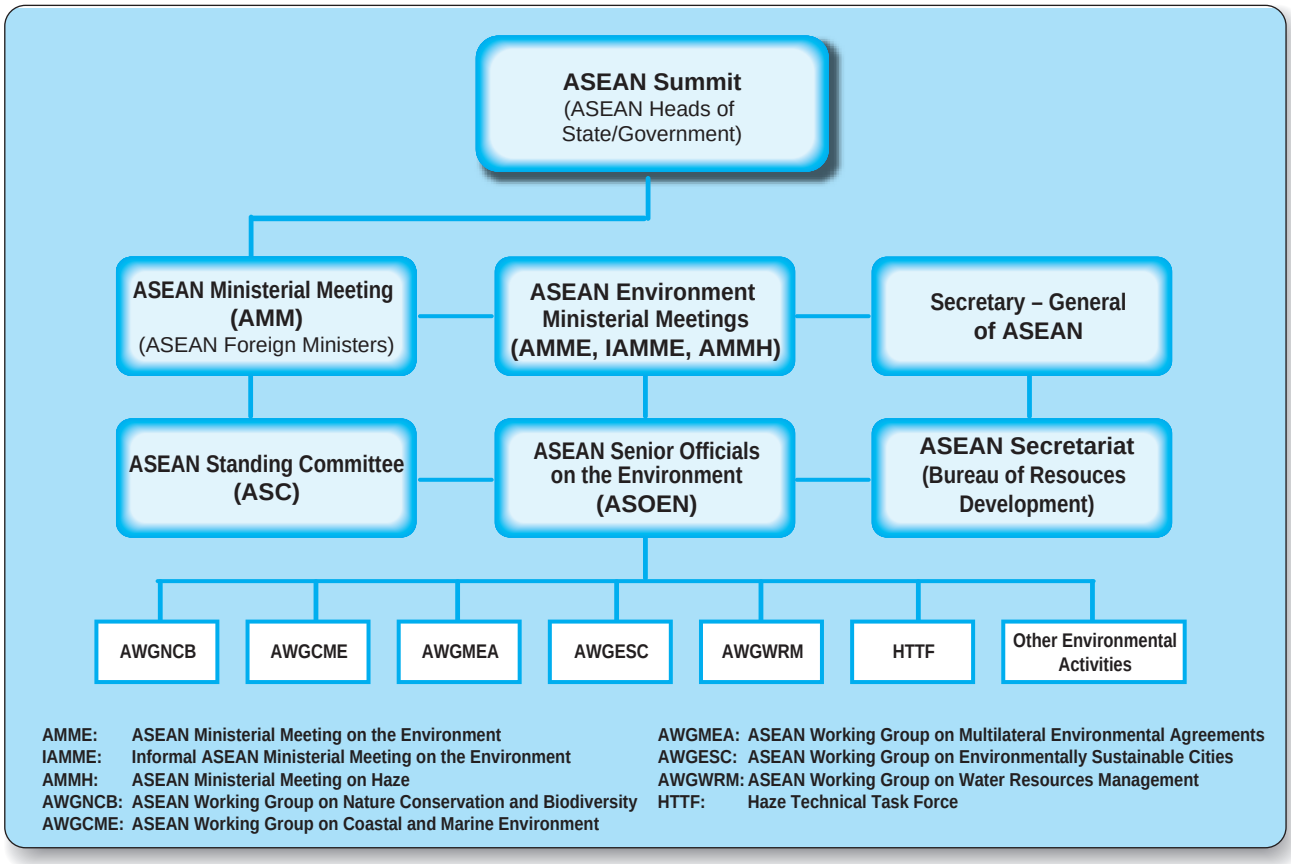
Institutional Framework

A formally instituted inter-governmental structure exists in ASEAN where environmental issues are considered at various levels up to the ASEAN Heads of State/Government. At these Summit Meetings, the ASEAN Leaders provide the vision and broad thrust for cooperation in various sectors, including cooperation on environment. The ASEAN Ministers for Environment are primarily responsible for policy matters related to the environment. The Environment Ministers meet once every three years on a formal basis, and since 1994 have met on an informal basis annually in between these formal meetings. Deliberations of the Environment Ministers are also considered by the Foreign Ministers at the ASEAN Ministerial Meeting (AMM), in particular to enhance coordination and synergy among the various other sectors of cooperation.

The ASEAN Senior Officials on the Environment (ASOEN) meet annually and are responsible for formulation, implementation and monitoring of regional programmes and activities on the environment. ASOEN comprises heads of environmental ministries/departments/agencies who are responsible for environmental matters in their respective countries. ASOEN members also serve as the national ASOEN focal points for promoting ASEAN's activities in their respective countries. ASOEN is assisted by six subsidiary bodies, namely the Working Group on Coastal and Marine Environment, the Working Group on Environmentally Sustainable Cities, the Working Group on Multilateral Environmental Agreements, the Working Group on Nature Conservation and Biodiversity, the Working Group on Water Resources Management, and the Haze Technical Task Force. The ASEAN Secretariat coordinates and reports to ASOEN on all other activities that do not fall within the purview of the respective working groups.

The ASEAN Secretariat provides support for all of these institutional bodies (Figure 9.1). In particular, the ASEAN Secretariat acts as a resource base, providing advice and information. The ASEAN Secretariat also coordinates the implementation of regional activities and programmes, in addition to servicing the meetings of the ASEAN bodies. The ASEAN Secretariat ensures proper coordination between activities of various other sectoral areas so as to promote synergy and avoid duplication. Another important role played by the ASEAN Secretariat is the coordination between ASEAN bodies and its programmes with those of dialogue partners and other international organisations in terms of resource mobilisation, programme implementation and in general enhancing institutional linkage. The Bureau for Resources Development, in particular the Environment and Disaster Management Unit, is managing all matters related to environment.

Figure 9.1: ASEAN Institutional Framework for Environmental Cooperation



In order to achieve meaningful and focused cooperation, the ASEAN Environment Ministers at their 7th informal meeting in 2002 in Vientiane, Lao PDR prioritised environmental cooperation in ten areas and agreed that the idea of each country spearheading programmes in one specific area of interest would help to create better platforms for further cooperation on the environment. Following these decisions, ASOEN at their 14th meeting in Yogyakarta, Indonesia (2003) noted the expression of interest from member countries to take the lead on specifics area of cooperation and agreed on the following lead country arrangement.

Table 9.1: Lead Countries for the Ten Priority Areas for Cooperation

Priority Areas for Regional Cooperation	Lead Country	Subsidiary Body of ASOEN
Global environmental issues (focus on MEAs)	Indonesia	AWGMEA
Land and forest fires and transboundary haze pollution	Indonesia	ASOEN-HTTF
Coastal and marine environment	Viet Nam	AWGCME
Sustainable forest management	*Philippines*	*AWGNCB*
Sustainable management of protected areas		
Freshwater resources	*Thailand*	*AWGWRM*
Urban environmental management and governance	Singapore	AWGESC
Promotion of environmentally sound technologies and cleaner production	Malaysia	
Public awareness and environmental education	Myanmar	
Sustainable development monitoring and reporting, database harmonisation	Viet Nam	

Major Regional Programmes and Activities

Transboundary Haze Pollution

The ASEAN Agreement on Transboundary Haze Pollution (AATHP) was signed by the ASEAN Environment Ministers on behalf of their governments in Kuala Lumpur, Malaysia on 10 June 2002. UNEP hailed the AATHP as the first regional arrangement in the world that binds a group of contiguous states to tackle haze pollution resulting from land and forest fires.[1] It entered into force on 25 November 2003, sixty days after the submission of sixth instrument of ratification by Thailand. As of December 2005, seven member countries, namely Brunei Darussalam, Lao PDR, Malaysia, Myanmar, Singapore, Thailand and Viet Nam, have ratified the Agreement.

The AATHP seeks to prevent and monitor transboundary haze pollution as a result of land and/or forest fires which should be mitigated, through concerted national efforts and intensified regional and international cooperation in the overall context of sustainable development and in accordance with the other provisions of the Agreement. The AATHP provides for the establishment of the ASEAN Coordinating Centre for Transboundary Haze Pollution Control (ACC), which will facilitate cooperation and coordination among member countries. To support the implementation of the AATHP, an ASEAN Transboundary Haze Pollution Control Fund will be created.

In addition to ongoing activities implemented under the Regional Haze Action Plan, there have been substantive developments in the implementation of the ASEAN Agreement on Transboundary Haze Pollution. These include continuous monitoring of land and forest fires and associated haze by the ASMC; development and operationalisation of the regional standard operating procedures (SOP) to guide monitoring and assessment efforts and joint emergency response; simulation exercises to familiarise member countries with the regional SOP and enhance coordination and communication mechanisms in joint emergency response; development of a website (ASEAN Haze Action Online website) to facilitate information sharing and dissemination; development of an online inventory of available fire fighting resources in member countries that could be made available in case of emergency; development of guidelines for zero burning and controlled burning practices; dialogue sessions with plantation companies to promote zero burning practices; establishment of community fire brigades at the village level; development of a regional strategy on sustainable use of peatlands; and various capacity building, training programmes, and on-the-ground activities to promote rehabilitation and sustainable use of peatlands.

Figure 9.2: ASEAN Haze Action Online Website (www.haze-online.or.id)

Table 9.2: Guidelines to Control Land and Forest Fires under the ASEAN Agreement on Transboundary Haze Pollution

Item	Guidelines for the Implementation of the ASEAN Zero Burning Policy	Guidelines for the Implementation of Controlled Burning Practices
Definition	A method of land clearing whereby the tree stand, either logged over secondary forests or an old area of plantation crops such as oil palm are felled, stacked, and left *in situ* to decompose naturally.	The controlled application of fire to fuels in either a natural or modified state, under specified environmental conditions that allow the fire to be confined to a pre-determined area and at the same time produce the intensity required to achieve pre-determined management objectives.
Beneficiaries	Large-scale plantation companies	Farmers, smallholders and shifting cultivators
Techniques	Various techniques and steps for the replanting of plantation crops to oil palm involve pulverisation, windrowing without shredding of palms, or planting to young palms on residue piles. There are also zero burning techniques for replanting rubber to oil palm, and replanting cocoa-coconut areas. For the development of new oil palm plantations, there are also various techniques and steps for various types of land features like secondary/logged over-forests on flat to undulating terrain, on hilly terrain, or on peat. The general steps for planting oil palm from secondary forest on flat to undulating terrain involve the following: planning for new planting; under-brushing; lining and construction of roads and drains; felling; stacking of residual wood biomass; legume cover establishment; planting of oil palm seedlings; post-planting management.	• Heading fire – moves with the wind; most intense; faster spread rate, wider flaming zone; longer flames; burns cooler at the ground surface; containment is critical when wind speed and fuel quantity increases • Backing fire – against the wind; the least intense; slow spread rate; has narrow flaming zone; short flames; the easiest way to burn; takes longer time to complete the burn; burns hotter at the ground surface • Flanking fire – at right angles, perpendicular to the wind; intermediate intensity; has moderate flame heights and speed; the slope of the land has an effect on rate of spread similar to that of the wind • Other techniques: Strip-heading fire; Spot fire; Centre fire
Benefits	Does not cause air pollution; reduces greenhouse gases emission; improves soil organic matter; agronomic benefits can be enhanced; less dependent on weather conditions; has shorter fallow period than clearing by burning; would result in additional revenue from continued harvesting of the palms until they are felled; would ensure economic and ecological sustainability	• More economical and efficient compared to other land clearing methods • Could improve soil fertility • Clears away debris • Could control the growth of weeds and competing vegetation • Minimises smoke production • Could help in controlling pests and diseases
Potential problems	• Pests such as the rhinoceros beetle and the Basal Stem Rot caused by *Ganoderma boninense* can cause serious losses to the new oil palm stand • Logged-over forests and peat swamps, susceptible to attacks by termites • Could provide breeding ground for rats • More expensive to implement for forest clearing, particularly in areas with a high volume of biomass • During prolonged dry weather, decomposing biomass could dry out and become sources of accidental fires • May not be acceptable to those who are unfamiliar with the new technique	• Could produce smoke that may affect the surrounding areas • May cause damage on ecosystem • Could produce large amount of smoke • Most soil biological properties damaged at 100 °C. Heating between 220 °C and 460 °C will destroy soil structure. • Fire may spread to other areas • Weak government handling will hinder effective coordination and cooperation between the government and farmers • Burning applied to a large area will produce a lot of smoke

To ensure speedy and timely response during critical periods of fire and haze, the ASEAN Environment Ministers have established a Panel of ASEAN Experts on Fire-and-Haze Assessment and Coordination to provide rapid independent assessment of the situation on the ground, and provide recommendations to facilitate immediate response and effective mobilisation of resources in the region. The Panel consists of experts from member countries with various technical expertise and background. They will be mobilised during potential or impending critical periods to gather latest information on fire-and-haze situation on the ground, and recommend the type and scope of resources that need to be mobilised to mitigate the fires and haze. Member countries are committed to allocate resources and provide full support to ensure expeditious mobilisation of the Panel of ASEAN Experts.

At the 11th ASEAN Summit in December 2005, the ASEAN Leaders expressed their serious concern over the impact of land and forest fires and the resulting transboundary haze pollution that affects the region almost annually. While various measures have been undertaken at the national level over the years, and at the regional level as guided by the ASEAN Agreement on Transboundary Haze Pollution, the Leaders recognised the need to further intensify and undertake coordinated action, particularly to address underlying causes of land and forest fires. Swift and more effective inter-agency collaboration and coordination at the national and regional levels is necessary to deal comprehensively with transboundary haze pollution and its widespread impact.

Box 9.5: The ASEAN Peatland Management Initiative (APMI)

Southeast Asia has more than 25 million hectares of peatlands, comprising 60% of the world's tropical peatlands and roughly one tenth of the entire extent of global peatland resource. The majority of the peatlands in Southeast Asia is in Indonesia, which has over 70% of total peatland areas. Other major peatland areas are found in Brunei Darussalam, Malaysia, the Philippines, Thailand, and Viet Nam. These peatlands have significant importance for socio-economic development and livelihoods of local communities. Peatlands play an important role in the hydrological cycle, carbon store and sink functions; serve as habitat for unique biological diversity; and provide food supply (especially freshwater fish and other natural products), timber and non-timber forest products (e.q. rattan and honey). However, increased development, land conversion, and degradation caused by land and forest fires have reduced peatland resources significantly over the past few years.

The most important management issue of regional importance is transboundary haze pollution arising from peatland fires. Peat fires in Southeast Asia almost always occur as a result of human intervention. Undrained peat rarely burns. Therefore, drainage of peatland for agriculture, forestry and other purposes is the main root cause of peatland fires. In 1997 – 1998 widespread fires destroyed or degraded 2 million ha of peatlands. Peatlands of the region are thought to store up to 5% of all carbon stored on the world's land surface. The clearance, drainage and burning of peatlands in the region is now leading to significant carbon emissions.

The ASEAN Peatland Management Initiative (APMI) aims to promote sustainable management of peatlands in the ASEAN region through collective action and enhanced cooperation to support and sustain local livelihoods, reduce risk of fire and associated transboundary haze pollution, and contribute to global environmental management. The APMI is envisaged as a long-term initiative that will work through the existing ASEAN structure and will be coordinated by the ASEAN Secretariat and the ASOEN-HTTF. The specific objectives under APMI are to: (a) enhance understanding and build capacity on peatland management issues in the region; (b) reduce the incidence of peatland fires and associated haze; (c) support national and local level implementation activities on peatland management and fire prevention; and (d) develop a regional strategy and cooperation mechanisms to promote sustainable peatland management. The APMI and its initial work plan for 2003 – 2005 were endorsed by the ASOEN-HTTF in February 2003, and subsequently noted by the ASEAN Environment Ministers in March 2003. During this initial period, the ASEAN Peatland Management Strategy covering the period of 2006 – 2020 have been developed through regional workshops and national consultations to guide Member Countries into taking concrete actions to support sustainable management of peatlands and reduce peat fires and associated transboundary haze pollution within the framework of the ASEAN Agreement on Transboundary Haze Pollution. Plans are underway to operationalise the regional strategy.

Table 9.3: Completed and On-Going Programmes and Activities to Control Transboundary Haze Pollution

Project Title	Description
1. Regional Response for Land and Forest Fire and Transboundary Haze Pollution: SRFA Fire and Haze Disaster Simulation Exercises	**Objective:** Create a practice field for member countries and other relevant organisations/agencies for learning and strengthening existing institutional structures responsible for coordination, preparedness and response aspects of land and forest fire disaster. **Current status:** Two table-top exercises conducted in July 2003 and April 2004, respectively. Simulation exercise being planned in 2007.
2. IFAD/ GEF Project on the Rehabilitation and Sustainable Use of Peatlands in Southeast Asia (PDF-B)	**Objectives:** Strengthen capacity for sustainable peatland management, minimise the degradation of peatlands in relevant Southeast Asian countries, rehabilitate and sustainably manage targeted peatlands, and enhance the livelihood of local communities through sustainable peatland management **Current status:** Project development phase (PDF-B) ongoing
3. Publication and Dissemination of Information Materials on the Implementation of ASEAN Agreement on Transboundary Haze Pollution	**Objectives:** Communicate ASEAN's efforts and initiatives on land and forest fires and transboundary haze pollution to showcase ASEAN's efforts, project a positive image and correct the misperception of the international media regarding the haze issues in the region **Current status:** Ongoing
4. Inventory of Fire Fighting Resources	**Objective:** Provide online information on fire fighting resources available in member countries that could be shared in situations where such need arises. The information is available on the ASEAN Haze Action Online website (www.haze-online.or.id) Current status: Ongoing
5. Rainfall Estimation for Monitoring of High Risk Fire Areas in Southeast Asia	**Objective:** Develop a technique to detect rain areas and estimate rain amounts in the ASEAN region using data from the Japanese GMS-5/MTSTAT (Geostationary Meteorological Satellite/Multi-functional Transport Satellite). **Current status:** Ongoing
6. Development of a Comprehensive Regional Early Warning System to Support the Successful Implementation of the ASEAN Agreement on Transboundary Haze Pollution	**Objective:** Develop a comprehensive regional early warning system to support the successful implementation of the ASEAN Agreement on Transboundary Haze Pollution through (i) advancing the development and operationalisation of the regional fire Danger Rating System: (ii) utilising/ optimising the use of hotspot data; (iii) developing comprehensive and adequate air quality data in fire-prone areas; (iv) calibrating existing haze dispersion model; (v) improving climate outlook dissemination; (vi) developing and updating risk maps; (vii) harmonising terminology; and (viii) developing a sustainable and quality (better accuracy and higher resolution) GIS database. **Current status:** Proposal under formulation
7. Second Workshop on Zero Burning	**Objective:** Promote the use of the Guidelines on the ASEAN policy on Zero Burning to plantation companies, timber concessionaires, and fire experts in ASEAN **Current status:** Activity under preparation
8. Conference on Promoting Partnerships for the Implementation of the ASEAN Agreement on Transboundary Haze Pollution	**Objectives:** Provide a forum for exchange of inputs and ideas with regard to the implementation of the ASEAN Agreement on Transboundary Haze Pollution; provide an opportunity for ASEAN to share the progress and needs for the implementation of the Agreement; promote and strengthen partnership between relevant regional and international organisations and donor communities to support the implementation of the Agreement; and explore areas for possible cooperation and partnership with them to meet future challenges of land and forest fire and transboundary haze pollution **Current status:** Activity under preparation
9. Operationalisation of the Panel of ASEAN Experts on Fire and Haze Assessment and Coordination	**Objective:** Develop the deployment, operational mechanisms, and reporting procedures; and discuss future activities of the Panel of ASEAN Experts. **Current status:** Activity under preparation

Nature Conservation and Biodiversity

The successful completion of the EU funded ASEAN Regional Centre for Biodiversity Conservation (ARCBC) Project from 1999 to 2004 convinced ASEAN to establish a legally constituted permanent organisation known as the ASEAN Centre for Biodiversity through an agreement among member countries signed on 27 September, 2005. The main role of the Centre is "to facilitate cooperation and coordination among the members of ASEAN, and with relevant national governments, regional and international organisations, on the conservation and sustainable use of biological diversity and the fair and equitable sharing of benefits arising from the use of such biodiversity in the ASEAN region." The European Union will continue to financially support the first three-and-a-half years of operation of the Centre.

In December 2003, 27 national protected areas were designated as ASEAN Heritage Parks when the ASEAN Declaration on Heritage Parks was adopted by the ASEAN Environment Ministers. The ASEAN Heritage Parks Programme provides a means for member countries to learn and benefit from available best practices in park management. In September 2004, the first Conference on ASEAN Heritage Parks was held in Khao Yai National Park, an ASEAN Heritage site in Thailand. The conference served as a venue for the managers of ASEAN Heritage Parks to share experiences, and will be a regular initiative of the ASEAN Heritage Programme.

ASEAN is also in the process of concluding a draft ASEAN Framework Agreement on Access to, and Fair and Equitable Sharing Benefits Arising from the Utilisation of, Biological and Genetic Resources. The Framework Agreement principally aims to set minimum standards with a view to harmonising national laws, regulations and policies on access and benefit sharing in view of the common and shared resources in the region.

Coastal and Marine Environment

To help protect the shared marine waters in the region, ASEAN has adopted the Marine Water Quality Criteria for the ASEAN Region, the ASEAN Criteria for National Marine Protected Areas, and the ASEAN Criteria for Marine Heritage Areas. The Marine Water Quality Criteria sets values for an initial set of 17 parameters for the protection of aquatic life and human health, while the Criteria for National Marine Protected Areas and ASEAN Marine Heritage Areas contain criteria for designation and management of existing and new protected areas. It also established an information exchange mechanism on seven subject areas: coral reef, sea grass, and mangroves; tanker sludge and ballast water; solid, liquid, and hazardous waste management; coastal erosion; eco-tourism; and coastal wetlands.

Table 9.4: Marine Water Quality Criteria For The ASEAN Region

For Aquatic Life Protection	
Parameter	**Criteria Values**
Ammonia (NH_3-N)	70 µmg /L
Cadmium	10 µmg /L
Chromium (VI)	50 µmg /L
Copper	8 µmg /L
Temperature	Increase not more than 2 °C above the maximum ambient temperature
Cyanide	7 µmg /L
Dissolved oxygen	4 mg/L
Lead	8.5 µmg /L
Mercury	0.16 µmg /L
Nitrate (NO_3-N)	60 µmg /L
Nitrite (NO_2-N)	55 µmg /L
Oil and grease	0.14 mg/L
Total phenol	0.12 mg/L
Phosphate (PO_4^{3-}–P)	15 µmg /L (Coastal) 45 µmg /L (Estuarine)
Tributyltin	10 mg/L
Total suspended solids	Permissible 10% maximum increase over seasonal average concentration
For Human Health Protection	
Parameter	**Criteria Values**
Bacteria	100 faecal coliform/100 mL 35 enterococci/100 mL

Integrated Water Resources Management

ASEAN has formulated the ASEAN Long Term Strategic Plan for Water Resources Management (2003) and the ASEAN Strategic Plan of Action on

Water Resources Management (2005) to provide a programmatic implementation framework and develop regional project proposals based on assessment of needs and priorities in the region. The ASEAN Working Group on Water Resources Management (AWGWRM) agreed to have lead country/ies coordinate the further development and implementation of the individual project concepts.

Table 9.5: Regional Project Proposals on Water Resources Management and its Lead Country/ies

Project Concepts	Lead Country/ies
1. Demand Management Learning Forums	Singapore and Thailand
2. ASEAN IWRM Country Strategy Guidelines	Malaysia
3. River Classification Systems	Viet Nam
4. ASEAN Water Data Management and Reporting System Design	Malaysia
5. Risks and Impacts from Extreme Events in ASEAN Countries	Indonesia and Thailand
6. Knowledge Sharing and Exchange	Philippines
7. Exchanging Information and Creating Awareness in a Structured Basis Among Relevant Agencies	Philippines
8. Integrated Land Use Planning	–
9. Increasing Long Term Awareness, Knowledge and Community Participation in Integrated Water Resource Management	Indonesia
10. Education on Sanitation and Pollution Management	–

Environmentally Sustainable Cities

In June 2003 the ASEAN Working Group on Environmentally Sustainable Cities (AWGESC) was created to implement the Regional Environmentally Sustainable Cities Programme (RESCP). The Framework for Environmentally Sustainable Cities in ASEAN was developed in December 2003, with the vision "Towards Environmentally Sustainable Cities in ASEAN." Member countries have since then nominated 24 cities to participate in the implementation of the Framework. In 2005, the ASEAN Environment Ministers endorsed the ASEAN Initiative on Environmentally Sustainable Cities (AIESC), which replaces the RESCP and serves as an overarching mechanism for ASEAN cities to pursue environmental sustainability and goes beyond the scope of Clean Air, Clean Water and Clean Land, to include green and blue issues in the future.

Table 9.6: Participating Cities in the AIESC

Country	City
Brunei	Bandar Seri Begawan
Cambodia	Phnom Penh, Siem Reap
Indonesia	Balikpapan, Medan, Sidoarjo
Lao PDR	Luang Prabang, Vientiane, Xayabouri
Malaysia	Kuantan, Putrajaya
Myanmar	Mandalay, Yangon
Philippines	Cagayan de Oro, Iloilo, Quezon
Singapore	Singapore
Thailand	Bangkok, Chiangmai, Krabi, Phuket
Vietnam	Da Nang, Ha Long, Hanoi

A Conference on Environmentally Sustainable Cities in ASEAN was held in Singapore in October 2004 to provide city officials in-depth understanding of the Framework for Environmentally Sustainable Cities in ASEAN; share best practices on Clean Air, Clean Water, and Clean Land; cluster cities with similar priorities and capacity development needs; and facilitate possible collaboration between cities and international organisations.

Capacity building activities like workshops and training courses will be organised and conducted in each thematic area. They are aimed at providing technical assistance to city officials to implement the Framework and incorporate relevant best practices to address their respective areas of concern, and to develop performance and quantitative indicators for environmental sustainability.

Table 9.7: Goals and Objectives of Clean Air, Clean Land, and Clean Water of AIESC

Clean Air	Clean Land	Clean Water
Goal: *To achieve and maintain good air quality to safeguard good public health (Pollutant Standards Index < 100)*	**Goal:** *To achieve minimal land disposal of waste and move towards sustainable production and consumption patterns*	**Goal:** *Achieve ASEAN long-term goals for water quality intended for various uses by 2010 and move towards sustainable supply and use of water*
Objectives		
• Data availability and data quality and analysis • Emission control from mobile sources • Emission control from stationary sources • Emission control from area sources • Zoning/land use planning • Transport and traffic management • Cleaner fuels • Energy efficiency • Institutional arrangements and capacity building • Awareness and participation	• To manage, and dispose of solid waste and safeguard public health • To manage, minimise, and dispose of toxic and hazardous wastes to safeguard public health • To reduce waste generation and disposal • To develop and safeguard green areas in cities • To enhance environmental responsibility and ownership	• To achieve good accessibility and quality of water supply for ASEAN cities • To protect water resources, safeguard ecosystems, and public health, so as to achieve ASEAN water quality standards • To move towards sustainable supply and use of water • To inculcate environmental responsibility and ownership

Global Environmental Issues

ASEAN Member Countries actively participate in various global environmental fora and continue to promote common points of understanding on issues of common or regional interest. Lead countries have been assigned to analyse the ramifications of MEAs to ASEAN so that all member countries could reach either common point of understanding or common position as appropriate. Through sharing of experiences in implementing MEAs, member countries are encouraged to cooperate in addressing common issues, and to provide guidance to those that are preparing to ratify or accede to the MEAs. ASEAN has established the ASEAN Working Group on Multilateral Environmental Agreements to provide a forum for member countries to exchange on a regular basis information and experiences, and to design and implement capacity building programmes.

Various capacity building activities related to the Clean Development Mechanism of the Kyoto Protocol to the UN Framework Convention on Climate Change were carried out. ASEAN collaborated with the United Nations University and UNEP in coordinating the implementation of the MEAs. A workshop was held to identify issues and modalities for synergies among MEAs and an ASEAN case study highlighted opportunities and means for overcoming constraints in the effective implementation of MEAs at the national and regional levels. The First UNEP Workshop on Effective Implementation of Chemicals and Hazardous Wastes Conventions held in Malaysia in 2001 identified gaps, constraints, and capacity needs including a regional approach in the implementation of these conventions. Framework proposals have been developed to address these concerns, which are being used by member countries to design their own capacity building programmes.

ASEAN Environmental Education Action Plan

In October 2000, the ASEAN Ministers responsible for environment adopted the ASEAN Environmental Education Action Plan (AEEAP 2000 – 2005). It provided a framework for the development and implementation of environmental education (EE)

activities; enhance manpower capability and initiate mass-based action in managing the environment through information, education, and communications campaign. The Plan focussed on four target areas, namely, formal education, informal education, manpower capacity building, and networking, collaboration, and communication. Thirty-six actions at both the national and regional levels were outlined for each of the target areas. Under Target Area 4: Networking, Collaboration and Communication, ASEAN has developed the ASEAN Environmental Education Inventory Database providing an on-line inventory of environmental education resources in all member countries.

During the mid-term review of the AEEAP in December 2002, member countries sought to consolidate national initiatives that would have greater impact if implemented on a regional scale and to accelerate the achievements of the AEEAP. Six regional proposals were proposed namely: (a) Education for Sustainable Development, (b) Integration of Environmental Education into Primary Schools, (c) ASEAN Environmental Camp, (d) Teacher Training on Environmental Education for Basic Education Schools in the BIMP-EAGA Countries, (e) Environmental Education Training for University Teachers, and (f) Establishment of an ASEAN Environmental Education Centre and Fund.

Box 9.6: ASEAN Environmental Education Inventory Database (AEEID)

The ASEAN Ministers responsible for the Environment on 18 December 2003 formally launched the ASEAN Environmental Education Inventory Database (AEEID). AEEID (http://www.aeeid.aseansec.org) is an interactive on-line database of materials, experiences, and best practices on environmental education in the ASEAN Region. The Database provides an opportunity for greater sharing of environmental education resources and networking within the region and beyond; and also presents limitless opportunities for further publicising activities, sharing ideas and resources, and to undertake networking and partnership activities to enhance environmental education in the region.

Features of AEEID include: information on programmes; courses; resource materials, resource persons; implementing organisations and partners; related web links; and calendar of events. Interested parties can easily locate environmental education initiatives in the region such as activities, programmes and courses offered, organisations and persons involved, or electronically upload their environmental education activities through the template provided.

Box 9.7: Sekolah Lestari – Environment Award Programme

On 27 January 2005, Malaysia launched the Sekolah Lestari – Anugerah Alam Sekitar (Environment Award) Programme, a cooperative activity between the Department of Environment, Ministry of Natural Resources and the Environment, the Ministry of Education and Institute for Environment and Development (LESTARI), Universiti Kebangsaan Malaysia (UKM).

The Programme aims to support and enhance the implementation of the National Policy on the Environment, containing 8 principles and 7 strategies. The first strategy is focused on education and awareness that provides an understanding of the concept of environmental well-being and sustainable development, in line with Rio Agenda 21. The concept of Sekolah Lestari hinges on an integrated approach, involving the school community as a whole, their families, local communities, government, private sector and non-governmental organisations. This concept encompasses the integrated approach in management, curriculum, co-curriculum and greening activities. Sekolah Lestari shall encapsulate current and planned environmental activities and also serve as a centre of learning and education that can influence both the school community and society towards a way of life that is sustainable.

Source: *Ministry of Natural Resources and the Environment, Malaysia (2005)*

ASEAN Environment Year 2003

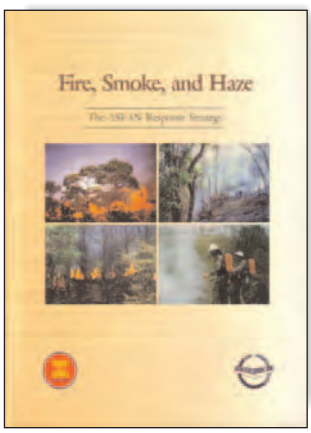
The ASEAN Environment Year 2003 (AEY) regional launch was hosted by the Royal Kingdom of Cambodia with the theme "Together Towards Sustainable Development." The year-long activities highlighted national and regional environmental issues and cooperation programmes which served to broaden the participatory process of all stakeholders in environmental management and to stimulate regional environmental activities. It helped to achieve the following objectives:

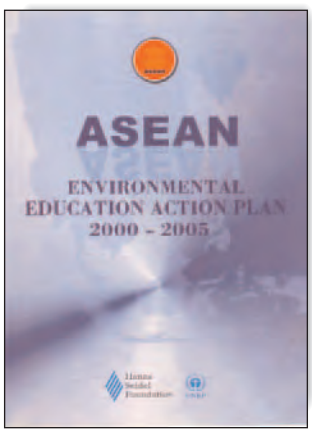
- To promote environmental awareness at all levels of societies within ASEAN;
- To highlight ASEAN achievements in the field of environment;
- To create better informed and environmentally sensitive societies in order to enhance capacities to achieve the ASEAN Vision 2020;
- To enhance partnership among governments, private sectors, civil societies, and NGOs to participate in environmental protection and sustainable resource management;
- To promote and strengthen cooperation and solidarity among ASEAN countries, ASEAN Plus Three, and other countries; and
- To stimulate regional activities in the environmental area to achieve sustainable development.

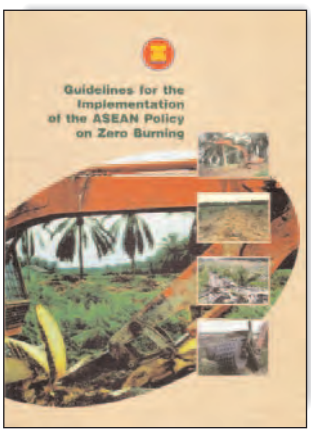
ASEAN celebrates AEY every three years and 2006 has been designated another ASEAN Environment Year with Indonesia as the host.

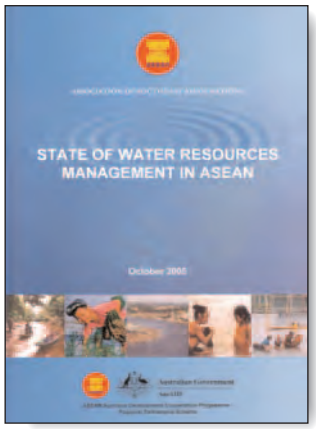
Publications related to environment

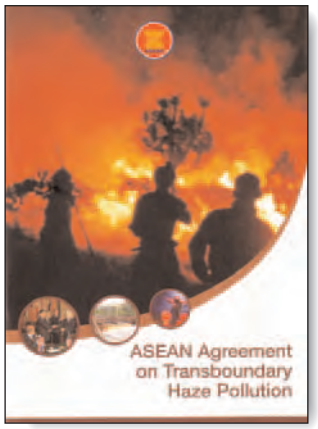
An important component of environmental education and awareness raising is the regular publication by the ASEAN Secretariat of various reports, books and other information materials for dissemination to numerous institutions and individuals in the region. Many of these publications are outputs of environmental programmes and projects implemented by member countries and coordinated by the ASEAN Secretariat. These publications serve as valuable reference materials for government officials, researchers, civil society organisations and the general public.











State of the Environment Reports

The First ASEAN State of the Environment Report was published in 1997, and the Second ASEAN State of the Environment Report in 2000. In 2002, ASEAN published the ASEAN Report to the World Summit on Sustainable Development held in Johannesburg, South Africa. The Report showcased ASEAN's achievements on sustainable development and emphasised the use of regional governance mechanisms, and regional goals and plans as a vehicle to implement these efforts at the national and regional levels. The major recommendations of the ASEAN report to the WSSD were: encourage sustainable economic growth; reform of the international financial structure; adherence to mutually supportive trade and environment policies; reduce/eliminate poverty; access to better health services; sustainable management of natural resources and environmental protection; call for global support for MEAs; streamline sustainable development governance framework at the international level; provision of adequate and predictable financing to ensure the effective implementation of sustainable development initiatives; facilitate access to technology and build the capacity of developing countries to absorb and adapt scientific knowledge and technological skills; and support for initiatives on partnerships.

All member countries publish periodically their state of environment report as detailed out below.

Table 9.8: State of the Environment Reports of Member Countries

Country	Latest SoER Published	Frequency	Website
Brunei Darussalam	Brunei Darussalam State of Environment Report 2006	Every 5 years	http://www.env.gov.bn
Cambodia	State of the Environment Report 2004	Periodic	
Indonesia	State of the Environment in Indonesia 2004	Annual	http://www.menlh.go.id
Lao PDR	Lao PDR Environment Monitoring Report 2004 (LEM)	Periodic	
Malaysia	Malaysia Environmental Quality Report 2004	Annual	http://www.doe.gov.my
	Department of Environment Annual Report 2004	Annual	
Myanmar	National Environment Performance Assessment Report 2006	Periodic	
Philippines	Philippine Environmental Quality Report 1990 – 1995	Every 5 years	http://www.emb.gov.ph
	National Air Quality Status Report 2003 – 2004	Every 2 years	
	Department of Environment and Natural Resources Annual Report 2004	Annual	
Singapore	State of the Environment Report 2005	Periodic	http://www.mewr.gov.sg
Thailand	State of the Environment Report 2005	Annual	http://www.onep.go.th
	Thailand's State of Pollution Report 2004	Annual	http://www.pcd.go.th
Viet Nam	State of the Environment Report 2005	Annual	http://www.nea.gov.vn
	Viet Nam's Environmental Monitor 2005	Annual	

Environmental Cooperation with ASEAN Dialogue Partners/ International Organisations

ASEAN has formal dialogue relations with Australia, Canada, China, European Union, India, Japan, Pakistan, Republic of Korea, New Zealand, Russia Federation, United States of America and the United Nations Development Programme (UNDP). Various environmental cooperative activities have been developed through this channel which forms a major source of support for ASEAN's environmental cooperative activities. ASEAN has also promoted cooperation with a number of international organisations which include the United Nations Environment Programme (UNEP), The United Nations University (UNU), United Nations Development Programme (UNDP), United Nations Educational Scientific and Cultural Organisation (UNESCO), Asia Development Bank (ADB), and the Hanns Seidel Foundation (HSF).

Table 9.9: Major Cooperative Activities with ASEAN Dialogue Partners

Country	Programme	Activities
Australia	ASEAN-Australia Development Cooperation Programme RegionalPartnership Scheme	• Development of the ASEAN Strategic Plan of Action on Water Resources Management • Capacity Building for the Implementation of the ASEAN Marine Water Quality Criteria
Canada	Fire Danger Rating System (FDRS)	• Canadian Forest Service worked with agencies in Indonesia and Malaysia on a 5-year initiative to develop and operate the FDRS • Attachment from January to August 2004 of an FDRS specialist to the ASEAN Secretariat
China	ASEAN-China Cooperation	• China-ASEAN Environmental Policy Dialogue held in Hainan Province, China in August 2004 • ASEAN-China Workshop on Botanical Garden and Plant Conservation, 15–19 May 2006
European Union	ASEAN-EU Cooperation	• ASEAN Regional Programme for Regional Integration Support on the link between trade and environment and implications of international environmental agreements; and development of common approach to deal with transnational environmental problems • Five-year support for the ASEAN Regional Centre for Biodiversity Conservation Project (1999 – 2004) • Support for the first three-and-half years operations of the ASEAN Centre for Biodiversity
Japan	Japan-ASEAN General Exchange Fund (JAGEF) Japan-ASEAN Exchange Projects (JAEP)	• An Assessment for the Establishment of an ASEAN Regional Network to Promote Environmentally Sound Technologies • A Study for the Establishment and Operationalisation of an Emergency Response and Strategic Planning Institute for Environmental Disasters • ASEAN-Japan Consultation Visit, April 2004 • Seminar on Framework for Environmentally Sustainable Cities in ASEAN (also known as Conference on ESC), 14 – 15 October 2004 • Workshop on the Development of Key Indicators for Clean Air, Clean Water and Clean Land; and Award/s to Promote Environmental Sustainability in ASEAN Cities, 6 – 8 December 2005
Republic of Korea	ASEAN-Republic of Korea Cooperation	• Flagship Project on "Restoration of the Degraded Forest Ecosystem in the Southeast Asian Tropical Region (2000 – 2005) • Flagship Project on "Restoration of the Degraded Forest Ecosystem in the Southeast Asian Tropical Region (Phase II) (2005 – 2008) • Consultation Visit by ASEAN Senior Officials on the Environment to ROK 2005
United States	ASEAN Cooperation Plan	• Workshop on transboundary aquatic invasive alien species associated with aquaculture in Southeast Asia, July 2004 in Penang, Malaysia • Development of national biosafety networks consisting of training workshops and technical support for ASEAN countries, 2004

Environmental Cooperation with Civil Society Organisations (CSOs)

ASEAN has welcomed and encouraged the participation of CSOs in its regional programmes and activities. In the area of environment and sustainable development, CSOs have been consulted on specific issues of interest, mainly on a project basis. In 1986 ASEAN adopted the Guidelines for ASEAN Relations with Non-Governmental Organisations to draw them into the mainstream of ASEAN activities and to ensure meaningful interaction and fruitful relationship with ASEAN bodies. In recognition of the important role of CSOs, their participation has become increasingly institutionalised in ASEAN with a view to make more effective their contribution at the regional and national level. To ensure regular and structured collaboration with CSOs, the ASEAN Senior Officials on the Environment have endorsed a proposal on "ASEAN Civil Society Organisations (CSOs) Consultative Forum on Environmental Protection and Sustainable Development". The CSOs are being consulted to realise this Forum.

End Note

1 United Nations Environment Programme (UNEP) (2003), "UNEP Congratulates ASEAN on Fire Haze Agreement: Thailand's ratification brings ground breaking legal initiative into force,"
< http://www.unep.org/Documents.multilingual/?DocumentID=354&ArticleID=4309&l=en > 2 Nov 2005.

CHAPTER 10

Towards An Environmentally Sustainable ASEAN Community

Nurturing human, cultural and natural resources for sustained development in a harmonious and people-centred ASEAN

ASEAN Socio-Cultural Community Plan of Action

As ASEAN pursues broader and deeper integration, it must ensure that the end goal of an ASEAN Community is environmentally sustainable. This is succintly captured in the VAP as follows: "Social inequities can threaten economic development and in turn undermine political regimes. Economic instability can exacerbate poverty, unemployment, hunger, illness and disease. Social instability can emerge from environmental scarcity or the inequitable distribution among stakeholders of the use of environmental assets. Failure to address these critical and persistent social issues can further cause both economic and political dislocations". Progress towards an environmentally sustainable ASEAN Community should be quantitatively monitored. Based on data from reputable sources, the ASEAN Member Countries have generally performed better than most countries of the world in terms of environmental sustainablity. Furthermore the difference among member countries is small indicating that countries generally have similar level of environmental sustainability. In terms of ecological footprint measures, the member countries also performed better than the world average. This chapter also highlights some of the critical and emerging issues that can lead to environmental insecurity and therefore impact adversely on the other pillars of the ASEAN Community building efforts. The chapter concludes by summarising the various measures being undertaken in the region situated within the concept of sustainable development to achieve an environmentally sustainable ASEAN Community.

The global community has generally accepted the concept of 'sustainable development' as the guiding principle to ensure mother earth will continue to sustain life for the foreseable future. The 1987 Bruntland Commission defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". However, differences in interpretation, and more so, in implementation of this concept abounds. The International Institute for Sustainable Development characterises it as a "fluid concept that will continue to evolve over time, but common characteristics underlie its many streams of thought. Sustainable development emphasises the need for:

(i) concern for equity and fairness – ensuring the rights of the poor and of future generations;
(ii) a long term view – applying the precautionary principle; and
(iii) systems thinking – understanding the interconnections between the environment, economy and society.

Accordingly, sustainable development will never be a fixed plan of action agreed to by all parties, for example solutions will differ among different countries based on their capacities and aspirations for the future. The global community has generally accepted the principle of common but differentiated responsibility, embodying the concept that all countries share a common concern for the environment, but each group (typically the developed and developing countries) has differentiated responsibility based on their contribution (historical and current) to global environmental problems, and the financial and technical capacity to ameliorate them.

Sustainable development generally involves integrated development of three sectors; namely economic development, social development and environmental protection. This concept is succintly captured in the attainment of an environmentally sustainable ASEAN Community through the ASEAN Socio-Cultural Community pillar.

> "Social inequities can threaten economic development and in turn undermine political regimes. Economic instability can exacerbate poverty, unemployment, hunger, illness and disease. Social instability can emerge from environmental scarcity or the inequitable distribution among stakeholders of the use of environmental assets. Failure to address these critical and persistent social issues can further cause both economic and political dislocations"

Accordingly this Report has attempted to highlight key developments in each of these sectors in the region. Chapter 2 described the geo-physical conditions, climate and demographics of the region and how these factors determine the characteristic environmental issues of the region. Chapter 3 noted that high population density, rapid

urbanisation, and poverty places stresses on the environment. Chapter 4 showed how the strength and vitality of economic growth in the region places environmental stresses on the natural resource base, while at the sametime the increased income level and change of industrial structure could help address some of these problems. Chapters 5 – 7 documented the richness and vitality of the aquatic and terrestrial ecosystems, and the quality of air in the region. Chapter 8 demonstrated ASEAN's commitments to address global environmental issues, although the region is not the source of many of these problems, it is significantly affected by them. Chapter 9 highlights the ASEAN policy and institutional framework and the many regional programmes and intiatives to assist member countries in effectively addressing a broad range of environmental issues, particularly those of transboundary nature.

However, progress in each of these sectors does not necessarily indicate overall progress in terms of sustainable development or environmental sustainability. Embarking on such a composite measure is not easy; for instance there are limits to determining the basket of parameters, its respective contribution and the interaction among them. Nature is never easy to comprehend nor amenable to measurement. However, it is necessary that some form of measure, however crude it may be, need to be attempted if we were to truly claim that we are making progress towards sustainable development or environmental sustainability.

This chapter will highlight some credible studies and parameters that are commonly used to benchmark the region's progress as a whole towards environmental sustainability and with other countries or regions of the world.

Environmental Sustainability

Environmental sustainability means enabling the environment to continue to provide the material, energy and other resources needed to support a growing economy and maintain a decent quality of life for all people while preserving the integrity of the very same environment. Millennium Development Goal 7 emphasises environmental sustainability. Its targets are to integrate the principles of sustainable development into country policies and programmes and to reverse the loss of environmental resources; halve by 2015 the proportion of people without sustainable access to safe drinking water and sanitation; and by 2020 achieve a significant improvement in the lives of at least 100 million slum dwellers. It is not enough that the principles of sustainable development are integrated into national policies and programmes. It is equally important that measurable indicators such as the proportion of land area covered with forest, intensity of the use of energy, carbon dioxide emissions per capita and the like are monitored to guarantee that environmental sustainability is attained.

There have been a number of attempts to quantify environmental sustainability. One such effort is the Environmental Sustainability Index (ESI) developed by Yale University and Columbia University. The ESI aims to concretise the concept of environmental sustainability, which is defined as "the long-term maintenance of valued environmental resources in an evolving human context."[1] It builds on 76 datasets and 21 key indicators classified into 5 components: state of environmental systems, anthropogenic stresses on the environment, aspects of human vulnerability to environmental stresses, social and institutional capacity to affect environmental change, and global leadership towards greater environmental sustainability.

Box 10.1: The Environmental Sustainability Index (ESI)

Core components and logic

- A country is more likely to be environmentally sustainable to the extent that its vital environmental systems are maintained at healthy levels, and to the extent to which levels are improving rather than deteriorating (i.e. Environmental Systems);
- A country is more likely to be environmentally sustainable if the levels of anthropogenic stress are low enough to engender no demonstrable harm to its environmental systems (i.e. Reduce Environmental Stresses);
- A country is more likely to be environmentally sustainable to the extent that people and social systems are not vulnerable to environmental disturbances that affect basic human well-being; becoming less vulnerable is a sign that a society is on a tract of greater sustainability (i.e., Reduce Human Vulnerability);

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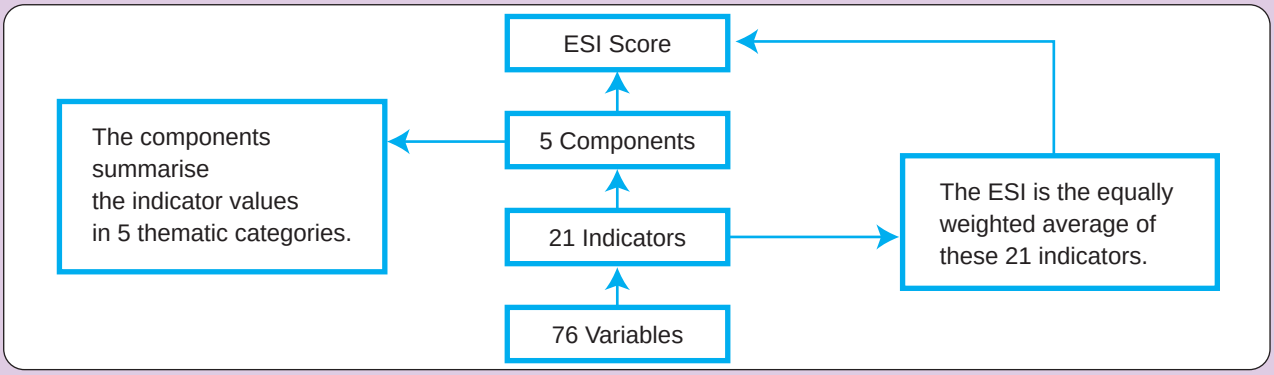
- A country is more likely to be environmentally sustainable to the extent that it has in place institutions and underlying social patterns of skills, attitudes and networks that foster effective responses to environmental challenges (i.e., Social and Institutional Capacity); and
- A country is more likely to be environmentally sustainable if it cooperates with other countries to manage common environmental problems, and if it reduces negative transboundary environmental impacts on other countries to levels that cause no serious harm (i.e., Global Stewardship).

Constructing the ESI score



Source: *Etsy, D.C., et.al. (2005), 2005 Environmental Sustainability Index: Benchmarking National Environmental Stewardship, New Haven: Yale Centre for Environmental Law and Policy.*

The ESI scores of eight countries in the region (except Singapore and Brunei Darussalam which were not assessed) indicated that environmental and ecological systems were deteriorating due to problems related to air pollution, habitat destruction and declining water quality. Malaysia had the best sustainability index with an ESI score of 54.0 and the Philippines and Viet Nam the lowest with scores of 42.3. However, the range between the scores for these countries were not large, indicating that countries in the region generally have similar level of environmental sustainability. Malaysia scored well in three of the five ESI components, namely, environmental systems, human vulnerability to environmental stresses, and social and institutional capacity to respond to environmental stresses.

Having comparatively matured economic and social systems such as those of the Philippines, Thailand and Indonesia did not ensure high scores on environmental sustainability. In contrast, the lesser developed countries such as Myanmar, Lao PDR, and Cambodia benefited from small "ecological footprints" in the past and negligible contributions to global emissions of greenhouse gases. The cluster containing Cambodia, Myanmar and Laos was characterised by moderate environmental systems and ecological stress scores and above average global stewardship. The group of countries including the other five ASEAN nations performed rather poorly on all but the human vulnerability and capacity components.

As a comparision with the ESI scores of other countries of the world, the 2005 ESI score ranged from a high of 75 to a low of 29 among 116 countries assessed. Therefore the ESI scores of ASEAN Member Countries are generally above average compared to the world average.

Table 10.1: Environmental Sustainable Index of selected ASEAN Member Countries, 2005

Country	ESI Score
Cambodia	50.1
Indonesia	48.8
Lao PDR	52.4
Malaysia	54.0
Myanmar	52.8
Philippines	42.3
Thailand	49.7
Viet Nam	42.3

Source: *Tanja Srebotnjak (2005), "The Performance of the ASEAN Member States in the 2005 Environmental Sustainability Index (ESI)," a paper written for the Third ASEAN State of the Environment Report 2005.*

Related to environmental sustainability is the concept of Ecological Footprint, which is "a resource management tool that measures how much land and water area a human population requires to produce the resources it consumes and to absorb its wastes under prevailing technology."[2] The Ecological Footprint supports environmental sustainability by advocating that society's demand on nature should be in balance with nature's capacity to meet that demand.[3]

Malaysia's ecological footprint (including food, fiber, timber and energy footrprints) was the highest among the eight countries in the region where data were available. Malaysia needed 2.4 global hectares/person (ghp) of itself per year to meet its resource requirements. Its footprint in 2002 was higher than the average of the whole world, middle income countries, and Asia Pacific countries. Malaysia's total biocapacity (or resource supply) was higher than its ecological footprint (or resource demand) resulting in a reserve of 0.9 ghp, the biggest among the eight countries. In contrast, Cambodia needed less than itself to be able to meet its resource requirements. Indonesia, Philippines and Thailand encountered deficits in 2002 because their total biocapacities were not enough for their ecological footprints. Lao PDR and Myanmar still have substantial ecological reserve and resource supply accompanied by modest ecological footprint and resource demand.

Table 10.2: Ecological Footprints of Selected Member Countries, World and Regional Income Groups, 2002

Region/ Country	Population (million)	Total Footprint (global ha/person)				
		Ecological	Food, Fiber	Energy and Timber	Bio capacity	Ecological Deficit (–) or Reserve
World	6,220	2.2	0.9	1.2	1.8	–0.4
High Income	926	6.4	2.1	4.1	3.4	–3.0
Middle Income	2,990	1.9	0.9	0.9	2.1	0.2
Low Income	2,280	0.8	0.5	0.3	0.7	–0.1
Asia Pacific	3,450	1.3	0.6	0.6	0.7	–0.6
Cambodia	13.8	0.5	0.3	0.2	0.7	0.2
Indonesia	217	1.0	0.6	0.4	1.0	–0.1
Lao PDR	5.5	0.8	0.5	0.2	1.4	0.5
Malaysia	24.0	2.4	1.0	1.3	3.3	0.9
Myanmar	48.9	0.9	0.6	0.2	1.3	0.4
Philippines	78.6	1.0	0.6	0.4	0.6	–0.4
Thailand	62.2	1.4	0.6	0.7	1.0	–0.4
Viet Nam	80.3	0.8	0.4	0.2	0.8	0.0

Source: *Global Footprint Network (2006).*
Note: *No data for Brunei Darussalam and Singapore*

Box 10.2: Philippine Ecological Footprint, 1961 – 2002

The Philippine demand on ecological resources increased from less than its own biocapacity in 1961 to more than double its domestically available biocapacity in 2002. The ecological deficit that exists when ecological demand exceeds supply can be financed by importing biocapacity, liquidating existing stocks of ecological capital, or allowing wastes to accumulate and ecosystems to degrade.

Figure a illustrates, for each year, how many "Philippines" were required to meet the resource requirements of the Philippines. Resource demand (Ecological Footprint) for the country as a whole is the product of population and per capita consumption. Resource supply (biocapacity) varies each year with ecosystem management, agricultural practices (such as fertiliser use and irrigation), ecosystem degradation,

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and weather. Expressed in terms of "number of Philippines" the biocapacity is always 1 (represented by the horizontal blue line). The figure shows the ratio between the country's demand and the country's biocapacity in each year, and how this ratio has changed over time.

Figure b tracks, in absolute terms, the average per person Ecological Footprint and per person biocapacity in the Philippines over a 40-year period. Figure c shows the components of average per person Ecological Footprint in the Philippines.

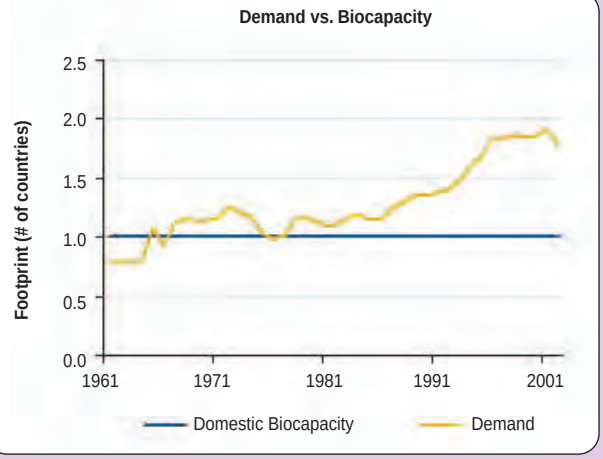


Figure a

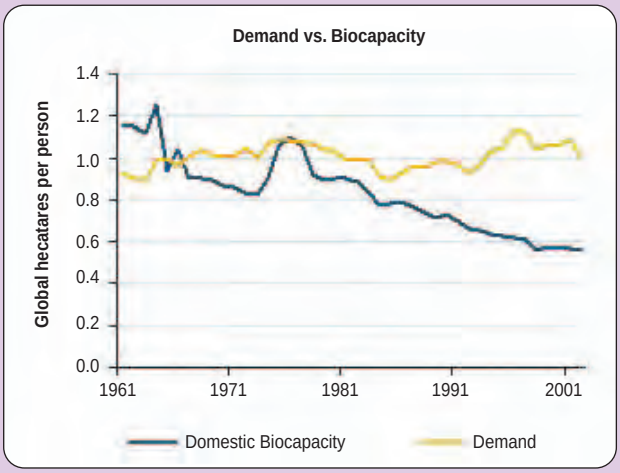


Figure b

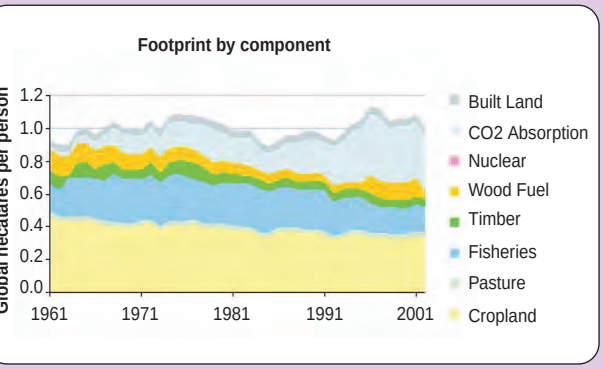


Figure c

Source: *Global Footprint Network (2006).*

Environmental Security

Another concept related to and complementary to environmental sustainability and ecological footprint is environmental security. As with the two, the concern for the increasing global environmental changes and decreasing resources to feed the growing human population has led to the concept of environmental security. It is generally defined as "the freedom from social instability due to environmental degradation. It means the relative public safety from environmental dangers caused by natural or human processes due to ignorance, accident, mismanagement or design and originating within or across national borders."

In the ASEAN region, environmental security can be threatened by the growing scarcity of resources, quantitatively and qualitatively. The sources of environmental security are classified into five categories, namely, environmental degradation which affects terrestrial ecosystems, atmospheric pollution and degradation, water resources, the maritime environment, and energy resources.

Environmental security has several dimensions. For example, in the controversy involving the "hydro-industrialisation" of the Mekong River Basin with its six riparian states (China and the five ASEAN Member Countries, namely, Myanmar, Lao PDR, Thailand, Cambodia, and Viet Nam), three dimensions of "environmental security" have been identified that may cause possible conflict. These are: (a) national resource security in the form of water allocation conflicts; (b) economic security in the case of hydropower development; and (c) human security as hydropower development impacts on local communities and the implications for domestic political stability.[4]

Resource security conflicts may arise from competing claims of contiguous countries for a fair

share of international waters. Fortunately, in the case of the Mekong River Basin, this kind of conflict has been prevented so far through dialogue, by respecting the various rules for water utilisation and abstraction in the lower basin, and through the integrated development and management of the upper and lower basins. The economic security dimension involves the "resource exploitation and its implication for economic relations and economic security."[5] When there is increased asymmetrical dependency relationship among the riparian states this may cause more possible points of conflict for them. Lastly, the human security dimension is based on emphasising the primary importance of protecting individuals from both violent and non-violent threats to their safety, rights, and social systems – threats that include environmental degradation."[6] Other human security threats include the deforestation of upper watershed areas resulting in serious land degradation.

Table 10.3: Potential Sources of Environmental Insecurity in the ASEAN Region

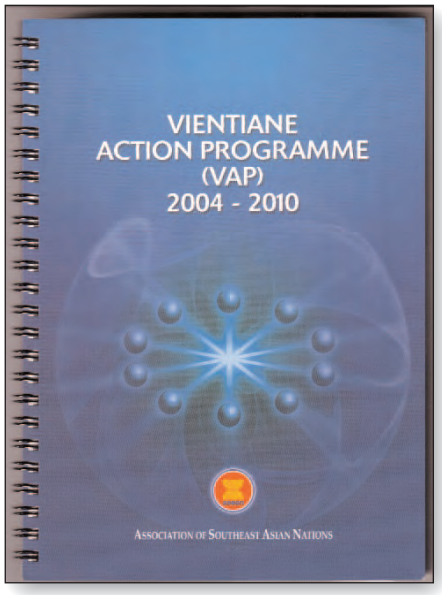
Category	Specific Environmental Problems	Affected Area/Country	Threats
Terrestrial Environment	Deforestation, desertification, land degradation, and loss of arable land	Whole region especially in Malaysia, Indonesia, Philippines, Cambodia, Viet Nam and Myanmar	Soil loss, siltation, changes in water retention and runoff patterns, and food insecurity
Atmospheric Pollution	Urban air pollution	Bangkok, Manila and Jakarta, etc.	Chronic health problem (example: respiratory ailments), ecological damage
	Transboundary haze pollution	Brunei Darussalam, Indonesia, Malaysia, Singapore, Thailand and Viet Nam	Chronic health problem (example: respiratory ailments), economic loss, ecological damage
	Global climate change	Whole Region	Rising sea levels, changes in weather patterns, increase in extreme weather and natural disasters, changes in seasons, loss of agricultural production, and variations in freshwater availability
Water Resources	Scarcity and pollution or "water stress"	Whole region, notably in Jakarta, Bangkok and Metro Manila	Death of aquatic species and loss of livelihood from fishing
Marine Environment	Pollution and over fishing	Gulf of Thailand, Jakarta Bay, Manila Bay, Mekong Delta region and South China Sea	Destruction of mangrove habitats and shrimp aquaculture, decline of fish stocks, etc.
Energy	Growth in demand but decreasing supply, pollution, and production of hazardous wastes	Whole region	Economic meltdown if there is shortage, and pollution (air, water and soil) if not disposed of properly

Source: *Adapted from Elliott (2001), pp 440–442*

ASEAN Community Building and Environmental Sustainability

The concept of an ASEAN Community is defined in the Declaration of ASEAN Concord II adopted by the Leaders of ASEAN in October 2003. It states that "an ASEAN Community shall be established comprising three pillars, namely, political and security cooperation, economic cooperation, and socio-cultural cooperation that are closely intertwined and mutually reinforcing for the purpose of ensuring durable peace, stability and shared prosperity in the region."

It is evident that an overarching goal of the ASEAN Community is promoting sustained economic growth to reduce poverty and socio-economic disparities among and within countries of the region. The ASEAN Community is to be established for the purpose, among others, of ensuring a durable shared prosperity in the region. For this purpose, the Vientiane Action Programme serves as the current road-map for the period 2004 – 2010 to achieve this goal.



The Vientiane Action Programme contains a number of strategic thrusts and measures that may impact on environmental sustainability, namely:

- Free flow of goods, services, investment and a freer flow of capital, equitable economic development and reduced poverty and socio-economic disparities
- A single market and production base
- Cooperation to address the development divide and accelerate economic integration
- Raising the standard of living of disadvantaged groups and the rural population
- Active involvement of all sectors of society, in particular, women, youth and local communities
- Investing more resources for basic and higher education, training, science and technology development, job creation and social protection
- Employment generation, alleviating poverty and socio-economic disparities, and ensuring economic growth with equity
- Regional mobility
- Prevention and control of infectious diseases such as HIV/AIDS and SARS
- Cooperation in addressing problems associated with population growth, unemployment, environmental degradation and transboundary pollution as well as disaster management

It is evident from the features of the ASEAN Community that as the region becomes a single market and production base, it will have to shift towards economic growth patterns that do not compromise environmental sustainability. The expected growth in the region's GDP resulting from regional integration and mobility must maintain or restore environmental quality and ecological integrity. The ASEAN Community must decouple negative environmental impacts from economic growth processes by adopting, as a first principle, the concept that ecosystem goods and services are critical to long-term economic and social viability. The Community's economy must focus on creating wealth and at the same time minimise or achieve zero-waste. This means that cleaner production, new and renewable sources of energy, waste minimisation and resource recovery must be given primary importance. National environmental regulations and standards must be progressively harmonised as tariffs are dismantled to ensure environmental issues does not emerge as non-tariff measures.

As envisioned, the ASEAN Community will be committed to promoting environmental sustainability. Indeed it is a major thrust of the Vientianne Action Programme, which aims to promote a "clean and green ASEAN with fully established mechanisms for sustainable development to ensure the protection of the region's environment, the sustainability of its natural resources and the high quality of life of its people." Various programmes and measures will be implemented in order to ensure that the Community's economic development will, at the same time, result in social equity and environmental sustainability.

The road towards an environmentally sustainable ASEAN Community will be full of challenges. This report opens with a presentation of the seven most important and urgent challenges confronting the region. In closing it is fitting that we reemphasise these challenges viewed from the perspective of the Vientiane Action Programme – the current ASEAN's roadmap "towards shared prosperity and destiny in an integrated, peaceful and caring ASEAN Community."

First, the ASEAN Community must narrow the socio-economic divide among and within countries of the region while ensuring a proper balance between economic development and environmental protection.

In the Preamble of the Vientiane Action Programme, the ASEAN Leaders recognise that "deepening and broadening the integration of ASEAN must be accompanied by technical and development cooperation to address the development gap among the Member Countries" and reiterate their "commitment to strengthen efforts to narrow the development gap in ASEAN." To this end, one of the five goals and strategies towards realising the ASEAN Community deals specifically with narrowing the development gap. Here the Leaders state clearly and emphatically that "the gap must be narrowed as an end in itself if the principle, that development is a fundamental human right, is to be followed. It must also be narrowed, as a necessary condition for realising the end goal of economic integration. Indeed, efforts to narrow the development gap would be self-reinforcing."

Second, the ASEAN Community must prevent or reduce the occurrences of natural and man-made disasters and minimise the damage and alleviate the human suffering caused by them.

The ASEAN Leaders recognise the importance of natural disaster prevention, monitoring and mitigation to attain sustained development in a harmonious and people-centred region. Indeed among the regional interventions identified to build a "community of caring societies" is "ensuring disaster-resilient nations by minimising the adverse effects of disasters in pursuit of safer communities and sustainable development." To attain the goal of a clean and green ASEAN, the Leaders further identify, as one of the medium-term strategies and milestones in pursuit of this goal, the prevention of "transboundary haze pollution as a result of land and/or forest fires through concerted national efforts and intensified regional action and international cooperation."

Third, the ASEAN Community must address adequately the worsening air pollution, noise and congestion, lack of adequate infrastructures and waste disposal and management in the urban areas of most countries of the region resulting from, among others, increasing energy and materials consumption, worsening traffic conditions, rapid industrialisation, and uncontrolled rural-to-urban migration.

In pursuit of the goal of environmental sustainability, the Vientiane Action Programme aims to attain "zero waste and minimal impact on the environment, and promote business opportunities in environmental goods and services, through relevant environmentally sound technologies" as well as ensure that "cities/urban areas in ASEAN are environmentally sustainable, while meeting the social and economic needs of the people." Indeed much of the environmental concerns related to the urban areas can be mitigated through the use and application of cleaner production technologies, sustainable transport systems, and environmentally sound energy systems.

Fourth, the ASEAN Community must reverse the trend of land degradation, deforestation, depletion of natural resources and loss of biodiversity in many countries of the region and promote the conservation and sustainable use of biological and genetic resources.

The Leaders address this challenge extensively in their blueprint of the ASEAN Community. The Vientiane Action Programme lists the following medium-term strategies and milestones for promoting environmental sustainability: (a) ensure ASEAN's rich biological diversity is conserved, and sustainably managed, and the benefits arising from these biological and genetic resources are fairly and equitably shared toward enhancing social, economic and environmental well-being; (b) ensure sustainable management of land-based resources while enhancing optimum agricultural production; and (c) promote the sustainable management of forest resources and critical ecosystems through the eradication of unsustainable practices as well as strengthening the preservation and management of the ASEAN Heritage Parks.

Fifth, the ASEAN Community must effectively protect the region's freshwater resources and marine and coastal ecosystems.

To the same extent that the ASEAN Leaders are concerned with the integrity of the region's terrestrial ecosystems, so are they concerned with the quality and supply of the region's

freshwater and the protection of its marine and coastal resources. Accordingly, the Leaders declare in the Vientiane Action Programme the need to: (a) promote sustainability of water resources to ensure sufficient water quantity of acceptable quality to meet the needs of the people of ASEAN in terms of health, food security, the economy and the environment, taking into consideration the strong linkage between water, health and poverty; and (b) ensure ASEAN's coastal and marine environment are sustainably managed; representative ecosystems, pristine areas and species are protected; economic activities are sustainably managed; and public awareness of the coastal and marine environment instilled.

Sixth, the ASEAN Community must address global environmental issues while at the same time addressing the immediate and pressing economic, social and environmental issues that confront each country in unique and multifarious ways.

The ASEAN Leaders, in the Preamble of the Vientiane Action Programme, acknowledge that ASEAN has to work within a new strategic context since the "global and regional economic environment has changed and is continuously challenged by new developments." Consequently, in order to promote a clean and green ASEAN with fully established mechanisms for sustainable development, it is essential to "effectively address global environmental issues without impinging on competitiveness, or social and economic development based on the principle of common but differentiated responsibility."

Seventh, the ASEAN Community must further strengthen regional institutional arrangements to make them more effective in promoting environmental sustainability.

The Leaders of ASEAN have declared that "we shall strengthen further ASEAN's institutional framework both in terms of its structure and process to ensure that it is responsive to the challenges and needs of moving towards an ASEAN Community, including in terms of coordination and efficiency as well as in strengthening its ability to shape events in Southeast Asia and beyond." Accordingly, as part of the implementation mechanism of the Vientiane Action Programme, the Leaders call for "strengthening existing institutions and, as necessary, the establishment of appropriate institutional arrangements to facilitate coordination among the various implementing bodies and with external partners."

The region faces many other challenges but these seven are the most urgent if the envisioned ASEAN Community is to promote environmental sustainability. As the economic integration of the region broadens and deepens resulting in sustained economic growth, there will be need to reduce the resource intensities of both production and consumption. The pressure on natural resources deriving from these production and consumption processes will have to be mitigated and managed to ensure that they remain within the carrying capacity of the natural environment. To this end, the Vientiane Action Programme provides adequate answers.

And so the ASEAN Leaders have spoken. They are committed to a clean and green ASEAN Community. Through the Vientiane Action Programme, they are determined to build a community of caring societies, manage the social impacts of economic integration, and – most essential of all – promote environmental sustainability. They have elaborated the needed measures and actions. The rest is up to the people of the region. Are we determined to do our share?

End Notes

1 Daniel C. Esty *et al.* (2005), *2005 Environmental Sustainability Index: Benchmarking National Environmental Stewardship* (New Haven: Yale Centre for Environmental Law and Policy), p. 11.

2 Global Footprint Network (2006), "Ecological Footprint: Overview," < http://www.footprintnetwork.org/gfn _sub.php?content=footprint_overview > 22 Feb 2006.

3 *Ibid*.

4 Evelyn Goh (2001), "The Hydro-Politics of the Mekong Rover Basin: Regional Cooperation and Environmental Security," in *Non-Traditional Security Issues in Southeast Asia*, eds. Andrew T.H. Tan and J.D. Kenneth Bautin (Singapore: Institute of Defence and Strategic Studies-Nanyang Technological University), p. 470.

5 *Ibid*., p. 483.

6 *Ibid*., p. 487.

Appendix

Appendix 1

ACRONYMS AND ABBREVIATIONS

A

AAQMS	Ambient Air Quality Monitoring Stations
AATHP	ASEAN Agreement on Transboundary Haze Pollution
ACB	ASEAN Centre for Biodiversity
ACC	ASEAN Coordinating Centre for Transboundary Haze Pollution Control
ACE	ASEAN Centre for Energy
ADB	Asian Development Bank
AEC	ASEAN Economic Community
AEEAP	ASEAN Environmental Education Action Plan
AEEID	ASEAN Environmental Education Inventory Database
AEG-CITES	ASEAN Experts Group on CITES
AEGE	ASEAN Experts Group on the Environment
AEY	ASEAN Environment Year
AFTA	ASEAN Free Trade Area
AFP	Asia Forest Partnership
AHP	ASEAN Heritage Parks
AIESC	ASEAN Initiative on Environmentally Sustainable Cities
AIRBoards	Air Quality Monitoring Display Boards
AKECOP	ASEAN-Korea Environmental Cooperation Project
AMC	ASEAN Member Country
AMM	ASEAN Ministerial Meeting
AMDC	ASEAN Millennium Development Compact
AMME	ASEAN Ministerial Meeting on the Environment
AMMH	ASEAN Ministerial Meeting on Haze
AMWQC	ASEAN Marine Water Quality Criteria
AMRDPE	ASEAN Ministers on Rural Development and Poverty Eradication
APFC	Asia-Pacific Forestry Commission
API	Air Pollution Index
APMI	ASEAN Peatland Management Initiative
AQMN	Air Quality Monitoring Network
ARCBC	ASEAN Regional Centre for Biodiversity Conservation
ASC	ASEAN Security Community
ASC	ASEAN Standing Committee
ASCC	ASEAN Socio-Cultural Community
ASEAN	Association of Southeast Asian Nations
ASEAN-WEN	ASEAN Wildlife Enforcement Network
ASEP	ASEAN Sub-regional Environmental Programme
ASMA	Alam Sekitar Malaysia Sdn. Bhd.
ASMC	ASEAN Specialised Meteorological Centre
ASOEN	ASEAN Senior Officials on the Environment
ASOEN-HTTF	ASEAN Senior Officials on the Environment-Haze Technical Task Force
ASOF	ASEAN Senior Officials on Forestry
AusAID	Australian Agency for International Development
AWGCME	ASEAN Working Group on Coastal and Marine Environment
AWGESC	ASEAN Working Group on Environmentally Sustainable Cities
AWGMEA	ASEAN Working Group on Multilateral Environmental Agreements
AWGNCB	ASEAN Working Group on Nature Conservation and Biodiversity
AWGWRM	ASEAN Working Group on Water Resources Management

B

BAN	Basel Action Network
BCRC-SEA	Basel Convention Regional Centre for Training and Technology Transfer for Southeast Asia
BDF	Biodiesel Fuel
BIMP-EAGA	Brunei Darussalam, Indonesia, Malaysia, the Philippines - East ASEAN Growth Area
BOD	Biological Oxygen Demand

C

CBD	Convention on Biological Diversity
CBFM	Community-based Forest Management
CDM	Clean Development Mechanism
CFC	chlorofluorocarbons
CI	Conservation International
CIFOR	Centre for International Forestry Research
CIS	Commonwealth of Independent States
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMAC	Cambodian Mine Action Centre
CMAA	Cambodian Mine Action and Victim Assistance Authority
CMS	Convention on Migratory Species
COD	Chemical Oxygen Demand
COP	Conferences of the Parties
CSOs	Civil Society Organisations
CZERMP	Coastal Zone Environmental and Resource Management Project
CZM	Coastal Zone Management

D

DDT	dichlorodiphenyltrichloroethane
DIW	Department of Industrial Works of Thailand
DENR	Department of Environment and Natural Resources of the Philippines
DOE	Department of Environment of Malaysia
DPT	Diphteria, Pertussis and Tetanus
DTTS	Deep Tunnel Sewerage System
DWNP	Department of Wildlife and National Parks of Malaysia

E

EDMU	Environment and Disaster Management Unit of the ASEAN Secretariat
EEZ	Exclusive Economic Zone
EFB	Empty Fruit Bunches
EIA	Environmental Impact Assessment
ELS	Energy Labelling System
EMB	Environmental Management Bureau of the Philippines
EMRED	Emission Reduction
ENB	Earth Negotiations Bulletin
ENCON	Energy Conservation
ENSO	El Niño Southern Oscillation
EOS	Earth Observing System
ESI	Environmental Sustainability Index

F

FAO	Food and Agricultural Organization
FDI	Foreign Direct Investment
FDRS	Fire Danger Rating System
FSC	Forest Stewardship Council

G

GDP	Gross Domestic Product
GEC	Global Environment Centre
GEF	Global Environment Facility
GHG	Greenhouse Gas(es)
GIS	Geographic Information System
GMOs	Genetically-modified Organisms
GMS	Geostationary Meteorological Satellite
GNP	Gross National Product
GPS	Global Positioning System

H

HDI	Human Development Index
HDU	Human Development Unit of the ASEAN Secretariat
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
HPA	Ha Noi Plan of Action
HSF	Hanns Seidel Foundation
HTTF	Haze Technical Task Force

I

IAMME	Informal ASEAN Ministerial Meeting on the Environment
IBA	Important Bird Area
ICM	Integrated Coastal and Marine Management
ICZM	Integrated Coastal Zone Management
IFAD	International Fund for Agricultural Development
IFF	International Forest Forum
IISD	International Institute for Sustainable Development
IMF	International Monetary Fund
INBAR	International Network on Bamboo and Rattan
IPF	Inter-governmental Panel on Forests
IPCC	Inter-governmental Panel on Climate Change
ITA	Investment Tax Allowance
ITTA	International Tropical Timber Agreement
ITTO	International Tropical Timber Organization
IUCN	World Conservation Union

J

JAEP	Japan-ASEAN Exchange Fund
JAGEF	Japan-ASEAN General Exchange Fund

M

MA	Millennium Ecosystem Assessment
MAG	Mine Advisory Group
MC&I	Malaysian Criteria, Indicators, Activities and Standards of Performance
MDG	Millennium Development Goals
MEAs	Multilateral Environmental Agreements
MEWR	Ministry of the Environment and Water Resources of Singapore
MOE	Ministry of the Environment
MONRE	Ministry of Natural Resources and the Environment
MPA	Marine Protected Area
MRT	Mass Rapid Transit
MSW	Municipal Solid Waste
MTOE	Metric Tonnes of Oil Equivalent
MTSTAT	Multifunctional Transport Satellite
MTTC	Malaysian Timber Certification Council
MVA	Manufacturing Value Added

N

NASA	National Aeronautic and Space Administration
NCE	National Committee on Environment of Brunei Darussalam
NDF	Non-detriment Findings
NEA	National Environment Agency of Singapore
NEB	National Environment Board of Thailand
NEEC	National Energy Efficiency Committee
NFP	National Forest Programme
NGO	Non-Governmental Organisation
NICEM	National Instrumentation Centre for Environmental Management
NOAA	National Oceanic and Atmospheric Administration
NRES	New and Renewable Sources
NRSE-SSN	New and Renewable Sources of Energy - Subsector Network
NRU	Natural Resources Unit of the ASEAN Secretariat

O

ODS	Ozone Depleting Substances
OECD	Organization for Economic Cooperation and Development
ONEP	Office of the National Environment Board of Thailand

P

PAs	Protected Areas
PCBs	polychlorinated biphenyls
PDF	Project Development Facility
PEMSEA	Partnerships in Environmental Management for the Seas of East Asia
PHVA	Population and Habitat Viability Analysis
PIC	Prior Informed Consent
PM	Particulate Matter
POME	Palm Oil Mill Effluent
POPs	Persistent Organic Pollutants
PPP	Purchasing Power Parity

PRB	Population Reference Bureau
PRESSEA	Promotion of Renewable Energy Sources in Southeast Asia
PSI	Pollutant Standards Index
PUB	Public Utilities Board of Singapore

R

R&D	Research and Development
ReFOP	Regional Forest Programme for Southeast Asia
RE	Renewable Energy
RECOFTC	Regional Community Forestry Training Centre for Asia and the Pacific
RESCP	Regional Environmentally Sustainable Cities Programme
RFA	Regional Firefighting Arrangement
RHAP	Regional Haze Action Plan (ASEAN)
RIA	Roadmap for the Integration of ASEAN
ROK	Republic of Korea

S

SARS	Severe Acute Respiratory Syndrome
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
SEC	Singapore Environment Council
SFM	Sustainable Forest Management
SGP	Singapore Green Plan
SoER	State of the Environment Report
SOP	Standard Operating Procedure
SPAE	Strategic Plan of Action on the Environment of ASEAN
SPM	Suspended Particulate Matter
SSG	Site Support Group
SSME	Sulu-Sulawesi Marine Ecoregion
STP	Sewage Treatment Plant

T

TBCA	Transboundary Conservation Area
TRIPs	Trade-Related Intellectual Property Rights
TSP	Total Suspended Particulates

U

UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNDESA	United Nations Department for Economic and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNEP/DTIE/IETC	United Nations Environment Programme/Division of Technology, Industry and Economics/International Environmental Technology Centre
UNEP/GRID	United Nations Environment Programme /Global Resource Information Database
UN-ESA	United Nations Economic and Social Affairs
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change

UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
UNU	United Nations University
US	United States
USAID	US Agency for International Development
UXO	Unexploded Ordnance

V

VAP	Vientiane Action Programme
VOC	Volatile Organic Compound

W

WB	World Bank
WGABS	Working Group on Access and Benefit Sharing
WHO	World Health Organization
WRI	World Resources Institute
WRM	Water Resources Management
WRP	Water Reclamation Plant
WSSD	World Summit on Sustainable Development
WTO	World Tourism Organization
WTO	World Trade Organization
WWF	World Wild Fund for Nature

Appendix II

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C. A NOTE ON INTERNET WEBSITES USED

During the preparation of this Third ASEAN State of the Environment Report, a considerable amount of information was downloaded from the following websites:

Organisation/Website	Internet Address	Information downloaded
ASEAN Centre for Energy	www.aseanenergy.org	energy data
ASEAN Environmental Education Inventory Database	http://aeeid.aseansec.org	environmental education
ASEAN Haze Action Online	www.haze-online.or.id	haze
ASEAN Regional Centre for Biodiversity Conservation (ARCBC)	www.arcbc.org.ph	terrestrial ecosystems
ASEAN Specialised Meteorological Centre	http://app.nea.gov.sg	hotspot counts
ASEAN Secretariat	www.aseansec.org	various topics
Asian Development Bank (ADB)	www.adb.org	social development, economic development
BirdLife International	www.birdlife.org	bird areas
Conservation International (CI)	www.conservation.org	biodiversity
Convention on International Trade in Endangered Species	www.cites.org	species of animals
Department of Environment, Malaysia	www.doe.gov.my	various topics of Malaysia
Food and Agriculture Organization	www.fao.org	fisheries, forestry, water resources
Global Footprint Network	www.footprintnetwork.org	ecological footprints
IUCN cat Specialist Group	http://lynx.uio.no	terrestrial ecosystem
Ramsar Convention website	www.ramsar.org	wetlands
Secretariat of the Vienna Convention	http://ozone.unep.org	ozone depleting cfc
United Nations – Economic and Social Development	www.un.org/esa	various data
United Nations Development Programme (UNDP)	www.undp.org	human development, social development
United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)	www.unescap.org	social development
United Nations Educational and Cultural Organisation (UNESCO)	www.unesco.org/whc	world heritage
United Nations Environment Programme (UNEP)	www.unep.org	various topics
World Bank (WB)	www.worldbank.org	various topics
World Resources Institute – EarthTrends	http://earthtrends.wri.org	Environmental data and trends

Scheduled ASEAN Meetings on the Environment: 2001 – 2005

1. ASEAN Ministerial Meeting on the Environment

27 September 2005	9th Informal ASEAN Ministerial Meeting on Environment	Philippines
13 October 2004	8th Informal ASEAN Ministerial Meeting on Environment	Singapore
16 – 18 December 2003	9th ASEAN Ministerial Meeting on Environment	Myanmar
20 – 21 November 2002	7th Informal ASEAN Ministerial Meeting on Environment	Lao PDR
15 – 16 May 2001	6th Informal ASEAN Ministerial Meeting on Environment	Cambodia

2. ASEAN Ministerial Meeting on Haze

10 November 2004	11th ASEAN Ministerial Meeting on Haze	Viet Nam
04 March 2003	10th ASEAN Ministerial Meeting on Haze	Cambodia
11 June 2002	9th ASEAN Ministerial Meeting on Haze	Kuala Lumpur

3. Meeting of the Conference of the Parties to the ASEAN Agreement on Transboundary Haze Pollution

11 November 2004	1st Meeting of the Conference of the Parties to the ASEAN Agreement on Transboundary Haze Pollution	Viet Nam

Members

1. *Brunei Darussalam*
   H.E. Pehin Dato Haji Abdullah Bakar
   Minister of Development

   H.E. Dato Seri Setia Dr. Awang Haji Ahmad bin Haji Jumat
   Minister of Development
   (until 9th AMME, 11th AMMH and 1st COP)

   H.E. Pg. Indera Wijaya Pg. Dr. Hj. Ismail bin Pg. Hj. Damit
   Minister of Development
   (until 6th IAMME)

2. *Cambodia*
   H.E. Dr. Mok Mareth
   Senior Minister, Minister for the Environment

3. *Indonesia*
   H.E. Rachmat Witoelar
   Minister for Environment

   H.E. Nabiel Makarim, MPA
   Minister for Environment
   (until 8th IAMME, 11th AMMH and 1st COP)

   H.E. Sonny Keraf
   Minister for Environment
   (until 6th IAMME)

4. *Lao PDR*
   H.E. Prof. Dr. Bountiem Phissamay
   Minister to Prime Minister's Office and President of Science, Technology and the Environment Agency

   H.E. Prof. Dr. Souli Nanthavong
   Minister of Science, Technology and Environment
   (until 6th IAMME)

5. *Malaysia*
   H.E. Dato' Seri Adenan Satem
   Minister of Natural Resources and the Environment

   H.E. Dato' Seri Law Hieng Ding
   Minister of Science, Technology and Environment
   (until 7th IAMME and 9th AMMH)

6. *Myanmar*
   H.E. Win Aung
   Chairman of National Commission for Environmental Affairs and Ministry of Foreign Affairs

7. *Philippines*
   H.E. Michael T. Defensor
   Secretary, Department of Environment and Natural Resources

   H.E. Elisea G. Gozun
   Secretary, Department of Environment and Natural Resources
   (until 9th AMME and 10th AMMH)

   H.E. Heherson T. Alvarez
   Secretary, Department of Environment and Natural Resources
   (until 6th IAMME)

8. *Singapore*
   H.E. Dr. Yaacob Ibrahim
   Minister for the Environment and Water Resources

   H.E. Lim Swee Say
   Minister for the Environment
   (until 9th AMME, and 10th AMMH)

9. *Thailand*
   H.E. Yongyut Tiyapairat
   Minister of Natural Resources and Environment

   H.E. Suwit Khunkitti
   Minister of Natural Resources and Environment
   (until 8th IAMME, 11th AMMH and 1st COP)

   H.E. Prapat Panyachatiraksa
   Minister of Natural Resources and Environment
   (until 9th AMME and 10th AMMH)

   H.E. Sontaya Kunplome
   Minister of Science, Technology and the Environment
   (until 6th IAMME)

10. *Viet Nam*
    H.E. Mai Ai Truc
    Minister of Natural Resources and Environment

    H.E. Prof. Chu Tuan Nha
    Minister of Science, Technology and the Environment
    (until 6th IAMME)

11. *ASEAN Secretariat*
    H.E. Ong Keng Yong
    Secretary-General of ASEAN

    H.E. Rodolfo C. Severino
    Secretary-General of ASEAN
    (until 7th IAMME and 9th AMMH)

4. Plus Three Environment Ministers Meeting

28 September 2005	4th ASEAN Plus Three Environment Ministers	Manila
14 October 2004	3rd ASEAN Plus Three Environment Ministers	Singapore
19 December 2003	2nd ASEAN Plus Three Environment Ministers	Myanmar
21 November 2002	1st ASEAN Plus Three Environment Ministers	Lao PDR

Members

People's Republic of China
H.E. Xie Zhenhua
Minister of State for Environmental Protection Administration

Japan
H.E. Ms. Yuriko Koike
Minister for Environment

Republic of Korea
H.E. Kyul-Ho Kwak
Minister of Environment

5. ASEAN Senior Officials on the Environment (ASOEN)

16 – 18 August 2005	16th ASEAN Senior Officials on the Environment	Malaysia
03 – 05 August 2004	15th ASEAN Senior Officials on the Environment	Lao PDR
07 – 09 July 2003	14th ASEAN Senior Officials on the Environment	Indonesia
17 – 19 July 2002	13th ASEAN Senior Officials on the Environment	Cambodia
03 – 04 August 2001	12th ASEAN Senior Officials on the Environment	Bandar Seri Begawan

Members

1. *ASOEN Chairman*
   Mr. Hj. Mohd. Said bin Pehin Dato Hj. Hashim
   Permanent Secretary, Ministry of Development
   Brunei Darussalam

   Dr. Tran Hong Ha
   Director-General, Viet Nam Environmental Protection Agency
   Ministry of Natural Resources and Environment Viet Nam
   (until 16th ASOEN)

   Dr. Nguyen Ngoc Sinh
   Director-General, National Environment Agency, Ministry of Science, Technology and Environment, Viet Nam
   (until 14th ASOEN)

   Mr. Sunthad Somchevita
   Permanent-Secretary
   Ministry of Science, Technology and Environment
   (until 13th ASOEN)

2. *Brunei Darussalam*
   Mr. Hj. Mohd. Said bin Pehin Dato Hj. Hashim
   Permanent Secretary, Ministry of Development

   Mr. Hj. Mohd. Jumin Marsal
   Permanent Secretary, Ministry of Development
   (until 15th ASOEN)

   Mr. Pg. Hj. Kamarulzaman bin PPSDSB Pg. Haji Ali
   Acting Permanent Secretary, Ministry of Development
   (until 13th ASOEN)

   Dato' Hj. Zakaria bin Hj. Noordin
   Permanent Secretary, Ministry of Development
   (until 12th ASOEN)

3. *Cambodia*
   Dr. Lonh Heal
   Technical Director-General, Ministry of Environment

   Mr. Khieu Muth
   Director-General, Ministry of Environment
   (until 14th ASOEN)

4. *Indonesia*
   Ms. Liana Bratasida
   Assistant to the Minister for Global Environmental Affairs and International Cooperation, Ministry of the Environment

   Mr. Aboejoewono Aboeprajitno
   Assistant Minister for Global Environment Affairs, Ministry of the Environment
   (until 14th ASOEN)

   Mr. Effendy A. Soemardja
   Assistant Minister for Global Environment Affairs, Ministry of the Environment
   (until 12th ASOEN)

5. *Lao PDR*
   Mr. Soukata Vichit
   Director-General, Department of Environment, Science Technology and Environment Agency

6. *Malaysia*
   Dato' Dr. Isahak Yeop bin Mohamad Shar
   Secretary General
   Ministry of Natural Resources and the Environment

   Dato' Leong Ah Hin
   Secretary General, Ministry of Science, Technology and the Environment
   (until 14th ASOEN)

7. *Myanmar*
   U Than Swe
   Secretary, National Commission for Environmental Affairs Director-General, Ministry of Forestry

   U Thaung Tun
   Secretary, National Commission for Environmental Affairs Director-General, Ministry of Forestry
   (until 15th ASOEN)

   U Aung Bwa
   Secretary, National Commission for Environmental Affairs
   (until 14th ASOEN)

   U Thane Myint
   Secretary, National Commission for Environmental Affairs
   (until 13th ASOEN)

   U Kyaw Tint Swe
   Secretary, National Commission for Environmental Affairs
   (until 12th ASOEN)

8. *Philippines*
   Mr. Demetrio L. Ignacio, Jr.
   Undersecretary for Planning and Policy, Department of Environment and Natural Resources (DENR)

9. *Singapore*
   Mr. Tan Yong Soon
   Permanent Secretary, Ministry of the Environment and Water Resources

Mr. Lam Chuan Leong
Permanent Secretary, Ministry of the Environment
(until 14th ASOEN)

Mr. Tan Gee Paw
Permanent Secretary, Ministry of the Environment
(until 12th ASOEN)

10. *Thailand*
Mr. Petipong Pungbun Na Ayudhya
Permanent Secretary, Ministry of Natural Resources and Environment

Mr. Plodprasop Suraswadi
Permanent Secretary, Ministry of Natural Resources and Environment
(Until 14th ASOEN)

Mr. Sunthad Somchevita
Permanent-Secretar Ministry of Science, Technology and Environment
(until 13th ASOEN)

11. *Viet Nam*
Dr. Tran Hong Ha
Director-General,
Viet Nam Environmental Protection Agency,
Ministry of Natural Resources and Environment

Dr. Nguyen Ngoc Sinh
Director-General, National Environment Agency, Ministry of Science, Technology and Environment, Viet Nam
(until 14th ASOEN)

12. *ASEAN Secretariat*
Dr. Raman Letchumanan
Head, Environment and Disaster Management Unit Bureau for Resources Development

6. Plus Three Senior Officials on the Environment

19 August 2005	2nd ASEAN Plus Three Senior Officials on the Environment	Malaysia
06 August 2004	1st ASEAN Plus Three Senior Officials on the Environment	Lao PDR

Members

People's Republic of China
Ms. Fang Li
Director
Regional Environment Cooperation Division,
International Cooperation Department, State Environmental Protection Administration (SEPA)

Mr. Qinghua Xu
Director General
State Environmental Protection Administration (SEPA)
(until 1st Plus Three SOME)

Japan
Mr. Naohisa Okuda
Senior Policy Coordinator, Global Environment Bureau, Ministry of Environment

Mr. Taku Ohmura
Deputy Director
Policy and Coordination Division
Global Environment Bureau
Ministry of the Environment
(until 1st Plus Three SOME)

Republic of Korea
Dr. Lee Minho,
Director of International Affairs Division,
International Cooperation Bureau, Ministry of Environment

Mr. Young-Woo Park
Director General
International Coordination Bureau
Ministry of Environment
(until 1st Plus Three SOME)

7. ASOEN-Haze Technical Task Force

16 November 2005	22nd ASOEN Haze Technical Task Force	Brunei Darussalam
8 – 9 November 2004	21st ASOEN Haze Technical Task Force	Viet Nam
27 – 28 February 2003	20th ASOEN Haze Technical Task Force	Philippines
10 June 2002	19th ASOEN Haze Technical Task Force	Malaysia
14 May 2001	18th ASOEN Haze Technical Task Force	Cambodia

Members

1. *Chairperson ASOEN-HTTF*
   Ms. Liana Bratasida
   Assistant to the Minister for Global Environmental Affairs and International Cooperation, Ministry of the Environment, Indonesia

   Mr. Effendy A. Soemardja
   Assistant Minister for Global Environment Affairs, Ministry of the Environment, Indonesia
   (until 18th HTTF)

2. *Brunei Darussalam*
   Hj. Mohd. Said bin Pehin Dato Hj. Hashim
   Permanent Secretary
   Ministry of Development

3. *Cambodia*
   Dr. Lonh Heal
   Technical Director-General
   Ministry of Environment

4. *Lao PDR*
   Mr. Soukata Vichit
   Director General
   Department of Environment
   Science Technology and Environment Agency

5. *Malaysia*
   Dato' Dr. Isahak Yeop bin Mohamad Shar
   Secretary General Ministry of Natural Resources and the Environment

6. *Myanmar*
   U Thaung Tun
   Secretary
   National Commission for Environmental Affairs,
   Director-General, Political Department
   Ministry of Foreign Affairs

7. *Philippines*
   Mr. Demetrio L. Ignacio, Jr.
   Undersecretary for Planning and Policy
   Department of Environment and Natural Resources (DENR)

8. *Singapore*
   Mr. Tan Yong Soon
   Permanent Secretary
   Ministry of the Environment and Water Resources

9. *Thailand*
   Mr. Petipong Pungbun Na Ayudhya
   Permanent Secretary
   Ministry of Natural Resources and Environment

10. *Viet Nam*
    Dr. Tran Hong Ha
    Acting Director-General
    Viet Nam Environmental Protection Agency
    Ministry of Natural Resources and Environment

11. *ASEAN Secretariat*
    Dr. Raman Letchumanan
    Head,
    Environment and Disaster Management Unit
    Bureau for Resources Development

8. Working Group on Coastal and Marine Environment (AWGCME)

11 – 12 July 2005	7th ASEAN Working Group on Coastal and Marine Environment	Malaysia
22 – 23 June 2004	6th ASEAN Working Group on Coastal and Marine Environment	Indonesia
11 – 12 June 2003	5th ASEAN Working Group on Coastal and Marine Environment	Cambodia
09 – 10 July 2002	4th ASEAN Working Group on Coastal and Marine Environment	Viet Nam
10 – 11 July 2001	3rd ASEAN Working Group on Coastal and Marine Environment	Brunei Darussalam

Members

1. *Chairman of AWGCME*
   Prof. Dr. Nguyen Chu Hoi
   Institute of Fisheries Economics and Planning
   Ministry of Fisheries, Viet Nam

   Mr. Jarupong Boon-Long
   Deputy Director-General
   Pollution Control Department
   Thailand
   (until 3rd AWGCME)

2. *Brunei Darussalam*
   Mr. Hj Mohd Zakaria bin Hj Sarudin
   Director
   Department of Environment, Parks & Recreation
   Ministry of Development

3. *Cambodia*
   Mr. Vann Monyneath
   Deputy Director
   Department of Nature Resource Assessment and Environment Data Management
   Ministry of Environment

4. *Indonesia*
   Ms. Liana Bratasida
   Assistant to the Minister for Global Environmental Affairs and International Cooperation, Ministry of the Environment

   Mr. Aboejoewono Aboeprajitno
   Assistant Minister for Global Environment Affairs, Ministry of the Environment
   (until 6th AWGCME)

   Mr. Sudariyono
   Deputy Assistant Minister for Marine Resources
   Ministry of the Environment
   (until 3rd AWGCME)

5. *Lao PDR*
   Mr. Soukata Vichit
   Department of Environment
   Science Technology and Environment Agency

6. *Malaysia*
   Dato' Dr. Isahak Yeop Mohamad Shar
   Secretary General
   Ministry of Natural Resources and the Environment

   Dato' Leong Ah Hin
   Secretary-General
   Department of Environment
   (until 6th AWGCME)

   Mr. Ng. Kam Ciu
   Secretary-General
   Ministry of Science, Technology and the Environment
   (until 3rd AWGCME)

7. *Myanmar*
   Dr. Swe Thwin
   Professor, Department of Marine Science
   University of Mawlamyine
   Ministry of Education, Mawlamyine

8. *Philippines*
   Mr. Lorendo Barangan
   Director, Coastal and Environment Program
   Department of Environmental and Natural Resources

   Dr. Ramon J.P. Paje
   Undersecretary for Policy and Technical Services, Department of Environmental and Natural Resources
   (until 3rd AWGCME)

9. *Singapore*
   Mr. Koh Kim Hock
   Deputy Director
   International Relations Department
   Ministry of the Environment

   Mr. Chua Yew Peng
   Deputy Director
   International Relations Department
   Ministry of the Environment
   (until 6th AWGCME)

   Mr. Khoo Seow Poh
   Head, International Environment and Policy Department
   Ministry of the Environment
   (until 3rd AWGCME)

10. *Thailand*
    Dr. Pornsook Chongprasith
    Marine Environment Division Director
    Pollution Control Department

    Dr. Supat Wangwongwatana
    Deputy Director
    Pollution Control Department
    (until 6th AWGCME)

    Mr. Jarupong Boon-Long
    Deputy Director-General
    Pollution Control Department
    (until 4th AWGCME)

11. *Viet Nam*
    Prof. Dr. Nguyen Chu Hoi
    Institute of Fisheries Economics and Planning
    Ministry of Fisheries

12. *ASEAN Secretariat*
    Dr. Raman Letchumanan
    Head,
    Environment and Disaster Management Unit
    Bureau for Resources Development

9. Working Group on Multilateral Environmental Agreements (AWGMEA)

18 – 19 May 2005	9th ASEAN Working Group on Multilateral Environmental Agreements	Cambodia
04 – 06 May 2004	8th ASEAN Working Group on Multilateral Environmental Agreements	Brunei Darussalam
24 – 28 March 2003	7th ASEAN Working Group on Multilateral Environmental Agreements	Malaysia
27 – 28 June 2002	6th ASEAN Working Group on Multilateral Environmental Agreements	Viet Nam
02 – 03 October 2002	5th ASEAN Working Group on Multilateral Environmental Agreements	Singapore
27 – 28 March 2001	4th ASEAN Working Group on Multilateral Environmental Agreements	Thailand

Members

1. *Chairperson of AWGMEA*
   Ms. Liana Bratasida
   Assistant to the Minister for Global Environmental Affairs and International Cooperation, Ministry of the Environment

   Mr. Loh Ah Tuan
   Director General (Environmental Protection)
   National Environment Agency,
   Singapore
   (until 8th AWGMEA)

   Ms. Hj. Rosnani Ibarahim
   Director General
   Department of Environment, Malaysia
   (until 5th AWGMEA)

2. *Brunei Darussalam*
   Mr. Hj Mohd. Zakaria Bin Hj Sarudin
   Director, Department of Environment, Parks and Recreation, Ministry of Development

3. *Cambodia*
   Mr. Ma Chan Sethea
   Chief of ASEAN Office
   Ministry of Environment

   Mr. Pao Sophal
   Assistant to the Minister for Planning, Cooperation and ASEAN Affairs
   Ministry of Environment
   (until 8th AWGMEA)

4. *Indonesia*
   Ms. Liana Bratasida
   Assistant to the Minister for Global Environmental Affairs and International Cooperation,
   Ministry of the Environment

   Mr. Aboejoewono Aboeprajitno
   Assistant Minister for Global Environment Affairs,
   Ministry of the Environment,
   (until 7th AWGMEA)

   Mr. Effendy A. Sumardja
   Assistant Minister for Global Environment Affairs,
   Ministry of the Environment,
   (until 5th AWGMEA)

5. *Lao PDR*
   Md. Keobang A. Keola
   Deputy Director General
   Department of Environment
   Science, Technology and Environment Agency

   Mr. Soukata Vichit
   Director General
   Department of Environment
   Science, Technology and Environment Agency
   (until 6th AWGMEA)

6. *Malaysia*
   Ms. Hj. Rosnani Ibarahim
   Director General
   Department of Environment
   Malaysia

7. *Myanmar*
   Mrs. Yin Yin Lay
   Joint Secretary/ Director
   National Commission for Environmental Affairs
   Ministry of Forestry

8. *Philippines*
   Mr. Demetrio L. Ignacio
   Undersecretary for Policy and Planning
   Department of Environment and Natural Resources (DENR)

   Dr. Ramon J.P. Paje
   Undersecretary for Policy and Planning
   Department of Environment and Natural Resources (DENR)
   (until 5th AWGMEA)

9. *Singapore*
   Mr. Loh Ah Tuan
   Director General (Environmental Protection)
   National Environment Agency, Singapore

   Mr. Khoo Seow Poh
   Head
   International Environment and Policy Department
   Ministry of the Environment
   (until 5th AWGMEA)

10. *Thailand*
    Mrs. Wantanee Petchampai
    Environmental Specialist,
    Office of International Cooperation on Natural Resources and Environment

    Mr. Chalermsak Wanichsombat
    Deputy Permanent Secretary
    Ministry of Natural Resources and Environment
    (until 8th AWGMEA)

    Dr. Wanee Samphantharak
    Deputy Secretary General
    Office of Environmental Policy and Planning
    (until 6th AWGMEA)

11. *Viet Nam*
    Mr. Nguyen Minh Cuong
    Officer,
    Vietnam Environmental Protection Agency (VEPA)
    Ministry of Natural Resources and Environment

    Mr. Nguyen Thi Tho
    Deputy Head,
    National Environment Agency
    Ministry of Science, Technology and Environment
    (until 8th AWGMEA)

Dr. Nguyen Ngoc Sinh
Director-General,
National Environment Agency
Ministry of Science, Technology and Environment
(until 6th AWGMEA)

12. *ASEAN Secretariat*
Dr. Raman Letchumanan
Head,
Environment and Disaster Management Unit
Bureau for Resources Development

10. Working Group on Nature Conservation and Biodiversity (AWGNCB)

21 – 23 June 2005	15th ASEAN Working Group on Nature Conservation and Biodiversity	Thailand
16 – 18 June 2004	14th ASEAN Working Group on Nature Conservation and Biodiversity	Philippines
13 – 15 Aug 2003	13th ASEAN Working Group on Nature Conservation and Biodiversity	Singapore
17 – 18 July 2001	11th ASEAN Working Group on Nature Conservation and Biodiversity	Malaysia

Members

1. *Chairperson of AWGNCB*
Dr. Theresa Mundita S. Lim
Director, Protected Areas and Wildlife Bureau
Department of Environment and Natural Resources, Philippines

Mr. Wilfrido S. Pollisco
Director, Protected Areas and Wildlife Bureau
Department of Environment and Natural Resources, Philippines
(until 13th AWGNCB)

Dr. Reynaldo C. Bayabos
Director
Protected Areas and Wildlife Bureau
Department of Environment and Natural Resources, Philippines
(until 11th AWGNCB)

2. *Brunei Darussalam*
Ms. Martinah Haji Tamit
Senior Environment Officer, Department of Environment, Parks and Recreation, Environmental Planning and Management Division, Ministry of Development

3. *Cambodia*
Mr. Pisey Oum
Deputy Director
Ministry of Environment

Mr. Pao Sophal
Assistant to the Minister
Planning, Cooperation and ASEAN Affairs
Ministry of Environment
(until 14th AWGNCB)

4. *Indonesia*
Mr. Adi Susmianto, Msc.
Director, Biodiversity Conservation,
Directorate General for Forest Protection and Nature Conservation, Ministry of Forestry

Mr. Widodo S. Ramono
Director, Biodiversity Conservation
Directorate General for Nature Protection and Conservation, Ministry of Forestry
(until 14th AWGNCB)

5. *Lao PDR*
Mr. Bouaphanh Phanthavong
Head of Technical Unit
Department of Forestry
Division of Forest Resources Conservation
(until 14th AWGNCB)

6. *Malaysia*
Ms. Goh Siok Eng
Deputy Director
Conservation and Environmental Management Division
Ministry of Science, Technology and Environment

7. *Myanmar*
Mr. Htun Paw Oo
Director
Nature and Wildlife Conservation Division,
Forest Department

Mr. Khin Maung Zaw
Director
Nature and Wildlife Conservation Division
Forest Department
(until 14th AWGNCB)

8. *Singapore*
Dr. Lena Chan
Assistant Director (Biodiversity Centre)
Singapore Botanic Gardens
National Parks Board

9. *Thailand*
Ms. Nisakorn Kositratna
Office of Natural Resources and Environmental Policy and Planning

Dr. Srisuda Jarayabhand
Senior Environment Officer
Office of International Cooperation on Natural Resources and Environment
Ministry of Natural Resources and Environment
(until 13th AWGNCB)

Dr. Saksit Tridech
Secretary-General
Office of Environmental Policy and Planning
(until 12th AWGNCB)

10. *Viet Nam*
Mr. Le Xuan Canh
Director
Institute of Ecology and Biological Resources

Dr. Vu Quang Con
Director
Institute of Ecology and Biological Resources
(until 12th AWGNCB)

11. *ASEAN Secretariat*
Dr. Raman Letchumanan
Head,
Environment and Disaster Management Unit
Bureau for Resources Development

11. Working Group on Environmentally Sustainable Cities (AWGESC)

28 – 29 June 2005	3rd ASEAN Working Group on Environmentally Sustainable Cities	Viet Nam
20 – 21 July 2004	2nd ASEAN Working Group on Environmentally Sustainable Cities	Thailand
25 – 26 June 2003	1st ASEAN Working Group on Environmentally Sustainable Cities	Singapore

Members

1. *Chairperson of AWGESC*
Mr. Loh Ah Tuan
Deputy CEO/Director-General for Environmental Protection
National Environment Agency, Singapore

2. *Brunei Darussalam*
Mr. Hj. Mohd. Zakaria Hj. Sarudin
Director, Department of Environment, Parks and Recreation, Ministry of Development

Mr. Hj. Mohd. Jumin bin Hj. Marsal
Permanent Secretary
Ministry of Development
(until 2nd AWGESC)

3. *Cambodia*
Dr. Lonh Heal
Chairman ASOEN – Cambodia
Technical Director-General
Ministry of Environment
Department of Planning & Legal Affairs
Ministry of Environment

Mr. Khieu Muth
Director General
Department of Planning and Legal Affairs
Head of ASEAN Unit
Ministry of Environment
(until 2nd AWGESC)

4. *Indonesia*
Mr. Mohammad Helmy
Assistant Deputy
Domestic Waste and Small Scale Enterprise Pollution Control
Ministry of the Environment

Ms. Liana Bratasida
Chairman ASOEN – Indonesia
Assistant to the Minister for Global Environmental Affairs and International Cooperation,
Ministry of the Environment
(until 2nd AWGESC)

Mr. Aboejoewono Aboeprajitno
Assistant to the Minister for
Global Environment Affairs
Ministry of the Environment
(1st AWGESC)

5. *Lao PDR*
Mr. Soukata Vichit
Chairman ASOEN – Lao PDR
Director General
Department of Environment
Science, Technology and Environment Agency

6. *Malaysia*
Dato' Hajah Rosnani Ibarahim
Director General
Department of Environment
Ministry of Natural Resources and the Environment

Dato' Dr. Isahak Yeop Mohamad Shar
Secretary-General
Ministry of Natural Resources and the Environment
(until 2nd AWGESC)

Dato' Leong Ah Hin
Secretary-General
Ministry of Science, Technology and the Environment
(1st AWGESC)

7. *Myanmar*
Ms. Yin Yin Lay
Joint Secretary/Director
National Commission for Environmental Affairs
Ministry of Forestry

Mr. Thaung Tun
Chairman ASOEN – Myanmar
Secretary
National Commission for Environmental Affairs
(until 2nd AWGESC)

Mr. Thane Myint
Secretary
National Commission for Environmental Affairs
(1st AWGESC)

8. *Philippines*
Mr. Demetrio L. Ignacio, Jr.
Chairman ASOEN – Philippines
Undersecretary for Planning and Policy
Department of Environment and Natural Resources (DENR)

9. *Thailand*
Ms. Usa Kiatchaipipat
Director
Urban Environment and Area Planning Division
Office of National Resources and Environmental Policy and Planning

Dr. Plodprasop Suraswadi
Permanent Secretary
Ministry of Natural Resources and Environment
(until 2nd AWGESC)

10. *Viet Nam*
Ms Nguyen Thi My Hoang
Officer
International Cooperation Division
Vietnam Environmental Protection Agency
Ministry of Natural Resource and Environment

Dr. Nguyen Ngoc Sinh
Director General
National Environment Agency
Ministry of Science, Technology and Environment
(until 2nd AWGESC)

11. *ASEAN Secretariat*
Dr. Raman Letchumanan
Head,
Environment and Disaster Management Unit
Bureau for Resources Development

12. Working Group on Water Resources Management (AWGWRM)

01 September 2005	5th ASEAN Working Group on Water Resources Management	Indonesia
22 October 2004	4th ASEAN Working Group on Water Resources Management	Thailand
09 – 10 June 2004	3rd ASEAN Working Group on Water Resources Management	Malaysia
21 – 22 November 2003	2nd ASEAN Working Group on Water Resources Management	Thailand
28 – 29 January 2003	1st ASEAN Working Group on Water Resources Management	Thailand

Members

1. *Chairman of AWGWRM*
Mr. Sanong Chantanintorn
Director General
Department of Water Resources
Ministry of Natural Resources and Environment, Thailand

Mr. Kasem Chancharoonpong
Director General
Department of Water Resources
Ministry of Natural Resources and Environment, Thailand
(until 4th AWGWRM)

Mr. Surachai Sasisuwan
Director General
Department of Water Resources
Ministry of Natural Resources and Environment, Thailand
(until 2nd AWGRM)

2. *Brunei Darussalam*
Mr. Hj Suhaimi bin Hj Ghafar
Director of Water Services
Public Works Department

3. *Cambodia*
Mr. Am Norin
Deputy Director
Department of Water Resources Management and Conservation
Ministry of Water Resources and Metrology

4. *Indonesia*
Dr. Ir. Sutardi, M.Eng (Mr)
Head of Sub Directorate for Hydrology
Directorate General of Water Resources
Ministry of Settlement and Infrastructure

5. *Lao PDR*
   Mr. Chanthanet Boulapha
   Deputy Director of Water Resources
   Coordination Committee Secretariat (WRCCS),
   Prime Minister Office
   Science, Technology and Environment Agency

6. *Malaysia*
   Datuk Ir. Hj. Keizrul Abdullah
   Director General
   Department of Irrigation and Drainage
   Ministry of Natural Resources and Environment

7. *Myanmar*
   Mr. Sein Tun
   Deputy Director
   Directorate of Water Resources and
   Improvement of River Systems
   Ministry of Transport

8. *Philippines*
   Mr. Ramon B. Alikpala
   Executive Director
   National Water Resources Board

9. *Singapore*
   Mr. Chan Yoon Kum
   Director
   Water Department
   Public Utilities Board

10. *Viet Nam*
    Dr. Nguyen Thai Lai
    Director General
    Department of Water Resources Management
    Ministry of Natural Resources and Environment

11. *ASEAN Secretariat*
    Dr. Raman Letchumanan
    Head,
    Environment and Disaster Management Unit
    Bureau for Resources Development

13. ASEAN Working Group on Sub-Regional Fire Fighting Arrangements (SRFA) for Borneo and Sumatra

14 November 2005	17th Joint Meeting of the Working Groups on Sub-Regional Fire-Fighting Arrangements (SRFAs) for Borneo and Sumatra	Brunei Darussalam
17 March 2005	16th Joint Meeting of the Working Groups on Sub-Regional Fire-Fighting Arrangements (SRFAs) for Borneo and Sumatra	Singapore
22 – 23 July 2004	15th Joint Meeting of the Working Groups on Sub-Regional Fire-Fighting Arrangements (SRFAs) for Borneo and Sumatra	Indonesia
22 – 23 April 2004	14th Joint Meeting of the Working Groups on Sub-Regional Fire-Fighting Arrangements (SRFAs) for Borneo and Sumatra	Malaysia
31 July – 2 August 2003	13th Joint Meeting of the Working Groups on Sub-Regional Fire-Fighting Arrangements (SRFAs) for Borneo and Sumatra	Indonesia
15 – 16 January 2003	12th Joint Meeting of the Working Groups on Sub-Regional Fire-Fighting Arrangements (SRFAs) for Borneo and Sumatra	Brunei Darussalam
12 – 13 August 2002	11th Joint Meeting of the Working Groups on Sub-Regional Fire-Fighting Arrangements (SRFAs) for Borneo and Sumatra	Singapore
21 May 2002	10th Joint Meeting of the Working Groups on Sub-Regional Fire-Fighting Arrangements (SRFAs) for Borneo and Sumatra	Indonesia
1 March 2002	9th Joint Meeting of the Working Groups on Sub-Regional Fire-Fighting Arrangements (SRFAs) for Borneo and Sumatra	Indonesia
6 September 2001	Informal Joint Meeting of the Working Groups on Sub-Regional Fire-Fighting Arrangements (SRFAs) for Borneo and Sumatra	Indonesia
15 – 16 November 2001	8th Joint Meeting of the Working Groups on Sub-Regional Fire-Fighting Arrangements (SRFAs) for Borneo and Sumatra	Malaysia
17 July 2001	Urgent Joint Joint Meeting of the Working Groups on Sub-Regional Fire-Fighting Arrangements (SRFAs) for Borneo and Sumatra	Video Conference
1 – 2 August 2001	7th Joint Meeting of the Working Groups on Sub-Regional Fire-Fighting Arrangements (SRFAs) for Borneo and Sumatra	Brunei Darussalam
24 – 25 April 2001	6th Joint Meeting of the Working Groups on Sub-Regional Fire-Fighting Arrangements (SRFAs) for Borneo and Sumatra	Malaysia
5 – 6 February 2001	5th Joint Meeting of the Working Groups on Sub-Regional Fire-Fighting Arrangements (SRFAs) for Borneo and Sumatra	Singapore

Members

1. *Chairperson of SRFA Sumatra*
   Mr. Lee Heng Keng
   Deputy Director-General for Operations
   Department of Environment
   Malaysia

   Dato' Hajah Rosnani Ibarahim
   Director-General
   Department of Environment
   Malaysia
   (until 13th Joint SRFA)

2. *Chairperson of SRFA Borneo*
   Mr. Hj. Mohd. Jumin bin Hj. Marsal
   Permanent Secretary
   Ministry of Development
   Brunei Darussalam

   Dato Paduka Hj. Zakaria Hj. Noordin
   Permanent Secretary
   Ministry of Development
   Brunei Darussalam
   (until 13th Joint SRFA)

3. *Indonesia*
   Ms. Liana Bratasida
   Assistant to the Minister for Global Environmental Affairs and International Cooperation, Ministry of the Environment

   Mr. Effendy A. Soemardja
   Assistant Minister for Global Environment Affairs, Ministry of the Environment
   (until Informal Joint SRFAs, 2001)

4. *Singapore*
   Mr. Chua Yew Peng
   Head, Planning and Development Department
   National Environment Agency

   Mr. Joseph Hui
   Head, Planning and Development Department
   National Environment Agency
   (until 16th Joint SRFA)

   Mr. Khoo Seow Poh
   Director, Corporate Communications and International Relations Division Ministry of Environment
   (until 10th Joint SRFA)

5. *Thailand*
   Mr. Petipong Pungbun Na Ayudhya
   Permanent Secretary
   Ministry of Natural Resources and Environment
   (since 17th Joint SRFA)

6. *ASEAN Secretariat*
   Dr. Raman Letchumanan
   Head,
   Environment and Disaster Management Unit
   Bureau for Resources Development

14. Simulation Organising Committee (SOC)

15 – 16 March 2005	3rd Meeting of the Simulation Organising Committee	Singapore
13 – 14 January 2003	2nd Meeting of the Simulation Organising Committee	Brunei Darussalam
13 August 2002	1st Meeting of the Simulation Organising Committee	Singapore

Members

1. *Chairperson of SOC*
   Ms. Liana Bratasida
   Assistant to the Minister for Global Environmental Affairs and International Cooperation,
   Ministry of the Environment

2. *Brunei Darussalam*
   Mr. Hj. Mohd Zakaria Hj Sarudin
   Director
   Department of Environment Parks and Recreation
   Ministry of Development

3. *Malaysia*
   Mr. Lee Heng Keng
   Deputy Director General for Operation
   Department of Environment
   Malaysia

4. *Singapore*
   Mr. Joseph Hui
   Head, Planning and Development Department
   National Environment Agency

5. *ASEAN Secretariat*
   Dr. Raman Letchumanan
   Head,
   Environment and Disaster Management Unit
   Bureau for Resources Development

15. Sub-Regional Climate Review Meeting (SRCR)

27 Aug 2002	8th Sub-Regional Climate Review Meeting (SRCR)	Malaysia
24 May 2002	7th Sub-Regional Climate Review Meeting (SRCR)	Philippines
1 April 2002	6th Sub-Regional Climate Review Meeting (SRCR)	Singapore

Members

1. *Chairperson of SRCR*
   Mr. Woon Shih Lai
   Director, ASEAN Specialised Meteorological Centre (ASMC)
   Singapore

2. *Brunei Darussalam*
   Mr. Muhamad Husaini Aji
   Acting Chief Meteorological Officer
   Brunei Meteorological Service

3. *Indonesia*
   Mr. Sri Diharto
   Director-General Meteorological and Geophysics
   Indonesia

4. *Malaysia*
   Dr. Lim Joo Tick
   Director-General, Malaysian Meteorological Service Malaysia

5. *ASEAN Secretariat*
   Dr. Raman Letchumanan
   Head,
   Environment and Disaster Management Unit
   Bureau for Resources Development

16. SRFA Legal group on Law and Enforcement (LGLE)

22 – 23 April 2001	2nd Meeting of Sub-Regional Fire-Fighting Arrangement (SRFA) Legal Group on Law and Enforcement	Malaysia

Members

1. *Chairperson of LGLE*
   Ms. Muslina Sulaiman
   Principal Assistant Director,
   International Affairs Unit
   Department of Environment

2. *Brunei Darussalam*
   Mr. Pg Shamhary Pg Dato Paduka Haji Mustapha
   Environment Officer, Environment Unit,
   Ministry of Development

3. *Indonesia*
   Mr. Antung Deddy Radiansyah
   Head of Centre for Emergency Response and Readiness for Environmental Disaster,
   Environmental Impact Management Agency (BAPEDAL)

4. *Singapore*
   Mr. Bin Chee Kwan
   Chief Engineer (Regional Policy)
   Ministry of the Environment

5. *ASEAN Secretariat*
   Ms. Adelina Kamal
   Senior Officer, Environment and Disaster Management
   Bureau for Resources Development

Appendix IV

Preparation of the Third ASEAN State of the Environment Report

(A) Designated Focal Points

1. *Brunei Darussalam*
   Ms. Martinah Haji Tamit
   Senior Environment Officer
   Department of Environment, Parks and Recreation
   Ministry of Development

2. *Cambodia*
   Dr. Lonh Heal
   Technical Director-General, Ministry of Environment

3. *Indonesia*
   Ms. Siti Aini Hanum
   Assistant Deputy for Environmental Information and Data
   Capacity Building and Technical Infrastructure Development Division
   Ministry of Environment

4. *Lao PDR*
   Md. Keobang A. Keola
   Deputy Permanent Secretary, Department of Environment,
   Science Technology and Environment Agency

5. *Malaysia*
   Ms. Dalilah Binti Dali
   Principal Assistant Director
   Department of Environment
   Ministry of Natural Resources and Environment

6. *Myanmar*
   Ms. Yin Yin Lay
   Joint Secretary
   National Commission for Environmental Affairs
   Ministry of Forestry

7. *Philippines*
   Mr. Demetrio L. Ignacio, Jr.
   Undersecretary for Planning and Policy,
   Department of Environment and Natural Resources (DENR)

8. *Singapore*
   Mr. Koh Joon Hong
   Assistant Director
   International Relations Division
   Ministry of Environment and Water Resources

9. *Thailand*
   Ms. Duangmal Sinthuvanich
   Director, Monitoring and Evaluation Division
   Office of Natural Resources and Environmental Policy and Planning
   Ministry of Natural Resources and Environment

10. *Viet Nam*
    Dr. Tran Hong Ha
    Director-General, Viet Nam Environmental Protection Agency, Ministry of Natural Resources and Environment

11. *ASEAN Secretariat*
    Dr. Raman Letchumanan
    Head of Environment and Disaster Management Unit,
    Bureau for Resources Development

(B) Planning and Review Meeting

First Task Force Meeting on the Third ASEAN State of the Environment Report (Penang, Malaysia, 15 August 2005)

Brunei Darussalam	:	Hj. Shaharudin Khairul Hj. Annuar
Indonesia	:	Ms. Liana Bratasida
Malaysia	:	Ms. Dalilah Binti Dali
Myanmar	:	Ms. Yin Yin Lay
Singapore	:	Mr. Koh Joon Hong
Thailand	:	Mrs. Wantanee Petchampai
ASEAN Secretariat	:	Ms. Wendy Yap Mr. Aprianto Masjhur Ms. Vinca Safrani

Second Task Force Meeting on the Third ASEAN State of the Environment Report (Indonesia, 23 – 25 August 2006)

Cambodia	:	1. Mr. Sreng Sophal 2. Mr. Sam Thary
Indonesia	:	1. Ms. Siti Aini Hanum 2. Mrs. Murawani Nurfadilastuti
Lao PDR	:	1. Mr. Kongsaysy Phommaxay 2. Mr. Syamphone Sengchandala
Malaysia	:	1. Ms. Dalilah Binti Dali 2. Dr. Sivanathan Elagupillay
Myanmar	:	1. Dr. San Win 2. Ms. Kyi Kyi Myint
Singapore	:	1. Mr. Koh Joon Hong 2. Ms. Chan Yee Ping Jacin
Thailand	:	1. Mr. Mingkwan Thornsirikul 2. Mr. Rangsan Pinthong
Viet Nam	:	1. Ms. Nguyen Thanh Nga 2. Mr. Nguyen Van Thuy
ASEAN Secretariat	:	Dr. Raman Letchumanan (Chairman) Mr. Aprianto Masjhur Mr. M. Tanzir Wilson Mr. Susilo Ady Kuncoro Mr. Nyi Soe