Fourth ASEAN State of the Environment Report 2009

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For inquiries, contact:
Public Affairs Office
The ASEAN Secretariat
70A Jalan Sisingamangaraja
Jakarta 12110, Indonesia.
Phone : (62 21) 724-3372, 726-2991
Fax : (62 21) 739-8234, 724-3504
E-mail : public.div@asean.org

General information on ASEAN appears on-line at the ASEAN Secretariat Website: www.asean.org

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Cover Illustration:

ASEAN celebrated ASEAN Day 2009 with the theme "Green ASEAN", and the design used for publicity materials is reflected on the cover of this Report. This Report has also adopted the theme of "Green ASEAN".

FOREWORD

I am pleased to present the ASEAN State of the Environment Report 2009, the fourth in the series. The first report was published in 1997 and since then this series of reports published every three years has tracked the status and progress of environmental management in the region.

This report comes soon after the entry into force of the ASEAN Charter on 15 December 2008. The Charter represents a significant development in the long history of ASEAN which transformed the coalition of nations born out of the Bangkok Declaration of 1967 into a legal and rules-based entity. The Charter, among others, has emphasized that ASEAN shall promote sustainable development so as to ensure the protection of the region's environment, the sustainability of its natural resources, and the preservation of its cultural heritage and the high quality of life of its people.

ASEAN celebrated the 2009 ASEAN Day with the theme "Green ASEAN". The theme reflects ASEAN's commitment to build an environmentally sustainable ASEAN Community by the year 2015. The Roadmap for an ASEAN Community 2009 – 2015 lays out the goals, strategies and actions to achieve this goal based on the principle of sustainable development through the ASEAN Socio-Cultural Community Blueprint, the ASEAN Economic Community Blueprint, the ASEAN Political-Security Community Blueprint, and the Initiative for ASEAN Integration 2nd Work Plan.

Accordingly the Report takes a holistic approach in presenting the socio-economic conditions, the status and trends in the various environmental sectors, and what ASEAN is doing to promote environmental sustainability while placing priority on socio-economic development. In line with the theme of "Green ASEAN", the Report has focused on greening the ASEAN economy, highlighting how a sustainable and resilient economic base could be built from the rich natural resources of the region while at the same time ensuring social development and environmental sustainability.

The environmental performance of most ASEAN Member States, as assessed by reputable studies, is above the world average, and the ecological footprint is much lower than that of many nations. However, ASEAN will continue to face growing environmental challenges given the need to lift a third of its population earning less than US$ 2 a day out of poverty, and the many other pressures exerted on the environment such as population growth, urbanization and industrialization.

Furthermore, many of the environmental problems in the region are exacerbated by developments outside the region. This Report has outlined what we have done and are committed to do in the future to promote environmental sustainability. Therefore this Report provides a useful reference for all parties to join hands with ASEAN to make the region and the planet a better place for our future generations.

I would like to express my sincere appreciation to all those who have been involved in the preparation of this insightful report. I would like to particularly thank the Government of Japan, and the Hanns Seidel Foundation for their generous financial support for this publication.

Thank you.

Dr. Surin Pitsuwan
Secretary-General of ASEAN

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ACRONYMS AND ABBREVIATIONS

ASEAN Member States:

BRU	Brunei Darussalam
CAM	Cambodia
IND	Indonesia
LAO	Lao PDR
MYA	Myanmar
MAL	Malaysia
PHI	Philippines
SIN	Singapore
THA	Thailand
VIE	Viet Nam

A

a.s.l	above sea level
AADCP-RPS	ASEAN-Australia Development Cooperation Programme-Regional Partnerships Scheme
ACB	ASEAN Centre for Biodiversity
ACCI	ASEAN Climate Change Initiative
ADB	Asian Development Bank
ADMU	Ateneo de Manila University
AEC	ASEAN Economic Community
AEEAP	ASEAN Environmental Education Action Plan 2000 – 2005
AEEID	ASEAN Environmental Education Inventory Database
AEY	ASEAN Environmental Year
AHP	ASEAN Heritage Parks
AIESC	ASEAN Initiative on Environmentally Sustainable Cities
AMS	ASEAN Member States
AMWQC	ASEAN Marine Water Quality Criteria
APMS	ASEAN Peatland Management Strategy
APSC	ASEAN Political-Security Community
ARCBC	ASEAN Regional Centre for Biodiversity Conservation
ASCC	ASEAN Socio-Cultural Community
ASEAN	Association of Southeast Asia Nations
ASEAN-WEN	ASEAN Wildlife Enforcement Network
ASMC	ASEAN Specialised Meteorological Centre
ASOEN	ASEAN Senior Officials on the Environment
AWGCC	ASEAN Working Group on Climate Change
AWGCME	ASEAN Working Group on Coastal and Marine Environment
AWGEE	ASEAN Working Group on Environmental Education
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

BCRC-SEA	Basel Convention Regional Centre for Training and Technology Transfer for Southeast Asia
BOD	Biological Oxygen Demand

C

CAQM	continuous air quality monitoring
CBD	Convention of Biological Diversity
CDM	Clean Development Mechanism
CDST	chassis dynamometer smoke test
CFCs	chlorofluorocarbons
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNG	Compressed Natural Gas
CO	carbon monoxide
CO_2	carbon dioxide
COD	Chemical Oxygen Demand
COP	Conference of the Parties
CP	cleaner production
CSOs	ASEAN Civil Society Organisations
CTI	Coral Triangle Initiative

D

DENR	Department of Environment and Natural Resources
DFR	Deramakot Forest Reserve
DO	Dissolved Oxygen
DOE	Department of Environment
DTSS	Deep Tunnel Sewerage System

E

E^2PO	Energy Efficiency Programme Office
EAS	East Asia Summit
EC	European Commission
ECC	Employees' Compensation Commission
EE	Environmental Education
EEE	electrical and electronic equipment
EF	Ecological footprint
EGS	environmental goods and services
EMA	Energy Market Authority
EPI	Environmental Performance Index
ES	ecosystem services
ESC	Environmentally Sustainable City
ESD	Environmentally Sustainable Development
ESI	Environmental Sustainability Index
EST	Environmentally Sound Technology

F

FAO	Food and Agriculture Organisation of the United Nations
FPA	Fertiliser and Pesticide Authority
FSC	Forest Stewardship Council

G

GDP	Gross Domestic Product
GGND	Global Green New Deal
GHG	greenhouse gas

H

HDI	Human Development Index
HDL	Human Development Level

I

IACCC	Inter-Agency Committee on Climate Change
IAI	Initiative for ASEAN Integration
IAMME	Informal ASEAN Ministerial Meeting on the Environment
IAS	Invasive alien species
IEE	Initial Environmental Examination
IPCC	Intergovernmental Panel on Climate Change
IRRS	Integrated Resource Recovery System
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resources Management

J

JSA	Japanese Government Team for Safeguarding Angkor

L

LCFC	low capacity flushing cisterns

M

MDG	Millennium Development Goal
MEAs	Multilateral Environmental Agreements
MEWR	Ministry of the Environment and Water Resources
MLW	maximum laden weight
MoNRE	Ministry of Natural Resources and Environment
MPA	Marine Protected Area
MRF	material recovery facility
MSC	Sub-Regional Ministerial Steering Committee
MSW	municipal solid waste
MWA	Metropolitan Water Authority
MWSS	Manila Water Supply System

N

NBSAP	National Biodiversity Strategies and Action Plans
NC2	Second National Communication
NCCC	National Climate Change Committee
NEA	National Environment Agency
NGO	non-government organisation

NO_2	nitrogen dioxide
NO_x	nitrous oxide
NRM	natural resource management
NRW	non-revenue water
NVP	National Vision Policy

O

O_3	ozone
ODP	ozone depletion potential
ODS	ozone depleting substance

P

PA	Protected Areas
Pb	lead
PCD	Pollution Control Department
PD	Presidential Decree
PES	Payment for Ecosystem Services
PKWS	Peam Krasaop Wildlife Santuary
PLI	Poverty Line Income
PM	particulate matter
PM_{10}	particulate matter smaller than 10 micrometres
$PM_{2.5}$	particulate matter smaller than 2.5 micrometres
PMCR	Participatory Management of Coastal Resources
POP	persistent organic pollutant
ppm	parts per million
PPP	purchasing power parity
PPRT	*Program Pembangunan Rakyat Termiskin* or Development Programme for the Hardcore Poor
PSI	Pollutant Standards Index
PSR	Pressure-State-Response
PWS	Payment for watershed services

Q

QPS	quarantine and pre-shipment

R

RDFP	refuse-derived fuel plant
READI	Regional EU-ASEAN Dialogue Instrument
RSPO	Roundtable on Sustainable Palm Oil
RUPES	Rewarding Upland Dwellers for Providing Environmental Services

S

SAN	Sustainable Agriculture Network
SCP	Sustainable Consumption and Production
SEC	Singapore Environment Council
SGLS	Singapore Green Labelling Scheme
SME	Small and Medium Enterprises

SO_2	sulphur dioxide
SoER	State of the Environment Report
SPKR	*Skim Pembangunan Kesejahteraan Rakyat* or People Well-being Development Scheme
SWM	solid waste management

T

TSP	total suspended particulates
TSS	total suspended solids

U

UN	United Nations
UNDESA	United Nations Department on Economic and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNEP-WCMC	United Nations Environment Programme - World Conservation Monitoring Centre
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency

V

VAP	Vientiane Action Programme
VMC	village management committee
VOC	volatile organic compound

W

WDPA	World Database on Protected Areas
WEEE	waste electrical and electronic equipment
WSSD	World Summit on Sustainable Development
WTO	World Trade Organisation

Measurement unit:

mm	millimetre
cm	centimetre
m	metre
km	kilometre
km^2	square kilometre
ha	hectare
toe	tonne of oil equivalent
%	percent
US$	US Dollar
$\mu g/m^3$	microgram per cubic metre
km/hour	kilometre per hour

CHAPTER 1
Introduction

We 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

ASEAN Vision 2020

Introduction

"ASEAN shall be united by a common desire and collective will to live in a region of lasting peace, security and stability, sustained economic growth, shared prosperity and social progress, and to promote its vital interests, ideals and aspirations" emphasised the ASEAN Heads of State/Government when they adopted the ASEAN Charter on 20 November 2007. The Charter which entered into force on 15 December 2008 transformed ASEAN into a legal and rules-based organization, and strengthened its institutional framework to realise the vision of an ASEAN Community by the year 2015. Subsequently, the Leaders on 1st March 2009 adopted the Roadmap for an ASEAN Community 2009 – 2015 as the primary means to realise the goals and purposes of the ASEAN Charter.

ASEAN's commitment to a more sustainable path to development was expressed as early as 1997 in the ASEAN Vision 2020, which called 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 peoples"

To realise the ASEAN Vision, in October 2003, the Heads of State/Government of ASEAN Member States (AMS) 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".

However, the path to a green ASEAN community is not going to be smooth. There are numerous challenges that ASEAN has to overcome to realise the ambitious goals and purposes laid out in the ASEAN Charter and the Roadmap for an ASEAN Community 2009 – 2015. This is even more so for many of the complex, multifaceted and transboundary environmental issues with require coordinated action beyond the national and regional level. The key challenges that ASEAN has to address are as follows:

ASEAN must continue to vigorously pursue its sustainable development framework as embodied in the Roadmap for an ASEAN Community 2009 – 2015. The **greening of the ASEAN economy** requires ASEAN to increasingly pursue market based approaches. The potential for trade in environmental goods and services are huge, and is certainly sustainable in the longer term, compared to the conventional exploitative use of ecosystem resources. However, as developing nations, with about 185 million people in ASEAN still earning less than US$2 a day, economic growth and social development shall remain a priority.

ASEAN has to ensure that all member states achieve sufficient development potential and capacity to fully realise its goals and aspirations for an ASEAN Community. The lesser developed member states should accelerate their development efforts aided by the more developed member states and the global community to ensure true ASEAN integration. Therefore **narrowing the socio-economic divide** among and within the member states of ASEAN, and to ensure environmental sustainability in the process of catching up with economic growth and social development remains an important task.

Damage caused by natural and man-made disasters not only sets back years or even decades of development, but also retards the capacity of people and nations to recover from the damage inflicted. Several recent devastating disasters remind us of the increasing frequency and severity of disasters the ASEAN region is exposed to. Many of these disasters, such as forest fires, are caused by environmental degradation which in turn causes further ecosystem disruption. Therefore addressing environmental sustainability is of paramount importance to reduce the severity of hazards, minimise loss of life and suffering, and to progressively move up the economic and social ladders.

The **climate change crisis** is the embodiment of what can go wrong, if action is not taken globally based on the principle of common but differentiated responsibility. ASEAN is particularly vulnerable to the impacts of climate change due to the concentration of people and economic activities in the coastal areas, its rich biological diversity, resource-based economies, and the increased vulnerability of the people especially the poor.

ASEAN needs to make greater efforts to **address land and forest fires to minimise transboundary smoke haze pollution**. ASEAN has made commendable efforts to put in place institutional mechanisms and programs to prevent, monitor and mitigate fires through the ASEAN Agreement on Transboundary Haze Pollution. However, increased fires are closely associated with the dry and hot El Nino periods that are now occurring more frequently. As fires destroy ecosystem and biodiversity and contributes to climate change by releasing carbon, it is important that the global community become more engaged and work with ASEAN to address this recurring problem.

ASEAN has to protect its **freshwater resources and marine and coastal ecosystems**. These are important life-sustaining and economic resources. The rising population and increasing industrial and agricultural activities will continue to exert pressure on these resources.

ASEAN has to further **reduce the rate of deforestation and loss of biodiversity** in the region which hosts an abundance of flora and fauna, many of which are found nowhere else in the world. Already there are encouraging signs of reduction of the rate of deforestation. However, the rate of deforestation is still high compared to the world's average, and further reducing it will remain challenging considering the primarily resource-based economy of the region.

ASEAN has to ensure that its **cities and major urban settlements are environmentally sustainable**. The increasing population, rapid rate of urbanisation, and rising affluence, among others, will exert greater pressure on the limited resources and capacity of the cities. Priority has to be given to the development of better public transportation systems, introduction of cleaner energy technologies, establishment of more green spaces, and the promotion of more sustainable consumption and production practices.

ASEAN should continue to play a proactive role to address **global environmental issues**, while addressing the pressing national and regional economic, social and environmental issues. All AMS have ratified the major multilateral environmental agreements and have demonstrated their capability to fulfil many of their obligations and commitments ahead of the deadline such as in the Montreal Protocol. ASEAN needs to further intensify regional cooperation to enhance and strengthen national and regional capacities to fulfil their commitments to relevant MEAs through regional research, increased awareness, capacity building and informed policy choices.

Finally, ASEAN needs a robust **regional institutional and policy framework** to effectively implement its mandate, ensure coordination among the various sectors and the three community pillars, and more importantly to ensure that regional efforts support coordinated actions at the national level to realise the purposes of ASEAN Vision 2020 and the ASEAN Charter.

The following chapters elaborate further how these challenges are being met by analysing the state and trends of social, economic and environmental conditions, highlighting the national level efforts to address these issues, providing a comprehensive coverage of the regional environmental management framework, and concluding with a discussion of how ASEAN is pursuing its efforts to realise a green ASEAN Community by the year 2015.

ASEAN State of the Environment Reports

ASEAN publishes its State of the Environment Report (SoER) generally once every three years. The First ASEAN SoER was published in 1997 and covered seven countries that were member states then. Three years later, the Second ASEAN SoER was published, covering all the ten member states.

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, the publication of the Third ASEAN SoER was deferred to 2006.

This Fourth ASEAN SoER, as with previous reports, was published with the full participation of and inputs from all AMS. The Government of Japan and the Hanns Seidel Foundation provided financial support for the preparation and publication of this Report. The ASEAN Secretariat provided overall coordination and supervision for the preparation of this Report.

The Fourth SoER offers a glimpse of the prospects and challenges facing the region and highlights what ASEAN has done to protect the environment and promote sustainable development. This Report specifically:

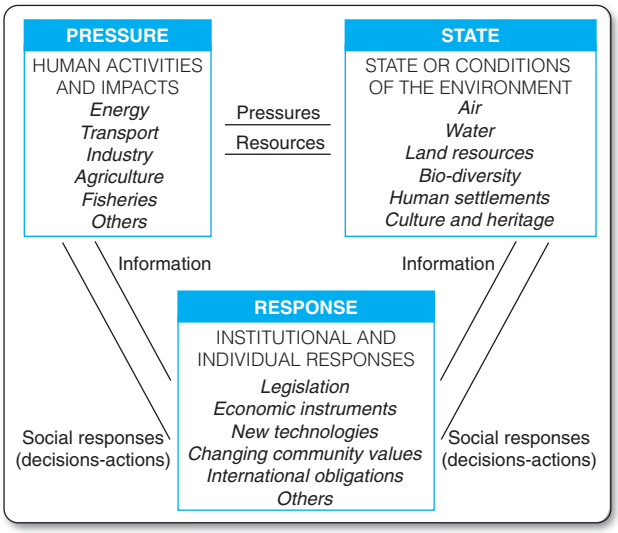
- describes the status and trends of the environment, and developments in related sectors by examining and analysing relevant economic, social and environmental data and indicators;
- presents developments in emerging issues, particularly transnational and global environmental concerns; and
- highlights ASEAN's achievements and progress in environmental management and sustainable development, articulates its aspirations for the ASEAN Community, and explores opportunities for collaboration.

The Report is a valuable resource for governments; international, regional and national organisations; non-governmental organisations; policy makers; researchers; students; media; and the general public who are involved or interested in environment and sustainable development. It begins with an overview of the geographical setting and demography of the region, describes the economic and social development of AMS; discusses issues pertaining to terrestrial, freshwater, marine, coastal ecosystems, atmosphere and sustainable production and consumption; elaborates on the major global environmental issues and the AMS response to these issues; describes the environmental management framework used by ASEAN to address sustainable development, and concludes with an analysis of the way forward towards a Green ASEAN.

Framework and Organisation of Fourth ASEAN State of the Environment Report

The ASEAN State of the Environment Reports have followed the Pressure-State-Response (PSR) 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 fourth report, Chapters 2 to 3 cover the "pressure" factors, Chapters 4 to 7 present the "state" of the environment in the region, and Chapters 8 to 10 discuss the regional "response".

Figure 1.1: Pressure-State-Response Model



Source: *UNEP Environment Assessment Programme for Asia and the Pacific*[1]

Chapter 1: Introduction presents the mandate and purposes of ASEAN regional cooperation as articulated by the ASEAN Vision 2020 and the ASEAN Charter to realise an ASEAN Community by the year 2015, and the main challenges faced in realizing these purposes. The structure of the report and the data sources are also explained.

Chapter 2: Geography, Climate and People describes the physical geography of the region and

Table 1.1: The PSR Model for the Fourth SoER Framework

PSR Model	Fourth SOER Chapters
Pressure	Chapter 2: Geography, Climate and People Chapter 3: Society and Economy
State	Chapter 4: Freshwater and Marine Ecosystems Chapter 5: Terrestrial Ecosystems Chapter 6: Atmosphere Chapter 7: Sustainable Consumption and Production
Response	Chapter 8: Global Environmental Issues Chapter 9: ASEAN Environmental Management Framework Chapter 10: The Way Forward: Green ASEAN

its features – which form the setting for the unique natural endowment and contribution to some of the environmental problems in the region. The population and the demographic trends of the region are then described.

Chapter 3: Society and Economy documents the social trends with emphasis on health, education and poverty. It then examines the recent pattern of economic growth in ASEAN, employment and incomes and discusses its implications for environmental sustainability.

Chapter 4: Freshwater and Marine Ecosystems describes the state of freshwater and marine ecosystems in the region. The increasing pressure on the region's water resources and threat to water quality due to population and economic growth are examined. The state of the region's rich and diverse wetlands and marine habitats are also examined and the threats evaluated.

Chapter 5: Terrestrial Ecosystems examines the state of the terrestrial ecosystems in the region. The rich biodiversity of plants and animals is described, and the challenges facing ASEAN in conserving such resources are examined.

Chapter 6: Atmosphere evaluates the air quality and related problems in the region. The region's two major air pollution concerns – transboundary smoke haze pollution resulting from land and forest fires, and the quality of urban air quality – are discussed. The issue of climate change and its impacts on the region are also discussed.

Chapter 7: Sustainable Consumption and Production examines the waste management problems in the region and how these are being addressed. A more holistic approach to promote sustainable consumption and production in AMS is introduced and describes how AMS can benefit from this approach.

Chapter 8: Global Environmental Issues describes the participation of AMS in multilateral environmental agreements and actions taken at the national level to fulfil their obligations and commitment to address these issues in the region.

Chapter 9: ASEAN Environmental Management Framework reviews ASEAN's policy and institutional framework as well as the major programmes and activities being undertaken in the region. The coordinated actions being implemented within the framework of sustainable development, principally through the ASEAN Socio-Cultural Community Blueprint is explained.

Chapter 10: The Way Forward: Green ASEAN concludes by highlighting some of the emerging issues, particularly those relating to greening of the economy, and ASEAN's commitment to enhancing environmental sustainability as it pursues its overall goal of establishing an ASEAN Community by 2015. It concludes by discussing how ASEAN is addressing the challenges identified in Chapter 1.

Sources of Information

The main sources of information for the Fourth SoER were the AMS and ASEAN institutions. These included the various databases and publications of the ASEAN Secretariat (particularly the ASEAN Stats) and other ASEAN-affiliated institutions (e.g. ASEAN Centre for Biodiversity, ASEAN Centre for Energy, ASEAN Specialised Meteorological Centre and the ASEAN Wildlife Enforcement Network). The various national SoER reports of AMS provided valuable information for the preparation of this publication, particularly the member states' successful initiatives and good practices.

Where ASEAN primary data was not available, relevant information was sourced from:

- International organisations such as the United Nations Environment Programme, United Nations Development Programme, World Health Organisation, United Nations Economic and Social Commission for Asia and the Pacific, United Nations Industrial and Development Organisation, United Nations Educational, Scientific And Cultural Organisation, United Nations Department of Economic and Social Affairs, United Nations Commission on Sustainable Development, Food and Agriculture Organisation, Intergovernmental Panel on Climate Change, Secretariats of the various multilateral environmental agreements, International Energy Agency, World Fish Center, Asian Development Bank and the World Bank.
- Environmental non-government organisations/ other organisations, including World Wide Fund for Nature, International Union for Conservation of Nature, Conservation International, TRAFFIC, Roundtable on Sustainable Palm Oil, Forest Stewardship Council and the Sustainable Farm Certification International.

On the basis of the experience gained from preparation of the ASEAN SoERs as well as national SoER reports, there is an urgent need for AMS to regularly and systematically share information among themselves. There is also a need for AMS to harmonise their databases, especially for key environmental parameters, and to cooperate more effectively in the preparation of national and regional reports. Such cooperation will also facilitate reporting obligations to outside bodies.

Endnotes

1 UNEP Environment Assessment Programme for Asia and the Pacific. (n.d). *Needs for Environmental Data Standards in State of the Environment Reporting*. Available online at http://www.grida.no/soe/iea/Purna/PDF-file/Data-standard-paper-Draft.pdf

CHAPTER 2
Geography, Climate and People

The ASEAN Socio-Cultural Community will address the region's aspiration to lift the quality of life of its peoples through cooperative activities that are people-oriented and environmentally friendly geared towards the promotion of sustainable development. The ASEAN Socio-Cultural Community shall contribute to building a strong foundation for greater understanding, good neighbourliness, and a shared sense of responsibility

The ASEAN Socio-Cultural Community is characterised by a culture of regional resilience, adherence to agreed principles, spirit of cooperation, collective responsibility, to promote human and social development, respect for fundamental freedoms, gender equality, the promotion and protection of human rights and the promotion of social justice

Roadmap for an ASEAN Community 2009 – 2015

The ASEAN region is endowed with rich natural resources that sustain essential life support systems both for the region and the world. Apart from providing water, food and energy, these natural resources play an important role in sustaining a wide range of economic activities and livelihoods. The strategic location of ASEAN has also brought about numerous economic advantages to the region, particularly through international shipping and foreign trade. However, due to geological and geographical factors, the region suffers from a range of climatic and natural hazards such as earthquakes, typhoons, floods, volcanic eruptions, droughts, fires and tsunamis which are becoming more frequent and severe. In addition, the geophysical and climatic conditions shared by the region have also led to common and transboundary environmental concerns such as air and water pollution, urban environmental degradation and transboundary haze pollution.

The ASEAN region is blessed with a variety of unique ecosystems such as the Mekong River Basin, Ha Long Bay and Lake Toba. The region also has a long coastline, measuring about 173,000 kilometres in total, and is surrounded by major seas and gulfs such as the South China Sea, the Andaman Sea and the Gulf of Thailand. In view of its proximity to the equator, the region enjoys a warm and humid climate throughout the year. The rich marine life and abundant mineral resources supports important economic activities such as oil exploration, commercial and small-scale fisheries, and tourism.

ASEAN is highly populated. In mid 2008, the region had about 580 million people with a density of 130 people per square kilometre, one of the highest in the world. Population density is especially high in megacities such as Jakarta and Manila at about 10,000 people per square kilometre, spurred by increasing rural-urban migration and rapid urbanisation. In 2005, 44 percent of the region's total population were living in urban areas and this is projected to increase to 55 percent by 2020. This brings about myriad environmental problems such as poor water and air quality and lack of proper sanitation facilities.

ASEAN needs to judiciously use its rich natural resources while sustaining the life-support systems, foster economic growth without degrading the natural environment, meet the demanding social needs of its people who are rapidly moving up the human development ladder, while enhancing its resilience and social protection systems against natural and man-made disasters.

ASEAN FACTS AND FIGURES

Extent	3,300km North to South 5,600km West to East
Land Area	4.46 million square kilometres *3% of the world's total*
Climate	Tropical (*monsoon-influenced*)
Temperature	Annual average range typically 25 – 34°C
Rainfall	1,000 – 4,000 mm per year
Population (mid-2008)	580 million *8.7% of the world's total*
Projected Population in 2020	650 million
Population Density (mid-2008)	130 people per square kilometre *World average: 49 people per square kilometre*

Geography

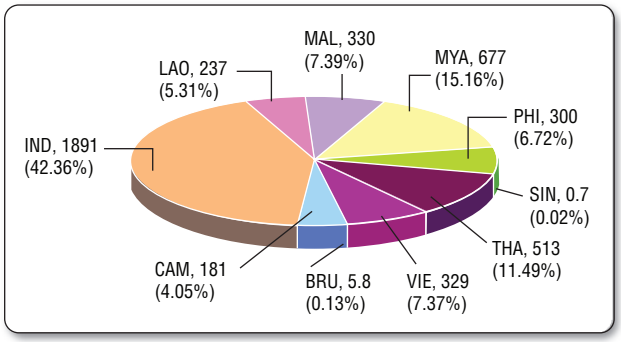
Physical Setting and Resources

The ASEAN region lies within the waters of the Pacific Ocean, Indian Ocean, Andaman Sea and South China Sea, and stretches more than 3,300 kilometres from north to south (latitudes 30° North to 11° South) and 5,600 kilometres from west to east (longitudes 92° West to 142° East). ASEAN borders China to the north, India and Bangladesh to the northwest, and East Timor and Papua New Guinea to the southeast.

Figure 2.1: Map of the ASEAN Region

Southeast Asia is divided into two sub-regions, Mainland Southeast Asia and Maritime Southeast Asia. Mainland Southeast Asia consists of Cambodia, Lao PDR, Myanmar, Thailand, Viet Nam and Peninsular Malaysia. Maritime Southeast Asia, or commonly referred to as the Malay Archipelago, consists of Brunei Darussalam, Indonesia, Malaysia (Sabah and Sarawak), the Philippines and Singapore. Malaysia is separated by the South China Sea with Peninsular Malaysia on the mainland and Sabah and Sarawak on the island of Borneo, while Indonesia and the Philippines are archipelagic island countries.

Figure 2.2: Land Area of AMS



Unit: '000 km^2 (%)

Source: *ASEAN Community in Figures, 2008*[1]

The region has a combined land area of about 4.46 million square kilometres, accounting for 3 percent of the world's total land area. The land area of individual member states varies widely, from 710 square kilometres for Singapore to 1.9 million square kilometres for Indonesia.

Geographical Features

Mainland Southeast Asia is characterised by its north-south trending mountain ranges and associated plateaus, fertile coastal plains and extensive river systems. The interior mainland is predominantly mountainous and densely forested, as several mountain ranges run from north to south, separating the lowlands and the coastal plains. The northern region is mostly of higher elevation, with the highest peaks at the northern end of Myanmar. Interspersed with the long linear mountain ranges are some of the prominent plateaus at various altitudes, such as the Shan Plateau of eastern Myanmar, Korat Plateau of Thailand and Bolovens Plateau of Lao PDR. Flat, wide coastal plains generally dominate the mainland area to the north and east of the Gulf of Thailand, contrasting the narrower coastal plains in Viet Nam. In the northeast of Viet Nam lies the famous Ha Long Bay, which features 1,969 remarkable limestone karsts and isles.

Another distinctive feature of Mainland Southeast Asia is the extensive Mekong River basin. Flowing through China and ultimately into South China Sea, the Mekong River traverses in a south-easterly direction forming a vast delta in Viet Nam. Closely associated with the Mekong River is Asia's largest freshwater lake – the Tonle Sap in

Cambodia. During the monsoon season, excess water in the Mekong River forces the Tonle Sap River to flow backward, increasing the size of the lake from about 2,600 square kilometres to 10,000 square kilometres and raising the water level by an average of 7 metres at the peak of the floods.[2] This direction of flow, however, reverses during the dry season.

In Peninsular Malaysia, the lowlands and coastal plains are separated by central main range, which is made up of several parallel mountain ranges aligned north to south. The mountainous core is predominantly covered by tropical rainforests with several karst-limestone landscapes widely distributed in the central and northern regions. Singapore, separated from Mainland Southeast Asia by the Strait of Johor, is generally characterised as lowland with gently undulating plateau in the centre.

Most of the islands in Maritime Southeast Asia have been formed along the convergent boundaries of the three crustal units – the Eurasian, Indian-Australian, and Pacific plates. These islands are volcanic in origin. Their mountainous cores are dominated by a chain of volcanoes. The central region of the island of Borneo, although hilly and mountainous, however does not have any active volcanoes. The most prominent range, the Crocker Range, peaks at Mount Kinabalu at 4,095 metres and runs in a south-westerly direction through the states of Sabah and Sarawak (Malaysia) and Kalimatan (Indonesia).

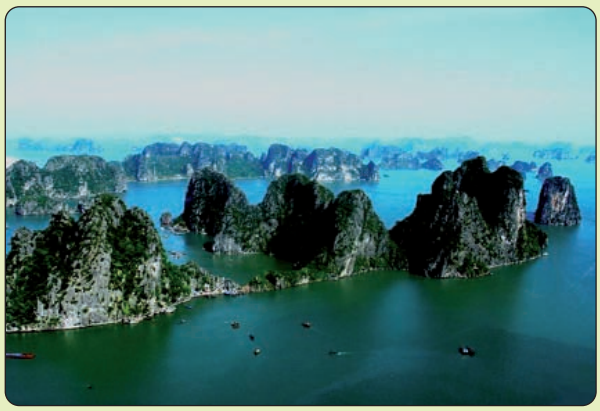
Box 2.1: Ha Long Bay – A Unique Ecosystem

Situated in the northeast region of Viet Nam, Ha Long Bay comprises 1,969 islands of various sizes, made up mainly of limestone and schist. These islands are mainly concentrated at the southeast and southwest of the Bay and provide spectacular sceneries of caves and grottoes with impressive stalactites and stalagmites. The more famous caves and grottoes here are Thien Cung (Heavenly Residence Grotto), Dau Go (Driftwood Grotto), Sung Sot (Surprise Grotto) and Tam Cung (Three Palace Grotto).

The islands of Ha Long Bay are often associated with legendary tales due to their unique formation. For example, one of the islands called Man's Head Island is thought to resemble a man standing and looking towards the mainland. Another island, the Dragon Island, seems to looks like a dragon hovering above the turquoise water. There are also the islands of the Sail, the Pair of Roosters, and the Incense Burner, all of which resemble their namesakes.

Ha Long Bay is culturally and historically important. It is thought to have strong associations with the ancient commercial port called Van Don and the Bai Tho Mountain (or Poem Mountain) in the heart of Ha Long city overlooking the bay. It is said that in 1468, King Le Thanh Tong wrote a poem about Ha Long and had it carved into the southern side of the mountain. There are also other engravings of poems about emperors and other famous historical figures on this mountain. Ha Long is also one of the first cradles of human existence in the area. Some of the prominent archaeological sites include Dong Mang, Xich Tho, Soi Nhu, and Thoi Gieng.

Besides its rich geological heritage, Ha Long Bay harbours a wide variety of ecosystems, such as the salt water-flooded forests, coral reefs, and tropical forests. Ha Long Bay has twice been recognised by United Nations Educational, Scientific and Cultural Organisation (UNESCO) as a World Natural Heritage Area, for its exceptional scenic beauty (on 17th December 1994), and for its geological and geomorphic importance (on 2nd December 2000).



Aerial view of Ha Long Bay

Source: *Ministry of Natural Resources and Environment, Viet Nam*

Table 2.1: Physical Geographical Features

Country	Geographical Features
Brunei Darussalam	Coastline length: about 161km Prominent features: • Hilly lowlands in the western region, rugged mountains in the eastern part and swampy tidal plain in the coastal area • Four main rivers – Brunei Belait, Tutong, Temburong and Brunei-Muara
Cambodia	Coastline length: about 435km Prominent features: • 75% of land generally low-lying with elevations of less than 100m above sea level • Central plains form the Tonle Sap, the Bassac River and the Mekong River basin • Surrounding central plains are highland areas, which include: – the Elephant Mountains and Cardamom Mountain to the west and southwest – the Dangrek Mountains to the north (adjoining the Korat Plateau of Thailand) – the Rattanakiri Plateau and Chhlong Highlands to the east
Indonesia	Coastline length: about 108,000km Prominent features: • An archipelagic state, which comprises 18,110 islands stretching 5,110km from east to west and 1,888km from north to south • Situated at the confluence of four tectonic plates – Asian Plate, Australian Plate, Indian Plate and Pacific Plate • Volcanic arc stretches from the islands of Sumatra-Java-Nusa Tenggara-Sulawesi with more than 100 active volcanoes in the southern and eastern parts of Indonesia
Lao PDR	Prominent features: • Stretches about 1,700km from north to south • 70% of Laos' terrain is mountainous, reaching a maximum elevation of 2,820m in the Xieng Khouang Province • Highest mountain is Phou Bia at 2,820m above sea level (a.s.l) • Remaining terrain consists of large and small plains distributed along the Mekong River
Malaysia	Coastline length: about 4,675km Prominent features: • Comprises Peninsular Malaysia, and Sabah and Sarawak (in Borneo), separated by the South China Sea • Both areas share similar landscapes, featuring coastal plains rising to often densely forested hills and mountains • The highest mountain is Mount Kinabalu (4,095m a.s.l) in the state of Sabah
Myanmar	Coastline length: about 3,000km Prominent features: • Stretches 936km from east to west and 2,051km from north to south • Natural landscape consists of central lowlands surrounded by steep, rugged highlands with the highest point at Hkakabo Razi (5,881m a.s.l)
Philippines	Coastline length: about 32,400km Prominent features: • Made up of 7,107 islands with main island groups of Luzon, Visayas, and Mindanao. • Located within the typhoon belt of the Western Pacific • Mountainous islands mainly covered in tropical rainforest and are volcanic in origin • The highest mountain is Mount Apo (2,954m a.s.l) located in Mindanao • Active volcanoes include the Mayon Volcano, Mount Pinatubo, and Taal Volcano
Singapore	Coastline length: about 224km Prominent features: • Made up of one main island with 63 surrounding islets • Comprises of different ecosystems, mainly primary and secondary forest, grassland, mangroves, mudflats, rocky coasts, coral rubble, coral reef and urban areas • The highest natural point is at Bukit Timah Nature Reserve (164m)
Thailand	Coastline length: about 2,600km Prominent features: • Consists of five natural regions: mountains and forests at the north, vast rice fields at the central plains, semi-arid farm lands at the northeast plateau, tropical islands and long coastline at the peninsular south, and fertile land for tree crops and coastline at the east • The highest point is Doi Inthanon (2,565m mean sea level)
Viet Nam	Coastline length: about 3,260km Prominent features: • Three quarters of Viet Nam's land mass is dominated by mountains and hills • The mountainous region is divided into four distinct mountainous zones: Northeastern Zone (Viet Bac), Northwestern Zone , North Truong Son Zone and South Truong Son Zone • Two major deltas: The Red River Delta (or Northern Delta) and the Mekong River Delta (or Southern Delta)

Oceans and Seas

AMS are fringed by three major seas and two gulfs that contain much of the region's marine and energy resources. These are the South China Sea, Andaman Sea, the Philippine Sea, Gulf of Thailand and Gulf of Tonkin. These seas are also major shipping lanes that are important for international trade. The South China Sea is the largest sea with a total area of 3.5 million square kilometres, followed by the Andaman Sea with about 790,000 square kilometres. The Gulf of Thailand and the Gulf of Tonkin cover about 320,000 square kilometres and 115,200 square kilometres respectively. The Philippine Sea, on the other hand, forms part of the Pacific Ocean which borders the Philippine islands. The Andaman Sea is also part of the larger Indian Ocean that stretches from Southeast Asia to the Indian subcontinent and down towards Australia.

The South China Sea forms an enclave bordering many of the AMS including Brunei Darussalam, Cambodia, Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam. With a maximum depth of over 5,000 metres, the South China Sea is economically significant for a myriad of marine and mineral resources for countries that border it. Its vast reserves of oil have been a major factor for rapid economic growth in the region for decades. This major sea, together with the Strait of Malacca, the Sunda Strait and the Lombok Strait, is one of the busiest shipping lanes in the world. To the north, the Gulf of Thailand and the Gulf of Tonkin are major resource contributors to Thailand, Cambodia and Viet Nam, and are heavily relied upon by people in coastal areas for their livelihood.

The seas and gulfs in the region play a critical role in supporting a diverse variety of marine life, which are important for both commercial and small-scale fisheries, as well as for the tourism industry. Coral reefs that are abundant here have given rise to a relatively new industry – diving tourism. Malaysia, Indonesia, Thailand and the Philippines are among the countries with the most diving sites. Economically important species such as crustaceans, coastal fishes, pelagic fishes, herring and sardines are also harvested from these water bodies.

Climate and Natural Hazards

Located close to the equator, the ASEAN region enjoys a warm and humid climate throughout the year with temperatures ranging between 25 and 34 degrees Celsius. The region is affected by two monsoonal seasons, each with distinct weather patterns. In between November and March, the Northeast Monsoon brings cool north-easterly winds and abundant precipitation to the coastal mountains of Viet Nam and the east coast of Peninsular Malaysia. The Southwest Monsoon, which begins around May and ends in September, brings moderately strong dry winds and rains to the southwest-facing slopes, usually at elevation below 2,000 metres. This wind pattern plays an important role in the spread of smoke haze pollution in the region. During the inter-monsoon periods of April and October, the region experiences light winds and little variation in temperature. Average annual precipitation ranges between 1,000 millimetres and 4,000 millimetres while average humidity is between 70 and 90 percent.

Due to its geographical location, the region is affected by the El Niño and La Niña phenomena that often alter the seasonal monsoon cycle and cause wide-ranging changes in weather patterns. Its location on the convergent boundaries of the Earth's crustal units and on the typhoon belt also exposes the region to various natural hazards, such as earthquakes and tsunamis, volcanic eruptions and typhoons. The 1991 Mount Pinatubo eruption, the 2004 Indian Ocean earthquake that caused widespread tsunami in the region, and the 2008 Cyclone Nargis that hit Myanmar, were among the most devastating natural disasters experienced in the region. Seasonal flooding and droughts are also common in the region, which are becoming more frequent and severe.

Population

The total population of AMS in mid-2008 was about 580 million, which accounted for 8.7 percent of the world's total. 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 229 million. It is the fourth most populous country in the world after China, India, and the United States. Six AMS are among the top 50 most populous countries in the world, namely, Indonesia, Philippines, Viet Nam, Thailand, Myanmar and Malaysia.

Box 2.2: Natural Hazards in ASEAN – The Case of Cyclone Nargis

Cyclone Nargis struck Myanmar on 2nd and 3rd of May, 2008. It made landfall at the western edge of the Ayeyarwady Delta about 250km from Yangon, and rapidly moved inland across the delta towards Yangon. It caused a devastating loss of life with an estimated 140,000 people killed or missing. The lives and livelihoods of survivors were also severely disrupted with up to 800,000 people displaced, 450,000 houses destroyed, farming areas devastated, and substantial losses of food stocks, equipment and infrastructure.

The destruction caused by Cyclone Nargis resulted from two main elements: high-speed winds of up to 250km/hour (135 knots); and a 3.6m (12 foot) storm surge. Nargis was the worst natural disaster in the history of Myanmar and the most devastating cyclone to strike Asia since 1991. The damage was widespread, with near-total destruction of fields and shelters in areas that were directly hit by the cyclone. Nargis also destroyed critical infrastructure such as roads, jetties, water and sanitation systems, fuel supplies and electricity. Due to the storm surge, countless villages were submerged and water supplies were contaminated. There were also inadequate food supplies to the cyclone victims. The total amount of damage and losses caused by Cyclone Nargis in the affected areas of Myanmar was estimated at US$ 4,057 million.

Houses destroyed at Hlaing Pone

Refugee tents at Set San

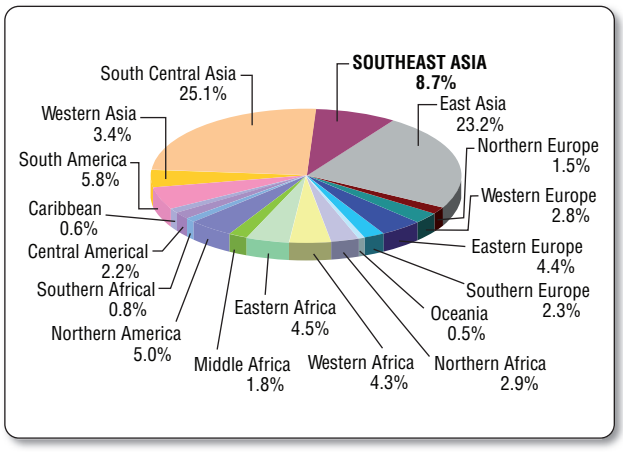
Source: *Post-Nargis Joint Assessment Report, July 2008[3]; Post-Nargis Periodic Review I, December 2008[4]*

Table 2.2: Population, Mid-2008

Country	Population (thousands)	% Total ASEAN Population
Brunei Darussalam	397	0.1
Cambodia	14,656	2.5
Indonesia	228,523*	39.4
Lao PDR	5,763	1.0
Malaysia	27,863	4.8
Myanmar	58,337*	10.1
Philippines	90,457	15.6
Singapore	4,839	0.8
Thailand	63,390*	10.9
Viet Nam	86,160	14.8
ASEAN	**580,385**	**100.0**

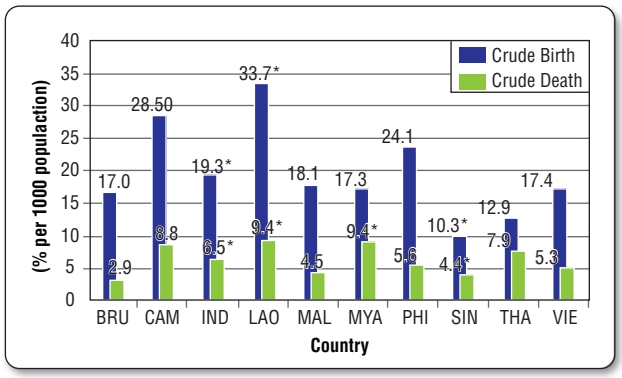
Source: *ASEANstats (*updated by AMS)*

Figure 2.3: ASEAN Population Compared to Other Regions, Mid-2008



Source: *Population Reference Bureau[5]*

Figure 2.4: Crude Birth and Death Rates, 2006



Source: *ASEANstats (*updated by AMS)*

Table 2.3: Annual Population Growth Rate, 2008

Country	(%)
Brunei Darussalam	1.8
Cambodia	2.0
Indonesia	1.3*
Lao PDR	2.8
Malaysia	2.4*
Myanmar	1.5*
Philippines	2.1
Singapore	5.5
Thailand	0.7
Viet Nam	1.2
ASEAN	**1.4**

Source: *ASEANstats (*updated by AMS)*

The rate of population growth in AMS ranged from 0.7 percent to 5.5 percent in 2008 as a result of natural growth and migration. Natural population increase occurs when crude birth rate is higher than death rate – the bigger the difference, the higher the natural population increase. Lao PDR, Cambodia and the Philippines had high rates of natural population increase in 2006. Conversely, in the same year, Singapore and Thailand recorded low rates of natural population increase.

The region's population is projected to rise to 650 million by 2020, with more than half living in urban areas. Apart from natural growth, rapid population growth in the ASEAN region may be attributed to declining infant and maternal mortality rates, which are associated with improved access to healthcare.

The ASEAN region also has one of the highest population densities in the world with about 130 people living in one square kilometre, compared to the world average of 49 persons per square kilometre. Among the AMS, Singapore has the highest population density in the region with 6,814 persons per square kilometre while Lao PDR's has the lowest with 24 persons per square kilometre. Two cities in the region, Jakarta and Manila, have more than 10,000 persons per square kilometre.

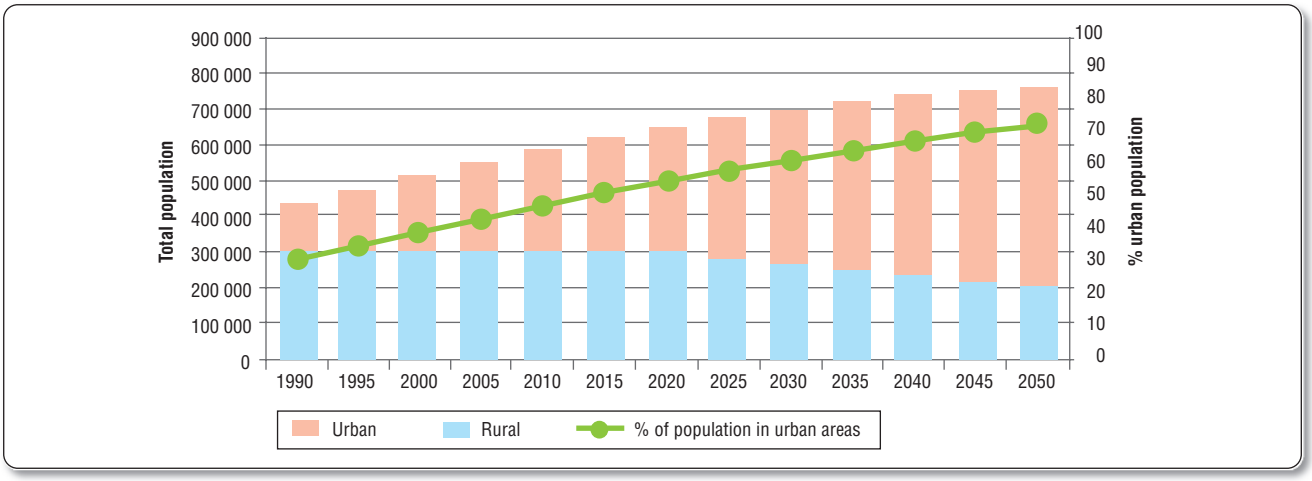
Table 2.4: Population Density, 2008

Country	Population Density (persons/km^2)
Brunei Darussalam	69
Cambodia	81
Indonesia	123*
Lao PDR	24
Malaysia	84
Myanmar	86
Philippines	302
Singapore	6,814*
Thailand	124*
Viet Nam	260
ASEAN	**130**

Source: *ASEANstats (*updated by AMS)*

Rising population in major cities is largely attributed to the rural-urban migration. The urban population in the region has been steadily increasing for the last two decades, from only 31.6 percent of the total population in 1990 to about 44 percent in 2005. The biggest decreases of rural population (largely due to migration of people from rural areas to major towns and cities for better employment opportunities) occurred in Indonesia and the Philippines. In Indonesia, its rural population decreased by about 35 percent between 1980 and 2006 while the Philippines experienced a 40 percent drop in the same period[6]. Rapid urbanisation, if not managed well, could lead to proliferation of urban slums, resulting in myriad of environmental and health problems such as degraded water and air quality, and lack of access to healthcare and proper sanitation.

Figure 2.5: ASEAN Population Projection & Urbanisation Rate



Source: *Department of Economic and Social Affairs of the United Nations Secretariat*[7]

Endnotes

1 ASEAN. (2008). *ASEAN Community in Figure 2008*. Jakarta, Indonesia: ASEAN Secretariat.

2 Cambodia's Official Tourism website http://www.tourismcambodia.com

3 ASEAN. (2008). *Post-Nargis Joint Assessment*. Available online at http://www.aseansec.org

4 ASEAN. (2008). *Post-Nargis Periodic Review I*. Available online at http://www.aseansec.org

5 Population Reference Bureau. (2009). *2008 World Population Data Sheet*. Available online at http://www.prb.org

6 ASEAN. (2008). *ASEAN Statistical Yearbook 2007*. Jakarta, Indonesia: ASEAN Secretariat.

7 World Urbanisation Prospects: The 2007 Revision Population Database website (http://esa.un.org/unup), accessed May 19, 2009.

CHAPTER 3
Society and Economy

The primary goal of the ASEAN Socio-Cultural community is to contribute to realising an ASEAN community that is people-centred and socially responsible with a view to achieving enduring solidarity and unity among the nations and people of ASEAN by forging a common identity and building a caring and sharing society which is inclusive and harmonious where the well-being, livelihood and welfare of the people are enhanced

The ASEAN Economic Community is the realisation of the end goal of economic integration as espoused in the Vision 2020, which is based on a convergence of interests of ASEAN Member States to deepen and broaden economic integration through existing and new initiatives with clear timelines. In establishing the ASEAN Economic Community, ASEAN shall act in accordance to the principles of an open, outward-looking, inclusive, and market-driven economy consistent with multilateral rules as well as adherence to rules-based systems for effective compliance and implementation of economic commitments

Roadmap for an ASEAN Community 2009 – 2015

Human development in the region has been encouraging. Three out of the 10 ASEAN Member States (AMS) are ranked high in the United Nations Development Programme's Human Development Index while the rest are ranked medium. Even though almost all the AMS have achieved, in advance, the Millennium Development Goal of halving poverty well before 2015, and have made significant improvements in reducing poverty incidence, the number of people in ASEAN living on less than US$ 2 a day remained high at 185 million in 2005.

Economic development is the key for achieving various social and environmental goals. For instance, economic growth can lead to improvement in health and education and can contribute to the increase in the people's standard of living. About 15 percent of the region's population still do not have access to safe drinking water while the incidence of malnourished children remained high in some AMS. However the male and female literacy rate in most AMS reached over 90 percent in 2007, and the unemployment rate had shown a decreasing trend from 2000 to 2008. The improved standard of living can lead to better care for the environment through reduced reliance on natural resources and increased awareness and capacity for environmental protection.

The service and industrial sectors contributed almost 90 percent to the region's economic growth while agriculture provides employment to a large percentage of the population. The average per capita Gross Domestic Product (GDP) in the region has been increasing consistently, from US$ 1,158 in 2000 to US$ 2,581 in 2008. Two AMS, Singapore and Brunei Darussalam, have per capita GDP higher than US$ 35,000. The increasing contribution of the service and industrial sectors is expected to put less pressure on the environment as there will be less direct dependence, as well as more value-added income from the natural resources.

The primary energy sources in the region are coal, oil, gas, geothermal and hydropower with coal accounting for 57 percent of energy consumption. AMS have taken steps to improve their energy intensities which remain low between 0.11 and 0.47 tonne of oil equivalent for every US$ 1,000 of their GDPs. Tourism in the region has also been rising steadily, recording positive growth almost every year since 2000.

ASEAN FACTS AND FIGURES

Human Development Index Ranking 2006 *(of 179 countries evaluated. Lower is better)*	**High:** Brunei Darussalam (27), Singapore (28), Malaysia (63) **Medium:** Thailand (81), the Philippines (102), Indonesia (109), Viet Nam (114), Lao PDR (133), Myanmar (135), Cambodia (136)			
Poverty Incidence *(% of population living below respective national poverty line [latest available estimates])*	Cambodia (34.7%), Indonesia (16.6%), Lao PDR (32.7%), Malaysia (3.6%), Myanmar (26.6%), the Philippines (30.0%), Thailand (8.48%), Viet Nam (14.75%)			
Prevalence of Malnourished Children below 5 years old *(latest available estimates)*	Cambodia (28.4%), Indonesia (24.4%), Lao PDR (36.4%), Myanmar (29.6%), the Philippines (20.7%), Singapore (3.3%), Thailand (7.0%), Viet Nam (20.2%)			
Literacy Rate	Male and Female *(over 90% for the majority of AMS)*			
Employment Rate	Male: over 80% for the majority of AMS Female: over 50% for the majority of AMS			
ASEAN GDP Growth Rate	2005	2006	2007	2008
	5.65%	5.98%	6.66%	4.42%
ASEAN Average GDP per capita	2005	2006	2007	2008
	US$ 1,606	US$ 1,895	US$ 2,249	US$ 2,582
ASEAN GDP per capita (2008) *Range amongst AMS*	US$ 465 – US$ 37,597			
Economic Structure (2007)				
Service-based	ASEAN (47.35%); Most serviced oriented – Singapore (66.7%)			
Industry-based	ASEAN (41.75%); Most industry-oriented – Brunei Darussalam (56.6%)			
Agriculture-based	ASEAN (10.90%); Most agriculture-oriented – Lao PDR (44.3%)			

Society

Human Development

Human development is generally about ensuring a higher quality of life for the people through enhancing human capabilities to enlarge people's choices. In September 2000, Member States of the United Nations signed the Millennium Declaration, committing them to achieving a series of targets known as the Millennium Development Goals (MDGs). The MDGs, comprising eight goals, focus primarily on achieving human development, translated in terms of higher living standard, better opportunities in education and employment, and gender equality, among others.

The Human Development Index (HDI) of the United Nations Development Programme (UNDP) is an effective method to measure the progress of human development. The HDI is a composite measure of standard of living (measured by real per capita Gross Domestic Product, adjusted for purchasing power), longevity (measured by life expectancy), and knowledge (measured by adult literacy and mean years of schooling). Based on the HDI value, each country is placed either in the high, medium or low human development category. Countries in the high human development list are those that have achieved HDI values above 0.8, while countries with medium human development level have HDI values between 0.5 and 0.8.

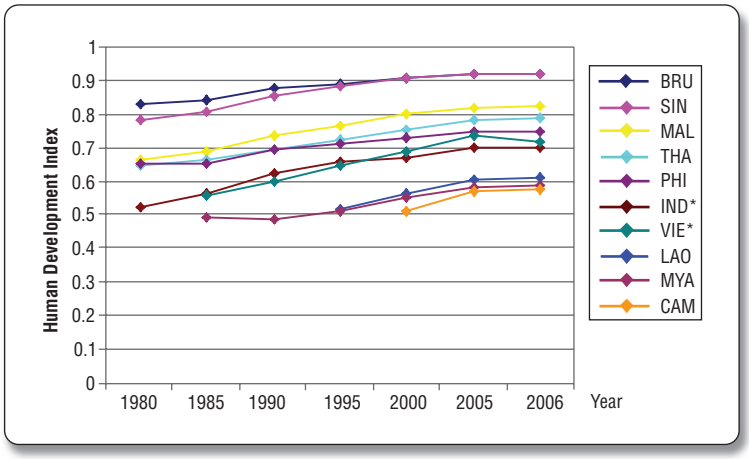
Table 3.1: AMS's Rank Based on Human Development Index, 2005 & 2006

Rank[a]	Country	Rank[b]		Change*	HDL
	2005* 2006#				
1	Brunei Darussalam	30	27	↑3	High
2	Singapore	25	28	↓3	
3	Malaysia	63	63	↔	
4	Thailand	78	81	↓3	Medium
5	Philippines	90	102	↓12	
6	Indonesia	107	109	↓2	
7	Viet Nam	105	114	↓9	
8	Lao PDR	130	133	↓3	
9	Myanmar	132	135	↓2	
10	Cambodia	131	136	↓5	

Sources: ** Human Development Report 2007/2008[1]*
 # Human Development Indices – A statistical update 2008[2]

Notes: *Rank[a] – Ranking among AMS (based on HDI 2006 rank)*
Rank[b] – Ranking among all countries evaluated
HDL – Human Development Level

Figure 3.1: Trend in Human Development Index, 1980 – 2006



Source: *Human Development Indices – A statistical update 2008 (*country data updated by AMS)*

All AMS have demonstrated an increase in their HDI values from 1980 to 2006. Although HDI values showed an increase, the rank of many AMS in 2006 dropped between 2 and 12 places due to improvement in HDI values demonstrated by other countries in the list (Note: 179 countries were evaluated in 2006). Among the AMS, Brunei Darussalam and Singapore have been consistently achieving high HDIs since 2001, placing them within the top 25 to 40. A slight increase in the 2006's HDI value for Brunei Darussalam saw the country replacing Singapore as the frontrunner among the ten AMS. Malaysia which ranked 63 for two consecutive years (2005 and 2006) is also placed under the High Human Development category. Thailand, the Philippines, Indonesia, Viet Nam, Lao PDR, Myanmar and Cambodia are all placed in the Medium Human Development category.

Poverty

Poverty eradication remains a big challenge in the region. Based on national poverty lines, Cambodia, Lao PDR, Myanmar and the Philippines have more than 25 percent of their population living below the national poverty lines. On the other hand, Malaysia and Thailand had less than 10 percent of their populations living below national poverty lines in 2007 while in Viet Nam, the latest estimate in 2007 was 14.8 percent. Overall, all AMS have showed consistent improvement in poverty reduction.

In 2005, ASEAN had approximately 185 million people living on less than US$ 2 a day[3]. The proportion of population living on less than US$ 2 a day remains considerably high in Cambodia, Lao PDR and Viet Nam (about 60 – 80 percent of each country's population). This is followed by Indonesia and the Philippines which have about half their population living on less than US$ 2 daily.

Table 3.2: Percentage of Population Below Poverty Lines, 2000 – 2007

Country	National Poverty Lines						
	2000	2001	2002	2003	2004	2005	2007
Brunei Darussalam	Not applicable						
Cambodia	–	–	–	–	34.70	–	–
Indonesia	19.10	18.40	18.20	17.40	16.69*	17.75*	16.58*
Lao PDR	–	–	33.50	32.70	–	–	27.00*#
Malaysia	–	–	5.10	–	5.70	–	3.60
Myanmar	–	26.60	–	–	–	–	–
Philippines	39.40	–	–	30.00	–	–	–
Singapore	Not applicable						
Thailand	14.20	13.00	9.80	–	11.20	–	8.48*
Viet Nam	–	–	28.90	–	19.50*	15.47	14.75

Source: *ASEANstats (*updated by AMS)*

Notes: *Brunei Darussalam and Singapore do not have explicit national poverty lines and other poverty data*
'–' not available at the time of publication
 # Estimated figure for the period of 2003 – 2009

Box 3.1: Progress in Achieving MDG 1 Target 1: Halve, between 1990 and 2015, the proportion of people whose income is less than US$ 1 a day

Cambodia: The poverty headcount index at the national level declined slightly from 39% to 35.9% between 1993 and 1999. If this trend continues, poverty incidence is expected to decline to just about 28% by 2015. This reduction, however, falls short of the national target of reducing poverty headcount to 19.5% by 2015. Meeting the target would therefore require more intensive poverty eradication efforts.

Indonesia: Between 1990 and 2006, the percentage of the population whose income was less than US$1 (PPP) per day had declined significantly from 20.60% in 1990 to 7.54% in 2006. According to this indicator, Indonesia has achieved the target well before 2015.

Lao PDR: Poverty in Lao PDR declined steadily from 46% to 33 % during the decade 1992 – 2002. If this trend continues, Lao will meet its national target of halving poverty by 2015.

Malaysia: Just below half of all households were poor in 1970. This proportion was halved in about 15 years, and more than halved again in the next 15 years. By 2002, only 5.1 percent of households were poor.

Myanmar: The country does not have the 1990 baseline data for poverty. In 2001, a Household Income and Expenditure Survey conducted to estimate poverty in the country showed that poverty rates for urban, rural and union were 20.7%, 28.4% and 26.6% respectively. The poverty gap ratio was 6.8%. Following the survey, Myanmar aimed to implement a more comprehensive poverty assessment for the whole county in 2003 with the assistance of UNDP.

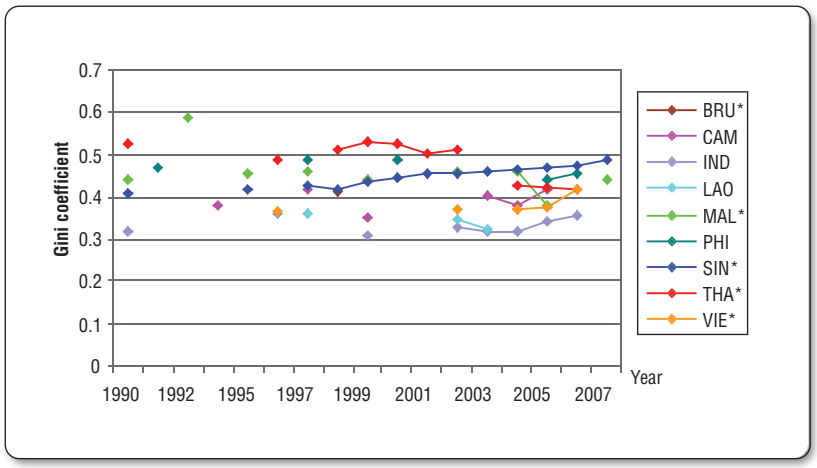
The Philippines: The proportion of people living in extreme poverty (classified as individuals whose incomes cannot support a recommended minimum food basket), showed a decrease from the 1991 baseline figure of 24.3% to 13.5% in 2003. Target indicators for household and population poverty incidence also indicated visible improvements. At these rates of decline in poverty incidence, the 2015 targets are expected to be met.

Thailand: Poverty incidence reduced from 27.2% in 1990 to 9.8% in 2002, thus already achieving the target well before 2015.

Viet Nam: The poverty rate fell from 58.1% in 1993 to 24.1% in 2004 with nearly 60 percent of poor households moving out of poverty. However, the pace of poverty reduction slowed down during the 1998 – 2004 period with an annual average of 2.4 percentage point reduction in the number of poor for the last two years. Thus, Viet Nam has successfully achieved the goal of halving the proportion of the poor well ahead of the 2015 target.

Sources: *AMS's MDG Reports*[4]

Figure 3.2: Gini Coefficient for Selected AMS, 1990 – 2007



Source: *ASEANstats (*country data updated by AMS)*

While inequality of income has often been associated with poverty, it is in fact a concept distinct from poverty. Inequality of income occurs when income or wealth of a nation is distributed unevenly. In countries where inequality of income is prevalent, the income gap between the rich and the poor is big. Inequality of income can be measured using the Gini coefficient, which is defined as a ratio with values between 0 and 1 (0 indicating perfect equality and 1 indicating the opposite). Among AMS, inequality in income is higher in Thailand, the Philippines, Malaysia and Singapore while Indonesia, Viet Nam, and Cambodia have lower Gini coefficient indices. The Gini coefficient for Lao PDR remained low between 1997 and 2003.

Health

Poverty poses serious risks to human health. Poor people are often marginalised and deprived of basic amenities and social services vital to sustaining a healthy life. Lack of access to safe drinking water, healthcare and sanitation facilities are some of the common problems faced by the poor. In the region, about 15 percent of population is without access to safe drinking water. Without safe drinking water, people are exposed to various kinds of water-borne diseases such as cholera and dysentery. Human health is also at risk due to deterioration of environmental quality, particularly air pollution. Nevertheless, improved healthcare quality and services should help reduce the prevalence of disease outbreak and other health problems.

Lack of nutrition caused by insufficient food supply, especially in children and expectant mothers, has led to the prevalence of malnourished children and underweight babies resulting in high child mortality. In several AMS, the incidence of malnourished children below 5 years old remained high between 2000 and 2007. However, in Cambodia and Viet Nam, significant improvements in providing nourishment were made during the same period. Cambodia was successful in reducing the prevalence of malnourished children below 5 years old from 39.5 percent to 28.4 percent while Viet Nam showed considerable decrease from 26.7 percent to 20.2 percent.

Table 3.3: Prevalence of Malnourished Children below 5 Years Old, 2000 – 2007

Country	2000	2004	2007
	(%)		
Brunei Darussalam	–	–	–
Cambodia	39.5	*28.4*	*28.4*
Indonesia	24.8	19.7	*24.4*
Lao PDR	36.4	–	40.0*
Malaysia	–	–	–
Myanmar	30.1	*29.6*	–
Philippines	–	*20.7*	*24.6**
Singapore	3.3	–	–
Thailand	–	*7.0*	*7.0*
Viet Nam	26.7	*20.2*	*20.2*

Source: *World Bank[5] (*updated by AMS)*

Notes: *(a) '–' not available at the time of publication*
(b) Figures in italics refer to periods other than those specified

Box 3.2: Poverty Eradication in Malaysia

One of the key poverty eradication programmes in Malaysia was the *Program Pembangunan Rakyat Termiskin* or PPRT (Development Programme for the Hardcore Poor) specifically targeted at the Hardcore Poor*. The programme involved the establishment of a register of hardcore poor households and contained a package of projects tailored to meet their specific needs, such as increasing their employability and incomes, provision of better housing, supply of food supplements for children and extending educational assistance. Under the National Vision Policy or NVP (2001 – 10), the PPRT was consolidated with other poverty alleviation programmes under the Skim *Pembangunan Kesejahteraan Rakyat* or SPKR (People Well-being Development Scheme). The SPKR covers economic, social, and physical projects aimed at eradicating poverty and hard-core poverty. Apart from generating income, the SPKR also emphasises building self-esteem and increasing self-reliance among the poor.

Another key strategy for poverty eradication is providing employment opportunities in higher-paying jobs, while welfare handouts are reserved for the aged and disabled. Since the poor in the early 1970s to 1990s were largely engaged in agriculture, they were encouraged to get involved in modern farming and non-farm or off-farm activities. The major programmes outlined under the New Economic Policy 1971 – 1990, the National Development Plan 1991 – 2000 and the NVP 2001 – 2010 were as follows:

- Resettling the landless and those with uneconomic holdings in new land development schemes. The settlers were provided with single unit houses complete with piped water and electricity;
- Undertaking in-situ development of existing agricultural land through rehabilitation and consolidation of the land, replanting of old commercial crops with new higher-yielding clones and better planting techniques;
- Integrating agricultural and rural development with downstream processing of farm products and encouraging village industries and rural entrepreneurship to generate additional sources of income;
- Introducing double-cropping or off-season cropping for paddy, inter-cropping and mixed farming on the same plots of land to supplement the income derived from main crops;
- Establishing farmers' markets in urban centres so that farm produce can be sold directly to consumers and fetch better prices;
- Providing training and education on topics pertaining to farming as well as work attitudes and values to motivate participants to become more productive farmers;
- Providing industrial and vocational training for the rural manpower, coupled with credit facilities and related support, to enable them to be employed in non-farm occupations or to start their own businesses in rural areas and urban centres;
- Improving educational access as well as providing text books and financial assistance to children of poor households; and
- Providing infrastructure and social amenities as part of a broader programme to improve the quality of life of all Malaysians. For the rural population, these include the provision of potable and piped water, electricity, roads, medical and health services and schools, including rural hostels.

** Hardcore Poor is a concept used to identify and target poor households whose monthly household income is less than the Food Poverty Line Income (PLI). The latest Gross Food PLI is RM 415.*

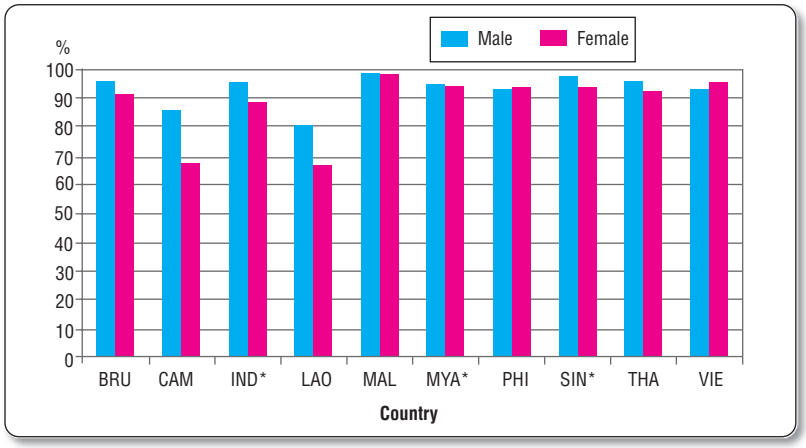
Sources: *Malaysia MDG Report 2005[6]; Official website of Ministry of Rural and Regional Development[7].*

Literacy

A high level of literacy will not only help poor people move out of poverty cycle, but will also widen their employment and livelihood options, which in turn will contribute to a higher standard of living. With an improved standard of living, better care for the environment could be expected.

The literacy levels of male and female adults are relatively high in most of the AMS. The literacy rate of male adults in Brunei Darussalam, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Viet Nam is over 90 percent while in Cambodia it is about 85 percent and Lao PDR about 80 percent. The literacy rate of female adults in Malaysia, Brunei Darussalam, Myanmar, the Philippines, Singapore, Thailand and Viet Nam is between 90 and 95 percent.

Figure 3.3: Male and Female Adult Literacy Rate, 2007



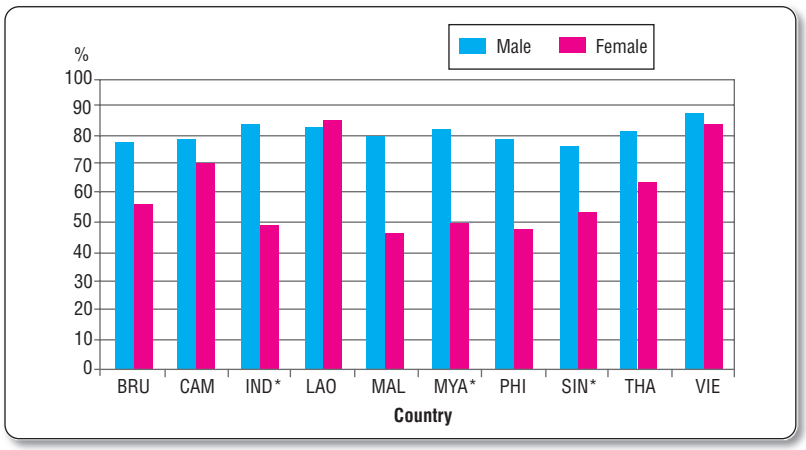
Source: *ASEANstats (*country data updated by AMS)*
Notes: *(1) Viet Nam's data as of 2004*
(2) Adult Literacy Rate refers to 15+; for Brunei Darussalam age 9 and above

Employment

Economic growth accompanied by increased employment opportunities is vital to reducing poverty and ultimately achieving the MDGs. Employment would help ensure that people are able to obtain basic necessities such as food, water, clothing and shelter. At the same time, it can also help reduce human pressure on the natural resources for livelihood.

In the ASEAN region, there is a big difference between female and male participation in the labour force. Male participation is relatively high with approximately 80 percent of males engaged in the workforce for all the countries. The rate of female participation in the workforce varied significantly among countries, with Lao PDR and Viet Nam posting the highest, at about 83 percent. Indonesia, Malaysia, Myanmar and the Philippines, on the other hand, have less than 50 percent females participating in the workforce.

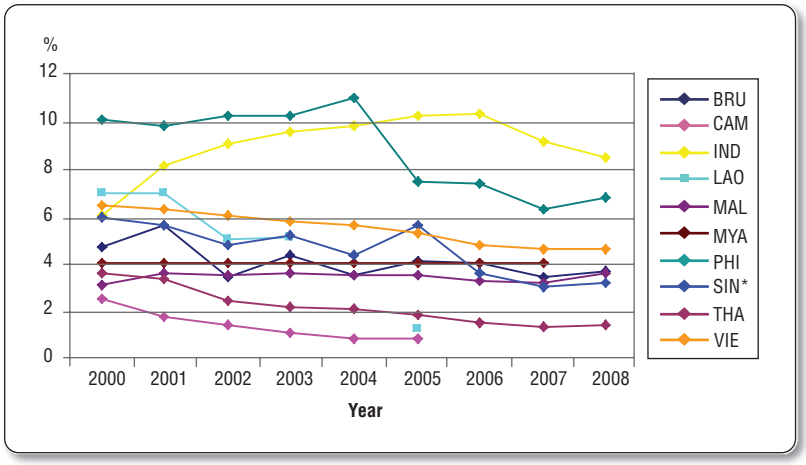
Figure 3.4: Male and Female Labour Participation Rate



Source: *ASEANstats*
Notes: *(1) Data year – Brunei Darussalam, Indonesia (Male), Malaysia, Myanmar, Philippines, Singapore and Thailand (data as of 2007); Cambodia (data as of 2004); Lao PDR (data as of 2003); Indonesia (Female) (data as of 2001); Viet Nam (data as of 1995)*
(2) Singapore data is limited to residents only.

Unemployment is one of the major factors leading to high poverty incidence in the region. From 2000 to 2008, the majority of the AMS have taken various steps to reduce unemployment rate by boosting and diversifying their economies. During this period, the unemployment rates in most AMS have declined.

Figure 3.5: Unemployment Rate of People 15 Years and Above, 2000 – 2008



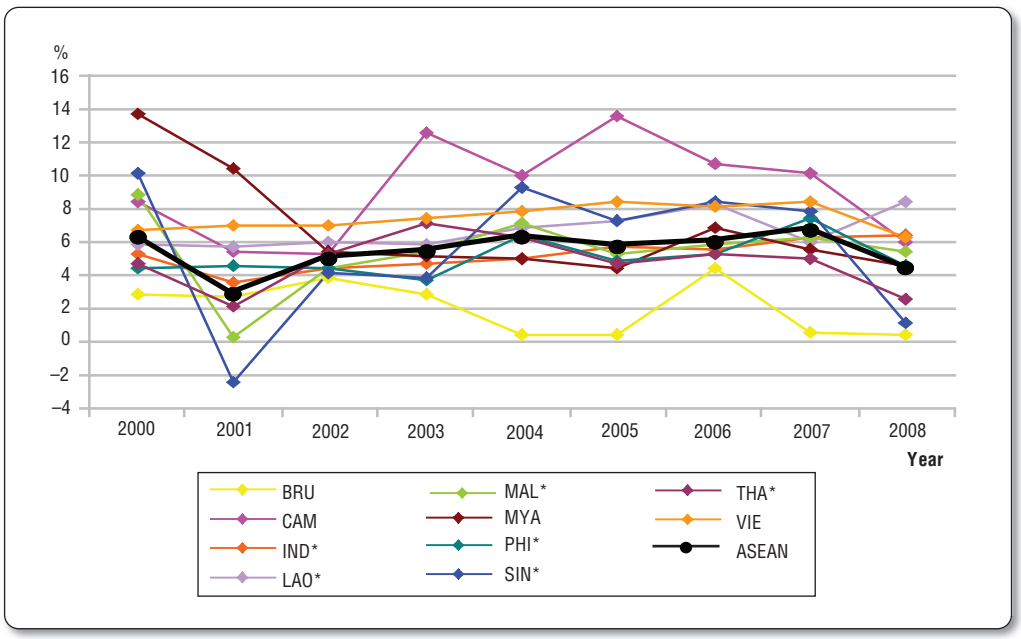
Source: *ASEANstats (*country data updated by AMS)*
Note: *Singapore data is limited to residents only.*

Economy

Economic Growth and Performance

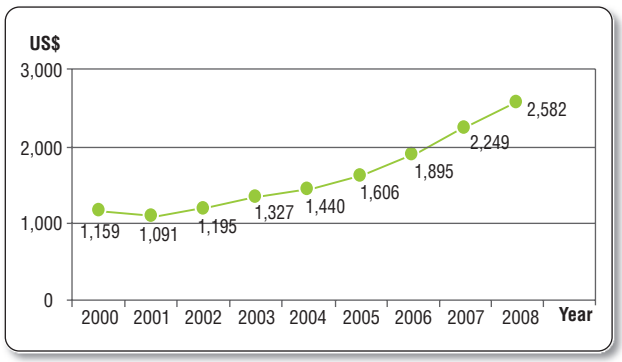
The economy of ASEAN as a whole experienced an average growth of 5.9 percent from 2003 to 2008, rising steadily from 5.4 percent in 2003 to 6.6 percent in 2007 before declining to 4.4 percent in 2008 due to the global financial crisis. The relatively high growth rate in the ASEAN region over the last decade has contributed to the increasing Gross Domestic Product (GDP) per capita. The average per capita GDP in ASEAN showed constant increases between 2000 and 2008. The average per capita GDP in 2000 was only US$ 1,158 but increased by more than 50 percent to US$ 2,581 in 2008. Singapore and Brunei Darussalam had the highest per capita GDP in 2008 at US$ 37,597 and US$ 35,623 respectively, and were among the high-income countries of the world. Malaysia is in the upper-middle income bracket with per capita GDP of US$ 7,992 in 2008. Indonesia, the Philippines and Thailand are in the lower-middle income category while Cambodia, Lao PDR, Myanmar and Viet Nam are among the low-income countries.

Figure 3.6: Rate of Economic Growth (GDP at Constant Price), 2000 – 2008



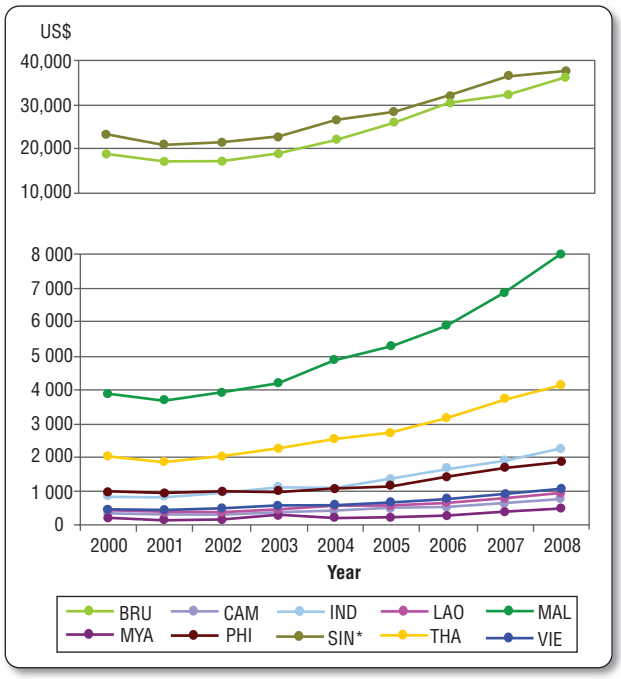
Source: *ASEANstats (*country data updated by AMS)*

Figure 3.7: Per Capita GDP (ASEAN Average) at Current Market Prices, 2000 – 2008



Source: *ASEANstats*

Figure 3.8: Per Capita GDP at Current Market Prices, 2000 – 2008

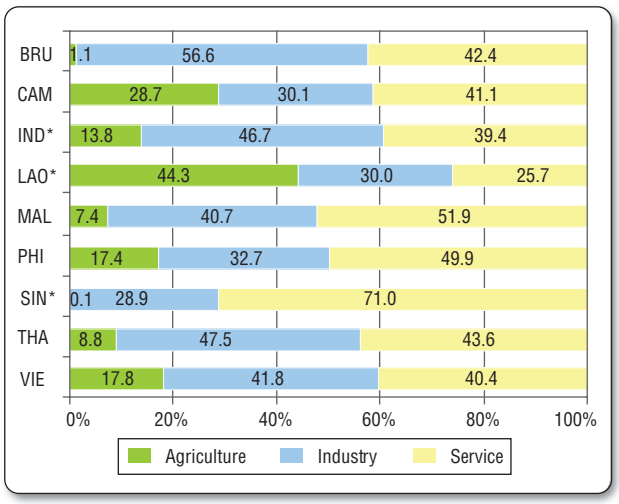


Source: *ASEANstats (*country data updated by AMS)*

Economic Structure

The economy of the region hinges on three main sectors: industry, service and agriculture. In 2007, both the industrial and service sectors were the biggest contributors to GDP growth. Among the AMS, Singapore and Brunei Darussalam posted the highest share of GDP contributed by the service sector (71.0%) and industrial sector (56.6%) respectively. In Singapore, the service industry comprises mainly business and financial services and wholesale and retail while Brunei Darussalam's major industrial-based activity is oil and gas production. Although the GDP share of agricultural sector was generally low across the region, this sector remains important in Lao PDR (44.3%), Cambodia (28.7%), the Philippines (17.4%) and Viet Nam (17.8%).

Figure 3.9: GDP Share of Major Economic Sectors for Selected AMS, 2007



Source: *ASEANstats (*country data updated by AMS)*

Notes: *(i)* ***Service-based economic activities*** *= wholesale and retail trade; restaurants and hotels; transport, storage and communications; financing, insurance, real estate and business services; and community, social and personal services*

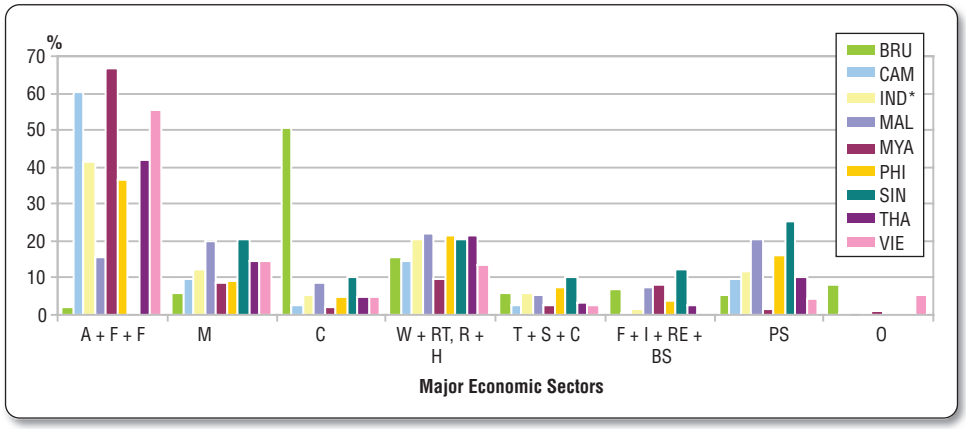
(ii) ***Industrial-based activities*** *= mining, quarrying, manufacturing, construction and public utilities (electricity, gas and water)*

(iii) ***Agricultural-based activities*** *= farming, hunting, forestry, fishing and livestock raising*

Although the service and industrial sectors contributed largely to the region's GDP, the data on employment by major industry groups showed a different scenario. Employment in agriculture, fishery and forestry was significantly high in the majority of the AMS, notably in Myanmar, Cambodia and Viet Nam. Some AMS are major producer of food crops, such as Indonesia (paddy, maize, soybean and cassava), Myanmar (paddy), the Philippines (maize and sugarcane), Thailand (paddy, sugarcane and cassava) and Viet Nam (paddy and sugarcane). Although the agriculture, fishery and forestry sectors' contribution to the region's GDP is small, they provide a large percentage of employment in the region.

Non-food crops such as oil palm and rubber are also important agricultural commodities for some AMS. Indonesia and Malaysia, notably, are the world's major producers of palm oil. Other countries

Figure 3.10: Percentage of Employment by Major Economic Sectors for Selected AMS



Source: *ASEANstats (*country data updated by AMS)*
Notes:
Major Industry Groups
A + F + F = Agriculture, Fishery & Forestry; M = Manufacturing; C = Construction; W + RT, R + H = Wholesales & Retail Trade, Restaurants & Hotels; T + S + C = Transportation, Storage, Communication; F + I + RE + BS = Finance, Insurance, Real Estate and Business Services; PS = Public Services; O = Others (Mining & Quarrying, Electricity, Gas & Water, Unknown)
Latest Data Available
Brunei Darussalam (1995); Cambodia (2004); Indonesia (2007); Lao PDR (no data available); Malaysia (2006); Myanmar (1996); Philippines (2006); Singapore (2006); Thailand (2006); Viet Nam (2006)

Table 3.4: Production of Major Food Crops, 2000 & 2007

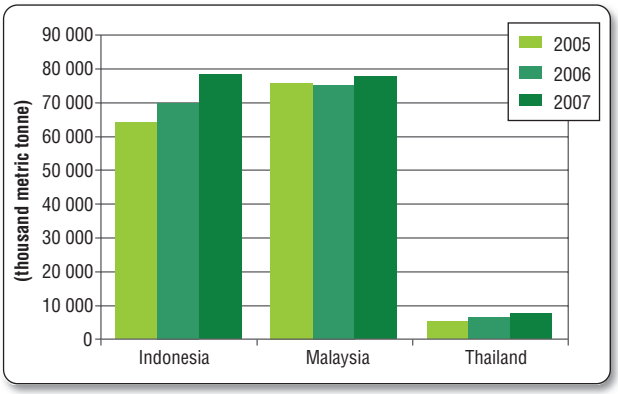
Country	Paddy		Maize		Soybean		Sugarcane		Cassava	
	2000	2007	2000	2007	2000	2007	2000	2007	2000	2007
	(1,000 metric tonnes)									
Brunei Darussalam	0	2	n.a	0	n.a	n.a	0	0	0	0
Cambodia	4,026	6,727	122	523	5	118	164	287	148	2,215
Indonesia*	51,899	57,157	9,676	13,288	1,018	593	1,780	2,588	16,089	19,988
Lao PDR*	2,202	2,710	117	691	5	11	297	324	118	233
Malaysia	2,141	2,277	26	40	n.a	n.a	492	756	38	40
Myanmar*	21,324	31,450	365	1,146	110	217	5,894	9,833	97	282
Philippines	12,389	16,240	4,511	6,737	1	1	21,223	22,235	1,766	1,871
Singapore*	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Thailand	24,948	30,014	4,492	3,540	313	211	46,029	68,641	19,094	26,777
Viet Nam	32,530	35,918	2,006	4,250	149	275	15,044	17,379	1,986	7,985

Source: *ASEANstats (*updated by AMS)*
Note: *n.a – not applicable*

– Myanmar, Thailand and Cambodia – are beginning to make inroads into the palm oil industry.

The exports of palm oil and crude rubber increased between 2002 and 2006. In 2006, the region exported about US$ 10 billion worth of palm oil and US$ 12 billion of crude rubber. The export of fishery products was also high, valued at US$ 7 billion in 2006. This was an increase of nearly 50 percent over the 2002 value. The high rate of agricultural and fishery exports could be a cause of concern if sustainable harvesting practices are not adopted.

Figure 3.11: Production of Oil Palm Fruit by Major Producers, 2005 – 2007



Source: *FAO Statistical Database*[8]

Table 3.5: ASEAN Trade in Selected Agricultural and Fishery Products, 2002 & 2006

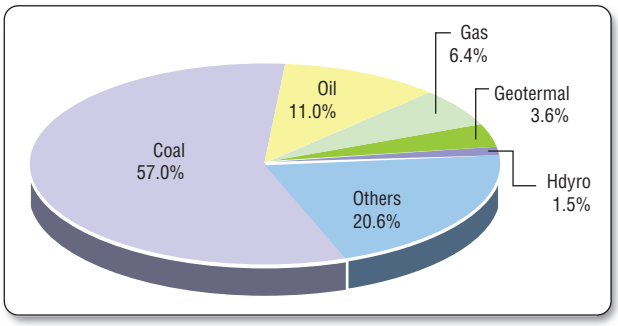
	Exports		Imports	
	2002	2006	2002	2006
	(US$ million)			
Agricultural Products				
Oil of Palm	5,656	10,117	256	409
Crude Rubber	3,556	12,060	404	939
Rice, including husked and broken rice	1,588	2,430	822	1,030
Fishery Products				
Fish and fish products	1,291	2,328	1,204	2,111
Crustaceans	2,216	3,864	354	439
Mollusks	494	875	154	212

Source: *ASEAN Statistical Yearbook 2007*[9]

Energy

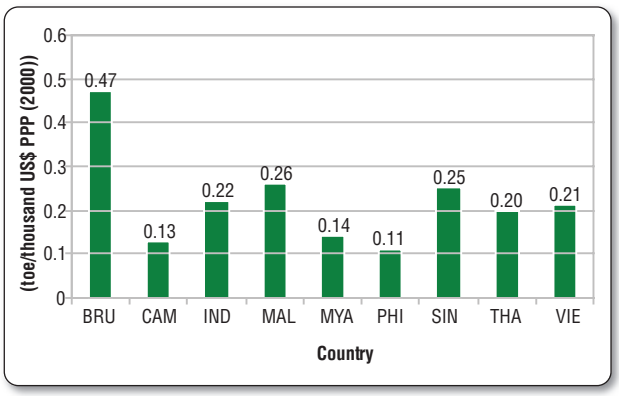
The primary energy sources in the region are coal (57%), oil (11%), gas (6.4%), geothermal (3.6%) and hydro (1.4%). Other sources account for a total of 20.6 percent. The ratio of energy supplied to GDP provides a measure of energy intensity in the region. This measure shows how much energy is used to produce US$ 1,000 of GDP. The ratio was lowest in the Philippines and Cambodia because only 0.11 tonne of oil equivalent (toe) and 0.13 toe of energy was used respectively to produce US$ 1,000 of GDP.

Figure 3.12: ASEAN Primary Energy Consumption, 2008



Source: *ASEAN Centre for Energy*

Figure 3.13: Total Primary Energy Supplied to GDP Ratio in Selected AMS, 2006

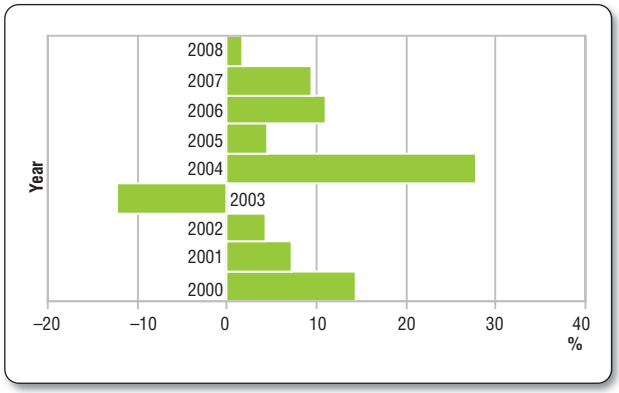


Source: *International Energy Agency*[12]

Tourism

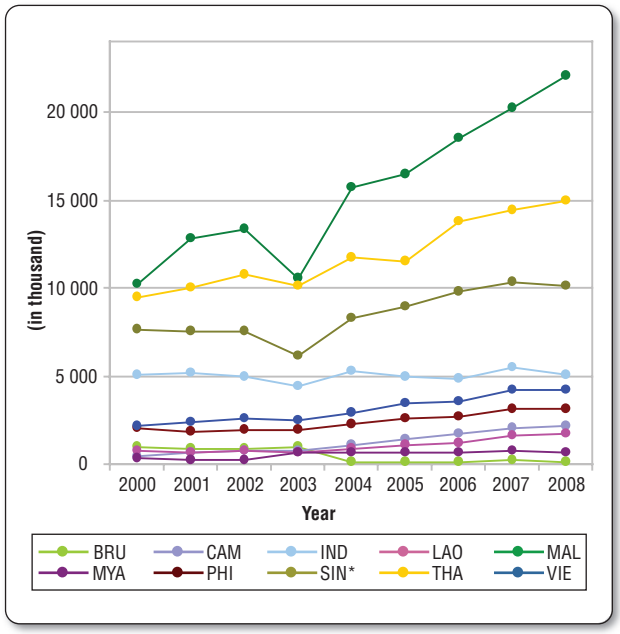
Tourism in the region has been steadily rising from 2000 to 2008, except in 2003 when the Severe Acute Respiratory Syndrome scare hit the region. The industry, however, recovered quickly in 2004 which saw an impressive 28 percent rise in tourist arrivals. While the rate of growth fell to about 5 percent in 2005, the industry picked up again in the following years.

Figure 3.14: ASEAN Growth Rate of Tourist Arrivals



Source: *ASEANstats*
Note: *Data 2008 – preliminary estimate as of date of compilation*

Figure 3.15: Tourist Arrivals, 2000 – 2008



Source: *ASEANstats (*updated by AMS)*
Note: *2008 data preliminary estimate as of date of compilation for all AMS except for Singapore.*

Nearly all AMS experienced an increase in their tourist arrivals after 2003, with Malaysia recording the highest rate of growth. Tourist arrivals in Malaysia increased by 40 percent from 15.7 million in 2004 to 22 million in 2008. Thailand and Singapore also experienced a considerable increase, about 27 percent and 21 percent respectively, between 2004 and 2008.

Endnotes

1 UNDP. (2007). *Human Development Report 2007/2008: Fighting climate change: Human solidarity in a divided world*. Available online at http://www.undp.org

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11 Energy Information Administration website (http://www.eia.doe.gov), accessed June 5, 2009.

12 International Energy Agency website (http://www.iea.org), accessed June 5, 2009.

13 Energy Information Administration website (http://www.eia.doe.gov), accessed June 5, 2009.

CHAPTER 4
Freshwater and Marine Ecosystems

Ensure ASEAN's coastal and marine environments 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

Roadmap for an ASEAN Community 2009 – 2015

The ASEAN region, by virtue of its location in the tropics, is endowed with abundant freshwater resources. In 2007, the region had a total capacity of 5,675 billion cubic metres of internal renewable water resources, with Brunei Darussalam, Lao PDR and Malaysia having the highest per capita water resource availability. With increasing population and economic activities, the rate of water use has increased across the region with the agricultural sector consuming up to 75 percent. Water consumption in ASEAN is expected to double during the latter half of the 21st century. AMS have embarked on programmes to optimise water use such as reducing non-revenue water, reforming water tariffs, improving efficiency of water utilities and introducing new regulations. The increasing population and industrial activities also affect the water quality as evidenced by pollution levels in many rivers. Among measures that AMS have put in place to protect water quality include the construction of sewerage facilities, establishing regulations and imposing effluent taxes. There are 1,764 water quality monitoring stations throughout ASEAN.

As the region continues to develop, more people have access to safe drinking water and improved sanitation facilities, both essential for better health and quality of life. In 2006, 86 percent of the ASEAN population had access to improved drinking water sources and 74 percent used improved sanitation facilities.

Mangrove and peatland are unique ecosystems in ASEAN with significant biological, environmental, social and economic importance. The region has over 52,000 square kilometres of mangrove, more than half of which are in Indonesia. The region has more than 25 million hectares of peatland, representing 60 percent of global tropical peatland. Many of the wetland areas have been designated as Ramsar sites or Wetlands of International Importance. There are 29 Ramsar sites in the region as of 2008 covering 1,320,391 hectares – a significant increase of 63 percent compared to 2006.

With a coastline of about 173,000 kilometres, the ASEAN region is a renowned centre of tropical marine biodiversity. Coral reefs in the region account for 34 percent of world's total, with the highest distribution being in Indonesia, Malaysia and the Philippines. At both national and regional levels, various initiatives have been taken by AMS to promote sustainable management of these resources. The marine protected areas in ASEAN as of 2007 covered 87,778 square kilometres – an increase of 56 percent compared to 1995. The 6-nation Coral Triangle Initiative demostrates ASEAN's commitment to conserve and protect the region's rich marine ecosystem along with adjacent countries and partners.

ASEAN FACTS AND FIGURES

ASEAN Coastline	173,000 kilometres			
ASEAN Internal Renewable Water Resources (2007)	5,675 billion cubic metres			
Water Use in Selected AMS:	Domestic	Industry	Agriculture	Others
Brunei Darussalam	77%	18%	5%	–
Indonesia	4%	5%	59%	32%
Thailand	4%	4%	75%	17%
Singapore	49%	51%	–	–
Viet Nam	8%	24%	68%	–
Population Using Improved Water Sources (2006)	86% of ASEAN population *(World average: 86%)*			
Population Using Improved Sanitation Facilities (2006)	74% of ASEAN population *(World average: 60%)*			
ASEAN Mangrove Forests	1980: 6,385,040 hectares 2005: 5,240,830 hectares			
ASEAN Peatland Area	25 million hectares *(60% of global tropical peatland)*			
Ramsar Sites in ASEAN	2006: 26 sites *(covering 811,000 hectares)* 2008: 29 sites *(covering 1,320,391 hectares)*			
Fisheries Production in ASEAN	2000: 17 million metric tonnes 2007: 26 million metric tonnes *(17% of world production)*			
Marine Protected Areas in ASEAN (2009)	620 sites			
Extent of Marine Protected Areas in ASEAN (2007)	87,778 square kilometres *(56% increase compared to 1995)*			

Freshwater Resources

The ASEAN region, by virtue of its location in the tropics, is endowed with abundant freshwater resources. In 2007, the region had about 5,674.5 billion cubic metres of internal renewable freshwater resources, which consisted of an average flow of rivers and recharge groundwater (aquifers) generated from endogenous (internal) precipitation. Due to AMS' vast differences in geographical location, land size and natural resources endowment, the availability of water resources per capita also varies considerably. Brunei Darussalam, Lao PDR and Malaysia have the highest per capita water resource availability among the AMS.

Water Use and Demand

The intensification of water use has been observed in the region. The sources of fresh water, including river basins, groundwater reserves, lakes,

Table 4.1: Total Internal Renewable Freshwater Resources, 2007

Country	(billion m^3)
Brunei Darussalam	8.5
Cambodia	120.6
Indonesia	2838.0
Lao PDR	190.4
Malaysia	580.0
Myanmar	880.6
Philippines	479.0
Singapore	0.9*
Thailand	210.0
Viet Nam	366.5
ASEAN	**5674.5**

Source: *Food and Agriculture Organisation of the United Nations (FAO)[1] (*updated by AMS)*

and man-made reservoirs, are increasingly under pressure to meet the increasing demand for agriculture, industry and domestic consumption. In Brunei Darussalam, the projected water demand in 2010, 2015 and 2020 are 862 million litres per day, 978 million litres per day and 1,139 million litres per day, respectively[2]. Water demand is 77 percent for domestic and commercial use, 18 percent for oil and gas industry and 5 percent for irrigation[3].

Table 4.2: Per Capita Water Resource Availability, 2007

Country	(m^3/capita/year)
Brunei Darussalam	22,254
Cambodia	8,493
Indonesia	15,500*
Lao PDR	33,063
Malaysia	22,211
Myanmar	18,202
Philippines	5,553
Singapore	194*
Thailand	3,310
Viet Nam	4,251

Source: *FAO[4] (*updated by AMS)*

In Indonesia, the recorded water use in 2005 was 591 billion litres per day and is projected to increase to 817 billion litres per day in 2010 and 1,131 billion litres per day in 2015. The breakdown of water usage in Indonesia is agriculture (58.52%), industry (5.24%), domestic (3.91%) and others (32.33%)[5].

Malaysia's water use had increased from 7,359 million litres per day in 2005 to 8,025 million per litres per day in 2007 and is projected to increase to 20,338 million litres per day by 2020. The rate of water use in Bangkok, Thailand has also shown an increase from 2005 to 2007, with agriculture accounting for the highest usage (around 75%)[6]. In Singapore, the demand for water has grown by about 9 percent in the past four years (2005 – 2008).

In Viet Nam, the total estimated water demand in eight regions, namely Northwest, Northeast, Red River Delta, North Central Coast, South Central Coast, Central Highlands, Northeast of Mekong and Mekong River Delta, was 91.29 billion cubic metres in 2002[7]. Water is used for agriculture (68%), industry (24%) and domestic (8%)[8]. The use of water in agriculture in all the other AMS (except Brunei Darussalam and Singapore) ranges from 62 to 98 percent[9].

Rapid growth in the economy and population will lead to even greater demand for water in the future. Water consumption in ASEAN is projected to double during the latter half of the 21st century[10]. Population growth will contribute most to the increase in water demand. As some AMS are rapidly moving up the industrialisation chain, water consumption within the industrial sector is expected to rise considerably. In order to manage water use and demand, AMS have taken various initiatives such as water use regulation and optimisation, and water conservation.

Table 4.3: Water Use and Projected Water Demand for Selected AMS

Country	2005	2006	2007	2008	2009	2010	2015	2020
	(million litres/day)							
Brunei Darussalam[a]	–	–	–	–	–	862	978	1,139
Indonesia[b^]	591,090	630,693	672,949	718,037	766,145	817,477	1,130,571	–
Malaysia[c#]	7,359	7,628	8,025	–	–	15,285	–	20,338
Singapore[d]	1,386	1,423	1,462	1,506	–	–	–	–
Thailand (Metropolitan)[e]	1,880	1,857	1,884	–	–	–	–	–

Sources: *[a] Ministry of Development, Brunei Darussalam*
[b] Indonesia State of Environment Report 2004
[c] Department of Water Supply, Malaysia; Ministry of Natural Resources and Environment, Malaysia
[d] Ministry of the Environment and Water Resources, Singapore
[e] The Metropolitan Waterworks Authority, Thailand

Notes: *'–' not available at the time of publication*
[^] Indonesia data include water demand for agriculture.
[#] inclusive of both domestic and non-domestic water use

Box 4.1: Water Conservation in Singapore

Complementing Singapore's supply strategy is its emphasis on water demand management. Singapore's demand management approach comprises pricing, mandatory water conservation requirements, and promoting a sense of ownership of water through partnership with the private and people sectors. Singapore targets to reduce its per capita domestic water consumption from 156 litres per day in 2008 to 140 litres per day by 2030.

(a) *Pricing*
Pricing of water is an important and effective mechanism in encouraging customers to conserve water. Water is treated as an economic good and priced to reflect its scarcity. Beyond recovering the costs of production and supply, a water conservation tax is applied to reflect the higher marginal cost of alternative water sources.

(b) *Mandatory requirements*
Legislative requirements to deter water wastage include mandatory installation of low capacity flushing cisterns (LCFC) for all new and ongoing building projects, maximum allowable flow rates in taps and sanitary appliances and maximum flush volumes for toilets. Singapore has further mandated since July 2009 that all the taps and mixers, urinals and dual-flush LCFCs installed in all new developments and existing premises undergoing renovations must have at least a "one-tick" or "Good" water efficiency rating under Singapore's Mandatory Water Efficiency Labeling Scheme.

(c) *Promoting ownership through partnership with the private and people sectors*
Singapore engages the private and public sectors in the management of water resources, instilling a sense of ownership, and emphasising the importance of water conservation.

Major activities include campaigns to save water, educating the young through the school curriculum and exhibitions, and community partnerships with institutions and grassroots organisations. In 2006, the 10-Litre Challenge was introduced to encourage each Singaporean to save 10 litres of water a day. As part of the 10-Litre Challenge, Singapore introduced voluntary water labelling scheme for taps and mixers, urinals, dual-flush LCFCs, showerheads and clothes washing machines in October 2006 to provide consumers with information on the water efficiency of appliances. The labelling scheme was made mandatory (label as shown in the photo) for taps and mixers, urinals and dual-flush LCFCs from July 2009. Water Volunteer Groups have also been formed to conduct house-to-house visits to households to educate them on water conservation practices, and assist in the installation of water saving devices.

On the non-domestic front, Singapore has a 3R strategy: encouraging industries to reduce water consumption, replace potable water with NEWater and sea water wherever feasible, and reuse water. The 10% Challenge was launched in November 2008 to engage non-domestic customers to improve water efficiency and to reduce water consumption through sustainable and efficient design, use of water conservation devices and proper management. A 10% Challenge website, a Water Efficient Building Design Guide and a Water Efficiency Manager Course were introduced under the 10% Challenge and the programme will be rolled out sector by sector starting with schools, hotels, commercial, and government buildings.

A Water Efficiency Fund was also launched in July 2007 to co-fund projects that would yield at least 10% reduction in water consumption within an organisation to encourage companies to look into efficient ways to manage their water demand and promote water conservation in the community.

Water efficiency label

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

Urban Water Demand Management Practices

AMS, depending on their circumstances, employ a wide range of methods to manage urban water demand. These methods can be broadly classified into five categories:

Tariff solutions

Water tariff reform is an instrument used by AMS to regulate urban water demand. In the Malaysian states of Johor and Selangor, affordable water tariffs for the low income groups and full cost recovery charges for the higher income groups are

applied. In Metro Manila and Metro Cebu, the Philippines, water tariffs have been adjusted to reflect the value of water as an economic good. In Metro Cebu, the price of water is about three times the national average reflecting its scarcity value. Arguably, this approach has helped to promote water conservation in the water scarce province. In Viet Nam, water is now valued as an economic good – through the use of water resource tax – and priced to reflect its scarcity value. In Phnom Penh and Sihanoukville, Cambodia, water tariff affordability studies have been undertaken as a basis for reforming the water tariff.

Management solutions

AMS share a common concern for improving operational efficiency of urban water utilities. They employ various management-related solutions to meet the urban water demand challenges. For example, in Indonesia and Malaysia, performance targets are commonly employed to reduce non-revenue water (NRW). In Indonesia, the target is for public water utilities to bring down NRW to 15 percent. In Malaysia, the target is to reduce NRW from 37 percent to 30 percent by 2010.

Decentralised management is another common approach to urban water demand management. In Johor Bahru in Malaysia, Phnom Penh in Cambodia and Manila in the Philippines, demand management zones/territory approaches have been effectively employed to manage NRW. Information technology such as geographic information system is also extensively used in Malaysia.

Performance and process benchmarking is also employed in Indonesia where urban water utilities are rated in terms of their efficiency. Performance-based contracts for NRW reductions have been used in Sihanoukville, Kuala Lumpur and Bangkok. Capacity building including employee empowerment and twinning arrangements are crucial to improving the ability of urban water utilities to improve water demand management.

Technical/engineering solutions

A key contributor to NRW is old and leaking pipes. Cities such as Manila, Phnom Penh, Mandalay, Kuala Lumpur and Ha Noi have embarked on programmes to replace their ageing and leaking pipes. Singapore has substantially replaced its pipes over the years and has introduced 100 percent metering since 1980.

Along with pipe replacement programmes, cities have also introduced engineering solutions such as pressure reducing valves to manage water pressure especially in Phnom Penh, Singapore and Manila (East).

Institutional/regulatory solutions

Institutional and regulatory reforms have been adopted by several AMS to promote accountability of urban water utilities. In Indonesia, public utilities are undergoing a process of debt restructuring to make them more viable. Responsibility and accountability for these utilities have also been transferred to local governments. Other important institutional reforms to promote accountability include defining the responsibilities of different levels of government – federal and state governments – in the case of Malaysia; and provinces and districts, in the case of the Philippines and Indonesia. In Thailand, river basin organisations are playing a larger role in water management. In Manila and Jakarta, public-private partnerships were instrumental in improving water service delivery. Successful private sector participation requires, among others, effective regulation and the alignment of corporate goals with social goals. In Malaysia and the Philippines, regulatory reforms have been introduced to separate service providers from regulators. Permitting and licensing systems for ground water extraction are used in Thailand, Myanmar, Lao PDR and Viet Nam but enforcement poses serious challenges.

Leadership, public education and community involvement

A stable, competent and committed leadership can make a substantial difference in the performance of urban water supply agencies and in urban water demand management, as evidenced in Manila, Phnom Penh, Singapore and Palembang (Indonesia). Public education on water conservation is an integral part of Urban Water Demand Management in Singapore. Along with programmes on pipe replacement, effective community involvement is crucial for reducing NRW. In the case of Manila Water, NRW has dramatically gone down from 63 percent in the 1990s to 20 percent in 2009.

Box 4.2: Water Demand Management in Selected ASEAN Cities

Bangkok

The Government of Thailand and Metropolitan Water Authority (MWA) are committed to supplying 24-hour potable piped water to every home in Bangkok. In consonance with the decision to "privatise" MWA in 2003, a regulatory commission has been proposed. MWA has in the past demonstrated good governance and a strong financial position. In 2001, it had an annual turnover of about $281 million and a net income after expenses (including debt servicing) of about $62 million.

Ho Chi Minh City

Parliament is considering the 14th draft of the Water Law. According to this draft, large important river basins will be managed by the River Basin Committee. The National Water Supply Strategy, which was formulated by the Ministry of Construction in 1993, set targets for service and coverage.

Jakarta

The Jakarta Water Supply Regulatory Body reviews tariff proposals from the Jakarta Water Supply Enterprise and two private operators. Once a proposal is reviewed, a recommendation is forwarded to the Jakarta Governor. The Governor decrees the tariff adjustment after consulting with and getting the approval of the Jakarta City Council. This system works on principles that include full cost recovery with a fair return on investment, affordability to consumers, demand management, simplicity and transparency.

Kuala Lumpur

With the corporatisation of the Selangor Water Supply Department into the Selangor Water Management Corporation Ltd., in March 2002, a senior government official was appointed the regulator. All major policies are announced through the media, and the public is invited to comment. Increases in water tariffs are discussed in public forums. There is a special day each month for the public to visit the regulator and the water company to communicate directly with staff involved in water service provision.

Manila

The basis for economic regulation is the concession agreements between Manila Water Supply System (MWSS) and Manila's two private operators. Tariffs may be adjusted for inflation, to offset the financial consequences of events unforeseen by the operators (extraordinary price adjustments) and to counter the effects of certain forecasts or assumptions, such as demand growth and per capita consumption, which severely hamper the finances of the operators (rate rebasing). In addition to tariff regulation, MWSS undertakes operations regulation (operator performance) and customer service regulation. There is no official government policy that is used as the basis for the contracts or regulation. Essentially, it is regulation by contract.

Phnom Penh

The Government has yet to finalise and fully institutionalise the Draft Urban Water Supply Policy and Guidelines, but the political framework for water supply centres on financial autonomy of public utilities, cost recovery, protecting the poor and providing regulatory mechanisms. Tariffs will cover all costs and ensure efficient bill collection. A block tariff will be set at less than the unit cost for small water user groups and will be set higher than the average cost for large volume water consumers. The regulatory body proposed would have five to seven members appointed by royal decree for a fixed term of 5 years. This body's main functions would be to promote efficiency, prepare the mechanisms for tariff revision and tariff control, ensure compliance with quality standards, and issue licenses to operators.

Vientiane

The Government has defined its policy on the management and development of the water supply sector, and this includes the devolution of responsibility for water supplies to local governments. The entity responsible for water supply and sanitation in Vientiane is called Nam Papa Lao. The Prime Minister has established a water supply regulatory board to assume decision-making functions and give advice on future directions. An appropriate regulatory framework is being established to allow for the possibility of private sector participation in the water supply system.

Source: *Extracted from Proceedings of Workshop on Urban Water Demand Management, 22 – 25 June 2009, Singapore*[11]

Access to Safe Drinking Water and Basic Sanitation

Related to water use is the quality of water for consumption. In 2006, the ASEAN region had about 86 percent of its population using improved water sources[13], which is the same as the world average[14]. With the advancement of technologies and rise in concern for human health, many AMS have placed strong emphasis on the need to improve drinking water sources. 100 percent of the population in Singapore and more than 95 percent of the population in Brunei Darussalam, Malaysia and Thailand have access to improved drinking water while in the Philippines and Viet Nam, the figure is above 90 percent. Cambodia, Indonesia, Lao PDR

and Viet Nam recorded significant increases in their percentage of population using improved drinking water sources between 1993 and 2006.

Table 4.4: Percentage of Population Using Improved Drinking Water Sources

Country	1993	1995	2000	2005	2006
Brunei Darussalam*	–	98	98	98	99
Cambodia	–	19	38	65	–
Indonesia *	16	–	50	–	57
Lao PDR	–	41	46	60	–
Malaysia	–	98	98	99	–
Myanmar	–	61	71	80	–
Philippines	–	87	90	93	–
Singapore *	100	100	100	100	100
Thailand	–	96	97	98	–
Viet Nam	–	64	77	92	–

Source: *MDG website[12] (*country data updated by AMS)*
Note: *'–' not available at the time of publication*

In terms of improved sanitation facilities[15], Cambodia, Lao PDR, Myanmar and Viet Nam have made great progress in 2006 compared to 2000. In 2006, the regional average was about 74 percent[16], which is above the world average of 60 percent[17]. These developments are on track to achieve the United Nations' Millennium Development Goal (MDG) target of universal access to safe drinking water and basic sanitation by 2015.

Table 4.5: Percentage of Population Using Improved Sanitation Facilities, 2000 & 2006

Country	2000	2006
Brunei Darussalam*	80	88
Cambodia	16	28
Indonesia*	63	69
Lao PDR	22	48
Malaysia	94	94
Myanmar	59	82
Philippines	72	78
Singapore*	100	100
Thailand	93	96
Viet Nam	51	65

Source: *MDG website (*country data updated by AMS)*
Note: *'–' not available at the time of publication*

Water Quality Management

Along with the regulation of freshwater resources to meet the rising demand of the region's growing population and economy, AMS have placed great emphasis on the management of water quality. Pollution control strategies have been put in place to better regulate the quality of water. One example is the effluent taxes for industrial and commercial pollutants. In the Philippines, the industries are required to pay a fixed fee based on the nature of the polluting activity and a volumetric fee based on the amount of effluent discharged. Another form is the waterborne fee, which is charged on top of the regular water tariff and the water consumption tax. This has been implemented in Singapore and is used to defray costs of treating used water[18]. Standards regulation however remains the key form of policy intervention in water quality management. Various legislations and guidelines have been established in the AMS for this reason. For example, in the Philippines, the sanitation code of the Philippines, Presidential Decree (PD) 856, the Pollution Control Law, PD 984, and the Clean Water Act, Republic Act 9725, all provide the legislative framework for ensuring water quality in the country. In Singapore, zoning restrictions prohibit certain polluting activities in identified rain water catchment areas[19].

In ensuring the environmental health of watercourses which provide drinking water, AMS have systematised their water source classification. This mainly involves categorising watercourses into classes based on water quality, and then managing those watercourses according to goals or standards set for each class. Usually, each classification indicates the desired water uses of a watercourse. Some AMS have started water quality monitoring, with Singapore starting as early as 1975. Although some AMS have not established long-term monitoring networks, they do however carry out monitoring programmes for major river basins. This has been observed in Viet Nam where in 2002, a river water monitoring programme was carried out at three river basins, namely Cau, Nhue-Day and Dong Nai systems[20]. This type of monitoring programme has also been implemented in the Philippines. From 2006 to 2007, 19 priority rivers were identified by the Philippines' Environment Management Bureau (EMB) for its Sagip Ilog Programme, which was developed with the primary target of improving Dissolved Oxygen (DO) and

Table 4.6: River Water Quality Monitoring Network in Selected AMS

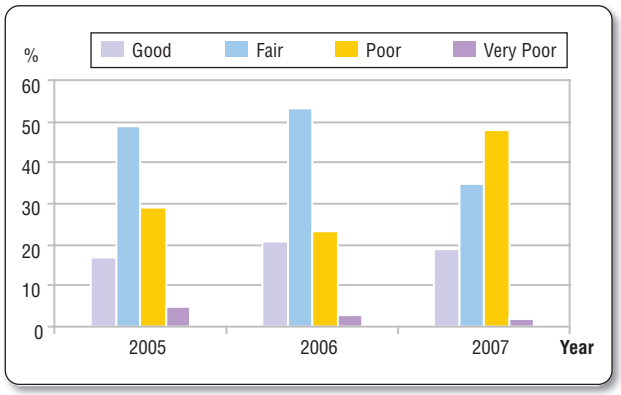
Country	Year Started	No. of Monitoring Station as of 2009
Indonesia[a]	2003	261
Malaysia[b]	1978	1,064
Singapore[c]	1975	71
Thailand[d]	1994	368

Sources: [a] *Pusat Sarana Pengendalian Dampak Lingkungan, Kementerian Negara Lingkungan Hidup, Indonesia*
[b] *Department of Environment, Malaysia*
[c] *Ministry of the Environment and Water Resources, Singapore*
[d] *Pollution Control Department, Thailand*

Biological Oxygen Demand (BOD) of those rivers[21]. In Brunei Darussalam, there has not been any formal assessment of the quality of rivers because rivers in the country are considered 'clean' and in their natural state since water catchment zones are in the interior areas where there are no major industrial developments. Water quality monitoring therefore focuses on the treatment processes at the water treatment plants and the water supplies at the distribution network.

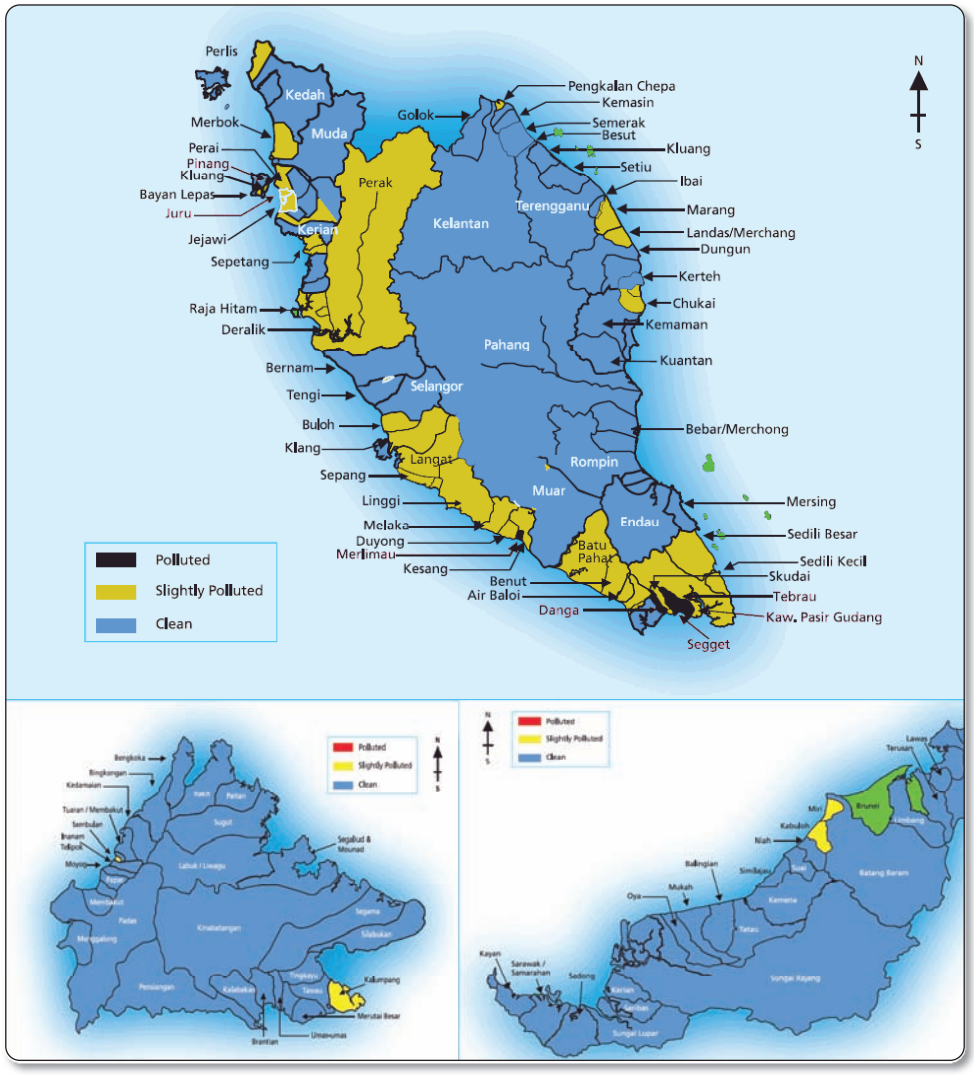
Despite consistent monitoring efforts and programmes undertaken by AMS, some countries showed a general decline in their river water quality, mainly due to urbanisation and industrialisation. In Indonesia, out of 30 rivers monitored in 2007, 27 percent were found to be polluted. In 2008, about 54 percent of the 33 rivers monitored were polluted[22]. River water quality in Thailand had also deteriorated in the three years between 2005 and 2007. The country recorded a considerable increase in the number of rivers classified as poor, from 29 percent in 2005 to 48 percent in 2007.

Figure 4.1: River Water Quality throughout Thailand, 2005 – 2007



Source: *Pollution Control Department, Thailand*

Figure 4.2: Status of Water Quality in Malaysian River Basins



Source: *Malaysia Environmental Quality Report 2007*[23]

In Malaysia, there are three categories of river basins, namely polluted, slightly polluted and clean. Inland river quality is further classified into five classes (Class I to V) based on the water quality index. River basins which are categorised as slightly polluted are located in states which are heavy in agriculture and industrial activities. The polluted river basins, on the other hand, are mostly located in ports and industry-intensive areas. The river basins in Sabah and Sarawak are generally cleaner because of greater forest cover and fewer industries.

Water quality in Viet Nam is assessed by observing the load of pollutants entering the rivers. These pollutants include Total Suspended Solids (TSS), BOD, Chemical Oxygen Demand (COD), Ammonium ($N\text{-}NH_4^+$) and Total Phosphorous (P).

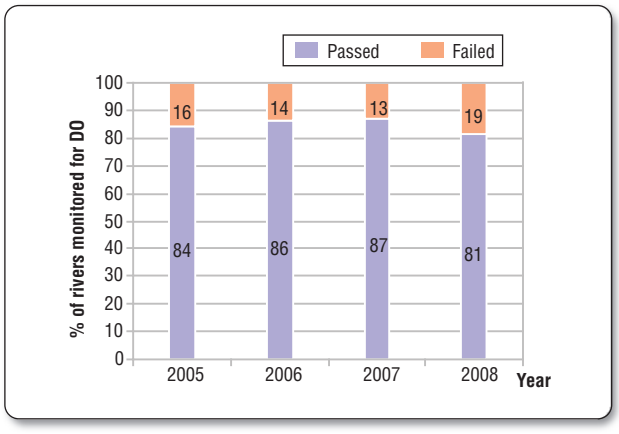
Table 4.7: Concentration of Pollutants in the Dong Nai River Basin, Viet Nam, 2004

Locality	Load of Pollutants (kg/day)					
	TSS	BOD	COD	$N\text{-}NH_4^+$	Total P	Oil
Lam Dong	22,824	14,658	27,138	951	517	2,603
Binh Thuan	1,000	594	1,074	43	24	90
Dak Nong	2,972	1,765	3,193	128	72	269
Binh Phuoc	7,448	4,494	8,170	317	177	707
Binh Duong	21,209	12,596	22,789	911	511	1,916
Tay Ninh	14,366	8,695	15,821	613	340	1,377
Long An	14,994	9,134	16,655	639	354	1,467
Dong Nai	34,620	22,512	41,820	1,435	776	4,082
Ho Chi Minh City	255,787	175,126	329,857	10,380	5,467	34,461
The Whole Basin	375,220	249,574	466,517	15,417	8,238	46,972

Source: *Viet Nam State of Environment Report 2006*[24]

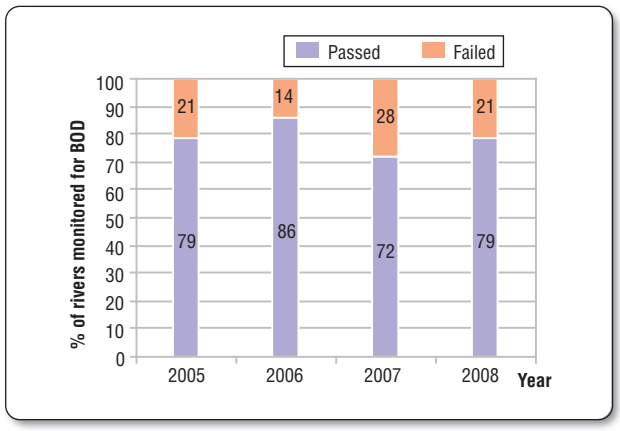
In the Philippines, inland water quality status is monitored using the water quality criteria set under the Department of Environment and Natural Resources (DENR) Department Administrative Order 34. The percentage of rivers that failed to meet the DO and BOD limits ranged from 13 to 19 percent and from 14 to 28 percent respectively.

Figure 4.3: Percentage of Rivers in the Philippines Monitored for DO



Source: *Environmental Management Bureau – DENR, Philippines*

Figure 4.4: Percentage of Rivers in the Philippines Monitored for BOD



Source: *Environmental Management Bureau – DENR, Philippines*

The establishment of sewerage and the construction of wastewater treatment facilities in several AMS are manifestations of their governments' concern to prevent water pollution. Singapore has well-developed sewerage infrastructure, composed of six centralised sewage treatment facilities called Water Reclamation Plants.

These plants not only treat used water but also reclaim water for non-potable use and indirect potable use. The country has established the Deep Tunnel Sewerage System (DTSS), which was conceived as a long term solution to meet the needs for used water collection, treatment and disposal. The DTSS comprises many stretches of link sewers leading to a 48-kilometre underground tunnel which conveys used water to a large centralised water reclamation plant in the eastern part of Singapore.

Since freshwater demand will continue to increase as the region's population increases, there is a need for a more effective and integrated management system that strikes a balance between the economic need and the 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 which complements the actions at the national and local levels.

Freshwater Ecosystems

Freshwater ecosystems are generally inland water bodies, without salt content. Streams, rivers, lakes, ponds and some wetlands (e.g. freshwater swamp and peat swamp) are the most common freshwater resources. The ASEAN region has several unique freshwater ecosystems such as the Tonle Sap in Cambodia and Lake Toba in Sumatra.

Table 4.8: Freshwater Fish Species (as of 2008)

Country	No. of Species
Brunei Darussalam	80
Cambodia	874^
Indonesia	1,003
Lao PDR	468
Malaysia	590^
Myanmar	310^
Philippines	295
Singapore	68*
Thailand	643
Viet Nam	1,000^

Source: *ASEAN Centre for Biodiversity (^ based on data in the country's Fourth National Report to the Convention on Biological Diversity)*
** updated by AMS*

Note: *ACB database composed of ARCBC Species Database 2004 and species recently added in the 2007 IUCN Red List of Endangered Species*

Freshwater ecosystems provide water for consumption, economic activities such as agriculture and industry, as well as food sources. Freshwater ecosystems are biologically rich in fish, amphibians, invertebrates and aquatic plants. Indonesia, Viet Nam and Cambodia have recorded high numbers of freshwater fish species. Freshwater ecosystems are also important waterways for transportation and sites for recreational activities.

Freshwater ecosystems are at threat in some countries, partly due to growing population and expansion of agricultural and aquaculture activities. This is further compounded by pollution as a result of industrialisation and urbanisation.

Wetlands

Important wetland systems in the ASEAN region include peatland and mangrove. These systems, along with other types of wetlands[25], have broad functions. They act as important habitat for fish and wildlife species and help control water pollution, sedimentation and erosion. They also help prevent flooding by temporarily storing floodwaters and releasing them slowly, therefore reducing flood peaks and protecting infrastructure downstream against flood damage. Although numerous benefits can be accrued from wetland habitats, these ecosystems continue to be threatened as a result of agricultural expansion and urbanisation. Many AMS have taken initiatives to conserve and protect their wetland ecosystems including designating wetland areas as Ramsar sites (Wetlands of International Importance) and wetland restoration. Regional initiatives such as the ASEAN Peatland Management Strategy have also been adopted to address the issues of wetland management on a sustainable basis.

Mangroves

Mangroves are unique in that they occupy an eco-tone between land and sea. Mangroves are widely distributed along the region's coastline, particularly at sheltered estuaries and along river banks and lagoons. Mangroves of the ASEAN region in 2005 occupied over 52,000 square kilometres, a reduction of about 18 percent since 1980. In the last few decades, many parts of the region witnessed significant levels of deforestation and conversion. Presently, the region has the largest extent of mangroves in the world with Indonesia accounting for more than half of

ASEAN's mangrove areas. Other AMS with a significant extent of mangroves are Malaysia and Myanmar, which together with Indonesia, account for more than 80 percent of total mangroves in Southeast Asia.

Table 4.9: Mangrove Areas, 1980 & 2005

Country	Hectares		% Of Total ASEAN Mangrove Area	
	1980	2005	1980	2005
Brunei Darussalam	18,400	18,400	0.29	0.35
Cambodia	91,200	69,200	1.43	1.32
Indonesia	4,200,000	3,443,830*	65.78	65.71
Malaysia	674,000	565,000	10.56	10.78
Myanmar	555,500	507,000	8.70	9.67
Philippines	295,000	240,000	4.62	4.58
Singapore	1,790	400*	0.03	0.01
Thailand	280,000	240,000	4.39	4.58
Viet Nam	269,150	157,000	4.22	3.00
TOTAL	**6,385,040**	**5,240,830**	**100**	**100**

Source: *FAO[26] (*updated by AMS)*

Box 4.3: Community Participation in Mangrove Rehabilitation in Koh Kong Province, Cambodia – A Case Study

The participation of local people was the basic principle embraced by the Participatory Management of Coastal Resources (PMCR) project when it began its work in the villages of Koh Sralao and Koh Kapic in Peam Krasaop Wildlife Sanctuary (PKWS) in 1997. With technical and financial assistance from International Development Research Centre, the team began a long but rewarding process of changing people's views on the environment and patiently working with communities to find better ways to support livelihoods. The mangrove resources in PKWS at that time had been destroyed by exploitation for charcoal production. In the beginning, the commitment to change was difficult for most local people. The government's initial response was to physically destroy the charcoal kilns without providing the communities with any alternative livelihoods. With the realisation that this strategy was counter-productive, the government engaged the local people who began to realise that they were in fact destroying their sources of livelihoods if they continued cutting down the mangroves for charcoal. The search for solutions began within the community but did not, however, end there. PMCR linked the local communities with other stakeholders within and outside Cambodia. They encompassed the provincial commune councils and non-government organisations. The people were provided with training, and participated in study tours and meetings with the objective of raising their awareness about the dangers and unsustainability of their activities, the benefits of mangrove resources and their ecosystems and the importance of local participation in resource management.

The key organisation in PMCR's work in Koh Kong province is the village management committee (VMC). The VMC is composed of elected local leaders and is the lead organisation for community development work. In 2000, VMCs were established in the communities of Koh Kapic and Koh Sralao. The VMCs were the community front-liners and local advocates of natural resource management (NRM). The VMC leaders led the implementation of project activities such as mangrove re-plantation, skills and awareness training and small livelihood projects. The adjoining communities, like Chrouy Pros, became aware of the VMCs' work and became interested in taking part in the PMCR project activities. This then became the impetus for expanding PMCR's activities to Chrouy Pros community. Aside from the growing interest of the Chrouy Pros fishers in NRM, the decision to expand PMCR's work was also in recognition that Koh Sralao and Koh Kapic fishers jointly access the resources in the Chrouy Pros bay and that, in reality, the social interaction among fishers in the three communities had long been established even before the VMCs were formed.

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The key activities of the VMCs include conducting patrols within identified community-managed areas, mangrove replanting, home gardening, improvement of drinking water supplies, waste management, seagrass conservation and project implementation. In general, the VMCs operate individually but there were several activities that linked them before the establishment of the federation. These included regular joint meetings of VMC, joint capacity building, study tours and joint project activities.

Degraded mangrove areas of Koh Kapic and Koh Sralao have been restored by VMCs

Source: *Ministry of Environment, Cambodia*

Peatland

The ASEAN region has more than 25 million hectares of peatland, comprising 60 percent of the global tropical peatland and roughly one tenth of the entire extent of global peatland[27]. A majority of ASEAN's peatland occurs in Indonesia, which has over 70 percent of total peatland area in Southeast Asia. Other major peatland areas are found in Malaysia, Thailand, Viet Nam, Brunei Darussalam and the Philippines.

Peatland is usually found in low altitude, sub-coastal areas extending inland for distances up to 300 kilometres and with depths varying from 0.5 metre to more than 10 metres. These peatlands have significant importance for socio-economic development and support for the livelihoods of local communities. Peatland in Southeast Asia are also significant carbon stores and sinks. If disturbed by drainage and burning, the carbon is released into the atmosphere, contributing to greenhouse effects. In 1997 and 1998, forest and peatland fires in the region had caused an estimated $ 9 billion worth of damage. Peatland fires are now major problems of regional and global significance releasing carbon emissions and causing transboundary smoke haze pollution[28].

Table 4.10: The State and Distribution of Peatland in Selected AMS

Indonesia	In 1987, it was estimated that the total peatland in Indonesia amounted to about 17 million hectares, down from the original peatland areas of about 20 million hectares. It is estimated that these 3 million hectares of peatlands were converted or destroyed between 1987 and 2000. Peatland areas are increasingly being used for the cultivation of perennial or plantation crops such as oil palm. The major peatland areas in Indonesia are: (a) Sumatra: About 4.6 million hectares of peatland occur mainly along the east coast of North Sumatra down to South Sumatra (b) Kalimantan: Peatland occupy 3.5 million hectares mainly on the west coast of West Kalimantan, in the central part of Central Kalimantan and some parts of East Kalimantan. (c) Papua: Peatland occur mostly in the southern coast and some fringes of the south-western coast with a total area estimated at 8.7 million hectares.
Malaysia	The total peatland area in Malaysia is estimated at between 2 and 2.5 million hectares. Substantial peat swamp forests have been cleared for agriculture and are under plantation crops such as oil palm. Peatland areas in Peninsular Malaysia are estimated at 0.9 million hectares with pristine peatland amounting to about 50,000 hectares. In Sabah and Sarawak, peat swamps are estimated to cover an area of about 1.5 million hectares.

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Thailand	The total peat swamp area of Thailand is estimated to be about 64,000 hectares. Most of the peat swamp forests are situated in Narathiwat Province of southeast Thailand, which has an area of 45,000 hectares. The most important site is Pru Toh Daeng.
Brunei Darussalam	The main peat deposits are in the Belait Peat Swamp in the South and in the Tasek Merimbun Park in Central Brunei. The Belait Peat Swamp is a good example of a well-kept peat swamp forest in the region.
Philippines	The main areas of peat are in the Southern Island of Mindanao, primarily in Agusan Marsh and Liguasan Marsh.
Viet Nam	The main areas of peat are located in the Mekong Delta.
Lao PDR	Some small topogenous peatland are found in the southern lowlands.

Source: *Extracted from the "ASEAN Peatland Management Initiative"*[29]

In November 2006, ASEAN Environment Ministers endorsed the ASEAN Peatland Management Strategy (2006-2020) to provide a framework for the sustainable management of peatland. The goal of the Strategy is to promote sustainable management of peatland in the ASEAN region through collective action and enhanced cooperation to support and sustain local livelihoods, reduce risk of fire and associated haze and contribute to global environmental management. The Strategy includes 25 operational objectives and 97 actions in 13 focal areas ranging from integrated management to climate change and inventory. AMS are now in the process of developing and implementing their respective national action plans.

Box 4.4: Belait Peat Swamp in Brunei Darussalam

Peat swamp forests form the second most dominant forest type in Brunei Darussalam covering around 90,000 ha or 15.6% of the land area. This forest ecosystem is an important habitat for endangered and rare wildlife and reservoir of specialised biodiversity and genetic resources. The forest is also known for its capability to sequester atmospheric carbon, higher than any other natural ecosystems.

The most extensive peat swamp forest is found in the Belait District and is connected with the peat swamps of the Baram Basin across the border in Sarawak (Malaysia). It can also be found in smaller areas around the Tutong lagoon, the lower Tutong River valley (Tanjong Maya), and in the Labu Forest Reserve in Temburong district.

The Brunei peat swamp forest is the least disturbed in north-western Borneo and represents the last remaining stand of undisturbed Alan trees (*Shorea albida*). Apart from Alan, other common tree species of the peat swamp forests include Jelutong Paya (*dyera lowii*), Ramin (*Gonystylus bancanus*), Jongkong (*Dactylocladus stenostachys*), Pulai Paya (*Alstonia pneumatophora & A. spatulata*), Kayu Malam (*Diospyros evena*), Kapur Paya (*Dryobalanops rappa*), Keruntum (*Combretocarpus rotundatus*) and Tulong (*Agathis borneensis*).

Aerial view of the Keruntum Padang forest. One of the common tree species of the peat swamp forest, the Alan trees, is found in the Belait District.

Source: *Ministry of Development, Brunei Darussalam*

Wetlands of International Importance

Many wetlands in the ASEAN region have been designated as Wetlands of International Importance or Ramsar sites. A Ramsar site is identified based on nine criteria listed by the Convention of Wetlands of International Importance (Ramsar Convention)[30]. The Ramsar Convention promotes the wise use of wetlands, defined as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development".

The ASEAN region has 29 Ramsar sites in seven countries (Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand and Viet Nam), covering a total area of 1,320,391 hectares. Thailand has the most Ramsar sites (10), followed by Malaysia (6). Indonesia has the largest area of Ramsar sites, covering a total of 656,510 hectares or about 50 percent of the regional total. The most recent designated Ramsar site is the Lower Kinabatangan-Segama wetlands in Sabah, Malaysia.

Table 4.11: Wetlands of International Importance

Ramsar Site	Date of Designation	Country, Region	Area (ha)
Boeng Chhmar and Associated River System and Floodplain	23/06/99	Cambodia, Kampong Thom Province	28,000
Koh Kapik and Associated Islets	23/06/99	Cambodia, Koh Kong Province	12,000
Middle Stretches of the Mekong River north of Stoeng Treng	23/06/99	Cambodia ,Stoeng Treng	14,600
Berbak	08/04/92	Indonesia, Jambi	162,700
Danau Sentarum	30/08/94	Indonesia, Kalimantan Barat	80,000
Wasur National Park	16/03/06	Indonesia, Papua	413,810
Pulau Kukup	31/01/03	Malaysia, Johor	647
Sungai Pulai	31/01/03	Malaysia, Johor	9,126
Tanjung Piai	31/01/03	Malaysia, Johor	526
Tasek Bera	10/11/94	Malaysia, Pahang	38,446
Kuching Wetlands National Park	08/11/05	Malaysia, Sarawak	6,610
Lower Kinabatangan-Segama Wetlands	28/10/08	Malaysia, Sabah	78,803
Moyingyi Wetland Wildlife Sanctuary	17/11/04	Myanmar, Southern Bago	10,360
Agusan Marsh Wildlife Sanctuary	12/11/99	Philippines, Mindanao	14,836
Naujan Lake National Park	12/11/99	Philippines, Oriental Mindoro	14,568
Olango Island Wildlife Sanctuary	01/07/94	Philippines, Cebu	5,800
Tubbataha Reefs National Marine Park	12/11/99	Philippines, Sulu Sea	33,200
Bung Khong Long Non-Hunting Area	05/07/01	Thailand, Nong Khai Province	2,214
Don Hoi Lot	05/07/01	Thailand, Samut Songkhram Province	87,500
Had Chao Mai National Park, Mu Koh Libong Non-Hunting Area, Trang River Estuaries	14/08/02	Thailand, Trang Province	66,313
Kaper Estuary, Laemson Marine National Park, Kraburi Estuary	14/08/02	Thailand, Ranong Province	122,046
Krabi Estuary	05/07/01	Thailand, Krabi Province	21,299
Kuan Ki Sian of the Thale Noi Non-Hunting Area	13/05/98	Thailand, Songkhla Province	494
Mu Koh Ang Thong National Park	14/08/02	Thailand, Surathani Province	10,200
Nong Bong Kai Non-Hunting Area	05/07/01	Thailand, Chiang Rai Province	434
Pang Nga Bay National Park	14/08/02	Thailand, Pang Nga Province	40,000
Princess Sirindhorn Wildlife Sanctuary (Pru To Daeng Wildlife Sanctuary)	05/07/01	Thailand, Narathiwas Province	20,100
Bau Sau (Crocodile Lake) Wetlands and Seasonal Floodplains	04/08/05	Viet Nam, Dong Nai	13,759
Xuan Thuy Natural Wetland Reserve	20/09/88	Viet Nam, Nam Ha	12,000

Source: *Ramsar Convention website*[31]

Box 4.5: Lower Kinabatangan-Segama Wetlands in Sabah, Malaysia

The Lower Kinabatangan-Segama Wetlands in Sabah was designated as Malaysia's sixth Ramsar site on 28 October 2008. Malaysia's largest Ramsar site, covering 78,803 ha, is located within the largest forest-covered floodplain in Malaysia. The site is a particularly good example of a natural coastal mangrove, consisting of a brackish and peat swamp forest.

The Lower Kinabatangan-Segama Wetlands is of global conservation importance for its rich biodiversity. The site harbours rare, threatened and endangered large mammal species including the world's smallest elephant. It is one of only two known sites in the world inhabited by ten species of primates, four of which are endemic to Borneo. Predominant wetland types found within the site are mangrove and brackish forest (including nipah swamps), peat swamp forest, and wet grasslands on peat, all of which are completely protected within three contiguous protected areas: Trusan Kinabatangan Forest Reserve, Kulamba Wildlife Reserve, and Kuala Maruap and Kuala Segama Forest Reserve. The peat swamp forest within the area is dominated by *Lophopetalum multinervium* (local name: *perupok*), a unique natural peat swamp forest association found only in the eastern part of Sabah. The site protects the largest remaining contiguous block of mangroves in Malaysia.

The site supports 17 species of fauna and 4 species of flora which are listed in Appendix I of the Convention on International Trade in Endangered Species, and in the 2007 IUCN Red List of Threatened Species including the Sumatran Rhinoceros *Dicerorhinus sumatrensis harrisoni* (Bornean subspecies), Borneo Pygmy Elephant *Elephas maximus borneensis* (Bornean sub-species) and Proboscis Monkey *Nasalis larvatus*.

Source: *Ministry of Natural Resources and Environment, Malaysia*

Aerial Photo of Lower Kinabatangan-Segama Wetlands

Coastal and Marine Resources

The ASEAN region has one of the world's richest and most biologically diverse marine resources. Wetland ecosystems like mudflats, mangroves, seagrass beds and coral reefs are also types of coastal and marine resources. With a total coastline of about 173,000 kilometres, the region accounts for about 17 percent of world's total marine fish production[32]. Between 2000 and 2007, the total fisheries and aquaculture production in the region ranged from 17 million metric tonnes to 26 million metric tonnes.

Both coastal and marine resources provide the region's population with a wide range of essential goods and services through fisheries, vast storehouses of biological diversity, and unparalleled commercial and recreational opportunities. The importance of coastal areas in terms of fishery resources, biodiversity conservation, economic growth, tourism, and food security is recognised by all AMS. Coastal vegetation habitats, such as mangrove forests, also serve as buffers to protect the shore line from wind generated storms while at the same time they absorb silt, nutrients, toxic substances and support fisheries, provide construction materials, medicinal plants and a huge range of other produce.

Table 4.12: Total Fisheries Production, 2000 – 2007

Country	2000	2001	2002	2003	2004	2005	2006	2007
	('000 metric tonnes)							
Brunei Darussalam	2.6	1.7	2.2	2.4	3.1	2.9	2.5	2.9
Cambodia	298.8	445.7	424.4	390.7	343.3	426.0	532.7	530.2
Indonesia	5,118.1	5,371.2	5,544.0	5,937.9	6,131.2	6,841.1	7,308.3	8,063.8
Lao PDR	71.3	81.0	93.2	94.7	94.7	104.6	104.9	104.9
Malaysia	1,461.2	1,415.8	1,463.6	1,483.3	1,542.1	1,424.1	1,498.7	1,598.0
Myanmar	1,192.1	1,309.1	1,474.5	1,595.9	1,987.0	2,217.5	2,581.8	2,840.2
Philippines	2,999.8	3,172.5	3,371.8	3,617.6	3,931.5	4,168.4	4,414.3	4,717.5
Singapore	10.5	7.8	7.8	7.1	7.6	7.8	11.7	8.0
Thailand	3,735.3	3,648.1	3,797.1	3,914.1	4,099.6	4,118.5	4,105.8	3,858.8
Viet Nam	2,136.8	2,332.9	2,530.6	2,823.6	3,108.1	3,397.2	3,664.3	4,315.9
TOTAL	**17,026.5**	**17,785.8**	**18,709.2**	**19,867.3**	**21,248.2**	**22,708.1**	**24,225.0**	**26,040.2**

Source: *FAO[33]*
Note: *Total fisheries production includes capture and aquaculture.*

Coral Reefs

The extent of coral reefs in Southeast Asia is about 34 percent of world's total. Coral reefs in the region are widely distributed in Indonesia, the Philippines and Malaysia. As a global centre for tropical marine biodiversity, the region has about 600 hard coral species and more than 1,300 reef-associated fish species[34]. In eastern Indonesia alone, over 1,650 fish species have been recorded[35]. Coral reefs are vital to food security, employment, tourism, pharmaceutical research and shoreline protection. It was estimated that well managed coral reefs in Southeast Asia have a potential economic value of US$ 12.7 billion, which represents more than 40 percent of the estimated global value[36].

Figure 4.5: Coral Reef Distribution in Southeast Asia

Source: *Tun, et al., 2008[37]*

The heavy reliance on marine resources across AMS has resulted in the overexploitation and degradation of many coral reefs, particularly those near major population centres. The main threats include overfishing, destructive fishing practices, and sedimentation and pollution from land-based sources. Human activities threaten an estimated 88 percent of Southeast Asia's coral reefs, jeopardizing their biological and economic value. In addition, dredging, land-filling, mining of sand, discharge of sewage and other activities associated with coastal development threaten about 25 percent of the region's coral reefs. Over 90 percent of the coral reefs in Cambodia, Singapore, the Philippines and Viet Nam were threatened, and over 85 percent of the reefs of Malaysia and Indonesia were threatened as of 2002[38]. The condition of coral reefs in Indonesia and Malaysia continue to show an overall decline although there were slight improvements in the overall reef condition in the Philippines, Singapore and Thailand between 2004 and 2008. During the same period, the overall condition of reefs in Viet Nam may have improved considerably while the condition of Brunei Darussalam's reefs is expected to have remained unchanged. In Cambodia and Myanmar, the status of coral reefs remains largely unrecorded[39].

To safeguard the region's marine and coastal biological resources, Indonesia, Malaysia and the

Philippines from ASEAN, along with Papua New Guinea, the Solomon Islands, and Timor Leste, formed a regional partnership to implement the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security. Another initiative taken by AMS to protect their coastal ecosystems was the Marine Protected Areas (MPAs) scheme. In 2002, the ASEAN environment ministers adopted the ASEAN Criteria for Marine Heritage Areas and Criteria for National Marine Protected Areas for designation and management of existing and new protected areas. The ASEAN Criteria for Marine Heritage Areas contains six main criteria and four additional criteria, while the ASEAN Criteria for national MPAs is broadly classified under five main groups – social, economic, ecological, regional and pragmatic.

Table 4.13: ASEAN Criteria for Marine Heritage Areas

Main Criterion	Description
Ecological Completeness	The site must demonstrate wholesome ecological processes and must have the capability to regenerate with minimal human intervention.
Representativeness	The site embodies the variety of ecosystems or species representing or typical of ASEAN region.
Naturalness	The area must be, for the most part, in a natural condition. It may be a second growth forest or rescued coral reef formation but the natural processes are still going on.
High Conservation Importance	The site is recognised as a site of regional significance for the conservation of important or valuable species, ecosystems or genetic resources. It creates or promotes awareness of the importance of nature, biodiversity and ecological process; it evokes respect for nature whenever people see it. There is a feeling of loss whenever the natural condition is lost.
Legally Gazetted Areas	The site must be identified, defined and designated by law or any legally accepted instrument of the owning country. Its boundaries should be defined and its use should be primarily as a protected area.
Approved Management Plan	The site must have a management plan duly approved by authorities of the AMS.
Additional Criterion	**Description**
Transboundary	The site may play a role in nutrients, materials or support for species (especially migratory ones) to the region as a whole. Both ecological processes and natural resources, which contribute to the maintenance of species or ecosystems, are often beyond national boundaries.
Uniqueness	The site may possess special features that could not be seen in any other site.
High ethno-biological significance	The site may demonstrate harmonious relationships between culture and ecology.
Importance for endangered or precious biodiversity	The site could be habitat of importance for endangered flora and fauna.

The extent of MPAs in the region has been increasing throughout the last decade. In 2007, the total area of MPAs was about 87,778 square kilometres, a 56 percent increase since 1995. The country with the highest number of MPAs is the Philippines, with a total of 339 MPAs. With about 7000 islands, the country's marine environment plays an important role in both food security and tourism. Indonesia (129) and Malaysia (83) also have high numbers of MPAs. The region's largest MPA, also the largest in the Coral Triangle, is the Savu Sea Marine National Park in Sulawesi, Indonesia which covers an area of 35,000 square kilometres, and harbours about 500 species of corals, 14 species of whales and 336 species of fish.

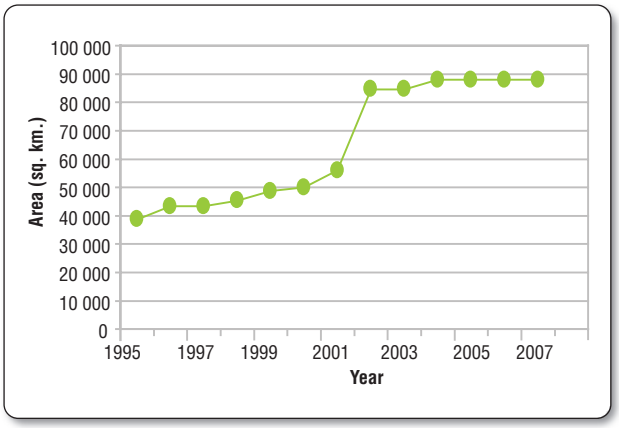
Table 4.14: Marine Protected Areas (as of September 2009)

Country	No. of MPAs
Brunei Darussalam	0*
Cambodia	2
Indonesia	129*#
Malaysia	83
Myanmar	6
Philippines	339
Singapore	2
Thailand	23
Viet Nam	36
TOTAL	**620**

Source: *Reefbase[40] (*updated by AMS)*

Note: *# includes 89 MPAs managed by Ministry of Marine and Fisheries (as of 2008) and 40 MPAs managed by Ministry of Forestry (as of 2007)*

Figure 4.6: Total Extent of Marine Protected Areas in ASEAN, 1995 – 2007



Source: *MDG website[43]*

Box 4.6: Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security

Covering nearly 6 million km^2 of ocean across parts of the seas of 6 countries in the Indo-Pacific – Indonesia, Malaysia, Papua New Guinea, the Philippines, the Solomon Islands, and Timor-Leste – the Coral Triangle contains a myriad life forms.

The Coral Triangle is defined by marine zones containing at least 500 species of reef-building coral – the yellow-shaded area in the map that is roughly triangular in shape. In this massive area, more than half of the world's reefs and 75% of the world's coral species, 40% of the world's coral reef fish species, and 6 of the world's 7 species of marine turtles are found. The Coral Triangle is also part of a wider region that contains 51 of the world's 70 mangrove species and 23 of the 50 seagrass species.

The Coral Triangle supports livelihoods and provides income and food security, particularly for coastal communities. Resources from the area directly sustain more than 120 million people.

The primary human benefits include:

- Direct livelihood, income and food security benefits;
- Major spawning and nursery ground for commercially important tuna species, which supports a multi-billion dollar industry;
- Healthy marine ecosystems contribute to a growing nature-based tourism industry;
- Healthy reef systems and mangroves help to protect coastal communities from storms and tsunamis, reducing casualties, injuries, and reconstruction costs;
- On many of the region's islands, the marine and coastal realm is a foundation for traditional cultures and societal wellbeing.

On 15 May 2009 in Manado, Indonesia, the leaders of the six nations signed the Coral Reef Initiative Leaders' Declaration on Coral Reefs, Fisheries and Food Security, affirming their commitments to protect and to sustainably manage the marine, coastal, and small island ecosystems in the Coral Triangle region.

Source: *Coral Triangle Initiative (CTI) – Regional Plan of Action[41]; CTI – The first stage of a new multilateral partnership[42]*

Threats to Coastal and Marine Resources

Despite action at national, regional and sub-regional levels, coastal and marine areas are continually exposed to environmental stress. Other types of stress to these resources include:

(a) Land-based sources of pollution resulting from transport, tourism and industrial activities including oil spills, discharge of sewage and industrial effluents and sediments
(b) Prawn culture and aquaculture activities along the coastline
(c) Unplanned development activities without a proper coastal zone management plan
(d) Ship and sea-based activities including oil spills, sludge disposal and mining in coastal areas, and
(e) Offshore petroleum and gas exploration – algal blooms, red tides and fish kills are not uncommon in the region. Red tides have been reported in AMS, including the Philippines and off the coast of Sabah, Malaysia.

A relatively new threat is being posed by climate change on the region's coastal and marine environment. In its Fourth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) projected that global sea-levels could rise between 0.18 and 0.59 metre during the 21st century. This could result in inundation of low-lying areas such as the delta of Cambodia and Viet Nam and certain parts of Bangkok, Thailand.

Climate change will also affect the seagrass beds which are found in shallow tidal and sub-tidal coastal marine environments along the ASEAN coastline. Like coral reefs, the seagrass ecosystem harbours entire food chains and themselves serve as food for the dugong, *Dugong dugon*, and several species of turtles like *Chelonia mydas* and fish. In addition, seagrass beds serve as feeding, breeding and nursery grounds for a host of marine life.

According to a study by the University Malaya Maritime Research Centre in 2005, seagrasses also contribute greatly to oxygenation of the seas as well as carbon sequestration, leading to reduction in the effects of global warming[44]. Their role in the oceanic carbon budget is proportionally more significant than expected from their cover or primary production alone, for seagrasses are estimated to contribute 12 percent of the net ecosystem production in the ocean[45].

One of the effects of increased global temperature on seagrasses will be the alteration of growth rates and other physiological functions of the plants themselves[46]. The distribution of seagrasses will shift as a result of increased temperature stress and changes in the patterns of reproduction. The direct effects of sea level rise on the coastal oceans will be increase in water depths, change in tidal variation, alteration in water movement, and increase in seawater intrusion into estuaries and rivers. Should these occur, all existing habitats will experience redistribution. Also, some plant habitats may decline or may be eliminated as a result of increased disease activity under more highly saline conditions. Increased water depth will reduce plant productivity as a result of limited exposure to light.

Several studies have projected that there could be localised decline in dugong population through habitat loss[47,48]. Anthropogenic factors such as coastal development and land use can affect the seagrass beds through terrestrial runoffs. This is observed in countries such as Philippines[49]. Mining and trawling activities or disturbances such as dredging and boat propeller scarring can also directly destroy seagrass beds, adversely affecting prawn fisheries.

Some of the reasons for the slow progress in managing the coastal and marine environment are the lack of irrefutable and clear information about the nature and extent of the problems affecting the coastal and marine environments; legal and institutional complexities; non-involvement of local communities; and weak multi-sectoral cooperation. In line with the overall multifaceted approach to environmental management the whole range of environmental tools – financial incentives, environmental management systems, environmental reporting, and legal instruments – should be promoted and increasingly applied in the region.

Endnotes

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13 Definition by World Health Organisation: Improved drinking water sources are defined in terms of the types of technology and levels of services that are more likely to provide safe water than unimproved technologies. Improved water sources include household connections, public standpipes, boreholes, protected dug wells, protected springs, and rainwater collections. Unimproved water sources are unprotected wells, unprotected springs, vendor-provided water, bottled water (unless water for other uses is available from an improved source) and tanker truck-provided water.

14 United Nations Economic and Social Commission for Asia and the Pacific. (2008). *Statistical Yearbook for Asia and the Pacific 2008*. Available online at www.unescap.org/stat/data/syb2008

15 Definition by World Health Organisation: Improved sanitation facilities are defined in terms of the types of technology and levels of services that are more likely to be sanitary than unimproved technologies. Improved sanitation includes connection to a public sewers, connection to septic systems, pour-flush latrines, simple pit latrines and ventilated improved pit latrines. Not considered as improved sanitation are service or bucket latrines (where excreta is manually removed), public latrines and open latrines.

16 Computed based on 2006 data

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23 Malaysia Environmental Quality Report 2007

24 Viet Nam State of Environment Report 2006

25 The Ramsar Convention uses a broad definition of the types of wetlands covered in its mission, including lakes and rivers, swamps and marshes, wet grasslands and peatland, oases, estuaries, deltas and tidal flats, near-shore marine areas, mangroves and coral reefs, and human-made sites such as fish ponds, rice paddies, reservoirs, and salt pans.

26 FAO. (2007). *The World's Mangroves 1980 – 2005 (FAO Forestry Paper 153)*. Available online at ftp://ftp.fao.org/docrep/fao/010/a1427e/a1427e00.pdf

27 ASEAN. (2007). *ASEAN Peatland Management Strategy*. Jakarta, Indonesia: ASEAN Secretariat.

28 ASEAN. (2005). *ASEAN Peatland Management Initiative*. Jakarta, Indonesia: ASEAN Secretariat.

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30 The Ramsar Convention, or the Convention on Wetlands of International Importance, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Negotiated through the 1960s by countries and non-governmental organisations that

were concerned at the increasing loss and degradation of wetland habitat for migratory waterbirds, the treaty was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975. It is the only global environmental treaty that deals with a particular ecosystem, and the Convention's member countries cover all geographic regions of the planet.

31 Ramsar Convention website (http://www.ramsar.org), accessed August 24, 2009.

32 Computed from FAO Fisheries and Aquaculture Information and Statistics Service – FISHSTAT Plus Universal software for fishery statistical time series (http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp)

33 FAO Fisheries and Aquaculture Information and Statistics Service – FISHSTAT Plus Universal software for fishery statistical time series (http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp)

34 Tun, K., Chou, L. M., Yeemin, T., Phongsuwan, N., Amri, A.Y., Ho, N., et. al. (2008). Status of the Coral Reefs in Southeast Asia. In: Wilkinson, C. (ed.), *Status of Coral Reefs of the World: 2008* (pp. 131 – 144). Townsville, Australia: Global Coral Reef Monitoring Network and Reef and Rainforest Research Center.

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CHAPTER 5
Terrestrial Ecosystems

Ensure ASEAN's rich biological diversity is conserved and sustainably managed toward enhancing social, economic and environmental well-being

Promote the implementation of sustainable management of forest resources in the ASEAN region and eradicating unsustainable practices including combating illegal logging and its associated trade through, amongst others, capacity building, technology transfer, enhancing public awareness and strengthening law enforcement and governance

Roadmap for an ASEAN Community 2009 – 2015

With about 43 percent forest cover compared to the world average of 30 percent, the ASEAN region is one of the most densely forested areas in the world. Brunei Darussalam, Cambodia and Malaysia have more than half their land area covered by forests. Due to the expansion of agriculture and human settlements to provide for the growing population, the region's total forest cover declined at about 1.3 percent per year from 2000 – 2005. However, the deforestation slowed significantly between 2006 and 2007 as indicated by the deforestation rate of 1.1 percent between 2000 and 2007. Viet Nam has increased its forest cover by about 17,000 square kilometres since 2000. New protected areas have been established in Lao PDR, Malaysia, Myanmar Philippines, Thailand and Viet Nam, bringing the region's total to 588,434 square kilometres (or 13.2% of the total land area). The extent of protected areas in AMS such as Cambodia and Thailand is more than 20 percent of their land area.

Although occupying only three percent of the earth's surface, AMS contain over 20 percent of all known plant, animal and marine species. Among these are a large number of species found nowhere else in the world. The region is home to three mega-diverse countries (Indonesia, Malaysia and the Philippines); several bio-geographical units (Malesia, Wallacea, Sundaland, Indo-Burma and the Central Indo-Pacific); and numerous centres of concentration of restricted-range bird, plant and insect species. AMS with high number of recorded species include Malaysia (21,914), Philippines (18,535), Indonesia (17,157) and Viet Nam (16,740). Species endemism in the ASEAN region is high. As of 2008, there were a total of 26,268 endemic species recorded in Southeast Asia. Indonesia, the Philippines and Malaysia have recorded over 7,000 endemic species each.

The region's rich biodiversity is at risk with hundreds of species in AMS being categorised as threatened. The threats include climate change, habitat loss, invasive alien species and illegal wildlife trade. Climate change is predicted to become the dominant driver of biodiversity loss by the end of the century. While the illegal wildlife trade affects all AMS, biodiversity-rich Indonesia, Malaysia and Myanmar are particularly at risk.

ASEAN has initiated and implemented various programmes to protect its terrestrial ecosystems and biodiversity. The ASEAN Heritage Parks Programme, ASEAN-Wildlife Enforcement Network and the tri-country Heart of Borneo Initiative are some of the collaborative efforts undertaken by AMS.

ASEAN FACTS AND FIGURES

Forest Cover	2000: 2,089,742 square kilometres 2007: 1,904,593 square kilometres
Forest to Land Ratio	2000: 46.8% 2007: 42.7% *(World average: 30.3%)*
Highest Forest Cover (2007)	Brunei Darussalam (76.0%), Malaysia (62.4%), Cambodia (55.3%)
Average Annual Forest Loss	Between 2000 and 2005: 1.35% Between 2000 and 2007: 1.11% *(Global average: 0.16%)*
Terrestrial Protected Areas (PA) (2008)	588,434 square kilometres *(13.2% of land area)* Indonesia: 247,269 ha or 42% of ASEAN's total
Mega-diverse Countries	Indonesia, Malaysia, Philippines *(of 17 countries globally)*
Endemic Species (2008)	Amphibians (396), birds (734), butterflies (1,143), dragonflies (139), mammals (380), plants (23,226), reptiles (250)

Forest Resources

The ASEAN region is recognised as one of the world's most heavily forested areas. About 43 percent of the region is covered by forests. Among all the AMS, Brunei Darussalam has the highest forest to land ratio (76% in 2007), followed by Malaysia (62.4% in 2007) and Cambodia (55.3% in 2007).

Over the past decades, forest resources have been steadily declining, with a number of forest areas in the region considered critically threatened. Between 2000 and 2007, the rate of deforestation in the ASEAN region averaged about 1.11 percent per annum, higher than the global average at 0.16 percent. This translates to an annual decrease of about 23,144 square kilometres of forests. At the same time, however, afforestation, reforestation, landscape restoration and natural expansion of forests have significantly reduced the net loss of forest area. In Viet Nam, for example, afforestation initiatives have led to an increase in its forest area by about 2,110 square kilometres annually. This is attributed to the Viet Nam's afforestation policies and the realisation of the Five Million Hectares Reforestation Programme.

The pressure on the region's forests comes from rising populations, increasing agricultural production (including traditional shifting cultivation), logging and mining. Many AMS still rely heavily on timber and agriculture commodities to earn foreign exchange and provide livelihood for their people. Non-timber forest products are of particular importance to the rural communities which rely on the forests for food, medicine and fibre, both for their own consumption as well as to generate income. In addition, illegal logging has long been a problem. There is a lack of resources for effective monitoring and law enforcement. Poaching is another problem which is particularly worrying because it has and continues to cause the "empty forest syndrome" in some areas, whereby forests are bereft of wildlife.

Most AMS have embarked on sustainable management of forest resources. Bearing in mind that sustainable forest management will take years to achieve, each AMS is making steady progress, in terms of policy development, organisational development, capacity building and the implementation of model and visionary programmes.

Table 5.1: Forest Areas, 2000 & 2007

Country	2000		2007		Annual Rate of Change (%)
	Forest Area (km^2)	Forest to Land Ratio (%)	Forest Area (km^2)	Forest to Land Ratio (%)	
Brunei Darussalam	4,430*	77.0	4,380*	76.0	–0.14
Cambodia	115,410	63.8	100,094	55.3	–1.66
Indonesia	978,520	51.8	847,522	44.8	–1.67
Lao PDR	99,332[a]	42.0	96,407[a]	40.7	–0.37
Malaysia	201,600[a]	65.4	196,630[a]	62.4	–0.31
Myanmar	345,540	51.1	312,900*	46.3*	–1.18
Philippines	79,490	26.5	68,472	22.8	–1.73
Singapore	30*	4.3*	30*	4.3*	0.00
Thailand	148,140	28.9	144,024	28.1	–0.35
Viet Nam	117,250	33.2[a]	134,134	38.5[a]	1.80
ASEAN	**2,089,742**	**46.8**	**1,904,593**	**42.7**	**–1.11**
WORLD	**39,886,105**	**30.7**	**39,373,263**	**30.3**	**–0.16**

Source: *ASEAN Centre for Biodiversity, compiled from FAOSTAT ResourceSTAT-Land[1] (*updated by AMS)*
Note: [a] *based on data found in the country's Fourth National Report to the Convention on Biological Diversity*

Box 5.1: Heart of Borneo – Three Countries, One Conservation Vision

Stretching across three countries and 746,000 km^2 of land, the island of Borneo is home to 221 species of mammals, 620 species of birds, 15,000 plant species (of which 35% are endemic) and over 150 species of dipterocarp trees. In a single tree, there can be 1,000 insect species. And that's just a rough estimate. Over the past ten years, more than 400 new species have been found. That's an astonishing 3 discoveries a month. The forests of Borneo are of major global importance for the diversity of its unique array of flora and fauna. The forests are also valued as a prized natural heritage and provide goods and services which are of great importance to the well-being of the locals. The conservation of these forests is therefore a matter of major national and international concern.

Although the governments of the three AMS (Brunei Darussalam, Malaysia and Indonesia) have already taken steps to protect them at the national level, international co-operation is required for effective conservation. The full diversity of tropical forests cannot be maintained if they are reduced to a patchwork within an otherwise man-made landscape. Evidence shows that forest conservation requires the maintenance of large blocks of inter-connected forests, without which there will be adverse effects on the local climate, hydrology and lead to an increase species extinction rates.

A good start has been made, but much remains to be done in the area of transboundary cooperation to ensure that Heart of Borneo becomes a significant global showcase of efforts to mitigate climate change while ensuring natural resource security for participating countries. On 12 February 2007 in Bali, Indonesia, Ministers responsible for forestry from Brunei Darussalam, Indonesia and Malaysia signed the Declaration on the Heart of Borneo Initiative which aims to conserve the Indo-Malayan forests of Southeast Asia on a large scale. The Initiative is under the Three Countries, One Conservation Vision concept.

Source: *WWF Malaysia website*[2]

Protected Areas

The past decade also saw an increase in Protected Area (PA) coverage among AMS. New protected areas were declared in Lao PDR, Philippines, Myanmar, Thailand, Malaysia and Viet Nam, reflecting efforts to contribute to the achievement of the 2010 Convention of Biological Diversity (CBD) target to protect at least 10 percent of the world's major forest types and other ecologically significant habitats. Cambodia and Thailand have PA coverage of over 20 percent of their respective landmass while PA coverage in Brunei Darussalam, Indonesia, Lao PDR and the Philippines was over 10 percent each. PA coverage in Indonesia alone accounts for 42 percent of ASEAN's total. This positive trend highlights increasing attention and recognition by AMS on the importance of conserving biodiversity. However, the effective management of these areas, especially the enforcement of laws to protect the species found in these critical habitats remains a challenge.

The ASEAN Heritage Parks (AHP) Programme is one of ASEAN's responses to the United Nations Millennium Development Goals with respect to reducing the rate of loss of biodiversity. The AHP programme supports and complements national efforts to protect the forests in the ASEAN region.

Table 5.2: Protected Areas as Percentage of Total Land Area

Country	Land Area (km^2)	Total PAs (as of 2008) (km^2)	% of PA to Total Land Area (as of 2008)
Brunei Darussalam	5,765	1,047*	18.2*
Cambodia	181,035	42,592	23.5
Indonesia	1,890,754	247,269	13.1
Lao PDR	236,800	36,992	15.6
Malaysia	330,252	22,178	6.7
Myanmar	676,577	49,456*#	7.3*
Philippines	300,000	54,491	18.2
Singapore	710	34	4.8
Thailand	513,120	108,958	21.2
Viet Nam	329,315	25,417	7.7
ASEAN	**4,464,328**	**588,434**	**13.2**

Source: *ASEAN Centre for Biodiversity, compiled from WDPA database (Fish, Lucy. 2008. Personal communication with UNEP-WCMC GIS Manager on WDPA 2009 pre-release.) *updated by AMS*

Note: *# Protected Area Systems described represent both 3.93% of notified and 3.37% of proposed. Protected areas in Myanmar have not been categorised into International Union for Conservation of Nature (IUCN) classification.*

Table 5.3: Protected Areas (based on IUCN Classification)

Country	Ia Strict Nature Reserve		Ib Wilderness Area		II National Park		III Natural Monument or Feature		IV Habitat/ Species Management Area		V Protected Landscape/ Seascape		VI Protected Area With Sustainable Use of Natural Resources		Total	
	No	Area (km^2)	No	Area (km^2)	No	Area (km^2)	No	Area (km^2)	No	Area (km^2)	No	Area (km^2)	No	Area (km^2)	No	Area (km^2)
Brunei Darussalam	15*	498*			2*	540*					5*	9*			22*	1,047*
Cambodia					7	7,423	1	103	16	30,930	3	97[a]	3	4,040	30	42,592
Indonesia	98	17,123	7	11,069	34	139,987	2	0.42	45	35,939	35	7,744	45	35,407	266	247,269
Lao PDR													23[a]	36,992[a]	23	36,992
Malaysia	163	4,678			71	11,569	2	1.4	17	4,677	7	1,034	3	219	263	22,178
Myanmar[#]															43*[#]	49,456*[#]
Philippines			4	125	53	8,678	4	245	19	23,360	44	9,922	232	12,160	356	54,491
Singapore					4	33	2	1							6	34
Thailand					136	70,992	13	2,031	57	35,935					206	108,958
Viet Nam					30[a]	9,850[a]			11[a]	858[a]	39[a]	2,153[a]	48[a]	12,556[a]	128[a]	25,417
ASEAN	**276**	**22,299**	**11**	**11,194**	**337**	**249,071**	**24**	**2,382**	**165**	**131,700**	**133**	**20,959**	**354**	**101,375**	**1,343^**	**588,434^**

Source: *ASEAN Centre for Biodiversity, compiled from:*
(1) WDPA database (Fish, Lucy. 2008. Personal communication with UNEP-WCMC GIS Manager on WDPA 2009 pre-release.)
(2) [a] Fourth National Report to the Convention on Biological Diversity
**updated by AMS*

Notes: *[#] Total Protected Areas (number and extent) include both notified and proposed. Protected areas in Myanmar have not been categorised into IUCN classification.*
[^] Total ASEAN inclusive of Myanmar's Protected Areas.

Biodiversity

Although occupying only three percent of the earth's surface, the ASEAN region contains over 20 percent of all known plant, animal and marine species. Among these are a large number of endemic species found nowhere else in the world[3]. The 7,000 islands that constitute the Philippines, for

Box 5.2: Top Ten New Species Discovered in 2008

Three of the top 10 new species described in 2008, as voted by the International Institute for Species Exploration at Arizona State University in the United States of America and an international committee of taxonomists – scientists responsible for species exploration and classification – were discovered in Southeast Asia. These were:

Hippocampus satomiae – the smallest known seahorse with a standard length of 13.8 cm and an approximate height of 11.5 mm. This pygmy species was found near Derawan Island off Kalimantan, Indonesia.

Phobaeticus chani – the world's longest insect with an overall length of 56.7 cm. The insect, which resembles a stick, was found in the state of Sabah (Malaysia) in Borneo.

Opisthostoma vermiculum – a snail which represents a unique morphological evolution, with a shell that twists around four axes. It is endemic to a unique limestone habitat in Malaysia.

Opisthostoma vermiculum
(Photo by Reuben Clements)

example, hold the world's fifth highest number of endemic mammals and birds. The high degree of endemism is due to the unique geological history, climate and location of the ASEAN region. The region is home to three mega-diverse countries (Indonesia, Malaysia, and the Philippines); several bio-geographical units (Malesia, Wallacea, Sundaland, Indo-Burma, and the Central Indo-Pacific); and numerous centres of concentration of restricted-range bird, plant, and insect species.

Biodiversity and natural ecosystems contribute significantly to the region's socio-economic growth. They provide goods and ecosystem services to which the well-being of human populations is intimately linked. Loss of biodiversity and ecosystem functioning results in a loss of these ecosystem services with devastating impacts on the livelihood and security of human population, especially the poor.

Box 5.3: Hornbills in Southeast Asia

Hornbills of the family *Bucerotidae* are birds found in tropical and subtropical Africa and Asia. They are omnivorous and feed on fruits and small animals. They are monogamous breeders nesting in natural cavities in trees. Their breeding method involves the female being sealed up inside the nest in a tree hole for the whole nesting cycle.

Of the 54 species found in the world, 23 of these (43%) are found in Southeast Asia. Nineteen species are found only in AMS and the four others are found in non-AMS such as Papua New Guinea, Bangladesh and India. Twelve species are single country endemics whereby nine species are found only in the Philippines and three in Indonesia (Sulawesi and Sumba). The four species of *Tarictic* Hornbills in the Philippines are among the least known of all the hornbills.

Hornbills, which have been called the "farmers of the forest", play a crucial role in the forest ecosystem by dispersing big seeds throughout the forest. A number of species of hornbills are threatened with extinction, mostly insular species with small ranges.

Due to their importance to the ecology of the forest and their endangered status, an international conference, the 5th International Hornbill Conference, was held in Singapore from 22 – 25 March 2009. The objectives of the Conferences were to share new information on the biology and conservation of the birds, to encourage conservation and the development of conservation techniques and to draw attention to the plight of hornbills in the modern world. The conference also highlighted the importance of hornbills to the forest ecology, and their significance as flagship species to promote nature appreciation and conservation.

The four-day workshop made the following observations/recommendations:

- The *Tarictic* Hornbills are an important group that needs further study.
- Habitat, control of poaching and nest sites should be the focus of main management intervention.
- Large tracts of intact forest are required for the survival of the birds. Therefore, protected area management is essential.
- Reserves such as Taman Negara and Gunung Mulu (Malaysia), Gunung Leuser and Bukit Barisan Selatan (Indonesia) which contain large areas of lowland forest are very important for a whole-of-ASEAN approach.
- Where nest sites are lacking (e.g., big trees have been removed), nest boxes can be tested as a supplementary conservation technique.
- Each AMS is conducting conservation projects on hornbills or conservation of their habitat. There is need to share and collaborate using this pool of expertise and experience.

Wreathed Hornbill (Photo by Khoo Boon Keat)

Source: *ASEAN Centre for Biodiversity*

Species Diversity

Southeast Asia is rich in species diversity with thousands of amphibian, bird, mammal, reptile, insect and plant species. Malaysia has the highest number of recorded species diversity with a total of 21,914 species recorded as of 2008. This was followed by Philippines (18,535), Indonesia (17,157), Viet Nam (16,740), and Myanmar (14,387). Across the region, plant species are the most diverse compared to other taxa. Indonesia, Malaysia, Myanmar, the Philippines and Viet Nam have all recorded over 10,000 species of plants. The number of bird species is also high in AMS such as Indonesia (1,666) and Myanmar (1,056).

Endemic Species

Endemism in the ASEAN region is high with a total of 26,268 endemic species recorded in 2008. Indonesia, the Philippines and Malaysia have over 7,000 endemic species each. High species endemism in these AMS is due to their geographical isolation (Indonesia and the Philippines are made up of archipelagic islands and Sabah and Sarawak in Malaysia are located on the island of Borneo). Endemic plant species in all AMS were the highest recorded compared with other taxa. The total endemic species of plants recorded in the ASEAN region is 23,226 species.

Endangered Species

Countries with high diversity of species and endemic species have also the highest number of threatened species recorded, with many categorised as globally endangered. These include Malaysia (1,092 species), Indonesia (976 species) and the Philippines (944 species). As there are more plant species than of other taxa, the number of threatened plant species is also higher. The protection and conservation of endangered species is no small task, and often requires a combination of scientific research, law enforcement, and protected area/habitat management, backed by political will.

Table 5.4: Inventory of Recorded Species (as of 2008)

Country	Amphibians	Birds	Butterflies	Dragonflies	Mammals	Plants	Reptiles	Total
Brunei Darussalam*	62	495	480	9	235	3,955	57	5,293
Cambodia	63[a]	545[a]	38	43	123[a]	2,308[a]	88[a]	3,208
Indonesia	426	1,666	1,104	801	800	11,657	703	17,157
Lao PDR	89	700[a]	532	65	282	412	150	2,230
Malaysia	242[a]	742[a]	1,936[a]	346	450[a]	17,631[a]	567[a]	21,914
Myanmar*	82[a]	1,056[a]	682[a]	244[a]	251[a]	11,800[a]	272[a]	14,387
Philippines*	105	576	939	251	183	16,223	258	18,535
Singapore*	27	376	287	117	58	2,053	102	3,020
Thailand	139	936	1,338	331	269	3,730	401	7,144
Viet Nam	162[a]	840[a]	1,153	158	310[a]	13,800[a]	317[a]	16,740

Source: *ASEAN Centre for Biodiversity (ACB database composed of ARCBC Species Database 2004 and species recently added in the 2007 IUCN Red List of Endangered Species)*

[a] based on data found in the country's Fourth National Report to the Convention on Biological Diversity

**country data updated by AMS*

Table 5.5: Inventory of Recorded Endemic Species (as of 2008)

Country	Amphibians	Birds	Butterflies	Dragonflies	Mammals	Plants	Reptiles	Total
Brunei Darussalam*	0	0	28	0	0	101	0	129
Cambodia	5	0	0	0	0	8	0	13
Indonesia	176	515	340	0	251	7,203	52	8,537
Lao PDR	2	0	7	0	1	41	0	51
Malaysia	64	9	117	0	6	7,136	17	7,349
Myanmar	n.a[a]	4[a]	n.a[a]	n.a[a]	1[a]	8[a]	7[a]	20
Philippines*	84	195	406	139	115	6,286	170	7,395
Singapore*	0	0	0	0	0[a]	7[a]	0	7
Thailand	11	3	41	0	4	1,948	0	2,007
Viet Nam	54	8	204	0	2	488	4	760
ASEAN	**396**	**734**	**1,143**	**139**	**380**	**23,226**	**250**	**26,268**

Source: *ASEAN Centre for Biodiversity (Species Listed in the 2004 ARCBC database)*
[a] based on data found in the country's Fourth National Report to the Convention on Biological Diversity
**country data updated by AMS*
Note: *n.a. – not available at the time of publication*

Table 5.6: Inventory of Recorded Threatened Species (as of 2008)

Country	Mammals	Birds	Reptiles	Amphibians	Molluscs	Other Invertebrates	Plants	Total
Brunei Darussalam	35	21	5	3	0	0	99	163
Cambodia	18[a]	22[a]	18[a]	3[a]	0	67	31	159
Indonesia	183	115	27	33	3	229	386	976
Lao PDR	46	23	11	5	0	3	21	109
Malaysia	70	42	21	47	19	207	686	1,092
Myanmar	39[c]	45[c]	21[c]	n.a[c]	n.a[c]	1[c]	38[c]	144
Philippines*	44	131	27	14	3	199	526	944
Singapore	12	14	4	0	0	161	54	245
Thailand	57	44	22	4	1	179	86	393
Viet Nam	72[b]	53[b]	52[b]	17	0	91	425[b]	710

Source: *ASEAN Centre for Biodiversity, compiled from 2008 IUCN Red List of Endangered Species[4] and Fourth National Reports to CBD:*
[a] Fourth National Report to the Convention on Biological Biodiversity: Cambodia
[b] Fourth National Report to the Convention on Biological Biodiversity: Viet Nam
[c] Fourth National Report to the Convention on Biological Biodiversity: Myanmar
**country data updated by AMS*
Note: *Threatened species include those critically endangered, endangered and vulnerable (based on 2008 IUCN Red List of Endangered Species)*
n.a. – not available at the time of publication

Box 5.4: Conserving the Javan Rhino in Ujong Kulon National Park, Indonesia

The Javan Rhino (*Rhinoceros sondaicus*) is the rarest of the rhino species, and is listed on IUCN's Red List as Critically Endangered. There are approximately 40 – 55 Javan rhinos left on earth, found only in two locations, i.e. Indonesia's Ujong Kulon National Park (approximately 35 – 50 animals) and Viet Nam's Cat Loc Reserve (five animals, and thus likely a non viable population).

Ujung Kulon National Park, located on the western-most tip of the island of Java contains a unique and last remaining remnant of lowland Javan rainforest separated from inhabited areas by a volcano and narrow isthmus. Apart from the Javan rhino, the park is home to numerous other endangered species such as the Javan gibbon and banteng, a species of wild cattle. In 1992, the Park and the Krakatau archipelago were declared Indonesia's first UNESCO World Heritage Site.

Since the establishment of the park, considerable emphasis has been placed on studying and monitoring the rhino population. The total rhino habitat available in Ujong Kulon is probably no more than 30,000 hectares. Rhinos require an average density of about one rhino per 400 hectares. This is relatively high compared to the needs of other large forest herbivores.

Although the rhinos in Ujung Kulon are protected by law, they are still seriously threatened by poaching and human encroachment. Pressure on natural resources is increasing throughout protected areas in Indonesia, including in Ujung Kulon, while financial and organisational support for the park and its staff is being reduced. Management of the natural resources need to be conducted holistically to allow sustainable practices which can provide long-term returns in terms of revenue to the local government.

Rhino Protection Units have been established to prevent poaching in the park. The continuation of this protection, combined with establishing a second population in Indonesia, provides the best possible hope for the species' survival. The feasibility of translocation to establish a new population elsewhere will be assessed, though this idea may be decades from becoming a reality.

Javan rhino in Ujong Kulon
(Photo by Ujong Kulon National Park Authority & WWF Indonesia)

Source: *International Rhino Foundation (updated by Ministry of the Environment, Indonesia)*

Biodiversity In Agro-Ecosystems

Since many AMS are generally agriculture-based societies, agro-ecosystems are critical landscapes for them. The protection of species biodiversity in agro-ecosystems is of equal importance in the conservation of habitats.

There are two established modalities for increasing agricultural production: expansion of existing agricultural areas, or intensification of agricultural productivity of existing production areas. Both have significant impacts on biodiversity. As most of the productive areas suitable for agriculture have already been utilised, expansion of agricultural areas often leads to encroachment of other ecosystems that inevitably cause destruction of natural habitats and biodiversity loss. Agricultural intensification, which involves the adoption of modern farming practices such as mechanisation, the use of chemicals to increase the productive output per hectare of land, and the focus on specific high value crops has introduced a key shift in the fundamental patterns in the intra-species diversity and farming fields of most agro-ecosystems in the region. Such practices have certain negative environmental repercussions on other ecosystem services, such as soil and land degradation, narrowing of agricultural genetic diversity, water pollution and contribution to greenhouse gas emission.

Among these impacts, the threat to agricultural genetic diversity presents the more serious concern for the region. The UN Millennium Ecosystem Assessment report cited that specialisation of plant breeders and the effect of harmonised globalisation of trade are leading to the substantial reduction in the genetic diversity of domesticated animals and plants in the agricultural systems[5]. For instance, livestock production (for meat, milk and eggs) has increasingly been reliant on few high-output breeds that are commonly utilised in industrial production systems. The same case is reported for plant genetic diversity.

Thousands of traditional crop varieties have disappeared through the centuries. While technology facilitates modern societies to store valuable germplasms in gene banks, it is recognised that it is practically impossible to know exactly what and how much traditional varieties of domesticated plants have been lost through the years. Certain indicative examples can be cited to underscore the seriousness of the situation: in South Korea, 74 percent of the most common crop varieties used in 1985 have now been replaced by different crop varieties; in China, of the 10,000 wheat varieties used in 1949 only about 1,000 are being used currently; and in the ASEAN region (Malaysia, the Philippines and Thailand), local varieties of rice, maize and fruits are now replaced by improved varieties that have been genetically enhanced[6]. Unfortunately, this matter has not been given much emphasis in terms of developing policy frameworks that minimise the loss of agricultural genetic resource diversity.

Threats To Biodiversity

Many of the threats to biodiversity are brought about by anthropogenic activities, which resulted in cascading effects on the region's flora and fauna. The observation of the UN Millennium Ecosystem Assessment of 2005 that "changes in biodiversity due to human activities were more rapid in the past 50 years than at any time in human history" can be aptly referred to the ASEAN region[7]. Some of the threats to biodiversity are habitat loss due to deforestation, climate change, poaching to fuel the illegal global wildlife trade, pollution and population growth. While the region prides itself in having mega-diverse countries, it has, as well, four[8] of the world's 34 biodiversity hotspots[9] – areas known to have exceptional levels of endemism of species facing serious loss of habitat.

Conventional assessment of biodiversity loss focused largely on the common services that ecosystems provide – provisioning of food and shelter. The indicators developed are usually based on the area (e.g. how much forests are lost in the case of landscapes) and quantity of species (species richness), which are more relevant for provisioning services. Although these indicators are important and relevant, other equally important services which ecosystems provide such as regulating, supporting and cultural functions need to be accounted for as well. The UN Millennium Ecosystem Assessment Report pointed out that, more often than not, the approach of enhancing one particular service of an ecosystem has a cost to other ecosystem services due to trade-offs. This complex relationship makes it difficult to actually determine the full cost and value of biodiversity loss in the region. Cognisant of this, the CBD advocates the use of the Ecosystem Approach which calls for assessing the state and condition of biodiversity resources and integrating it with other measures such as species variability, function, quantity and distribution. This would lead to a fuller understanding of the role of biodiversity and the implications of its loss to human well-being.

Climate Change

Climate change is likely to become the dominant direct driver of biodiversity loss by the end of the century[10]. Climate change is already forcing biodiversity to adapt either through shifting habitat, changing life cycles, or the development of new physical traits. The Fourth Intergovernmental Panel on Climate Change (IPCC) Assessment Report[11] indicates that up to 30 percent of all known species of the world are likely to be at increased risk of extinction before the end of this century. The IPCC report also predicts that up to 50 percent of the biodiversity of Asia is at risk while as much as 88 percent of reefs may be lost over the next 30 years due to climate change.

Invasive Alien Species

Invasive alien species (IAS) are species whose introduction and/or spread outside their natural distribution, past or present, threaten biological diversity. New environments may or may not have the elements necessary to control IAS, such as predators or competitors. When these are absent and the new habitats are similar enough to their former range, then the species may survive. Their population may then grow to a point where they take over food sources, prey on local species, and, generally begin to affect local biodiversity. Although only a small percentage of alien species become invasive, those that do may have extensive and long-lasting impacts.

Species introduction may be both intentional and unintentional. People may export or import species for trade, and to support agriculture, aquaculture, horticulture, forestry, fisheries and consumption. Some have been used as biological control agents for certain pests, and ironically have themselves become pests. Exotic pets, such as snakes, monkeys and ornamental fish may also have simply been released by their owners. International aid organisations have also brought plants and animals that have turned invasive as part of altruistic intentions to introduce new sources of food to impoverished nations.

In Southeast Asia, examples of IAS include:

- *Mimosa pigra* (Thai – *chi yop, mai yah raap yak, maiyarapton*; Malay – *kembang gajah, semalu gajah*; Bahasa Indonesia – *putri malu*; Vietnamese – *trinh nu nhon, xao ho*) in the Greater Mekong Sub Region has made fertile agricultural lands along the Mekong River unproductive converting agricultural lands into shrub lands that harbour lesser biodiversity, reducing fish production especially fish with no scales and affecting water birds relying on grasslands. In Viet Nam the *Mimosa pigra* caused the decline in the population of Sarus Crane (*Grus antigone*) from 800 individuals in the 1990s to less than 100 in 2003 through outcompeting the Spiked Rush (*Eleocharis sp*), which is the habitat of the Crane. In Cambodia, the potential area for infestation of the plant is 2,100 square kilometres of flood plains suitable for rice production[12].
- Coconut Leaf Eating Beetle (*Brintispa longissima*) damaged the Viet Nam coconut industry causing US$ 3.5 million in losses[13]. The coconut leaf beetle is one of the most damaging pests of coconut and other palms. The larvae and adults of the beetle feed on the soft tissues of the youngest leaf in the throat of the palm. Affected leaves dry up, resulting in stunting of the palm and reduced nut production. Prolonged attacks on young palms can lead to their death[14].
- Janitor Fish (*Pterygoplichthys pardalis* and *P. disjunctivus*) in the Laguna Lake of the Philippines has damaged fish cages and fishing nets such that they have affected the fish production and fish catch of fishermen. It is a predator to some local fishes and a competitor for the local fishes for food[15]. They also damage the riverbanks of important waterways leading to the collapse of the banks.
- Water Hyacinth (*Eichhornia crassipes*) is a floating plant. This invasive nuisance is a very fast growing plant, with populations known to double in as little as 12 days. It is *planta non grata* in much of the world where it often jams rivers and lakes with thousands of tonnes of floating plant matter, and also prevents sunlight and oxygen from reaching the water column and submerged plants. Its shading and crowding of native aquatic plants dramatically reduce biological diversity in aquatic ecosystems[16]. The aquatic ecosystems of Southeast Asia are not spared by this plant.
- The cane toad *Bufo marinus* (Giant Toad, Marine Toad) was introduced as a biological control agent of insect pests in sugar cane and other crops. The toad spread rapidly because it has a wide environmental tolerance, eats almost anything, and has few natural enemies. It is an adaptable animal, capable of fasting for up to six months. The cane toad has had drastic effects on native wildlife. The toads are predators to smaller frogs and toads whose numbers have consequently been reduced, while snakes and birds have been killed when attempting to eat the toad, either by being poisoned or suffocated. The toads are now well established in Japan, Papua New Guinea and the Philippines.
- The golden apple snail *Pomacea canaliculata* is a freshwater snail from South America. It was introduced to Taiwan in 1980, and has since become an invasive pest throughout the ASEAN region. Widely known as the golden kuhol, it was introduced in the Philippines as a high-protein food for both animals and humans. The snail escaped into waterways and has since ravaged rice fields all over the country. The snail feeds on young rice seedlings, with large adults being able to consume up to 25 per day. The invasion of golden apple snail has increased rice production costs, and currently threatens the promotion of direct-seeded rice in rice growing countries. Of the 3 million hectares of rice lands in the Philippines, 1.2 to 1.6 million hectares are infested with golden apple snail. In 1990, 212 million pesos (US$ 4.6 million) were spent to control this pest[17].

- The mosquito fish *Gambusia affinis* was widely distributed for the biological control of mosquito larvae and is now well established in the ASEAN region. They can survive in waters with low oxygen levels, high salinities and temperatures, and have a high breeding rate. They compete with indigenous fish species for zooplankton, and also prey on their eggs and larvae. Studies show that mosquito fish exacerbate rather than alleviate the mosquito problem since they do not eat mosquito larvae and actually reduce the population of species that naturally control mosquito populations.

IAS has major economic costs since they destroy crops, reduce biodiversity, and affect the water supply as they degrade freshwater systems and catchment areas. They drive up pest control costs as pesticides and herbicides have to be used and other long-term management schemes have to be developed to control the spread of IAS. These all have massive direct and indirect financial costs that may run into millions of dollars. In view of its significance, CBD had adopted the IAS as the theme for the 2009 International Day on Biological Diversity.

Illegal Wildlife Trade

Southeast Asia's high biodiversity, increasing affluence and accessible transport links, juxtaposed against generally weak enforcements, low penalties and limited public awareness have resulted in wildlife poaching, trafficking, and consumption of illegal wildlife parts and products.

The illegal wildlife trade affects all AMS. The rich bio-diversities of Indonesia, Malaysia and Myanmar are particularly targeted. Smugglers are frequently caught utilizing transport links through Thailand and Viet Nam. However, poaching, transit and consumption occurs in all countries to varying degrees. A significant proportion of wildlife trafficked through Southeast Asia is purchased by wealthy consumers outside the region, in China, Europe and the United States.

Box 5.5: ASEAN Wildlife Enforcement Network

The ASEAN Ministers responsible for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) officially launched the ASEAN Wildlife Enforcement Network (ASEAN-WEN), and endorsed the ASEAN Regional Action Plan on Trade in Wild Fauna and Flora 2005 – 2010 in December 2005. ASEAN-WEN is the world's largest wildlife law enforcement network that involves police, customs and environment agencies of all 10 AMS. ASEAN-WEN receives support from the United States Agency for International Development and United States Department of State, as well as in-kind donations from AMS.

The initiative aims to address illegal exploitation and trade in CITES-listed species within the ASEAN region by improving wildlife trade legislation, law enforcement networking and enabling more science-based decision making and information sharing through national and regional co-operation between enforcement agencies. In the long-term, ASEAN-WEN aims to encourage more prosecutions, maintain political will for the initiative and increase awareness among the public and law enforcement officers.

Through annual meetings, workshops and training, ASEAN-WEN facilitates increased capacity and better coordination and collaboration of law enforcement agencies among AMS, regionally and globally. Links with enforcement agencies in China, USA, the European Union and Australia and with the Secretariats of ASEAN and CITES, Interpol and the World Customs Organisation have broadened the Network's reach.

Along with an increase in ASEAN-WEN's visibility, the region has also experienced a recent increase in wildlife law enforcement actions. In January 2008, the Thai Navy seized one shipment of 275 pangolins, 6 tigers, 4 leopards and one clouded leopard along the Mekong River. Vietnamese authorities seized over 6 tonnes of pangolins the following month and 17 tonnes in March, 2008, instigating a cross-border investigation that led to the seizure of a further 14 tonnes in July 2008 in Indonesia.

In the second half of 2008, over 25,375 live animals were rescued, over 4.5 tonnes of carcasses were seized, and more than 100 related arrests made in Southeast Asia, according to media and government reports. Thirty major hauls of protected wildlife were reported during this period, almost doubling the 16 reported for the same period in 2007.

Almost all wild species including illegally cut timber, birds, reptiles, and mammals are traded in the ASEAN region. The pangolin is the most heavily traded mammal. ASEAN Wildlife Enforcement Network (ASEAN-WEN) estimates that 13,000 metric tonnes of turtles are shipped into China every year from the ASEAN region, where approximately three-quarters of freshwater turtle species are now considered threatened. Illegal wildlife traders have also exported snakes in large numbers to China from Viet Nam, resulting in the explosion of local rat population which then affected crop production. Illegal wildlife trade will result in massive and irrevocable biodiversity loss if left unchecked. ASEAN-WEN states that "if trends continue, scientists predict 13 to 42 percent of the ASEAN region's animal and plant species could be wiped out this century. At least half of those losses would represent global extinctions."

A World Bank-funded study[18] "What's driving the Wildlife Trade?" highlighted that the illegal trade and exploitation of wild animals and plants are having devastating effects on the ASEAN region's biodiversity. "There has been a drastic decline in the populations of many wildlife species with high commercial value, many of which are now rare, endangered or locally extinct – such as the Tiger, Sumatran rhinoceros, Javan rhinoceros, Asian elephant, pangolins, freshwater turtles and tortoises, agar wood and numerous wild orchid species," the study stated.

Endnotes

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8 **Indo-Burma** – Covers the Lower Mekong catchment, eastern Bangladesh, and extends across north-eastern India, encompasses nearly all of Myanmar, part of southern and western Yunnan Province in China, all of the Lao People's Democratic Republic, Cambodia and Viet Nam, the vast majority of Thailand, and a small part of Peninsular Malaysia. The hotspot also covers the coastal lowlands of southern China and several offshore islands.

Philippines – The only country in the ASEAN region identified as a biodiversity hotspot. Geological movements, tropical weather and once extensive forest cover of the country have developed high species diversity in some groups of organisms with a very high level of endemism. There are five major and at least five minor centres of endemism, from Luzon (with at least 31 endemic mammal species) to tiny Camiguin Island (at least two endemic mammal species). The Philippines has among the highest rates of discovery in the world with 16 new species of mammals discovered in the last 10 years.

Sundaland – The Sundaland hotspot covers the western half of the Indo-Malayan archipelago, and is dominated by Borneo and Sumatra. It is bordered by three hotspots: Indo-Burma on the northwest, Wallacea on the east, and the Philippines on the northeast.

Wallacea – Wallacea encompasses the central islands of Indonesia east of Java, Bali, and Borneo, and west of the province of New Guinea, and the whole of Timor Leste. The hotspot occupies a total land area of 338,494 km_ including the large island of Sulawesi, the Moluccas, and the Lesser Sundas.

9 To qualify as a hotspot, a region must meet two strict criteria: it must contain at least 1,500 species of vascular plants (> 0.5 percent of the world's total) as endemics, and it has to have lost at least 70 percent of its original habitat; Source: Conservation International, http://www.conservation.org/explore/priority_areas/hotspots/Pages/hotspots_defined.aspx, accessed July 4, 2009.

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CHAPTER 6
Atmosphere

Prevent transboundary 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

Enhance regional and international cooperation to address the issue of climate change and its impacts on socio-economic development, health and the environment, in ASEAN member states through implementation of mitigation and adaptation measures, based on the principles of equity, flexibility, effectiveness, common but differentiated responsibilities, and respective capabilities as well as reflecting on different social and economic conditions

Roadmap for an ASEAN Community 2009 – 2015

The rapid rise in population (projected to increase from 580 million in 2008 to 650 million in 2020), increasing urbanisation, and industrial activities means that managing air quality will remain a major challenge to AMS in the years to come. The transportation and the industrial sectors are the two major contributors to air pollution in ASEAN.

Singapore and Brunei Darussalam reported good air quality for over 95 percent of days in 2008. Indonesia, Malaysia and Thailand had more variable air quality but the number of days of unhealthy air quality was very low. Key air pollutants have also been declining – for example SO_2 in Malaysia and PM_{10} in Bangkok, Thailand and in Manila, the Philippines – due to air pollution control measures undertaken.

AMS are putting in new policies and programmes in place to improve air quality. The introduction of new regulations and stricter standards, cleaner fuels, green vehicles, improving public transportation, and promoting renewable energy are amongst measures being implemented in the region. AMS have also strengthened their air quality monitoring networks – there are now 177 air quality monitoring stations throughout ASEAN.

Transboundary smoke haze remains a recurring challenge for ASEAN especially during the dry El Niño periods when there is a spike in fires indicated by hotspot activities. Borneo and Sumatra had a decrease in hotspot activities between 2006 and 2008 due to the mitigation and preventive actions taken to suppress wildfires and the favourable wet conditions. Apart from region-wide actions to address land and forest fires through the ASEAN Agreement on Transboundary Haze Pollution, sub-regional concrete on-the-ground actions are also being undertaken in the Mekong and southern region of ASEAN, and through bilateral initiatives by Malaysia and Singapore with Indonesia.

Climate change is already affecting the region through more intense and frequent heat waves, droughts, floods, and tropical cyclones. It is expected to become even severe as a large proportion of the population and economic activity is concentrated along coastlines; the region is heavily reliant on agriculture for livelihoods; there is a high dependence on natural resources and forestry; and the level of poverty remains high making the people more vulnerable to these hazards. The mean temperature in the region increased by 0.1 to 0.3 degree Celsius per decade between 1951 and 2000; rainfall trended downward during 1960 to 2000; and sea levels have risen 1 to 3 millimetres per year. There is only so much AMS as developing countries and low greenhouse gas emitters could do as the problem essentially originated from outside the region, and the need to strike the balance between economic growth, social development and environmental protection. Even so, AMS are taking concrete actions within their capacity to address climate change, while calling on all parties to act immediately based on the principle of common but differentiated responsibility and respective capabilities.

ASEAN FACTS AND FIGURES

Air Quality *(in selected countries/cities-number of days)*:	Good	Moderate	Unhealthy	No data
Brunei Darussalam (2008)	366	0	0	0
Indonesia (2007)				
Jakarta	72	239	49	5
Palangkaraya	349	3	0	13
Surabaya	62	282	7	14
Malaysia (2008)	216	146	4	0
Singapore (2008)	353	13	0	0
Thailand (2007)	141	197	27	0

Number of Ambient Air Quality Monitoring Stations	BRU	MAL	MYA	PHI	SIN	THA	VIE
	5	51	3	37	11	52	18

Annual Cumulative Hotspot Counts *(incidence of fires)*	2006	2007	2008	2009 *(up to August)*
Sumatra	14,437	9,339	10,977	11,215
Peninsular Malaysia	299	587	632	758
Borneo	18,191	10,031	8,156	10,880
Cambodia, Lao PDR and Viet Nam	20,380	35,500	36,971	35,507
Myanmar	18,751	33,468	27,740	33,927
Thailand	8,578	14,696	13,654	12,936

Air Quality

The increasing urban and industrial activities in the ASEAN region, if not managed well, have the potential to adversely affect the region's atmosphere. The earth's atmosphere is crucial to sustain life on the land and in the oceans. The atmosphere also protects earth's life forms from harmful radiation and cosmic debris while playing an important role in the hydrological cycle. Since the beginning of the Industrial Revolution about 200 years ago, human activities have been impacting the atmosphere through the release of increased levels of greenhouse gases (GHGs), such as carbon dioxide (CO_2), methane and nitrous oxide (NO_x). The rapid rise in population and industrial activities means that managing air quality will be a major challenge to AMS in the years to come.

One of the most acute air quality problems faced by the ASEAN region is haze pollution, caused by uncontrolled land and forest fires. Fires are traditionally used to clear forests for the cultivation of plantation crops and for small scale subsistence agricultural activities by farmers during the dry season. The severity of fires is compounded by occurrences of El Niño which brings about drier weather conditions to the region. In 2006, the region experienced a severe episode of land and forest fires with smoke haze pollution affecting Indonesia, Malaysia, Brunei Darussalam, Singapore and the southern parts of Thailand, resulting in major health problems as well as massive economic losses. AMS have committed themselves to implementing concrete preventive, monitoring and mitigation measures under the ASEAN Agreement on Transboundary Haze Pollution.

Status of Air Quality

The current trends in energy use, urbanisation and development, and population growth in the region continue to alter the quality of air and ultimately the climate. The changing air quality will inevitably affect health, and water and food sufficiency. As explained in Chapter 2, the total

population in the ASEAN region has increased from approximately 450 million people in 1990 to 580 million at present. It is expected to grow to 650 million by 2020.

In Indonesia, the air quality is monitored in several locations throughout the country. Monitoring results show that there were 49 unhealthy days in Jakarta in 2007, 18 days in Medan, and 7 days in Surabaya. Data from other air quality monitoring sites also show that nitrogen dioxide (NO_2) concentration is relatively high (up to 30 parts per million) in the crowded cities[1], mainly due to large number of motor vehicles.

Table 6.1: Air Quality Status in Selected Cities in Indonesia, 2007

No	City/Town	Air Quality Status (no. of days)						
		Good	Moderate	Unhealthy	Very Unhealthy	Dangerous	No Data	Total Days
1	Jakarta	72	239	49	0	0	5	365
2	Bandung	0	0	0	0	0	365	365
3	Denpasar	0	0	0	0	0	365	365
4	Medan	2	55	18	1	2	287	365
5	Pekanbaru	8	1	0	0	0	356	365
6	Pontianak	4	0	0	0	0	361	365
7	Palangkaraya	349	3	0	0	0	13	365
8	Semarang	14	20	0	0	0	331	365
9	Surabaya	62	282	7	0	0	14	365
10	Jambi	0	0	0	0	0	365	365

Source: *Indonesia State of Environment Report 2007*

The number of vehicles in Indonesia had more than doubled from 10.2 million in 1992 to 35.0 million in 2005. 70.5 percent were motorcycles. Air pollution costs the Indonesian economy at least $ 400 million every year and this could increase ten-fold by 2010 in the absence of pollution control. Indonesia also has a large and diverse industrial sector that includes food, chemical, petroleum, coal, rubber, and plastic products. Except for large-scale facilities such as power plants, glass factories, and steel smelting factories, the majority of point source emissions come from boilers, generators, diesel engines, gas turbines, dryers, and incinerators[2]. Other significant sources of air pollution come from industries like food and beverages, paper and paper products, and textile and clothing apparel.

In Brunei Darussalam, the air quality was classified as good throughout 2008. However the annual average concentration levels of ambient PM_{10} (particulate matter smaller than 10 micrometres) increased from 12.3 microgram per cubic metre in 2006 to 18.1 microgram per cubic metre in 2008 – values which are, however, still below the national standard of 50 microgram per cubic metre.

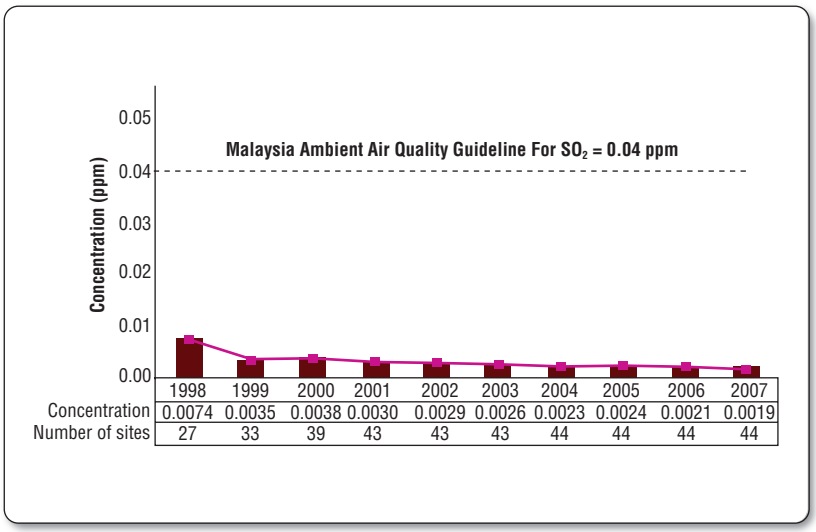
Table 6.2: Air Quality Status in Selected AMS

Country	Year	Air Quality Status (no. of days)		
		Good	Moderate	Unhealthy
Brunei Darussalam[a]	2008	366	0	0
Malaysia[b]	2008	216	146	4
Singapore[c]	2008	353	13	0
Thailand[d]	2007	141	197	27

Source: *[a] Ministry of Development, Brunei Darussalam*
[b] Department of Environment, Malaysia
[c] Ministry of the Environment and Water Resources, Singapore
[d] Pollution Control Department, Thailand

In 2008, Malaysia experienced 216 days of good air quality, 146 days of moderate air quality and 4 days of unhealthy air quality. The annual average sulphur dioxide (SO_2) concentration has been decreasing since 1998; average SO_2 concentration in 2007 was about 0.0019 parts per

Figure 6.1: Average SO_2 Concentration in Malaysia, 1998 – 2007



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Concentration	0.0074	0.0035	0.0038	0.0030	0.0029	0.0026	0.0023	0.0024	0.0021	0.0019
Number of sites	27	33	39	43	43	43	44	44	44	44

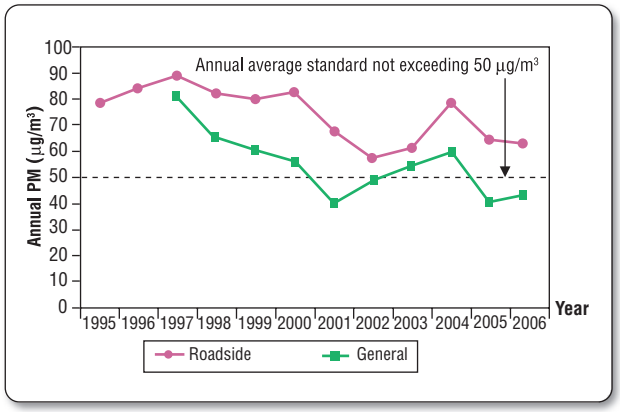
Source: *Malaysia Environmental Quality Report 2007*

million compared to about 0.0074 parts per million in 1998. The annual average concentration levels of ambient PM_{10} from 2000 to 2008 was generally within the Malaysian Recommended Ambient Air Quality Guidelines for PM_{10}[3].

In Malaysia, the transport sector accounted for most of the NO_x emissions and about 35 percent of total particulate matter (PM) emission in the country. The power sector and industries accounted for most of the SO_2 and PM emissions; the power sector accounted for about 60 percent of the total SO_2 emissions and almost 50 percent of total PM emissions, while the industries accounted for about 20 percent of total SO_2 and PM emissions[4].

Thailand recorded 141 days of good air quality, 197 days of moderate air quality and 27 days of unhealthy air quality in 2007. In Bangkok, transportation is the greatest source of air pollution. The number of vehicles in the city had increased from 600,000 in 1980 to more than 5 million by the end of 2007. Some of the air pollutants of concern in Bangkok include particulate matter, carbon monoxide (CO), SO_2 and NO_2[5]. The average concentration of ambient PM_{10} from 1995 to 2006 fluctuated annually, but on average exceeded the national standard of 50 microgram per cubic metre. However, the PM_{10} data showed a decreasing trend indicating an improvement in air quality over the years due to several pollution control measures undertaken by the city.

Figure 6.2: Annual Average PM_{10} in Bangkok, 1995 – 2006



Source: *Thailand State of Pollution Report 2006*

In the Philippines, the annual average PM_{10} between 2001 and 2007 was relatively high in three sites in Metro Manila, namely ADMU (Ateneo de Manila University), Poveda and Valenzuela, although the levels of PM_{10} did not exceed the national standard, which is 60 microgram per cubic metre. At ADMU, the annual average PM_{10} decreased from 50.4 microgram per cubic metre in 2001 to 45.7 microgram per cubic metre in 2007 while the other two sites, Poveda and Valenzuela, showed fluctuating trends. Based on the 2006 National Emission Inventory, the transportation sector was the major source of air pollution in most regions. It was estimated that 65 percent of the pollutants came from mobile sources, 21 percent from stationary sources, and the remaining 14 percent from area sources. The fastest average annual increase in vehicles has been motorcycles/tricycles (10.77%), most of which have

Table 6.3: Annual Average PM_{10} at Three Locations in the Philippines, 2001 – 2007

Country/City	National Standard	2001	2002	2003	2004	2005	2006	2007
		($\mu g/m^3$)						
• ADMU	60 $\mu g/m^3$	50.4	50.3	44.0	47.0	49.5	42.5	45.7
• Poveda		–	36.4	44.8	42.6	52.2	51.6	43.3
• Valenzuela		–	–	–	45.7	58.5	64.0	52.8

Source: *Philippines' National Air Quality Status Report 2006 – 2007*
Note: *'–' no data*

two-stroke engines. Between the years of 2003 and 2007, the monitoring results of total suspended particulates (TSP) showed a 33 percent improvement with concentrations decreasing from 144 to 97 microgram per cubic metre. Although the TSP levels are decreasing, the mean concentrations are still above the 90 microgram per cubic metre guideline value for the country[6].

In 2008, Singapore had 353 days of good air quality and 13 days of moderate air quality. Singapore's ambient air quality meets the United States Environmental Protection Agency (USEPA) standards except for $PM_{2.5}$ (particulate matter smaller than 2.5 micrometres). Diesel vehicles contribute about 50 percent of $PM_{2.5}$ in Singapore. Through various policy measures that would help reduce emissions from diesel vehicles, Singapore aims to achieve an annual $PM_{2.5}$ average of 12 microgram per cubic metre by 2020.

From 1st December 2005, the quality of diesel sold in Singapore had been controlled to contain 0.005% or lower Sulphur (by weight). This was to pave the way for the implementation of the more stringent Euro IV emission standard for all new diesel-powered motor vehicles which came in to force on 1st October 2006. Besides controlling the fuel quality and tightening emission standards, the government had also replaced the free acceleration smoke test with the chassis dynamometer smoke test (CDST), which all diesel-powered motor vehicles are required to undergo during the mandatory periodic roadworthiness test. The CDST is a more rigorous method that measures the smoke emission of diesel-powered vehicles under simulated driving conditions. The government also encourages the use of green vehicles, which are less polluting than conventional petrol and diesel-driven vehicles. Green Vehicle Rebates were first introduced in January 2001 for electric and hybrid vehicles, and extended to Compressed Natural Gas (CNG) vehicles in October 2001. However, the initial take-up was modest, with 198 green vehicles on the road as of end 2005. The scheme has since been enhanced (with the rebate off the Additional Registration Fee doubled to 40 percent of the Open Market Value for passenger cars and taxis from January 2006). By end of 2008, there were a total of 5,443 green vehicles on Singapore's roads (1,999 hybrid cars, 3,443 CNG vehicles and 1 electric car). The Government has also announced that the Green Vehicle Rebate Scheme will be further extended to 2011[7].

In Viet Nam, the transportation and industrial sectors are the major sources of urban air pollution. The transportation sector contributes about 70 percent of the urban air pollution. Among other sources of air pollutants monitored nationwide (i.e. including rural regions), the transport sector emits around 85 percent of CO and 95 percent of volatile organic compounds (VOCs). With regard to NO_2 emissions, the transportation and industrial sectors contribute approximately equal amounts, whereas industry is the major source of SO_2. Road transportation is the most important source of air pollution in urban areas in terms of CO, NO_x, hydrocarbons, VOCs, lead (Pb) and $PM_{2.5}$. Motorbikes are the major source of emissions of CO, hydrocarbons, and VOCs, whereas SO_2 and NO_x are mainly emitted by trucks. Between 2004 and 2006, total SO_2 concentrations from 5 to 6 monitoring sites[8] decreased from 160 microgram per cubic metre to 100 microgram per cubic metre. The annual average concentration of ambient PM_{10} between 2003 and 2006 for Ho Chi Minh City (75 – 88 microgram per cubic metre) exceeded the national standard of 50 microgram per cubic metre[9].

Air Quality Management

AMS have initiated various programmes and policies to manage air quality. AMS have also introduced air pollution control laws as well as extensive air quality monitoring programmes. As a further measure to prevent deterioration of the ambient air quality, most AMS have already phased out the use of leaded gasoline.

Table 6.4: Phase Out of Leaded Gasoline

Country	Introduced	Completed
Brunei Darussalam	1993	2000
Cambodia	–	–
Indonesia	2001*	2006*
Lao PDR	–	–
Malaysia	1991	1998
Myanmar	–	–
Philippines	1993	2001
Singapore	1991	1998
Thailand	1991	1996
Viet Nam	2000	2001*

Source: *ASEAN Secretariat (*updated by AMS)*
Note: *'–' not available at the time of publication*

In Cambodia, government efforts are focused on promoting renewable energy and cleaner and efficient energy technology (combined cycle gas turbine, hydropower, etc) in an effort to improve air quality.

In Lao PDR, renewable sources of energy play an important role in the country's economy, as about 80 percent of all energy is based upon renewable sources (68% is biomass and 12% is electricity which is predominantly from hydro-power)[10]. The traditional sources of energy, such as fuel wood, charcoal and other biomass residues (e.g. saw dust, rice husks) are still important. There is an encouraging sign of the country's decreasing dependence on fossil fuel. This decrease was facilitated by the increase in the use of biomass and hydropower. The share of hydropower in the total energy consumption is expected to increase further, as the country embarks on accelerated development of its abundant hydropower resources.

In Bangkok, Thailand, various efforts have been taken to reduce emissions from the transport sector. Some examples include setting up inspection points for black smoke-emitted vehicles, organising the Pollution Free Road campaign, promoting the use of cleaner fuel and improving fuel quality. Thailand has also taken the lead in promoting renewable energy through the organisation of various exhibitions on renewable energy and environmental technology which aims to further promote plans for renewable energy to replace fossil fuel sources as soon as possible. Various international exhibitions on renewable energy have been held in the country and the latest, called the International Exhibition of Environmental Protection and Pollution Control Technology was held in June 2009. Thailand also intends to take lead in International Dialogue on Biofuels. One of the national strategies on renewable energy is to promote the ethanol industry and make Thailand the Ethanol Hub of Asia.

In Singapore, the National Environment Agency (NEA) monitors air quality and pollution in the country. NEA evaluates all proposed industrial developments to make sure that they do not pollute. Through careful land-use planning, polluting industries are sited away from residential and water catchment areas. Regulations are stringently enforced to ensure that industries implement proper measures to manage air pollution. The agency regularly monitors the ambient air quality and looks out for potential air pollution incidents. NEA also regulates exhaust emissions from motor vehicles.

In Singapore, a range of measures is currently being undertaken to control $PM_{2.5}$ emissions from diesel vehicles including[11]:

(a) Adoption of stringent Euro IV exhausts emission standards for new diesel vehicles effective 1st October 2006
(b) Introduction of ultra low sulphur diesel effective 1st December 2005
(c) Use of chassis dynamometer smoke test for periodic mandatory inspection of diesel vehicles by vehicle inspection centres effective 1st January 2007
(d) Enforcement against smoky vehicles by the NEA

Since January 2001, all petrol- and diesel-driven vehicles were required to comply with the Euro II (European Commission [EC] Directive 96/69/EC) exhaust emission standards. From 1st July 2003, all motorcycles/scooters were required to comply with the exhaust emission standard as specified in EC Directive 97/24/EC before they can be registered for use in Singapore. From 1st October 2006, all new diesel-driven vehicles must comply with the more stringent Euro IV exhaust emission standard as specified in EC Directive 98/69/EC for passenger cars and light commercial vehicles with maximum laden weight (MLW) of 3,500 kilogramme or less, and EC Directive 1999/96/EC for heavy vehicles with MLW of more than 3,500 kilogramme before these vehicles can be registered for use in Singapore[12].

In addition to emission standards, all vehicles are subject to mandatory periodic inspections to ensure their compliance. The NEA takes stringent enforcement actions against smoky vehicles. The Environmental Protection and Management (Vehicular Emissions) Regulations stipulates that it is an offence for any person to use or permit the use of any smoky vehicle on the road. It is the responsibility of every vehicle owner to ensure that the vehicle is in good condition before using it on the road.

In general, Singapore manages its air quality through integrating air quality management agenda into other urban sector and national economic concerns. Their stringent controls on emissions and regulatory measures to address the different sources of pollution have been effective in maintaining air quality at an acceptable level, with Pollutant Standards Index (PSI) readings in the good range for most of the year.

Table 6.5: Air Quality Management in Selected AMS

Country	Progress
Brunei Darussalam	Brunei will soon set up additional network for air quality monitoring and roadside air monitoring stations under the National Development Plan 2007 – 2012. The stations will monitor PM_{10}, $PM_{2.5}$, O_3, SO_x, NO_x, CO and CO_2.
Indonesia	Leaded gasoline has been phased out. From 2007, all new gasoline vehicles and motorcycles sold in Indonesia have to comply with Euro II standards. The Department of Transportation has distributed more than 2,000 gas converter kits since 2006 to taxi and public microbus operators in cities where CNG supply is available. The incentive is to promote the shift of high usage public vehicles from gasoline to gas, and stimulate the demand of gas in the transport sector. Under the Blue Sky Programme, The Ministry of Environment recently launched the “Blue Sky Cities Award” in 2007 to promote clean air in Indonesian cities. The evaluation criteria for the Award included ambient air quality, vehicle exhaust emissions, and transport management system. Denpasar, Surabaya, Central Jakarta, Makassar and Yogyakarta were named winners of the Award in 2007.
Malaysia	The Environmental Quality (Control of Petrol and Diesel Properties) Regulations 2007 was enacted to improve the quality of petrol and diesel marketed in Malaysia particularly the reduction of sulphur content from 1,500 parts per million (ppm) and 3,000 ppm in petrol and diesel respectively to 500 ppm. In 2007 selected industries have been instructed to install continuous emission monitoring system. To assist the industries, 2 sets of guidelines were published; Volume 1 Guidelines for the Installation and Maintenance of Continuous Emission Monitoring System for Industrial Premises/Facilities and Volume 2 Guidelines for Continuous Emission Monitoring System – Data Interface System for Industrial Premises/Facilities. The Environmental Quality (Clean Air) Regulations 1978, the Environmental Quality (Control of Emission from Petrol Engines) Regulations 1996 and the Environmental Quality (Control of Emission from Diesel Engines) Regulations 1996 are being reviewed, among others to amend emission standards for both stationary and mobile sources taking into account current technological developments. A Clean Air Action Plan is also being formulated to improve air quality from all sectors.

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Country	Progress
Myanmar	The Government has initiated plans to use CNG in place of petrol and diesel in the short term and bio-fuel in the long term. The Government has planned to convert 100,000 petrol and 150,000 diesel vehicles to CNG vehicles and provide loans to the owners for the purchase of conversion kits. The Government has initiated the *Jatropha curcus* plantation in 2004 for cleaner fuel. Sugarcane planting for fuel production was initiated in 2005.
Philippines	The Government has enacted the Republic Act No. 9367 otherwise known as the "Bio-fuels Act of 2006". The Bio-fuels Act of 2006 was ratified on 29th November 2006 which mandates a minimum 1% bio-diesel blend and 5% bio-ethanol blend by volume in all diesel and gasoline fuels, respectively, being distributed and sold in the country. President Arroyo signed the Bill into law on 12th January 2007. The Department of Energy is implementing a long-term Alternative Fuels Programme to: (1) reduce the country's dependence on imported oil; and (2) provide cheaper and more environment-friendly alternatives to fossil fuels. The goal is to develop indigenous and renewable energy fuels for long-term energy security, which will be a pillar for the country's sustainable growth. The four major sub-programmes are: Bio-diesel Programme, Bio-ethanol Programme, Natural Gas Vehicle Programme for Public Transport and Auto-gas Programme. Other technologies advocated under the programme are hybrid, fuel cell, hydrogen and electric vehicles. In July 2007, the Department of Environment and Natural Resources issued the "Guidelines on the Requirements for Continuous Emission Monitoring Systems and other Accepted Protocols, Thereby Modifying and Clarifying Certain Provisions of Section 5, Rule X of DAO 2000-81 and other Related Provisions" (DAO 2007-22).
Singapore	The Ministry of the Environment and Water Resources (MEWR) has applied the more stringent Euro IV emission standards for new diesel vehicles since October 2006. The more stringent Chassis Dynamometer Smoke Test replaced the Free Acceleration Smoke Test from January 2007 for mandatory periodic inspections of diesel vehicles. In addition, MEWR has also been promoting clean vehicle technologies through incentives such as the Green Vehicle Rebate scheme.
Thailand	Pollution Control Department (PCD) formulated the Air Quality and Noise Management Master Plan (2005 – 2016). The National Environment Board issued significant notifications on air quality standard of NO_2 and control standards of polluted air, as well as noise standards during 2007 – 2008 to improve air quality and reduce noise pollution.
Viet Nam	Between 2001 and 2006, the Government issued three decrees regulating the age limits of cars, buses and trucks. In the past three years, 44,500 old vehicles have been excluded from use. This has contributed significantly to the reduction of air pollution. Roadmap for Application of Emission Standards to Road Motor Vehicles was approved by the Prime Minister in 2005. According to this Roadmap, EURO II is applied to second-hand automobiles imported into Viet Nam from July 2006 and for all domestically produced or imported automobiles from July 2007. By the year 2025, all vehicles in Viet Nam will be required to satisfy EURO V standards. In 2005, four national air quality standards, namely ambient air quality, maximum permitted levels of some toxic gases in ambient air, permitted levels of particulate, organic, and inorganic matter in industrial emissions, were promulgated.

Box 6.1: Car Free Day in Indonesia

The Car Free Day programme in Indonesia, which first started in 2002 in Jakarta, aims to improve air quality in major cities. The programme prohibits motorised vehicles from entering certain streets/roads in the city of Jakarta.

To further promote the awareness programme, the Jakarta's government in 2005 issued a law (Provinsi DKI Jakarta No2/2005) that requires the closure of certain roads at certain time on every fourth week. The programme in 2006 was successful in increasing the number of days with good air quality in Jakarta by 45 days, in 2007 by 73 days, and between January and July 2008 by 80 days.

Besides combating air pollution, the programme also aims to encourage policy reform on transport management. In the future, transportation policy will be geared towards balancing between public and private transport and between road and rail.

Following the success of the programme in Jakarta, cities such as Surabaya, Palembang, Bandung, Magelang, Cibinong and Bekasi have adopted this programme.

President Susilo Bambang Yudhoyono (extreme left) joining the Car Free Day Programme

Source: *Ministry of Environment, Indonesia*

Air Quality Standards and Monitoring

Air quality standards and monitoring programmes in the ASEAN region have been established reasonably well. Singapore for instance, adopts the PSI, which is a measure developed by the USEPA to provide accurate, timely and easily understandable information about daily levels of air pollution. It is determined by taking the highest sub-index calculated from the concentrations of five key air pollutants viz. PM_{10}, SO_2, CO, NO_2 and ground-level ozone (O_3) monitored at NEA's 11 ambient air monitoring stations located strategically in different parts of Singapore. The overall PSI reading is posted daily at 4pm on the NEA website with data obtained through the Telemetric Air Quality Monitoring and Management System. The system comprises remote air monitoring stations linked to a Central Control Station via dial-up telephone lines.

Malaysia's air quality monitoring network consists of 51 continuous air quality monitoring (CAQM) stations and 19 manual air quality monitoring stations. Out of the 51 CAQM stations, 44 are designed to measure CO, SO_2, NO_2, PM_{10}, and ground-level O_3 while 7 are designed to measure PM_{10}. The Malaysia's Air Pollutant Index, which is determined by taking the highest sub-index calculated from the concentrations of five key air pollutants viz. PM_{10}, SO_2, CO, NO_2 and ground-level O_3, provides information on daily levels of air pollution in the country.

Brunei Darussalam has 5 air quality monitoring stations measuring PM. Brunei Darussalam provides daily readings to the ASEAN Specialised Meteorological Centre.

In Thailand, monitoring the ambient air quality has been carried out since 1983. This has been improved and expanded from time to time to cover various areas of the country. The primary responsibility for monitoring rests with the PCD. Its monitoring network currently consists of 52 sites nationwide, which are linked to PCD's central computer system in Bangkok. The majority of the sites in all five regions (north, northeast, east, central, and south) monitor TSP, CO, NO_2, SO_2, PM_{10} and ground-level O_3. Concentrations of air pollutants are measured, collected, and analysed by a data acquisition system in each station and data is transmitted daily to the central data processing system at PCD through a dial-up telemetric communication system.

PCD also has five mobile ambient air quality monitoring units for emergency response to air pollution episodes and other special air pollution

studies. PCD is currently establishing ambient air quality standards for $PM_{2.5}$ and background information is currently being collected for that purpose. There are two continuous monitoring sites for $PM_{2.5}$ in Bangkok and two more stations are being proposed in other provinces.

Table 6.6: Ambient Air Quality Monitoring Stations in Selected AMS

Country	Year Monitoring Started	No. of Stations As of 2009	Parameters Monitored
Brunei Darussalam[a]	n.a	5	PM
Malaysia[b]	1978	51	CO, NO_2, O_3, SO_2, PM_{10}
Myanmar[c]	2008	3	PM_{10}, NO_2, SO_2
Philippines[d]	n.a	37^	TSP, PM_{10}, SO_2, NO_2, O_3, CO, Pb
Singapore[e]	1971	11	SO_2, PM_{10}, $PM_{2.5}$, O_3, CO, NO_x, Pb
Thailand[f]	1989	52	SO_2, NO_2, CO, O_3, PM_{10}, TSP
Viet Nam[g]	n.a	18	CO, NO_x, SO_2, O_3, PM_{10}, $PM_{2.5}$

Sources: *[a] Ministry of Development, Brunei Darussalam*
[b] Department of Environment, Malaysia
[c] Department of Health, Myanmar
[d] The Philippines' National Air Quality Status Report 2006 – 2007
[e] Ministry of the Environment and Water Resources, Singapore
[f] Pollution Control Department, Thailand
[g] Ministry of Natural Resources and Environment, Viet Nam

Notes: *n.a – not available*
^ number of stations as of 2007

Box 6.2: Marikina City Bikeways in the Philippines

The City of Marikina is a rapidly growing city. Marikina's population increased from 1980 to 1995 at a rate faster than Metro Manila. Marikina's growth in the economic prosperity and population is associated with an increased demand for mobility, both within its administrative borders and to central and other districts of Metro Manila. The number of passenger trips is expected to increase from the current average of 496,000 a day to about 1,200,000 a day.

The bikeways programme of Marikina City is a holistic social and advocacy campaign that promotes cycling as an alternative mode of transport. It is holistic because it not only creates the physical requirements for the adoption of bicycling, but also provides an opportunity for people to own bicycles, educates the public on the social dimension and safety of riding the bicycle, and puts in place policies that make this programme sustainable.

Aside from the construction of bikeways, the programme offers activities focusing on safe cycling education especially for the youth, bicycle loan and lending programme, bicycle ownership survey, Marikina cycling festival, cyclists organisations, bicycle clinics, and creating an ordinance mandating the use of bicycle lanes.

The Marikina Bicycle Plan 2003 – 2007 aims at developing a Bicycle System that is supplemented by programmes that promote their usage and ensure the safety of the users, fiscal and financial incentives, policies that ensure compliance to design standards, rules and regulations governing the use of the facilities and other activities that would support and complement the physical infrastructure the city has planned for, spent for and cared for.

In 2006, Marikina City constructed 46.6 km of bikeways (of the 66 km targeted) which connect residential areas to major transport terminals, markets, schools, commercial and industrial establishments. The Bikeways programme is partly funded by a Global Environment Facility/World Bank grant of US$ 1.1 million. It has been reported that 55% of Marikina households have bicycles and 22% use them to get to work. About 10,500 daily trips (2.9% of all trips) are still made by bicycle. In comparison, approximately 160,200 trips (1.7%) are made by bicycle in Metro Manila.

Source: *Environmental Management Bureau, Department of Environment and Natural Resources, Philippines*

Box 6.3: Viet Nam's "Master Plan of the National Natural Resources and Environment Monitoring Network to 2020"

Recognising the need for a stable and long-term monitoring network to provide timely and accurate data, the Prime Minister of the Socialist Republic of Viet Nam approved the "Master Plan of the National Natural Resources and Environment Monitoring Network to 2020" which was prepared by Viet Nam's Ministry of Natural Resources and Environment.

The Master Plan provides an overarching framework – building upon the existing monitoring network which has been in operation for a long time. The monitoring includes parameters on natural resources, water resources and hydrometeorology. Specific monitoring stations for forecasting and warning of catastrophes such as floods, tsunami, and earthquakes will be supplemented in the future.

The Master Plan focuses on some basic issues:

- Affirmed the important role of National Natural Resources and Environment Monitoring for socio-economic development, national sovereignty and security.
- Objectively assessed the achievements of the National Natural Resources and Environment Monitoring mission over the past years and identified the weaknesses.
- Defined the short-term and long-term objectives of the Plan for each monitoring network for the periods 2006 – 2010, 2011 – 2015 and 2016 – 2020.
- The implementation of the plan will depend on the scientific and practical experience gained over the past years, on the professional skills of the management and staff, the country's economic-social status as well as international developments in science and technology.

A typical air quality monitoring station in Vietnam

Source: *Ministry of Natural Resources and Environment, Viet Nam*

Transboundary Haze Pollution

In 2002, all AMS signed the ASEAN Agreement on Transboundary Haze Pollution to address land and forest fires and minimise transboundary haze pollution in the region. The Agreement entered into force in 23rd November 2003 after six AMS ratified it. To date, eight AMS have ratified the agreement. The fact that the Agreement was adopted and brought into force swiftly demonstrates the willingness and commitment among the AMS to deal collectively with issues of transboundary concern in a more formal manner, entailing legal rights and obligations of AMS.

Box 6.4: ASEAN Specialised Meteorological Centre

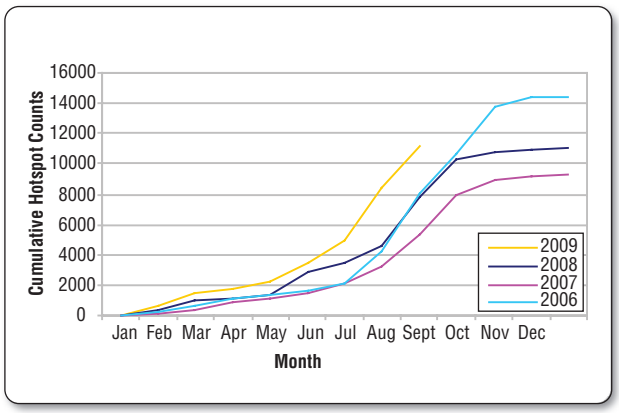
The ASEAN Specialised Meteorological Centre (ASMC) was established in January 1993 as a regional collaboration programme among the National Meteorological Services of AMS. Its main objective is to enhance regional capacity and strengthen support in the provision of meteorological services, through pooling the resources among AMS. The terms of reference of the ASMC are:

- Implement Numerical Weather Prediction models for use in the region
- Develop applications and interpretation of models' products and remote sensing data
- Conduct research and development work on longer-range forecasting techniques and climate studies.

The Centre is hosted by the Meteorological Services Division, National Environment Agency of Singapore. Under the ASEAN Regional Haze Action Plan endorsed by the ASEAN Ministers of the Environment and implemented in 1997, the ASMC was designated to monitor and assess land and forest fires and the occurrence of transboundary smoke haze affecting the ASEAN region. The countries monitored initially covered Brunei Darussalam, Indonesia, Malaysia and Singapore, and later extended to cover the rest of the ASEAN region in 2003.

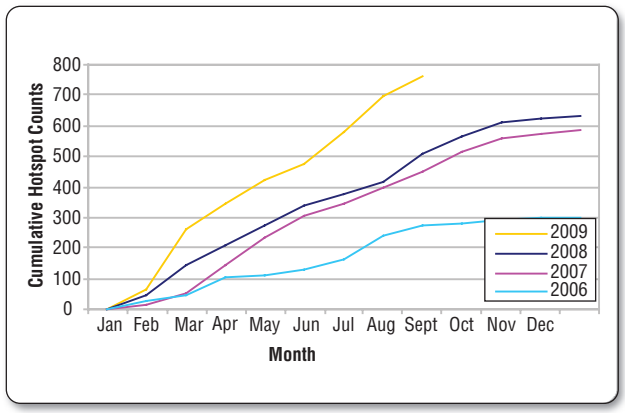
The region's land and forest fires are continuously monitored and preventive and mitigation actions are taken by the AMS. Some parts of the region, such as Borneo and Sumatra, have shown a decrease in hotspot activities between 2006 and 2008. This can be attributed to the mitigating actions taken by the government to suppress wildfires in the country and the wetter weather conditions in 2007 and 2008. However, most parts of the region including Borneo, Sumatra and Peninsular Malaysia saw an increase in hotspot activities in 2009 (from January to August) compared to the same period in 2006. This can be partly attributed to drier weather resulting from the influence of El Niño conditions which developed in mid 2009. Hotspot activities in Myanmar up to August 2009 were also higher compared to the same period in the previous years (2006 – 2008). In Thailand, the highest hotspot activities were recorded in 2007, while the hotspot activities in Cambodia, Lao PDR and Viet Nam (three countries combined) were highest in 2008.

Figure 6.3: Annual Cumulative Hotspot Counts in Sumatra, January 2006 – August 2009



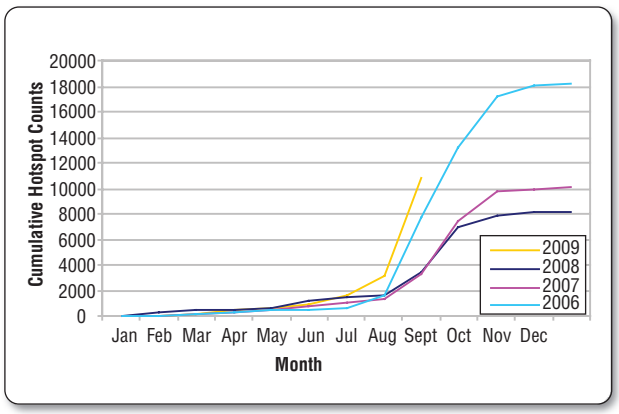
Source: *ASEAN Specialised Meteorological Centre, 2009*

Figure 6.4: Annual Cumulative Hotspot Counts in Peninsular Malaysia, January 2006 – August 2009



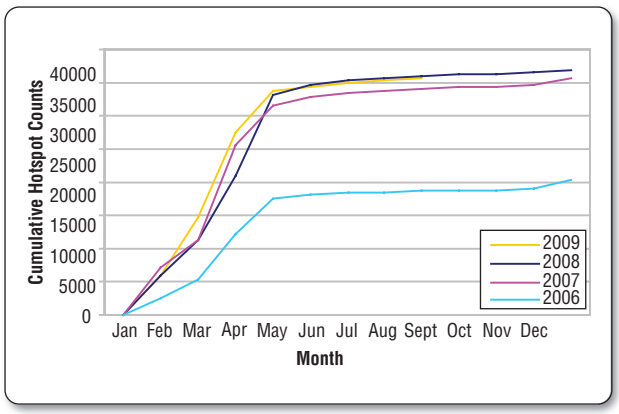
Source: *ASEAN Specialised Meteorological Centre, 2009*

Figure 6.5: Annual Cumulative Hotspot Counts in Borneo, January 2006 – August 2009



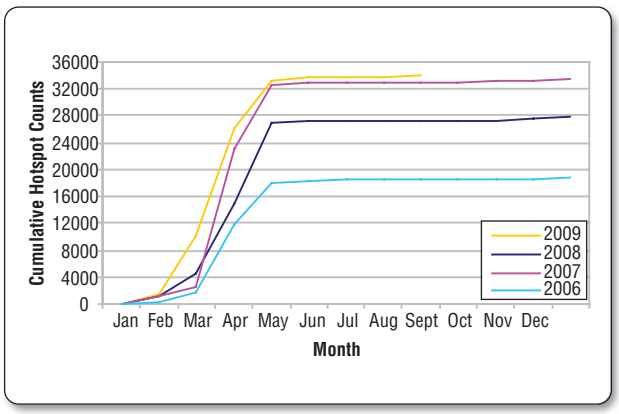
Source: *ASEAN Specialised Meteorological Centre, 2009*

Figure 6.6: Annual Cumulative Hotspot Counts in Cambodia, Lao PDR & Viet Nam, January 2006 – August 2009



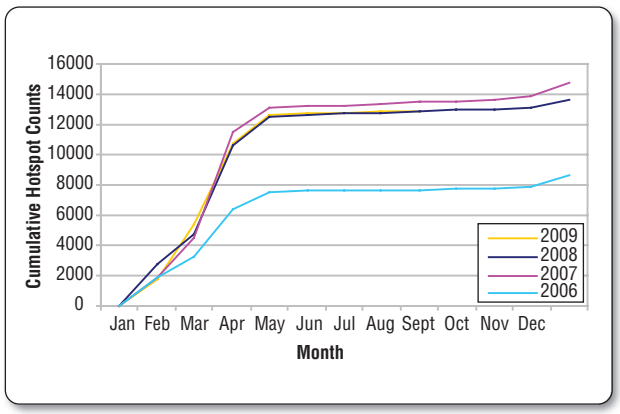
Source: *ASEAN Specialised Meteorological Centre, 2009*

Figure 6.7: Annual Cumulative Hotspot Counts in Myanmar, January 2006 – August 2009



Source: *ASEAN Specialised Meteorological Centre, 2009*

Figure 6.8: Annual Cumulative Hotspot Counts in Thailand, January 2006 – August 2009



Source: *ASEAN Specialised Meteorological Centre, 2009*

Realising the emerging threat of peatland fire and its associated haze to the economy and health of the region, and its possibility of contributing to climate change, the ASEAN Peatland Management Strategy (APMS) was established which outlines several national and regional actions to support the management of peatlands in the region. The APMS supports the implementation of the ASEAN Peatland Management Initiative (APMI) which was developed within the framework of the ASEAN Agreement on Transboundary Haze Pollution. The APMS was endorsed by the ASEAN Environment Ministers in November 2006.

The regional strategy on peatland management primarily focuses, among others, on:

- Enhancing awareness and knowledge on peatlands
- Addressing transboundary haze pollution and environmental degradation
- Promoting sustainable management of peatlands
- Enhancing and promoting collective regional cooperation on peatland issues

Climate Change

The vulnerability to and impact of climate change is a major concern to ASEAN. According to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) released in late 2007, warming of the climate system is evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level. Since IPCC's first assessment report in 1990, assessed projections have suggested that global averaged temperature increases between about 0.15 degree Celsius and 0.3 degree Celsius per decade for 1990 to 2005[13]. The IPCC projects that, without further action to reduce greenhouse gas emissions, the global average temperature is likely to rise by a further 1.8 to 4.0 degrees Celsius this century, and by up to 6.4 degrees Celsius in the worst case scenario. The projected global warming is likely to trigger serious consequences for humankind and other life forms, including a rise in sea levels of between 18 and 59 centimetres which will endanger coastal areas and small islands, and a greater frequency and severity of extreme weather events.

Southeast Asia is highly vulnerable to climate change as a large proportion of the population and economic activity is concentrated along coastlines; the region is heavily reliant on agriculture for livelihoods; there is a high dependence on natural resources and forestry; and the level of extreme poverty remains high. A study carried out by Asian Development Bank[14] (ADB) revealed that the mean temperature in the region increased by 0.1 to 0.3 degree Celsius per decade between 1951 and 2000; rainfall trended downward from 1960 to 2000; and sea levels have risen 1 to 3 millimetres per year. Heat waves, droughts, floods, and tropical cyclones have also become more intense and frequent. The same study projects a 4.8 degrees Celsius rise in mean annual temperature and a 70 centimetres rise in mean sea level by 2100 in Indonesia, the Philippines, Thailand and Viet Nam. A rise in sea level would result in major

problems for many of ASEAN's largest coastal cities, such as Jakarta, Bangkok and Manila. Millions of people may have to be resettled and massive expenditures incurred to protect the coastal cities. Projections of economic losses by the ADB study include a decline up to 50 percent of rice yield potential by 2100 and a loss of 6.7 percent of combined gross domestic product (GDP) each year by 2100. Other effects of climate change to the region include an increase of GHGs in the atmosphere partly due to low carbon sequestration potential of forests, increasing water stress, as well as adverse impact on human health.

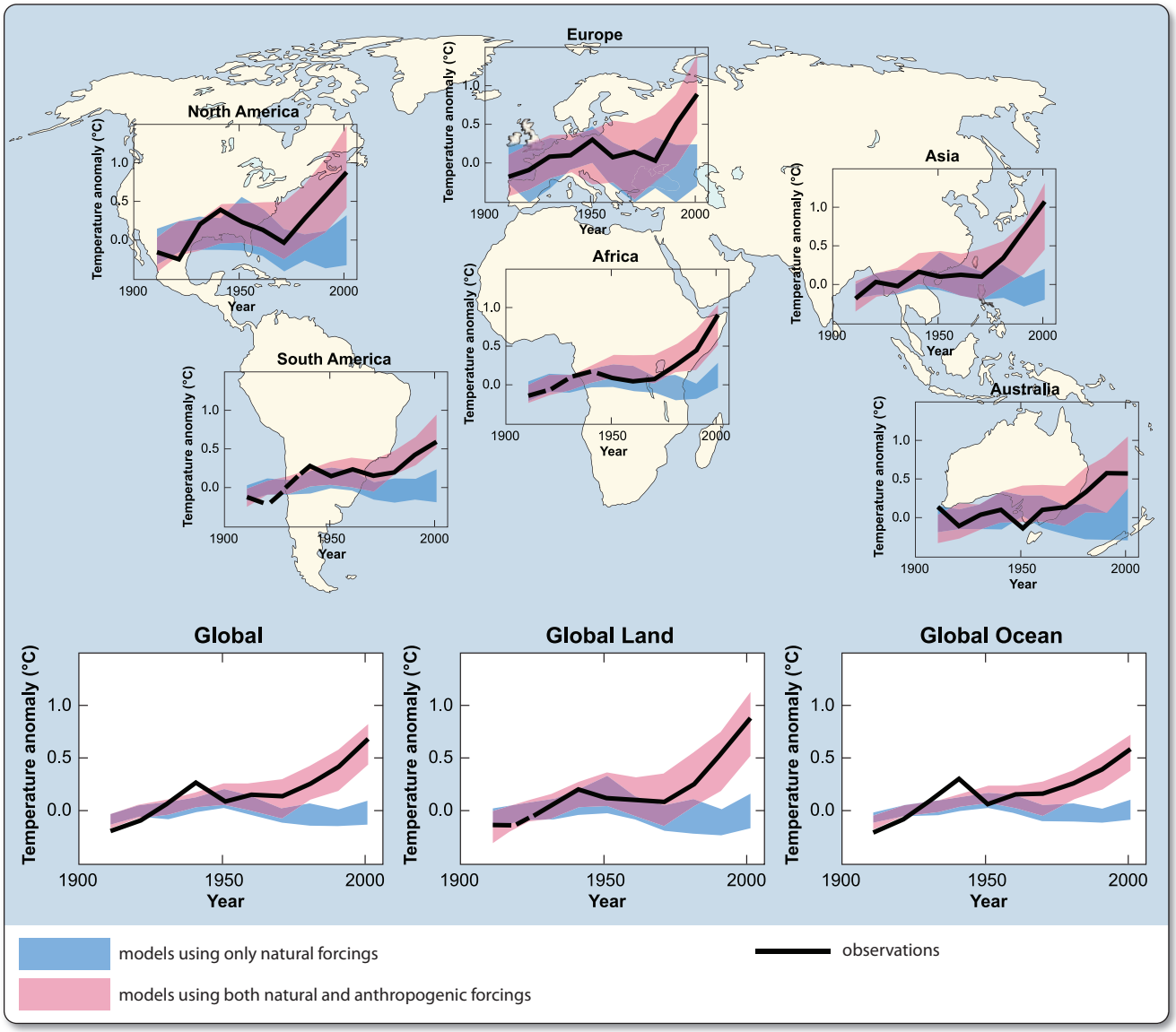
In general, climate change is likely to impact agriculture, water resources and biodiversity. Rising CO_2 levels would also have effects, both detrimental and beneficial, on crop yields. The overall effect of climate change on agriculture will depend on the balance of these effects. Assessment of the effects of global climate changes on agriculture might help countries to properly anticipate and adapt farming to maximise agriculture production. As the climate warms, there will be changes in the nature of global precipitation, evaporation, stream flow and other factors that will affect freshwater supply and quality. Climate change will present challenges to water utilities, and planning now could prevent freshwater crises in the upcoming years. Climate change is also likely to become the dominant direct driver of biodiversity loss by the end of the century[15].

AMS, though not the source of significant emission of greenhouse gases, have taken actions to address climate change through various environmental, economic and social activities over the years. Mitigation and adaptation are both becoming a priority in addressing climate change. Since the region is heavily forested, it therefore has great mitigation potential to reduce emissions from deforestation and/or degradation and through afforestation and/or reforestation, and to improve forest management. The region's energy sector also holds vast potential for mitigation. "Win-win" options include efficiency improvements in power generation, buildings, industry and transport. The ADB study noted that such "win-win" options could mitigate up to 40 percent of energy-related CO_2 emissions per year by 2020 and another 40 percent could be mitigated through positive-cost options such as fuel switching from coal to gas and renewable energy in power generation, at a total cost below 1 percent of GDP. Low-carbon growth brings significant benefits since the costs of inaction far outweigh costs of action.

Many AMS have also started strengthening their adaptive capacity through mainstreaming climate change adaptation in development planning. It has been projected that annual benefit (avoided damage) is likely to exceed the annual cost by 2060 and by 2100; benefits could reach 1.9 percent of GDP, compared to the cost at 0.2 percent of GDP[16]. In order to ensure that climate change adaptation and mitigation in the region is successful, international funding and technology transfer become imperative. In addition, strong inter-governmental policy coordination among various ministries is deemed crucial for the success of adaptation and mitigation in the region. Regional cooperation, such as the ASEAN Climate Change Initiative (ACCI), could offer an effective means to deal with cross boundary, climate change-related issues, such as water resource management, forest fire prevention, disaster and risk management and controlling the outbreak of diseases. It is worth noting that the current economic crisis provides an opportunity for ASEAN to start the transition toward a climate-resilient and low-carbon economy. There is scope for building "green investment" programmes into fiscal stimulus packages that combine adaptation and mitigation measures with efforts to shore up the economy, create jobs, and reduce poverty.

There have been concerted and united efforts from leaders from all around the world to address and combat climate change. Recognising that the ASEAN region is highly vulnerable to the adverse impacts of climate change, the ASEAN Leaders in 2007 adopted 3 declarations related to climate change, namely (i) ASEAN Declaration on Environmental Sustainability; (ii) ASEAN Declaration on the 13th Session of the Conference of Parties to the UNFCCC and the 3rd Conference of Parties Serving as the Meeting of the Parties; and (iii) Singapore Declaration on Climate Change, Energy and the Environment. The Declarations, among others, reaffirmed the need to improve the understanding of the region's vulnerability to climate change and to implement appropriate mitigation and adaptation measures, intensify

Figure 6.9: Comparison of Observed Continental- and Global-scale Changes in Surface Temperature with Results Simulated by Climate Models Using either Natural or Both Natural and Anthropogenic Forcings



Source: *IPCC, 2007*

ongoing operations to improve energy efficiency and the use of cleaner energy, and promote cooperation in afforestation and reforestation. The Declarations also urge the developed countries to continue taking the lead in reducing GHG emissions and further implement their commitments in the provision of financial resources, technology transfer and capacity building.

The ASEAN Ministers responsible for the environment attended the United Nations Climate Change Conference 2007 in Bali and discussed ASEAN's efforts to address climate change, and in particular contributed towards the successful conclusion of the Bali Roadmap as a key outcome of that Conference. The Ministers also agreed to encourage efforts to develop the ACCI. ACCI is envisaged to be a consultative platform to further strengthen regional coordination and cooperation in addressing climate change, and to undertake concrete actions to respond to its adverse impacts. This Initiative will strengthen the region's capacity, both in mitigation and adaptation, to bring forward the region's interests and priorities onto international negotiations on future climate regime as appropriate.

Endnotes

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8 In 2004, 6 sites were monitored (Quang Trung and Thong Nhat in Ho Chi Minh City, Láng and DHXD in Ha Noi, Phu Lien in Hai Phong, and Dà Nang). In 2005 and 2006, 5 sites were monitored (Quang Trung and Thong Nhat in Ho Chi Minh City, Láng in Ha Noi, Phu Lien in Hai Phong, and Dà Nang).

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CHAPTER 7
Sustainable Consumption and Production

Ensure cities and urban areas in ASEAN are environmentally sustainable while maintaining the social and economic needs of the people

Share experiences, expertise and technology in areas such as urban planning including transportation, green building, water management, urban greenery and urban biodiversity conservation, sanitation and waste management, 3Rs (Reduce, Reuse and Recycle) and air, noise, water and land pollution control

Roadmap for an ASEAN Community 2009 – 2015

The management of waste is a key challenge for AMS as they cope with increasing amounts of waste as a result of increasing population and urbanisation. Waste generation rates are higher in the urban areas – compounding the multitude of other environmental problems in the cities. At present, most AMS dispose their municipal solid wastes at sanitary landfills or open dumps although other methods such as composting and incineration are being increasingly used. The reduction, reuse and recycling (3R) of waste is also becoming increasingly common in AMS. Most AMS have embarked on various programmes to encourage 3R including awareness campaigns and engaging local communities in waste management. AMS are intensifying efforts to strengthen their policy and legal frameworks for the management of waste. Some AMS have formulated new and specific legislations to govern the management of municipal solid waste and industrial waste, apart from their existing environmental regulations.

Recognizing that disposing waste is only an end-of-the-pipe solution, AMS have embraced the concept of sustainable consumption and production so that wastes are regarded as resources and managed throughout the life-cycle of a product or process. Sustainable production promotes minimal use of resource and energy in the production of goods and services while ensuring that its impacts on the environment are minimised. It also promotes products that are safe and ecologically sound, are durable, repairable, readily recyclable, compostable and biodegradable. In line with this concept, AMS are promoting sustainable agriculture, cleaner production, eco-labelling and sustainable forestry practices. 28 mills in the region have obtained the Roundtable Sustainable Palm Oil certification, 19 farms are Rainforest Alliance certified while a total of 1.3 million hectares of forest in five AMS have obtained the Forest Stewardship Council certification. Indonesia Singapore, Thailand and Vietnam have also established their national eco-labelling schemes. As export-oriented nations, these initiatives, particularly the product certification programmes, are vital tools to enhance business competitiveness. With internationally-recognised certification, products from AMS can penetrate various markets. All these efforts will contribute towards greening the ASEAN economy without impinging on its competitiveness.

ASEAN FACTS AND FIGURES

ASEAN Average Municipal Waste Composition	Organic waste (46%), plastics (18%), paper (14%), others (22%)			
Methods of Municipal Waste Disposal (%)	Indonesia	Myanmar	Singapore	Thailand
Recycling	5.0	22.0	56.0	0.0
Sanitary landfill	0.0	0.0	3.0	34.5
Open dumps	69.0	73.0	0.0	64.0
Incineration	0.0	0.7	41.0	1.0
Composting	2.0	1.3	0.0	0.0
Others	24.0	3.0	0.0	0.5
Roundtable on Sustainable Palm Oil Certified Mills *(number of mills)*	Malaysia – 20; Indonesia – 8			
Rainforest Alliance Certified Farms *(number of farms)*	Indonesia – 11; Philippines – 6; Viet Nam – 2			
Forest Stewardship Council Certification	Indonesia – 1,090,062 ha; Lao PDR – 12,452 ha; Malaysia – 203,842 ha; Thailand – 7,643 ha; Viet Nam – 9,782 ha			
Eco-labelling Schemes *(practised in)*	Indonesia, Singapore, Thailand, Viet Nam			

The Challenge Of Waste Management

ASEAN's pursuit of a better quality of life for its people comes with many challenges. One of the key problems is the increasing amount of waste generated through unsustainable consumption and production. Waste generation imposes costs in terms of collection, treatment and disposal. It also impacts the environment through emissions to air and degradation of water and soil, all of which have potential impacts on human health.

The increasing amount of waste is just a symptom of the many unsustainable paths of economic development. Disposing waste is only an end-of-the-pipe solution. To achieve sustainability, the entire life cycle of a product, from the extraction of raw material through manufacture, use and disposal of the final product needs to be eco-friendly. At the production stage, it is important that the use of natural resources is minimised and highly durable materials and eco-friendly methods are employed. Production in AMS – agriculture, manufacturing or services – needs to embrace the concept of sustainable consumption and production, so that the vision of a clean and green ASEAN can be realised. Considering the fact that AMS are export-oriented nations, product certification programmes are vital tools to enhance business competitiveness. With internationally recognised certification, products from AMS can penetrate various markets.

Municipal Solid Waste

Municipal solid waste (MSW) is generally defined as domestic refuse and non-hazardous waste such as commercial and institutional waste, street sweepings and construction debris, human waste such as night-soil, ashes from incinerators, septic tank sludge and sludge from sewage treatment plants.

Waste Generation Rates

MSW makes up the bulk of the waste in most AMS. In Thailand, MSW makes up about 67 percent of the total waste generated in the country. Bangkok Metropolis and its surrounding provinces[1] account for the bulk of the waste, with 30 percent of total MSW. Thailand has made good progress in waste reduction through recycling programmes and the provision of safe and effective waste collection and disposal systems. These have resulted in the average daily generation of urban waste declining by 13 percent between 2005 and 2007.

Table 7.1: Urban Waste Generation in Selected AMS, 2005 – 2008

Country	2005	2006	2007	2008
	(million tonnes)			
Indonesia[a]	32.90	26.50	11.40	11.40
Myanmar[b]	0.69*	0.70*	0.69*	0.71*
Philippines[c]	–	–	12.15	–
Singapore[d]	5.01^	5.22^	5.60^	5.97^
Thailand[e]	7.64	6.82	6.64	–

Sources: *[a] Ministry of the Environment, Indonesia*
[b] Ministry of Forestry, Myanmar
[c] The Philippines National Solid Waste Management Commission
[d] Ministry of the Environment and Water Resources, Singapore
[e] Pollution Control Department, Thailand

Notes: ** data for Yangon city and 238 townships in Myanmar (exclude Mandalay and Nay Pyi Taw)*
^ includes total waste recycled, total waste incinerated and total waste land-filled

In Myanmar, the annual waste generation in urban areas has remained constant at about 0.7 million tonnes for the past four years. In Yangon, however, the daily waste generation increased threefold from 564 tonnes in 1990 to 1,324 tonnes in 2007. Other cities like Mandalay generate much lower amounts (about 300 tonnes per day)[2].

The annual amount of waste generated in Singapore increased from 5 million tonnes in 2005 to about 6 million tonnes in 2008. Singapore has over the years developed various waste reduction and recycling strategies to reduce the amount of waste going to landfill.

In Malaysia, the total MSW generated in 2004 was 8.7 million tonnes and the amount is projected to increase to 15.7 million tonnes in 2020[3]. In Cambodia, MSW accounted for 66 percent of total solid waste generated in the country in 1999. An average of 650 tonnes of waste was generated daily in the main urban centres, with the bulk of it generated from the Phnom Penh Municipality (465 tonnes per day). Other urban areas such as Siem Reap and Sihanoukville generated less waste, ranging between 15 and 17 tonnes per day[4].

In the Philippines, 12.15 million tonnes of MSW was generated in 2007 with National Capital Region generating the most (24% or 2.86 million tonnes) compared to other regions[5]. It was projected that the amount of MSW would rise to 13.67 million tonnes by 2010. In Indonesia, urban waste quantities have reduced significantly from 32.9 million tonnes in 2005 to 11.4 million tonnes in 2008[6]. The country's recent Regulations on MSW Management is an important effort that facilitates 3R, waste processing and utilisation, defines the role of the community, introduces incentive and disincentive systems, and the clarity of division of authority[7].

Box 7.1: Solid Waste Management in Bandung, Indonesia

Solid waste generation in Bandung, Indonesia is on a rise, and this has resulted in an urgent need to develop an effective solid waste management (SWM) system. Along with a non-governmental organisation, the municipality of Bandung developed a programme called the "Integrated Resource Recovery System" (IRRS) to manage the large amount of previously unmanageable waste. The programme is low in cost and provides employment for the urban poor. It also reduces the cost of waste disposal through the sale of recovered materials.

Through the IRRS programme, poor people especially those who previously 'scavenged' or collected recoverable and recyclable materials from the waste stream, were given financial and technical support to improve their recoverable waste collection services, to compost organic waste, and to create indigenous businesses and employment using waste products as raw material and "capital". Simultaneously, the programme also encourages financial institutions to provide support for the community, by providing capital for non-recycling enterprises. IRRS also has had a significant impact on setting fair prices for the secondary materials from which the people make their living, thereby supporting a fair living wage for these people who were previously considered an economic liability.

The IRRC also provides social support such as healthcare, schooling opportunity and loans through a cooperative. These allow the people to form businesses in resource recovery, composting and seed farming which not only provide them with income, but also help reduce the amount of money the city must spend on SWM in terms of collection and disposal.

Source: *Ministry of the Environment, Indonesia*

Waste Composition

The MSW in the ASEAN region is composed mainly of organic waste, plastic, paper and cardboard, textile, rubber and leather, wood, glass and metal. On average, 46 percent of the MSW in the region is organic waste, followed by plastic (18%) and paper (14%). As the rate of urbanisation and income levels rises, the composition of the MSW is expected to change.

Disposal and Treatment Methods

Most of the MSW in the region are disposed of at sanitary landfills or open dumps. However other types of waste treatment methods such as composting and incineration are being increasingly used, as are material recovery facilities (MRFs) and refuse-derived fuel plants (RDFPs).

Malaysia now has 10 sanitary landfills and 188 open dumps. In an effort to reduce pollution released from the open dumpsites, the Government planned to upgrade 30 open dumps and close 16 sites between 2006 and 2010. The government has also planned to rehabilitate 11 open dumps between 2011 and 2015. Besides sanitary landfills and open dumps, there are also five waste recycling centres and one refuse-derived fuel facility[8].

In the Philippines, as of 2007, there were about 700 to 800 open dumpsites. Many local government units have identified sanitary landfill sites to replace open dumps. The number of proposed sanitary landfills has increased from 166 sites in 2005 to 211 sites in 2007. The number of sanitary landfills also increased from 4 in 2005 to 35 in 2007, of which 16 were already in the operational stage while 19 were under construction. In 2007, there were 2,200 MRFs in the country, as compared to 1,103 in 2005. As a result of the decentralisation in waste management, a total of 2,473 barangays[9] were served by MRFs in 2007[10].

In Singapore, about 56 percent of all solid waste (including industrial waste) is recycled while 41 percent is incinerated at waste-to-energy plants. The remaining 3 percent comprising non-incinerable

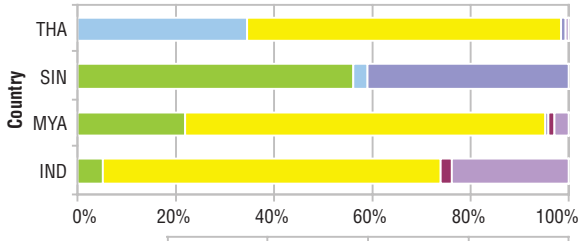
Table 7.2: Municipal Solid Waste Composition in Selected AMS

Country	Waste Composition (%)								
	Organic	Plastic	Paper/ Cardboard	Textile	Rubber & Leather	Wood	Glass	Metal	Others
Brunei Darussalam[a]	42	16	18	0	0	0	3	4	17
Indonesia[b]	58	14	9	2	2	2	2	2	6
Lao PDR[c]	30	30	15	0	0	0	25		0
Malaysia[d]	49	17	10	0	0	0	4	2	0
Myanmar[e]	73	2	18	2	0	4	0	0	1
Philippines[f^]	50	25	13	0	0		3	5	5
Singapore[g*]	24	24	25	3		3	2	2	17
Thailand[h]	42	14	16	3	1	7	5	3	9
Viet Nam[i#]	49	16	2		1		7	6	19

Sources: *[a] Department of Environment, Park and Recreation, Ministry of Development Brunei Darussalam*
[b] Ministry of the Environment, Indonesia
[c] Lao PDR Environment Monitor 2005
[d] Department of Solid Waste Management, Malaysia
[e] Ministry of Forestry, Myanmar
[f] Environmental Management Bureau, Department of Environment and Natural Resources, Philippines
[g] Ministry of the Environment and Water Resources, Singapore
[h] Office of Natural Resources and Environmental Policy and Planning, Thailand
[i] Ministry of Natural Resources and Environment, Viet Nam

Notes: *^ Data for Metro Manila only*
** Singapore's waste composition is for total municipal, industrial, commercial solid waste disposed off*
 # Data for Ha Noi only

Figure 7.1: Municipal Solid Waste Treatment and Disposal Methods in Selected AMS



	IND	MYA	SIN	THA
Recycling	5	22	56	0
Sanitary landfill	0	0	3	34.5
Open dumps	69	73	0	64
Incineration	0	0.7	41	1
Composting	2	1.3	0	0
Others	24	3	0	0.5

Sources: *(1) Indonesia: Ministry of the Environment*
(2) Myanmar: Ministry of Forestry
(3) Singapore: Ministry of the Environment and Water Resources
(4) Thailand: Office of Natural Resources and Environmental Policy and Planning

Note: *Singapore's figures for all types of waste. Recycling includes composting and MRF.*

Table 7.3: Solid Waste Management Facilities in the Philippines, 2005 – 2007

Year	Open Dumps	Controlled Disposal Facility	Proposed Sanitary Landfill	Sanitary Landfill	Material Recovery Facility
2005	794	309	166	4	1103
2006	692	388	171	10	1265
2007	826	359	211	35	2200

Source: *Philippines National Solid Waste Management Commission-Secretariat*

waste is disposed of at the Semakau offshore landfill. Singapore adopts a policy whereby all incinerable waste must be incinerated. Through incineration, the volume of waste can be reduced by as much as 90 percent. At the same time, the heat generated from the incineration process is used to generate electricity, providing approximately 2 percent of Singapore's total electricity supply.

On the average, about 82 percent of MSW in Viet Nam is disposed of at open dumpsites. The use of incinerators and refuse-derived fuel plants has become common in recent years whereby about 35 percent of MSW was incinerated in 2005 and 3 percent was treated using RDFPs in 2004[11]. In Brunei Darussalam, there is one sanitary landfill and 4 open dumps for waste disposal[12].

Box 7.2: Semakau Offshore Landfill in Singapore

Located 8 km south of Singapore with an area of 350 ha, Semakau Landfill is a unique offshore landfill created entirely from the sea space at a cost of S$ 610 million. It has been in operation since 1 April 1999. With a capacity of 63 million m^3, it is expected to meet Singapore's need for landfill space up till the year 2040.

At present, Semakau Landfill receives about 1,500 tonnes of incineration ash and 500 tonnes of non-incinerable waste every day. The landfill operation will eventually create an island made of almost entirely from trash when the landfill capacity is exhausted.

Semakau Landfill was constructed with prudence and ingenious engineering to contain all waste within the landfill area. A perimeter bund, lined with impermeable membrane, marine clay and rock layers, was erected around the landfill to contain any possible leachate in order to keep the surrounding waters pollution free. Two mangrove plantations totalling 136,000 square metres were also planted next to the landfill to replace those affected during the construction. Great care is taken during the operation to ensure that the landfill is scenic, clean and free of odour. As such, the rich and vibrant biodiversity on and around Semakau Landfill is very well preserved and protected.

In July 2005, the Minister for the Environment and Water Resources, Dr Yaacob Ibrahim, opened Semakau Landfill for members of public to enjoy the scenic view, appreciate the wide variety of marine habitats and participate in recreational activities, including intertidal marine-life exploration walks, bird watching and sport fishing. In July 2006, a renewable energy system comprising wind turbine and solar panel was installed to harness wind and solar energy to generate "green" electricity to light up the southern tip of the landfill. With the lighting, there are now night activities, such as stargazing, barbecuing and camping conducted at the landfill.

The opening of Semakau Landfill for recreational activities enhanced the vibrancy of leisure activities and environmental protection awareness of Singaporeans. It is now a popular destination for students and members of the public to learn and appreciate the waste management system and environmental protection policies of Singapore.

With its uniqueness in addressing both waste management and land scarcity needs of Singapore, Semakau Landfill has attracted attention from local and international media. The April 2007 issue of the New Scientist featured the landfill and dubbed it the "Garbage of Eden". In addition, AFP, South China Morning Post, The Standard of Hong Kong, CBC Radio Vancouver, CNN, Discovery Channel and Channel News Asia had also reported on Singapore's unique achievement in transforming an offshore landfill into a bio-treasure island with eco-tourism attractions.

An aerial view of Semakau Landfill

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

Reduce, Reuse and Recycle

The practice of reducing, reusing and recycling (3R) is becoming increasingly common. Most AMS have also embarked on nation-wide awareness campaigns to gain public acceptance and participation in 3R.

In Indonesia, several government agencies are working towards waste minimisation, re-using of waste and capacity building for waste management. Several methods of managing waste like composting, recycling and re-development of recyclable packaging materials are being put in place. In Singapore, food, paper, plastics, construction and demolition waste, wood and horticultural waste, metals, used slag, glass, textiles and tyres are all recycled, both for internal use and for export. All incinerable waste that are not recyclable are collected and disposed of at waste-to-energy plants for incineration and all the non-incinerable waste that are not recycled are sent to the offshore Semakau sanitary landfill.

The materials that are commonly reused, recycled or recovered include paper waste, plastic waste, scrap tires, glass, wood or timber, ferrous and non-ferrous metals and construction debris. In some AMS, there exist a long-standing practice of informal source separation and recycling of materials, which is usually carried out by small enterprises and individual waste pickers comprising women and children. Since the practice of recycling is often market-driven, recycling in the region has become selective. The disposal of those unselected recyclables remains a problem in many AMS.

Informal waste separation or waste picking usually takes place in three ways:

- At source: Waste separation or picking occurs before the scheduled collection vehicles arrive.
- During collection: Waste separation is carried out by collectors during loading.
- At the disposal site: Waste pickers or "scavengers" collect recyclable materials from landfills or open dumps.

Although waste picking is a daily activity for some people in the region, the income generated from this activity is usually insufficient to support a living. In view of this, some AMS have provided financial and technical assistance to the waste picking communities to improve their methods of collecting recoverable waste, thereby improving their incomes. At the same time, other measures have been introduced to ensure the waste picking activity does not endanger their health and safety.

Waste recycling and recovery activities reduce the financial burden of governments for SWM and at the same time provides employment for the people.

Box 7.3: Waste Collection System in the Philippines – Eco-Soldiers

The Philippines' Republic Act 9003 recognises the barangays as partners in building and taking care of the environment particularly in matters concerning proper solid waste management. At the barangay level, waste management focuses on recovery for composting and recycling. Waste is collected by the so called "eco-soldiers" who roam a barangay to collect biodegradable and recyclable waste using either a push cart or a bike with a sidecar. The items collected are then brought to a Material Recovery Facility where collected materials are sorted and stored until they are sold or processed.

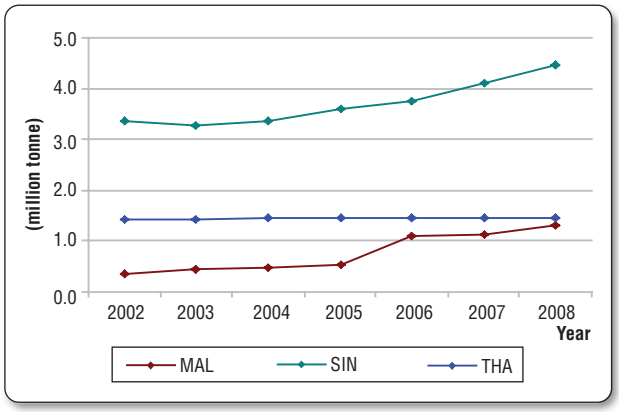
The work carried out by the eco-soldiers greatly helps in reducing the amount of waste going to landfills, thereby saving the government billions of dollars in waste collection and disposal. In addition, such strategy provides local communities with supplementary income from the sale of recyclable items or livelihood projects from waste materials, as well as with various health benefits from a cleaner environment.

Source: *Environmental Management Bureau, Department of Environment and Natural Resources, Philippines*

Industrial and Hazardous Waste

The largest industrial waste generator, especially in Thailand, Singapore and Malaysia, is the manufacturing sector involved in basic metals, tobacco, wood and wood products, and paper and paper products. An estimated 19 million tonnes of industrial waste were generated in 2000 in the AMS[13].

Figure 7.2: Industrial Waste Generation in Thailand, Singapore and Malaysia



Sources: *(1) Malaysia: Department of Environment*
(2) Singapore: Ministry of the Environment and Water Resources
(3) Thailand: Pollution Control Department

In Thailand, the total industrial waste generated averaged 1.45 million tonnes per year between 2002 and 2008. In Singapore, although the total industrial waste generated ranged between 3 and 4.5 million tonnes for the period of 2002 to 2008, the total amount of industrial waste that is disposed of is only around 1 million tonnes per year. This is due to intensive recycling efforts carried out by the country. In 2008, Malaysia generated about 1.3 million tonnes of industrial waste.

Hazardous waste represents approximately 1 to 3 percent of all waste generated in AMS. The amount of hazardous waste in 2000 was estimated to be three million tonnes[14]. This figure is expected to be much higher now since Indonesia alone in 2007 reported 4 million tonnes generated by the manufacturing and agro-industrial sectors[15]. Besides industrial activity, hazardous waste is also generated by households and commercial activities but in smaller quantities.

In some AMS, industrial waste continues to be managed as MSW in its collection, handling, treatment and disposal. The waste eventually gets mixed with domestic waste and ends up in open dumps and landfills. Illegal dumping of waste continues to occur in some AMS due to inadequate disposal facilities and the high cost of disposal. Some AMS however have established industrial waste treatment facilities. In Malaysia, for example, about 51 percent of industrial waste is treated on-site before disposal. Other main treatment and disposal methods include RDFP, sanitary landfill and incineration.

Waste Management Policies

AMS are intensifying efforts to strengthen their policy and legal frameworks for the management of waste. While some AMS have formulated new and specific legislations to govern the management of MSW and industrial waste, others are using their existing environmental regulations.

Brunei Darussalam

Waste management is governed by the Draft Environmental Order of Negara Brunei Darussalam. Waste-related policies include: (1) maintaining sustainable utilisation of natural resources; (2) minimising negative impacts on the environment arising from population growth and human activities; and (3) achieving balanced goals of socio-economic development to sustain sound environmental quality.

Cambodia

Waste management is governed by the sub-decree on SWM in the Law on Environmental Protection and Natural Resource Management. The purpose of the sub-decree is to regulate solid waste management in a safe manner to ensure the protection of human health and the conservation of biodiversity. The sub-decree has 32 articles, with emphasis on the management and monitoring of household and hazardous wastes.

Indonesia

The Act of the Republic of Indonesia Number 18 Year 2008 on waste management addresses five important aspects namely waste reduction, waste handling, reusing waste, optimizing capacity of waste management and developing regional and international cooperation.

Lao PDR

SWM is governed by the Environment Protection Law of Lao PDR 1998, under the (1) Regulation on the Monitoring and Control of Waste Discharge (No.1122/STENO) 1998; (2) Guidelines for Hospital Waste Management (1997); (3) Industrial Waste Discharge Regulation (No.180/MIH) 1994; and (4) The Policy and Programmes Appraisal Division and the Regulation and Compliance Monitoring Division.

Waste-related policies focus mainly on the effectiveness of implemented market and non-market instruments, which include: (i) public education and training programmes (moral suasion); (ii) general practices of SWM (waste collection, separation, dumping, treatment, disposal); (iii) policy recommendations to concerned authorities including effective instruments to minimise waste; and (iv) monitoring the polluting behaviours of individuals and industries and recovering from them the cost of pollution to the city.

Malaysia

Malaysia has two legislations related to SWM:

- Solid Waste and Public Cleansing Management Act 2007 (Akta Pengurusan Sisa Pepejal dan Pembersihan Awam, introduced in 2007 but not yet in force) – to provide for and regulate the management of controlled solid waste and public cleansing for the purpose of maintaining proper sanitation and related matters
- Solid Waste and Public Cleansing Management Corporation Act 2007 (Akta Perbadanan Pengurusan Sisa Pepejal dan Pembersihan Awam 2007) – to provide for the establishment of the Solid Waste and Public Cleansing Management Corporation with powers to administer and enforce the solid waste and public cleansing management laws and for related matters

The SWM policy calls for the "establishment of a national SWM system that is sustainable, holistic, integrated, cost-effective and socially acceptable towards better quality of life". The objectives of the SWM Policy Framework are as follows:

- To establish a solid waste management system that conserves resources and protects the environment and public health
- To establish a comprehensive, integrated and efficient solid waste management system from source of generation to final destination
- To establish a cost-effective and socially acceptable solid waste management system

Some of the key principles adopted by the framework include waste minimisation through 3R practices, integrated SWM, 'user-pays' principle, public awareness and education, and advanced and environment-friendly technologies.

Myanmar

Although Myanmar does not have a specific legislation on SWM, the country through its Pollution Control and Cleansing Department has developed by-laws on pollution control, giving considerable focus to waste management.

Philippines

In the Philippines, SWM is governed by a variety of regulations including:

- General Guidelines/Procedures in Conducting Waste Characterisation Survey/Study
- Philippines Ecological Solid Waste Management Act of 2000
- Executive Order No. 192, Series of 1987. Implementing Rules and Regulations of the Philippine Ecological Solid Waste Management Act of 2000
- Department Memorandum Circular No. 06. Adoption of IEE Checklist and IEE Report on the ECC Processing of Categorised Final Disposal Facility (Sanitary Landfill)
- DENR-DILG Joint Memorandum Circular 06-02. Amendment to Joint Memorandum Circular 06-01 Nationwide Search for Model Barangays
- DENR Administrative Order 06-09. General Guidelines on the Closure and Rehabilitation of Waste Disposal Facilities
- DENR Administrative Order 06-10. Guidelines on the Categorised Final Disposal Facilities
- DENR-DILG Joint Memorandum Circular 06-01. Nationwide Search for Model Barangays for Eco-waste Management System 2006 – 2007
- DENR-DOST Joint Memorandum Circular 06-01. Adopting Environmental Technology Verification Protocol

- NSWMCS Resolution #8. Guidelines on the Formulation and Approval of the 10 year SWM Plan
- NSWMCS Resolution #9. Creation of a Technical Working Committee for the Phasing Out of Non-Acceptable Products and Packaging Materials

These SWM policies place emphasis on (1) source reduction and minimisation; (2) resource recovery, recycling and reuse of waste at the barangay level; (3) efficient collection, proper transfer and transport of waste; and (4) efficient management of residuals and of final disposal sites and/or any other related technologies for the destruction/reuse of residuals.

Singapore

In Singapore, SWM is regulated by the National Environment Agency (NEA) under the Environmental Public Health Act and associated Regulations; and the Environmental Protection and Management Act and associated Regulations. Waste management is also one of the focus areas in the Sustainable Singapore Blueprint, with targets to improve the recycling rate from 56 percent in 2008 to 65 percent in 2020 and 70 percent in 2030.

Thailand

The legal framework for industrial waste, hazardous waste and solid waste management is based on a series of laws designed primarily for other purposes but which include provisions that govern solid and hazardous waste management. Key laws are:

- Enhancement and Conservation of National Environment Quality Act, 1992
- Public Health Act, 1992
- Public Order and Cleanliness Act, 1992
- Building Control Act, 1992
- Factory Act, 1992
- Hazardous Substance Act, 1992
- Industrial Estate Act, 1979

In practice, Ministerial Proclamations and the National Environment Board Notifications related to the waste management have been issued consecutively to deal with specific situations. The SWM policy framework is based on key issues such as waste separation and utilisation, sharing of disposal facilities, the use of integrated technologies and waste-to-energy plants and involvement of private sector for investment and operation.

Viet Nam

The main legislation that governs SWM is the Law on Environmental Protection 2005. Other related laws include: (1) The Law on Land (issued in 1989, and completed in 1993); (2) The Law on Protection and Development of Forests (issued in 1991); (3) The Decree on Health Protection of People (issued in 1989); (4) The Decree on Mineral Resources (issued in 1989); and (5) The Decree on Sea Products (issued in 1988).

The Law on Environmental Protection 2005 encourages waste reduction and recycling and stipulates the responsibility of the generators of waste. Decision No. 23/2006/Q_-BTNMT dated 26th December 2006 of Minister of Natural Resources and Environment prescribed the List of Hazardous Waste. Circular No. 12/2006/TT-BTNMT dated 26th December 2006 of Minister of Natural Resources and Environment provides guidelines for the registration and disposal of hazardous waste. The law also touches on economic instruments or initiatives in wastewater management using the "user-pays" principle. Under the law, all organisations and individuals must implement measures for environmental sanitation and have appropriate waste treatment equipment to ensure compliance with environment standards and to prevent and combat environmental degradation, environmental pollution and environment-related accidents.

The amount of waste generated in AMS will continue to increase as the population increases. Adequately treating and disposing waste will consume valuable resources and more land. It is therefore pertinent that AMS look towards a more sustainable pattern of consumption and production, leading to improved quality of life.

Sustainable Production

Sustainable production promotes the minimal use of resources and energy in the production of goods and services while ensuring that its impacts on the environment are minimised. It also promotes products that are safe and ecologically sound, are

durable, repairable and readily recycled, and are compostable and biodegradable.

Sustainable production also encompasses the entire life cycle of a product – starting from natural resources extraction to the production, distribution and disposal of goods and services. Sustainable production in all key economic sectors – agriculture, manufacturing, forestry and energy – will ensure that there are sufficient resources left for future generations.

Marrakech Process

The Marrakech Process is a global initiative to support the elaboration of a 10-Year Framework of Programmes on sustainable consumption and production, as called for by the World Summit on Sustainable Development Johannesburg Plan of Action. The goals of this initiative are to assist countries in their effort to build a greener economy, to help corporations to develop greener business models and to encourage consumers to adopt more sustainable lifestyles. The United Nations Environment Programme (UNEP) and United Nations Department on Economic and Social Affairs (UNDESA) are the lead agencies of this global process, with an active participation of national governments, development agencies and civil society. Seven Marrakech Task Forces have been created as a voluntary partnership initiative from developing and developed countries. These task forces are led by governments which – in cooperation with various other partners from the North and the South – commit themselves to carrying out a set of concrete activities at a national or regional level that promote a shift to Sustainable Consumption and Production (SCP) patterns. The Task Forces are supporting the implementation of SCP projects such as:

- Eco-labeling in Africa
- National action plans on SCP
- Developing tools and supporting capacity building in the areas of sustainable public procurement
- Sustainable tourism projects
- Networks on product policy to encourage more innovation in product eco-design and performance
- Sharing best policy practices on energy efficiency in buildings
- Promotion of sustainable lifestyles and education

Forty-five national cleaner production centres have been established (including one in Viet Nam) to support developing countries in their efforts to: raise awareness about sustainable production; train local experts and build local capacity; provide technical assistance to individual enterprises; support development of projects on cleaner development; disseminate technical information; and provide policy support to governments. The process also supports regional SCP implementation networks which have been launched in all regions to engage all interested stakeholders.

Box 7.4: Thailand's Strategy on Sustainable Consumption and Production

Thailand's Strategies on Sustainable Consumption and Production (SCP) was developed to accommodate the 10th National Economic and Social Development Plan. In 2004, the Royal Thai Government initiated the Competitiveness and Sustainable Development Promotion Committee to develop the green government procurement policy to promote production and consumption of environmental friendly products or "green products". The policy assumes that if the government, which is the biggest consumer, buys products which are produced, transported, used and disposed of with less environmental impacts, there will be more producers producing such products.

The Strategy also promotes a moderate level of production and consumption sufficient to serve the basic needs and quality of life of the people. Thailand's SCP strategy was implemented in 2007. The goal of the strategy is to achieve a balance between social satisfaction, security, and self sufficiency for the present and future generations by recognising the limitation of existing natural resources and the ecological carrying capacity of the environment. Some of the instrumental actions of the strategy include:

- Publicising successful examples of profitable clean production industries and financial success of self sufficient households and communities

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- Calling for government support on green products and services
- Creating market mechanism for recycled and reused products
- Expediting economic restructuring process to increase proportion of service sector in economy
- Reviving and promoting public values, and indigenous knowledge of SCP
- Promoting business ethics and good governance
- Promoting public participation in policy formulation, implementation, and evaluation of SCP
- Promoting green products for export

Preliminary indicators for the strategy suggest a successful implementation. The indicators for producers show a reduction in energy use intensity. For consumers, it shows that more recycling is done at domestic landfills which indirectly resulted in a higher Sustainable Development Index for Thailand. One of the overall indicators shows a distinct change to a smaller ecological foot print for Thailand.

Source: *UNEP[16]*

Sustainable Agricultural Production

Agricultural production has intensified in recent years to meet the growing demand for food and changing consumption patterns. The intensification of agricultural production, however, has led to many environmental problems such as soil erosion and degradation, increase in greenhouse gas emissions, loss of biodiversity and pollution. This highlights the need to adopt sustainable agricultural production so that while economic profitability is guaranteed, environmental health is maintained and social and economic equity is promoted. Since agriculture is the foundation of the economies of many AMS, participation in agricultural certification programmes such as the Roundtable on Sustainable Palm Oil (RSPO) and Rainforest Alliance Certification is particularly advantageous to society, businesses and the environment in the region.

In the past three decades, the oil palm industry has developed into an economic powerhouse, particularly in Malaysia and Indonesia. Sustainable palm oil production in the region has recently picked up pace as an increasing number of plantation companies participate in the RSPO certification. The RSPO aims to promote the growth and use of sustainable oil palm products through credible global standards which are manifested in its principles and criteria, and engagement of

Box 7.5: Roundtable on Sustainable Palm Oil

Palm oil is an important and versatile raw material for both food and non-food industries. It contributes to the economic development of AMS and to the diets of millions of people around the world. Driven by ever-increasing global demand for edible oils, the past few decades have seen rapid expansion in the production of palm oil in the region. From the 1990s, the area under palm oil cultivation had increased by about 43 percent, most of which were in Malaysia and Indonesia – the world's largest producers of palm oil.

Although palm oil has the highest yield per hectare than any other oil or oilseed crop, there are environmental pressures on its cultivation in eco-sensitive areas such as tropical rainforests. Development of new plantations has resulted in the conversion of large areas of forests with high conservation value and has threatened the rich biodiversity in these ecosystems. Use of fire for preparation of land for oil palm planting has been reported to contribute to the problem of forest fires in the late 1990s. The expansion of oil palm plantations has also given rise to social conflicts between the local communities and project proponents.

In response to the urgent and pressing global call for sustainably produced palm oil, the Roundtable on Sustainable Palm Oil (RSPO) was formed in 2004 with the objective of promoting the growth and use of sustainable oil palm products through credible global standards and engagement of stakeholders. RSPO is a not-for-profit association that unites stakeholders from seven sectors of the palm oil industry – oil palm producers, palm oil processors or traders, consumer goods manufacturers, retailers, banks and investors, environmental or nature conservation non-government organisations (NGOs) and social or developmental NGOs – to develop and implement global standards for sustainable palm oil production.

Source: *Adapted from RSPO website[17]*

Table 7.4: RSPO Certified Palm Oil and Palm Kernels (as of May 2009)

Country	No. of Mills Certified	Crude Palm Oil	Palm Kernels
		(metric tonnes)	
Indonesia	8	355,824	73,389
Malaysia	20	761,582	190,848
TOTAL	**28**	**1,117,406**	**264,237**

Source: *RSPO Secretariat, 2009*

stakeholders within the supply chain. The RSPO's principles and criteria not only emphasise the protection of the environment but also the welfare of local communities and plantation workers. Examples of the criteria include conserving high value forest and peatlands, supporting local community land rights and improving access to health and education. As of May 2009, 28 mills in Malaysia and Indonesia had obtained RSPO certifications. The total amount of RSPO-certified crude palm oil up to May 2009 was 1.1 million metric tonnes while the total amount of palm kernels certified was 0.26 million metric tonnes.

Producers of crops other than oil palm can also pursue certification such as the Rainforest Alliance Certification. In order to achieve the Rainforest Alliance certification, agricultural producers are required to comply with the social and environmental best practices defined in the standards established by the Sustainable Agriculture Network[18] (SAN). Once agricultural producers receive certification for their farms, they can apply to use the Rainforest Alliance Certified seal on their products. With the seal, the farms are considered to have reduced environmental footprints and are good neighbours to humans and wildlife. The Sustainable Farm Certification International is the body responsible for making certification decisions based on the result of its evaluation of audit reports provided by inspection bodies. As of August 2009, 19 farms in Indonesia, the Philippines and Viet Nam have obtained the Rainforest Alliance Certification.

Considering that AMS are export-orientated nations, product certification programmes are vital tools to enhance business competitiveness. With internationally recognised certification, products from AMS can penetrate various markets with ease and at a premium.

Table 7.5: Rainforest Alliance Certified Farms (as of August 2009)

Country	No. of Farms Certified	Crops
Indonesia	11	Coffee, tea
Philippines	6	Banana, pineapple
Viet Nam	2	Coffee

Source: *Sustainable Farm Certification International website[19]*

Manufacturing – Cleaner Production

Manufacturing industries account for a significant part of the AMS's consumption of resource and generation of waste. Manufacturing industries nevertheless have the potential to become a driving force for the creation of a sustainable society through cleaner production practices and the design of products and services that contribute to better environmental performance. Driven in part by stricter environmental regulations, manufacturing industries today are using various control and treatment measures to reduce the amount of emissions and effluents. More recently, efforts to improve environmental performance have moved towards thinking in terms of lifecycles and integrated environmental strategies and management systems. Manufacturing companies have also begun to accept larger environmental responsibilities throughout their value chains. The adoption of more integrated and systematic methods to improve sustainability performance has laid the foundation for new business models or modes of provision which can potentially lead to significant environmental benefits.

AMS have embarked on cleaner production (CP) initiatives, targeted at the manufacturing sector. For example, Indonesia's CP strategies include:

- Specifying target and target groups. according to a priority scale, adjusted to condition and needs of Indonesia
- Strengthening participation and support of all related stakeholders in cleaner production development and environmental-friendly technology
- Strengthening local and national capacities through human resource capacity improvement
- Developing cooperation network in national, regional and international levels to facilitate technology transfer

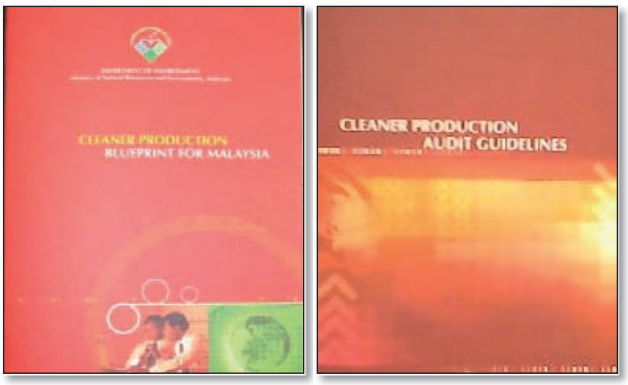
- Disseminating information to businesses regarding ISO 14000 series implementation and Clean Production concepts
- Developing incentive systems to promote cleaner production and environmental-friendly technology implementation

The project activities that have been conducted by Indonesia include:

- CP implementation in the electroplating, packaging, pulp and paper and textile industries
- Preparation of CP implementation guidance book in several industries, i.e. electroplating, wood processing, plywood, paint, fish processing, and cassava flour
- Assessment of CP opportunities in cosmetic, food/mini jelly, paint and fish processing industries
- Replicating CP success stories in several industries such as the paint, and food & beverage industries
- Providing incentives for CP and training in the industrial sector
- Identification of hazardous waste characteristic & utilisation of sludge in the textile, tile-ceramic and leather Industries
- Guidebook on hazardous material for Ink Industry
- Guidebook on Air Pollution Control in Electroplating Industry
- Guidebook on Environmental-Friendly Technology in Ceramic Industry
- Guidebook on Cost Estimation for Wastewater Treatment Installation in Leather, Palm Oil, Soybean Fermentation, Cold Storage, Cassava-Flour, Electroplating, Pulp and Paper, Crumb Rubber, and Textile Industry
- Guidebook on Management of used-batteries and its impact to environment
- Guidebook on Environmental Management System ISO 14001 for Small and Medium Enterprises (SMEs)

Malaysia published its CP Blueprint to guide CP implementation in the country. The Department of Environment of Malaysia has adopted four main strategies for the implementation of CP:

- Education and Awareness Campaign
- Networking and Dissemination of Information
- Training and Audit
- Capacity Building



CP Audit Guidelines were published to (i) introduce concept of CP to SMEs; (ii) assist SMEs in process efficiency thru application of CP; (iii) train DOE's officers in CP Audit.

In an effort to further improve productivity, Malaysia has also embarked on Green Productivity with the Malaysia Productivity Corporation acting as the lead agency. Green Productivity is a strategy for enhancing productivity and environmental performance simultaneously for overall socio-economic development. It is the combined application of appropriate productivity and environmental management tools, techniques and technologies that reduce the environmental impact of an organisation's activities, products and services while enhancing profitability and competitive advantage

As a part of its efforts to disseminate information on CP, Malaysia established a Cleaner Production Virtual Centre, a web-based application system designed to help inform and educate the public on CP, and to inform SMEs about financial support and trainings available for them in implementing CP in their companies.

Viet Nam's National Action Plan on Cleaner Production has three objectives: (i) Promotion of CP awareness among industries; (ii) Integration of CP with national socio-economic strategies and policies; and (iii) Creation of legal and institutional frameworks, and human and financial resources to promote continuous adoption of CP by industries. The National Centre for Cleaner Production was established in 1998. Some of the activities include:

- Organising workshops on environmentally sound technologies and national roundtable on CP every two years

- Cooperating with UNEP and other international organisations in CP and environmental technology
- Disseminating CP programmes
- Providing guidance and technical assistance to implement CP for specific sectors
- Implementing CP in 37 provinces
- Conducting training courses for trainers

The Ministry of Industry and Trade provides support to demonstration projects in 46 companies (28 training courses for participants from industries). The Ministry of Fishery provides support to demonstration projects in 21 companies (training courses for 1000 participants). The Ministry of Natural Resources and Environment conducts CP Roundtable once every 2 years.

In the Philippines, the government has been partnering the industry by sponsoring training on waste minimisation and pollution prevention. Such initiatives were accomplished through projects such as the USAID-Industrial Environmental Management Project focusing on SMEs; the Metropolitan Improvement Project engaged with industries within Metro Manila working closely with Pasig River Rehabilitation Project; and the ASEAN Environmental Improvement Project, which is directed towards large local and multinational corporations to help improve their competitiveness through better waste management.

The government has come out with a market-based instrument called the Philippine Environment Partnership Programme as one of the outputs of policy studies conducted. This is where private firms are given incentives for implementing specific pollution management programmes and thereby achieving a greater degree of environmental compliance.

The "Capacity Building of Regional Capabilities on Cleaner Production and Energy Efficiency" project is currently on-going through partnership between the Philippines' Government and the International Centre for Environmental Technology and Transfer of Japan. This project aims at strengthening of the competitiveness of industries, particularly SMEs through the adoption of CP and clean technologies. CP assessment is undertaken as an integral component of CP Programme that may eventually serve as the foundation for the establishment of Environmental Management System within a facility.

Singapore believes that growth and environmental sustainability are compatible and mutually reinforcing. The government promotes cleaner production by advocating energy efficiency within industries. The industrial sector in accounts for more than half of total national energy consumption. The government aims to introduce policies early in their course of development to safeguard environmental quality. Energy efficiency improves the competitiveness of industries, especially those energy intensive industries such as refinery, petrochemical, electronics and pharmaceutical sectors.

The government builds cleaner and more resource-efficient industries with the following approaches:

- promoting energy efficiency among industries and businesses
- enhancing water security and supply to support growing industrial needs
- promoting waste minimisation and recycling in industry to conserve resources
- controlling pollution from industries to ensure that industrial growth does not come at the expense of public health and the environment
- promoting Energy Technology and Sustainable Urban Solutions as new growth sectors within Singapore's economic portfolio

As part of Singapore's strategy in promoting waste minimisation at source, the NEA signed the voluntary Singapore Packaging Agreement with 5 industry associations (representing more than 500 companies), 19 individual companies, 2 NGOs and the Waste Management and Recycling Association of Singapore on 5th June 2007. The Packaging Agreement provides a platform for the government to collaborate with the industry to reduce packaging waste by using less packaging material or by using more recycled or recyclable materials over a 5-year period. The NEA has also established an Energy Efficiency Improvement Assistance Scheme to co-fund the cost of energy audits by up to 50 percent, to encourage companies to study their energy consumptions and identify potential areas for improvement.

In Thailand, Cleaner Technology programmes were initiated in 1990s. The Ministry of Science, Technology and Environment then developed a National Master Plan on Cleaner Production (2002 – 2011), which was endorsed by the Cabinet in January 2002. The development of this plan was based on three principles, namely precautionary approach, integration approach and continuous improvement approach. One of the major strategies of this Master Plan is the introduction of cleaner production in the following sectors: industry, agriculture, tourism and services, financial and banking, education as well as research and development.

Box 7.6: Energy Efficiency in Singapore

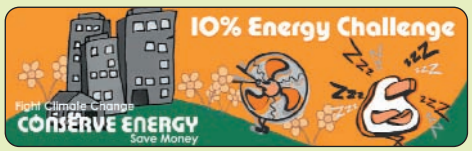
Singapore is moving ahead with measures to promote and enhance energy efficiency in the country. This is in line with the recognition that, given its national circumstances, energy efficiency is Singapore's key strategy to reduce its greenhouse gas emissions. With the initiatives by the Inter-Ministerial Committee on Sustainable Development, a target has been set to achieve a 35% improvement in energy efficiency from 2005 levels by 2030.

Chaired by the National Environment Agency and the Energy Market Authority, the Energy Efficiency Programme Office (E^2PO) was established in May 2007 to co-ordinate energy efficiency improvement programmes in Singapore. The E^2PO launched the E^2Singapore to document energy efficiency efforts in all sectors of the economy – power generation, industry, buildings, transport and households – which will be implemented by the relevant agencies.

Among some of the key areas targeted include promoting the adoption of energy efficiency technologies and measures, building the capability to sustain energy efficiency efforts and raising awareness of energy efficiency among businesses and the public. Some of the schemes and programmes offered by the government include the Design for Efficiency Scheme, Grant for Energy Efficiency Technologies and Energy Efficiency Improvement Assistance Scheme, Singapore Certified Energy Manager Programme and Training Grant, Energy Smart Building Label, Enhanced Green Mark Incentive Scheme for New Buildings, and Grant for Development of Clean Development Mechanism Documentation, among others.

More recently, the 10% Energy Challenge programme was launched on 26 April 2008 to challenge households to save 10% or more of their household electricity use by practicing simple habits that reduce electricity wastage. Among some of the key energy tips include, using a fan instead of an air conditioner to keep the house cool, switching off all home appliances at the power socket instead of using the remote control or leaving the appliance on standby and replacing incandescent light bulbs with compact fluorescent lamps.

A website (www.e2singapore.gov.sg) was also developed to provide information on Singapore's energy efficiency programmes and to help stakeholders understand what they can do to improve their energy efficiency.



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

Eco-labelling

Several AMS have implemented eco-labelling schemes to encourage sustainable production. In Indonesia, Eco-label Accreditation and Certification scheme was launched during the World Environment Day on 5th June 2004. The certification bodies are accredited by National Accreditation Committee. The certification criteria are based on ISO 14024, other eco-label programmes, legal requirements, relevant international conventions, and product quality standards.

In Viet Nam, the national eco-labelling programme was approved in 2009. The objectives of the programme are:

- To protect and efficiently use the existing natural resources
- To encourage environmental improvement
- To encourage customers to make better-informed decisions

The timeline for the programme is as below:

- 2009 – 2010: Develop detailed programme, establish a certification system and pilot certify some product
- 2011 – 2015: Group products and identify criteria for each group
- Since 2011: Certify Green label to products
- 2020: 100 percent import products and 50 percent domestic products have been printed with ISO 14021 environmental label

The Singapore Green Labelling Scheme (SGLS) was launched in May 1992 by the then Ministry of the Environment. The scheme applies to most products, except food, drinks and pharmaceuticals. The Green Label can be used on products which meet the eco standards specified by the scheme, allowing certification by mutual recognition of SGLS endorsed products by other members of the network. The Singapore Environment Council (SEC) has administered the scheme since June 1999. The Council is a nationally orientated, non-governmental organisation that seeks to raise the level of environmental awareness and action within industry and the community. The SEC secretariat recommends product categories and solicits suggestions from industries. It also approves applications for the Green Label. New criteria for the SGLS are established through both industry and consumer demand for products available in Singapore, and those marketed overseas. Criteria to grant a product the right to display the Green Label are set mainly by three methods:

- An Advisory Committee comprising representatives from government, private sector organisations, academic institutions and statutory boards
- Industry review comprising responsive manufactures that compose a committee to formulate and agree on a standardised criterion
- Inputs from Global Eco-labelling Network[20] and affiliated members on standards creation and mutual recognising agreements between international eco-labels

Once the criteria are set and approved by an approving board, manufacturers and distributors of that product may apply for the Green Label.

The Thai Green Label Scheme was initiated by the Thailand Business Council for Sustainable Development in October 1993. It was formally launched in August 1994 by the Thailand Environment Institute in association with the Ministry of Industry. The scheme was developed to promote the concept of resource conservation, pollution reduction, and waste management. The purposes of awarding the green label are:

- To provide reliable information and guide customers in their choice of products
- To create an opportunity for consumers to make an environmentally conscious decision, thus creating market incentives for manufacturers to develop and supply more environmentally sound products
- To reduce environmental impacts which may occur during manufacturing, utilisation, consumption and disposal of products

The Thai Green Label Scheme applies to products and services, not including foods, drinks, and pharmaceuticals. Products or services which meet the Thai Green Label criteria can carry the Thai Green Label. Participation in the scheme is voluntary.

Sustainable Forestry

Forestry is an important economic activity in a number of AMS, especially in those countries that have vast forested areas and are rich in commercially viable timber. Forests have traditionally provided people with access to clean water, food, medicine and important social and cultural connections especially for indigenous people in the region. Forests also improve the quality of our air and even slow the process of climate change. If managed responsibly, forests and tree plantations will benefit the people who are dependent on forests for their livelihood, and the global community at large. As such, there is a need to ensure sustainability of forest-based activities, from harvesting to the finished product.

The Forest Stewardship Council (FSC) sets the criteria for sustainable forest production. FSC uses certification to engage the forestry market, driving recognition of the value of forests to improve social and environmental standards in forest management practices worldwide. AMS are striving to improve forest management and timber harvesting by reducing the adverse effects of illegal logging, and recognizing their social, economic and environmental values.

Any company seeking FSC certification must adapt its management and operations to conform to the highest social and environmental criteria set by FSC. FSC has defined ten best practices to meet the social, economic, ecological, cultural and spiritual needs of present and future generations.

FSC Principles for Forest Stewardship are:

- Compliance with laws and FSC principles
- Tenure and use rights and responsibilities
- Indigenous people's rights
- Community relations and workers' rights
- Multiple benefits from the forest
- Assessment of environmental impact
- Management planning
- Monitoring and assessment of management impact
- Maintenance of high conservation value forests
- Responsible management of plantations

For FSC, each certificate holder is audited at least once a year. A total of 1,323,781 hectares of forest in five AMS have been FSC certified. Indonesia has the largest certified forest area followed by Malaysia.

Table 7.6 : FSC Certified Forest Areas

Country	No. of Certifications	Total Forest Area Certified (ha)
Indonesia	9	1,090,062
Lao PDR	1	12,452
Malaysia	5	203,842
Thailand	4	7,643
Viet Nam	1	9,782
TOTAL	**20**	**1,323,781**

Source: *FSC website*[21]

Deramakot Forest Reserve (DFR) in Sabah, Malaysia was the first natural tropical rainforest in Southeast Asia to be managed in accordance with sustainable forestry principles. It was certified in 1997 as complying with the requirements of the Malaysian Criteria and Indicators and FSC's Standards for Sustainable Forest Management. Reduced-impact logging is employed for harvesting timber with minimal impacts on the physical environment. A strict protection area (4,000 ha) is set aside for biodiversity conservation within the reserve as the DFR is a key habitat for five globally threatened large mammals, namely the Orangutan, Pygmy Elephant, Tembadau (Banteng), Proboscis Monkey and the Clouded Leopard.

Endnotes

1 Thailand Environment Monitor 2003

2 National Commission for Environmental Affairs, Myanmar

3 Department of Solid Waste Management, Malaysia

4 Cambodia Environment Monitor 2003

5 The Philippines' National Solid Waste Management Commission

6 ADIPURA Data (Clean & Green City Award – Ministry of the Environment, Indonesia)

7 Indonesia State of Environment Report 2007

8 Data from the Department of Environment Malaysia

9 A barangay is the smallest administrative division in the Philippines.

10 The Philippines' National Solid Waste Management Commission

11 Viet Nam State of Environment Report 2005

12 Ministry of Development, Brunei Darussalam

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16 UN Environment Programme: Sustainable Consumption and Production Branch website (http://www.unep.fr/scp), accessed August 24, 2009.

17 RSPO website (www.rspo.org), accessed July 1, 2009.

18 The SAN is a coalition of leading conservation groups that links responsible farmers with conscientious consumers by means of the Rainforest Alliance Certified seal of approval. Its collective vision is based on the concept of sustainability, recognizing that the well-being of societies and ecosystems is intertwined and dependent on development that is environmentally sound, socially equitable and economically viable. The SAN develops and owns the Sustainable Agriculture Standard.

19 Sustainable Farm Certification International website (http://sustainablefarmcert.com/), accessed September 7, 2009.

20 Global Eco-labelling Network, http://www.globalecolabelling.net

21 Forest Stewardship Council website (www.fsc.org), accessed September 5, 2009.

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 responsibilities, respective capabilities as well as reflecting on different social and economic conditions

Roadmap for an ASEAN Community 2009 – 2015

ASEAN continues 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 vulnerable to their adverse effects, particularly the impact of climate change, disposal of toxic and hazardous chemicals and the loss of biodiversity.

AMS have shown full commitment to major multilateral environmental agreements (MEAs) with 100 percent ratification, while the more recent MEAs have high rates of ratification. Regional cooperation among AMS in promoting capacity building, sharing experiences and best practices, and acting collectively to implement the MEAs have helped AMS to build confidence and synergise their efforts to contribute effectively to addressing global environmental issues.

AMS have already met their commitments to most of the relevant conventions. For example, all AMS have significantly reduced the use of ozone depleting chlorofluorocarbons to less than 1,000 tonnes per year since 2006 from as high as 9,000 tonnes in 1995. Many AMS are also several years ahead of internationally agreed deadlines to end the production and consumption of ozone-depleting substances. In terms of carbon dioxide emissions, the region has much lower emission rates than Europe, North America, and Middle East and North Africa. However, carbon dioxide emission in the region has increased at an average annual average rate of about 5.6 percent between 1995 and 2004. Most AMS have set up high-level institutional frameworks and developed strategies/action plans to fulfil their obligations towards addressing climate change. As of September 2009, 170 Clean Development Mechanism (CDM) projects in AMS have been registered with the CDM Executive Board.

As parties to the Convention on Biological Diversity, most AMS have formulated their respective national biodiversity strategies and action plans and are in various stages of implementing them. In terms of protecting wetlands, the area of wetlands in AMS listed as Ramsar sites has increased by 63 percent from 811,000 hectares in 2006 to 1,320,391 hectares in 2009. Two more sites have been added to the World Heritage Sites list, bringing the ASEAN total to 29.

AMS have also developed regional action plans and strategies to address global environmental issues in the region such as the ASEAN Peatland Management Strategy, ASEAN Climate Change Initiative and the ASEAN Regional Action Plan on Trade in Wild Fauna and Flora.

ASEAN FACTS AND FIGURES

Participation in Multilateral Environmental Agreements *(ratified or acceded)*	ASEAN
Vienna Convention	100%
Montreal Protocol	100%
UNFCCC	100%
Kyoto Protocol	100%
Convention of Biological Diversity	100%
CITES	100%
Stockholm Convention	80%
Cartagena Protocol	80%
World Heritage Convention	80%
Basel Convention	80%
Ramsar Convention	70%
Rotterdam Convention	50%
Total CFC Consumption	1995: 24,912 ODP metric tonnes 2007: 967 ODP metric tonnes
CO_2 Emissions of ASEAN vis-à-vis Other Regions (2005) ASEAN Europe North America Middle East & North Africa *(Note: CO_2 emissions from combustion of solid, liquid and gaseous fuels, manufacture of cement and gas flaring only.)*	*(billion metric tonnes)* 0.99 6.23 6.45 1.96
Number of CDM projects (as of September 2009)	170
Number of World Heritage Sites (2008)	17 cultural sites 12 natural sites

The ASEAN region with its unique and diverse natural endowment is particularly vulnerable to the global environmental threats in terms of the sustainability of its natural resources, the health of its people and their way of life. AMS have shown full commitment to a number of major multilateral environmental agreements with 100 percent ratification, while the more recent multilateral environmental agreements (MEAs) have a high rate of ratification. Regional cooperation among AMS in promoting capacity building, sharing experiences and best practices, and acting collectively to implement the MEAs have helped AMS to build confidence and synergise their efforts to contribute effectively to addressing global environmental issues.

Some of the major global environmental issues addressed by ASEAN include depletion of the ozone layer, climate change, illegal wildlife trade, loss of biodiversity, and dumping of toxic and hazardous wastes.

Protection of the Ozone Layer

All AMS have ratified or acceded to the Vienna Convention for the Protection of the Ozone Layer (Vienna Convention) and the Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol). In line with their commitment to phase-out or minimise the use of ozone-depleting chlorofluorocarbons (CFCs), all AMS have drastically reduced their consumption to less than

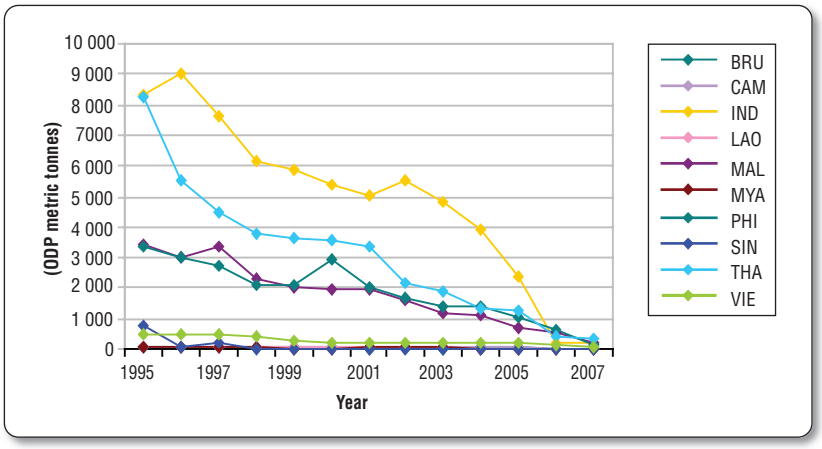
1,000 tonnes per year since 2006 from as high as 9,000 tonnes per year in 1995, with Indonesia showing the biggest reduction. Overall, most of the AMS have significantly reduced CFCs consumption in the region by more than 50 percent between 1995 and 2007. Myanmar and Singapore have completely eradicated the consumption of CFCs. Thus, some of the AMS are several years ahead of internationally-agreed deadlines to end production and consumption of chemicals that harm the earth's protective ozone layer.

Table 8.1: Participation in the Vienna Convention, Montreal Protocol and Its Four Amendments (as of September 2009)

Country	Ratification					
	Vienna Convention	Montreal Protocol	London Amendment	Copenhagen Amendment	Montreal Amendment	Beijing Amendment
Brunei Darussalam	26/07/90 (A)	27/05/93 (A)	03/03/09 (A)	03/03/09 (A)	03/03/09 (A)	03/03/09 (A)
Cambodia	27/06/01 (A)	27/06/01 (A)	31/01/07 (A)	31/01/07 (A)	31/01/07 (A)	31/01/07 (A)
Indonesia	26/06/92 (A)	26/06/92 (R)	26/06/92 (A)	10/12/98 (A)	26/01/06 (R)	26/01/06 (R)
Lao PDR	21/08/98 (A)	21/08/98 (A)	28/06/06 (A)	28/06/06 (A)	28/06/06 (A)	28/06/06 (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)	23/05/06 (R)	23/05/06 (R)
Singapore	05/01/89 (A)	05/01/89 (A)	02/03/93 (A)	22/09/00 (A)	22/09/00 (A)	10/01/07 (A)
Thailand	07/07/89 (A)	07/07/89 (R)	25/06/92 (R)	01/12/95 (R)	23/06/03 (R)	14/11/06 (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: *UNEP Ozone Secretariat* [1]
Notes: *R – Ratification, A – Accession, '–' not acceded or ratified*

Figure 8.1: Consumption of Ozone-Depleting CFCs, 1995 – 2007



Source: *UNEP Ozone Secretariat*
Note: *ODP – ozone depletion potential*

Malaysia's annual consumption of CFCs from 2002 to 2007 was consistently lower than the levels set under the Montreal Protocol and the national CFCs phase-out plan. Malaysia is expected to completely phase out the consumption of CFCs by 2010 as scheduled.

Indonesia had phased out CFCs nearly two years ahead of the 2010 deadline. Indonesia has also prohibited the import of methyl bromide since 2007. The country's focus after 2007 was on improving stakeholder awareness and participation, strengthening institutional and human resources

capacity and ozone depleting substance (ODS) import and use control.

The Philippines has also met with its commitments to the Montreal Protocol, with ODS consumption steadily declining since 1993. Many ODSs have been totally phased-out, ahead of schedule: methyl chloroform in 1997, all CFCs listed in Annex B of the Protocol, CFC 113, 114, and 115 and halons by 1999, CFC-11 by 2005 and methyl bromide[2] (non-QPS) by 2009. Presently, the Philippines is focused on total CFC-12 phase-out by 2010, following its National CFC Phase-out Project targets, and is devising a strategy to accelerate hydrochlorofluorocarbon phase-out.

Climate Change

All AMS have ratified or acceded to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. Although the region emits much lower carbon dioxide (CO_2) compared to most developed countries and regions, the emission rate however is increasing at an average annual rate of 5.6 percent. ASEAN's total CO_2 emission (produced from the combustion of fossil fuels, manufacture of cement and gas flaring) in 1995 was about 0.61 billion metric tonnes of CO_2 equivalent, but increased to about 0.99 billion metric tonnes in 2005. The total ASEAN CO_2 emission is much lower than that of Europe (6.23 billion metric tonnes) and North America (6.45 billion metric tonnes).

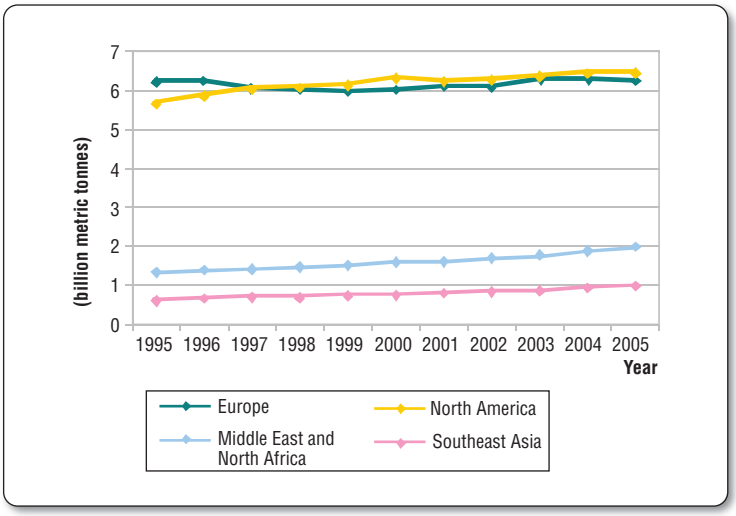
Table 8.2: Participation in UNFCCC and Kyoto Protocol (as of September 2009)

Country	UNFCCC	Kyoto Protocol
Brunei Darussalam	07/08/2007 (A)	20/08/2009 (A)
Cambodia	18/12/1995 (A)	22/08/2002 (A)
Indonesia	23/08/1994 (R)	03/12/2004 (R)
Lao PDR	14/01/1995 (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)

Source: *UNFCCC website[3]*
Note: *R – Ratification, A – Accession*

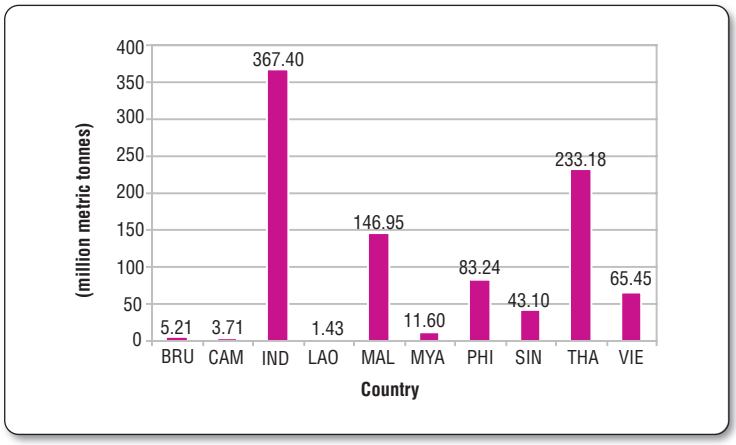
In 2005, total CO_2 emission (from combustion of solid, liquid and gaseous fuels; manufacture of cement; and gas flaring) among individual AMS ranged between 1.43 and 367.4 million metric tonnes of CO_2 equivalent. Brunei Darussalam, Cambodia and Lao PDR have low levels of total emissions.

Figure 8.2: Trend in Carbon Dioxide Emissions by Regions, 1995 – 2005



Source: *EarthTrends, World Resources Institute[4]*
Note: *Total CO_2 emissions include emissions produced during the combustion of solid, liquid, and gaseous fuels, as well as from the manufacture of cement, and gas flaring. CO_2 emission values do not include emissions from land use change or emissions from bunker fuels used in international transportation.*

Figure 8.3: Total Carbon Dioxide Emissions, 2005



Source: *EarthTrends, World Resources Institute*[5]

Note: *Total CO_2 emissions include emissions produced during the combustion of solid, liquid, and gaseous fuels, as well as from the manufacture of cement, and gas flaring. CO_2 emission values do not include emissions from land use change or emissions from bunker fuels used in international transportation.*

Although AMS, as Non-Annex I parties to Kyoto Protocol, have no obligation to set quantitative targets for emissions reduction, most AMS have implemented policies, programmes and measures to voluntarily reduce the emission of greenhouse gases (GHGs) and help mitigate climate change. Some of the mitigation efforts include reforestation and afforestation projects and reducing emissions from the waste and energy sectors through the Clean Development Mechanism (CDM). The CDM enables investment and technology transfer from developed countries for emission-reduction projects in developing countries, through which developed countries earn certified emission reduction credits that can be used to meet part of their emission targets under the Kyoto Protocol. As of September 2009, 170 CDM projects in AMS have been registered with the CDM Executive Board, covering a variety of areas such as landfill gas recovery, energy efficiency and renewable energy schemes, forestry, livestock and agriculture sectors.

AMS have also started to mainstream adaptation in development planning; enhance and build adaptive capacity, and implement proactive measures in key climate-sensitive sectors. International funding and technology transfer are essential for the success of adaptation actions in AMS.

Most AMS have set up dedicated high-level institutional frameworks, which include designation of related key agencies, and developed action plans for addressing climate change. They have also embarked on many programmes and initiatives and the appropriate policies are already in place. While considerable progress has been made, there is a need for integrating, more closely, climate change concerns into sustainable development policymaking.

Table 8.3: Registered CDM Projects (as of September 2009)

Country	No. of Projects
Cambodia	4
Indonesia	30
Lao PDR	1
Malaysia	61
Philippines	39
Singapore	1
Thailand	24
Viet Nam	10
TOTAL	**170**

Source: *UNFCCC CDM website*[6]

Table 8.4: National Climate Change Institutional Framework

Country	Institutional Framework	Action Plan/Programme
Brunei Darussalam	Ministry of Development – Designated Focal Agency for Climate Change	• National GHG Inventory Study • Promotion of Energy Efficiency • Pilot Project on Renewable Energy • Sustainable Forest Management • Flood Alleviation Programme
Cambodia	(1) National Climate Change Committee (NCCC), chaired by Senior Minister, Minister for Environment. The Prime Minister is the honorary chair (2) Climate Change Office serves as the Secretariat of the NCCC	• Develop climate change policies, legal instruments, strategies, programmes, and plans, including GHG mitigation and adaptation programmes, and promote their implementation • Promote the integration of climate change concerns into related policies, legal instruments, strategies, programmes, and plans Determine national positions and strategies for international negotiations on climate change • Coordinate activities concerning the implementation of UNFCCC, its protocols, and other international climate change agreements • Promote awareness and information dissemination on climate change
Indonesia	National Council on Climate Change – chaired by the President	• Released its National Climate Change Action Plan in 2007. The Action Plan calls for: i. greater integration between mitigation, adaptation, and national development goals through better coordination between relevant agencies (energy, transportation, forestry, and agriculture) ii. incorporation of climate-related funding decisions into all development plans, with the most promising signs of institutional coordination in medium- and short-term development plans; the plan is based upon "pro-poor, pro-job, pro-growth and pro-environmental" principles • Formulation of policies and measures in various sectors including energy, transportation, agricultural, water and coastal management.
Lao PDR	(1) Inter-Agency National Steering Committee on Climate Change (2) National Climate Change Office and Technical Working Groups (3) Water Resource and Environmental Administration – national focal point for climate change (4) Designated National Authority – review and approve CDM projects	• National Strategy and Action Plan on Climate Change 2009 • National Adaptation Plan of Action
Malaysia	(1) National Steering Committee on Climate Change, chaired by Secretary General of Ministry of Natural Resources and Environment (2) Core Group Meeting on Climate Change, chaired by Minister of Natural Resources and Environment to discuss further on	• Malaysia is currently drafting its National Climate Change Policy and preparing the NC2 report. • Other initiatives: i. Malaysia Industrial Energy Efficiency Improvement Project ii. GHG Inventory and estimation of

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Country	Institutional Framework	Action Plan/Programme
	climate change issues with experts and key persons. (3) National Committee on Clean Development Mechanism, chaired by Deputy Secretary General of Ministry of Natural Resources and Environment (4) Project Steering Committee on Second National Communication (NC2), chaired by Deputy Secretary General of Ministry of Natural Resources and Environment	carbon sequestration potential of Malaysia's natural forest, rubber and forest plantation. iii. Malaysian Building Integrated Photovoltaic Project iv. Biomass-based Power Generation and Cogeneration in the Palm oil Industry project v. Study of the impact of Climate change on the Hydraulic Regime and Water Resources of Peninsular Malaysia vi. Malaysian Airlines Voluntary Carbon Offset Scheme vii. Awareness Programmes on Climate Change
Myanmar	National Commission for Environmental Affairs, Ministry of Forestry – Designated Focal Agency for Climate Change	• GHG Inventory (Asia Least-cost Greenhouse Gas Abatement Strategy) • Preparing National Communications Project • Designated National Authority set up for CDM implementation • Preparing National Adaptation Programmes (National Adaptation Programmes for Action Project) • Sustainable Forest Management • Promotion of Energy Efficiency
Philippines	(1) Presidential Task Force on Climate Change, chaired by the President. (2) Office of the Presidential Adviser on Global Warming and Climate Change (3) Inter-Agency Committee on Climate Change (IACCC) acts as the national coordination mechanism and administrative machinery for the implementation of the Philippines' commitments to the UNFCCC: • Composed of government agencies and non-government organisation (NGO) representatives • Chaired by the Secretary of the Department of Environment and Natural Resources, and co-chaired by the Secretary of the Department of Science and Technology • Environmental Management Bureau – acts as IACCC Secretariat (4) The Department of Environment and Natural Resources as the Designated National Authority for CDM	• National Action Plan on Climate Change and the Second National Communication on Climate Change to the UNFCCC are currently being prepared • Climate Change Adaptation projects • National GHG Inventory • Develop action plans and targets in the energy sector to reduce GHG emissions, e.g. formulate policy framework for renewable energy; increase use of alternative fuels (ethanol blend without gasoline) by 10%. • Promote cleaner alternatives such as compressed natural gas, auto-gas and bio-fuel in the transport sector • Implement the National Energy Efficiency & Conservation Programme
Singapore	(1) Inter-Ministerial Committee on Climate Change, chaired by Senior Minister and Co-ordinating Minister for National Security – an inter-ministerial committee to ensure better coordination within the Government on climate change related issues (2) Inter-Ministerial Committee on Sustainable Development, co-chaired by Minister for	• Sustainable Development Blueprint – maps out Singapore's sustainable development plan, detailing the key goals and initiatives for the next 10 to 20 years. • E^2Singapore – a publication detailing the current measures and some of the future plans for various sectors, to mitigate carbon emissions and improve energy use.

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Country	Institutional Framework	Action Plan/Programme
	National Development and Minister for Environment and Water Resources – to formulate a national strategy for Singapore's sustainable development in the context of emerging domestic and global challenges. The Committee includes members from the Ministry of Finance, the Ministry of Trade & Industry, and the Ministry of Transport. (3) Energy Efficiency Programme Office, co-led by the National Environment Agency and the Energy Market Authority – an inter-agency committee to drive energy efficiency improvement in all sectors of Singapore's economy (4) National Climate Change Committee: • chaired by the Senior Parliamentary Secretary for the Environment and Water Resources; • comprises stakeholders from the public and private sectors, NGOs and academia to promote greater energy efficiency and cleaner energy; and • aims to raise awareness among consumers and businesses about the impacts and opportunities arising from climate change, and the actions they can take.	• Vulnerability Study – a study commissioned to identify Singapore's vulnerability to climate change; the study will project climate change effects such as temperature, sea level and rainfall patterns in Singapore in the next century, and the impacts of such effects like increased flooding and impacts on water resources and public health. • Singapore's National Climate Change Strategy: i. sets out how Singapore will address the various aspects of climate change, by better understanding our vulnerabilities to climate change, identifying and assessing adaptation measures required for climate change, and mitigating emissions of GHGs ii. highlights existing measures that have been put in place as a result of past environmental and developmental planning – for adaptation to climate change (e.g. the introduction of NEWater and desalination) iii. identified improving energy efficiency as key strategy for mitigating emissions of GHGs
Thailand	(1) National Climate Change Committee, chaired by the Prime Minister (2) Technical Sub-committees – support different aspects of climate change issues, including mitigation, vulnerability and adaptation. (3) Office of Natural Resources and Environmental Policy and Planning – national focal point to the UNFCCC	• 10-year climate change plan is being developed • Developed Strategic Plan on Climate Change (2008 – 2012) • Established the Thailand GHG Management Public Organisation to cover all aspects of implementation of climate change projects, including CDM projects • Key policy aim – to strengthen the links between measures to address sustainable development and those to address climate change; important areas of overlap include improvements to energy efficiency and promotion of carbon sequestration
Viet Nam	(1) National Steering Committee, chaired by the Prime Minister (2) The Department of Meteorology, Hydrology and Climate Change (under the Ministry of Natural Resources and Environment [MoNRE])– focal point for climate change activities	• Financial mechanisms and policies were instituted to support climate change activities. • MoNRE was tasked, in coordination with other relevant ministries, to establish a national target programme in response to climate change.

Sources: *Brunei Darussalam: Ministry of Development*
Cambodia: Ministry of Environment
Indonesia: Ministry of the Environment
Lao PDR: National Strategy and Action Plan on Climate Change; National Adaptation Programme of Action to Climate Change
Malaysia: Ministry of Natural Resources and Environment
Myanmar: Ministry of Forestry
Philippines: Department of Environment and Natural Resources
Singapore: Ministry of the Environment and Water Resources
Thailand: Office of Natural Resources and Environmental Policy and Planning
Viet Nam: Ministry of Natural Resources and Environment

Nature Conservation and Biodiversity

The major conventions under the category include:

- 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
- 1979 Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
- 1992 Convention on Biological Diversity and the 2000 Cartagena Protocol on Biosafety

All AMS have either ratified or acceded to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Convention on Biological Diversity (CBD). Most have ratified or acceded to the other three conventions. Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand and Viet Nam have ratified all of the above conservation and biodiversity-related MEAs.

Table 8.5: Participation in MEAs Related to Conservation and Biodiversity

Country	Ramsar Convention	World Heritage	CITES	CBD	Cartagena
Brunei Darussalam	–	–	04/05/90 (A)	27/07/08 (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)	13/02/08 (R)
Philippines	08/11/94	19/09/85 (R)	18/08/81 (R)	08/10/93 (R)	05/10/06 (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)

Sources: *CBD website; CITES website; UNESCO World Heritage website; and Ramsar Convention website*[7]
Notes: *R – Ratification, A – Accession, '–' not acceded or ratified*

Wetland Conservation

As parties to the Ramsar Convention, AMS have been active in identifying and protecting important wetland areas. The area of wetlands in AMS listed as Ramsar sites has increased by 63 percent from 811,000 hectares in 2006 to 1,320,391 hectares in 2009. This is an important contribution of AMS to the global efforts as the region hosts some of the most important freshwater swamps, peatlands and mangrove forests in the world. It is expected that more wetlands in the region will be designated as Ramsar sites in the future.

International Trade in Endangered Species

All AMS are parties to the CITES and have collaborated to control the trade in wild fauna and flora. The ASEAN Wildlife Enforcement Network is now the largest wildlife law enforcement network in the world. The ASEAN Regional Action Plan on Trade in Wild Fauna and Flora (2005 – 2010) provides a framework for enhanced collaboration among the AMS. Specifically, it addresses common issues of law enforcement networking, inter-agency co-operation, strengthening national legislation, and increasing the availability of scientific information to guide wildlife trade management by CITES

Table 8.6: CITES-Listed Species (as of September 2009)

Country	Animals			Plants		
	App. I	App. II	App. III	App. I	App. II	App. III
Brunei Darussalam	14	100	5	–	25	–
Cambodia	38	108	4	3	32	–
Indonesia	58	1255	11	27	943	–
Lao PDR	42	116	7	6	42	–
Malaysia	38	626	13	20	759	–
Myanmar	55	271	11	9	156	2
Philippines	19	805	3	13	166	–
Singapore	16	270	1	–	182	–
Thailand	50	429	9	15	209	1
Viet Nam	56	639	12	15	134	1

Source: *CITES website*[8]
Note: *'–' no species listed*

authorities. The Regional Action Plan also prioritises engagement with civil society to raise awareness of legality and sustainability issues with industry groups, traders and local communities involved in wildlife trade. AMS have also enacted legislations to support their obligations to the CITES – the most recent being Malaysia's International Trade in Endangered Species Act 2007.

Preservation of Cultural and Natural Sites

The number of World Heritage Sites in AMS has increased since the 3rd ASEAN State of Environment Report with a total of 17 cultural and 12 natural sites listed. The latest additions are the Temple of Preah Vihear in Cambodia and two historical cities, Melaka and Georgetown in Malaysia, which were listed in 2008.

AMS are rich in cultural sites. With the ongoing anthropological and archaeological research, many more sites are expected to be discovered. It is anticipated that more culturally and naturally significant sites will be listed as UNESCO's World Heritage Sites in the near future. However, the effort to list these sites has to be accelerated as many of these sites are being damaged by natural erosion and human activities such as poaching, theft and vandalism, intrusive commercial development and deforestation.

Table 8.7: World Heritage Sites (as of September 2009)

Country	Cultural	Natural
Cambodia	2	0
Indonesia	3	4
Lao PDR	2	0
Malaysia	1	2
Myanmar	0	0
Philippines	3	2
Thailand	3	2
Viet Nam	3	2
Total	**17**	**12**

Source: *UNESCO World Heritage Convention website*[9]
Note: *Brunei Darussalam and Singapore have yet to ratify the World Heritage Convention.*

Protecting Biological Diversity

As parties to the CBD, AMS have taken steps and instituted measures to reduce the rate of biodiversity loss in the region. AMS are also committed to achieve by 2010, a significant reduction in the current rate of biodiversity loss at the global, regional and national level. Most AMS have already formulated national biodiversity strategies and action plans (NBSAP) and are now in various stages of implementing them.

Box 8.1: Conservation and Restoration of the Angkor World Heritage Site

Built during the reign of King Suryavarman II in the early 12th century, Angkor World Heritage Site is known as one of the most important archaeological sites in Southeast Asia. The site consists of the remains of the Khmer Empire, including the temple of Angkor Wat and Bayon. Over the past centuries, the site has been seriously threatened especially due to natural erosion and stone deterioration. Additionally, although not as severely, the increasing number of tourists is also affecting the temples.

In collaboration with the Cambodian government, efforts have been made by local and international organisations to conserve the site. The Archaeological Survey of India and the German Apsara Conservation Project were among the first few organisations to render conservation initiatives in the Angkor Wat; with focus mainly on the most affected structures especially the devatas. It 1993, the Division of Cultural Heritage (under UNESCO) in cooperation with the World Heritage Centre initiated a more holistic plan to conserve the site. This initiative was successful and Angkor Wat was removed from the List of World Heritage in Danger in 2004. This initiative focused on conservation and restoration work on the Bayon temple, the Royal Plaza and the temple of Angkor Wat itself. The extent to which restoration work was carried out at these areas depended on the nature and criticality of the threats. The details of the work carried out are as follows:

First Phase (1995 – 1999)

During the first phase, conservation and restoration work was concentrated on the Bayon Temple and the Royal Plaza. The Japanese Government Team for Safeguarding Angkor (JSA) was entrusted as the implementation agency with support from the Japan International Co-operation Centre.

Second Phase (1999 – 2005)

For the second phase, the JSA team continued its activities at Prasat Suor Prat. Among the targets were the completion of the Master Plan for the preservation of Bayon and the restoration of the Northern Library of Angkor Wat. Since 1996, JSA has also been organizing annual symposiums on the Bayon. These scientific meetings attended by the Cambodian government and international experts have significantly increased the contributions of technical inputs in developing better preservation methods for the heritage site. Additionally, various researches have also been conducted to give input to the restoration works.

Ancient ruins of Angkor

Source: *Ministry of Environment, Cambodia*

Table 8.8: Status of National Biodiversity Strategies and Action Plans

Country	Status of NBSAP
Brunei Darussalam	Ratified the CBD only in 2008, and hence has not formulated its NBSAP yet.
Cambodia	The Cambodian NBSAP, adopted in 2002, recommends a sectoral approach to managing biodiversity. The NBSAP has 17 thematic areas and 98 priority action plans.
Indonesia	Indonesia's first Biodiversity Action Plan was published in 1993 prior to the ratification of the CBD. The second edition, published in 2003, covers the period 2003 – 2020. The NBSAP emphasises an approach for biodiversity management that is decentralised, participatory, and transparent, focussing on a "shift in the development paradigm, a new social contract between government, private sector, NGOs, communities and national, regional and local levels, and the strengthening of the preconditions for sustainable and equitable biodiversity management".
Lao PDR	The NBSAP, completed in 2004, comprises a strategy to 2020 and an action plan to 2010. The NBSAP has seven main objectives – among others to identify important biological diversity components and improve the knowledge base.

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Country	Status of NBSAP
Malaysia	The NBSAP was published in 1998 – comprising 15 strategies addressing 11 articles of the CBD. A guiding principle in the national policy is that the "role of local communities in the conservation, management and utilisation of biological diversity must be recognised and their rightful share of benefits should be ensured".
Myanmar	Developed its NBSAP in 2006. An initial phase of the NBSAP was implemented and identified a 3-level institutional structure to address the NBSAP. The institutional structures have yet to be formed.
Philippines	The first NBSAP was published in 1997. Since then, it has undergone several revisions. Strategies and immediate actions have been implemented in varying degrees. The Philippine Biodiversity Conservation Priority Setting Programme has identified 206 priority areas for conservation.
Singapore	The NBSAP which was launched on 5 September 2009 is part of Singapore's Sustainable Blueprint and complements the targets set out in the Singapore Green Plan 2012. The NBSAP documents in greater detail the integrated strategies and holistic efforts of the government, the community, and organisations in biodiversity conservation for the next few years, that are over and above the Singapore Green Plan.*
Thailand	Prior to CBD ratification in 2004, Thailand developed its first national Policy, Strategies and Action Plan on the Conservation and Sustainable Use of Biodiversity for the 1998 – 2002 period. The second NBSAP addressing seven thematic areas covers the 2003 – 2007 period.
Viet Nam	Promulgated its NBSAP in 1995. The new National Biodiversity Action Plan was approved in 2007; Main activities since then are the promulgation of various laws especially the Biodiversity Law in 2008. Objectives related to the completion of a legal framework and management system have been addressed but these are "outside the strategic objectives of the CBD".

Sources: *(1) CBD Secretariat[10]*
(2) Compiled from 4th National Reports to the CBD
**updated by AMS*

Chemicals and Hazardous Waste

The three major MEAs related to chemicals and hazardous wastes are:

- The 1989 Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (the Basel Convention)
- The 1998 Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (the Rotterdam Convention)
- The 2001 Convention on Persistent Organic Pollutants (the Stockholm Convention)

Eight AMS have either acceded to or ratified the Basel Convention. Five AMS have either acceded to or ratified the Rotterdam Convention and eight, the Stockholm Convention. As of September 2009, the Philippines, Singapore, Thailand and Viet Nam have acceded or ratified all three conventions related to chemical and hazardous waste.

Table 8.9: Participation in Chemical and Hazardous Waste related Conventions (as of May 2009)

Country	Basel Convention	Rotterdam Convention	Stockholm Convention
Brunei Darussalam	16/12/02(A)	–	–
Cambodia	02/03/01(A)	–	25/08/06(R)
Indonesia	12/07/93(R)*	–	11/06/09(R)*
Lao PDR	–	–	28/06/06(R)
Malaysia	08/10/93(A)	04/09/02(A)	–
Myanmar	–	–	19/04/04(A)
Philippines	21/10/93(R)	31/07/06(A)	27/02/04(R)
Singapore	02/01/96 (A)	24/05/05 (A)	24/05/05(A)*
Thailand	24/11/97(R)	19/02/02(A)	31/01/05(R)
Viet Nam	13/03/95(A)	07/05/07(A)	22/07/02(R)

Source: *Basel, Rotterdam & Stockholm Conventions' websites[11] (*updated by AMS)*
Notes: *R – Ratification, A – Accession, '–' not acceded or ratified*

AMS have formulated legislations, policies and plans to meet their commitments under these conventions. For example, the Philippines has drafted a National Implementation Plan that outlines programmes to meet its obligations to the Stockholm Convention and addresses the specific issues on persistent organic pollutants (POPs) in the country. The Fertiliser and Pesticide Authority (FPA) of the Department of Agriculture monitors prohibited pesticides, which include POPs. Currently, the pesticides that have been totally banned by the FPA are aldrin, chlordane, dieldrin, endrin, heptachlor, toxaphene, hexachlorobenzene, mirex and dichloro-diphenyl-trichloroethane. Other toxic and endocrine-disrupting chemicals monitored are polychlorinated dibenzo-*p*-dioxins (dioxins) and polychlorinated dibenzofurans (furans).

The Toxic Substances and Hazardous and Nuclear Waste Control Act (Republic Act 6969) in the Philippines provides the legal framework for the country's programme to manage the various chemicals. The Philippines' Inventory of Chemicals and Chemical Substances, which was formulated under the Act, provides a database of all existing chemicals and chemical substances used, sold, distributed, imported, processed, and/or manufactured in the Philippines.

Singapore has banned the use of the 10 POPs including industrial chemicals and pesticides. Air emission standards have also been introduced under the Environmental Protection and Management (Air Impurities) Regulations 2001 to limit dioxins and furans releases. Singapore submitted its National Implementation Plan to the Stockholm Convention Secretariat on 22nd August 2007.

Malaysia promulgated the Environmental Quality (Scheduled Wastes) Regulations in 2005, replacing the previous regulations of 1989. The

Box 8.2: E-Inventory for Malaysia

Malaysia as a Party to the Basel Convention on the Control of Transboundary Movement of Hazardous Waste and their Disposal has put in place measures to manage toxic and hazardous wastes based on the cradle-to-grave principle. The management of waste electrical and electronic equipment (WEEE) which is also referred to as e-waste was initiated through enforcement of the Environmental Quality (Scheduled Wastes) Regulations 2005 on 15 August 2005. To further address the issue of e-waste, the Department of Environment (DOE) formulated the Guidelines for the Classification of Used Electronic and Electrical Equipment 2008 to assist relevant parties to ascertain whether used electronic and electrical equipment are categorised as e-waste.

In order to better understand the rate of e-waste generation in Malaysia, the development of the e-waste inventory in Malaysia was carried out as a part of the Secretariat of the Basel Convention Project on Environmentally Sound Management of E-waste in the Asia-Pacific Region and funded by the Ministry of Environment Japan. EX Corporation (Japan) was appointed to administer the fund and to execute the project.

In Malaysia, the project was managed by DOE with the support of other government agencies such as the Department of Statistics, Customs Department, the Penang Municipal Council and Ministry of Housing and Local Government serving as the members of the Technical Committee. In addition, members from the Ministry of Environment Japan, the Secretariat of the Basel Convention, and the Basel Convention Regional Centre for Training and Technology Transfer for Southeast Asia were included in the Steering Committee.

The study showed that by 2020, the cumulative total WEEE from the seven categories of WEEE that will be discarded in Malaysia namely television sets, computer sets with CRT or LCD monitors and notebooks, washing machines, mobile phones, refrigerators, air conditioners and rechargeable batteries (mobile phones) is estimated to be about 1.165 billion units (21.379 million metric tonnes).

The affordability factor of electrical and electronic equipment (EEE) and the increasing need for EEE to fit the lifestyle demands are the factors that cause the increased generation of WEEE.

Malaysia is in the process of developing specific rules and regulations for the take-back of WEEE. There are 126 partial recovery facilities and 15 full recovery facilities of e-waste that are licensed by DOE. Community awareness on sound management of WEEE is limited but increasing.

Source: *Department of Environment, Malaysia*

new regulations enable the Department of Environment to control the use, storage, import and export of a wide range of hazardous wastes. These include many types of wastes that were previously not categorised as hazardous such as electronic wastes. Malaysia has also developed procedures for the import and export of hazardous wastes including protocols for tracking the movement of wastes. Although currently not a party to the Stockholm Convention, Malaysia regulates the use of many POPs such as dioxins and furans through its scheduled waste regulations.

The Basel Convention Regional Centre for Training and Technology Transfer for Southeast Asia (BCRC-SEA) in Jakarta, Indonesia serves as a regional centre for training and technology transfer. It also serves as facilitator and provides assistance and support to Parties in the region. BCRC-SEA's role is to contribute to synergies by identifying areas where similar goals are shared between the waste and chemicals conventions. The Centre does this by developing tools and supporting materials for the sound management of chemicals and hazardous wastes, and conducting capacity building programmes towards the detection and prevention of illegal trafficking. Through public-private partnerships, the Centre complements governments' efforts in life-cycle approach to chemicals and products.

Endnotes

1 UNEP Ozone Secretariat website (http://ozone.unep.org), accessed September 24, 2009.

2 Methyl bromide uses other than for quarantine and pre-shipment (QPS) treatment for imports, exports and certain commodities transported interstate as prescribed by the Montreal Protocol.

3 UNFCCC website (http://unfccc.int), accessed September 9, 2009.

4 Available at http://earthtrends.wri.org/searchable_db/index.php?action=select_theme&theme=3, accessed October 7, 2009 (EarthTrends compiled the data from the Climate Analysis Indicators Tool version 6.0, World Resources Institute http://cait.wri.org)

5 Available at http://earthtrends.wri.org/searchable_db/index.php?action=select_theme&theme=3, accessed October 7, 2009 (EarthTrends compiled the data from the Climate Analysis Indicators Tool version 6.0, World Resources Institute http://cait.wri.org)

6 UNFCCC CDM website (http://cdm.unfccc.int), accessed September 24, 2009.

7 CBD website (http://cbd.int); Convention on International Trade in Endangered Species of Wild Fauna and Flora website, (http://www.cites.org); UNESCO World Heritage Convention website (http://whc.unesco.org); and Ramsar Convention website (http://www.ramsar.org), accessed May 13, 2009.

8 CITES website (http://www.cites.org), accessed September 24, 2009.

9 UNESCO World Heritage Convention website (http://whc.unesco.org), accessed September 24, 2009.

10 CBD. (2008). *An Analysis of NBSAPs Submitted by ASEAN Countries (UNEP/CBD/NBSAP/CBW-SE-ASI/INF/2)*. Available online at http://www.cbd.int/doc/meetings/nbsap/nbsapcbw-seasi-01/information/nbsapcbw-seasi-01-inf-02-en.doc

11 Basel Convention website (http://www.basel.int); Rotterdam Convention website (http://www.pic.int); and Stockholm Convention website (http://www.pops.int), accessed May 13, 2009.

CHAPTER 9
ASEAN Environmental Management Framework

ASEAN shall work towards achieving sustainable development as well as promoting clean and green environment by protecting the natural resource base for economic and social development including the sustainable management and conservation of soil, water, mineral, energy, biodiversity, forest, coastal and marine resources as well as the improvement in water and air quality for the ASEAN region

Roadmap for an ASEAN Community 2009 – 2015

The ASEAN Charter, which entered into force on 15th December 2008, recognises the existence in member states of mutual benefits and interdependence among the peoples who are bound by geography, common objectives and shared destiny. Inspired by and united under *One Vision, One Identity and One Caring and Sharing Community*, the Charter resolves to ensure sustainable development for the benefit of present and future generations and to place the well-being, livelihood and welfare of the peoples at the centre of the ASEAN community building process. To realise the purposes of the Charter, ASEAN Leaders have adopted a new framework for regional cooperation in ASEAN – the Roadmap for an ASEAN Community 2009 – 2015 comprising the ASEAN Political-Security Community Blueprint, the ASEAN Economic Community Blueprint, the ASEAN Socio-Cultural Community Blueprint, and the Initiative for ASEAN Integration 2nd Work Plan. Environmental activities essentially come under the ASEAN Socio-Cultural Community Blueprint with strong inter-linkages with relevant elements of the other Community Blueprints. The institutional structure of ASEAN has been strengthened, particularly for cross-sectoral coordination, to effectively deliver on the strategies and actions in the Roadmap.

This essentially forms the framework for environmental cooperation in ASEAN for the next seven years. The framework is grounded on the principle of sustainable development with strong integrated linkages with economic growth and social development. The past several decades of regional cooperation and partnerships have led to the development and adoption of effective strategies and actions on environment in ten priority areas of cooperation in environment, which will be further pursued under the Roadmap.

The strengthened institutional and policy framework, coupled with the experience of previous and on-going programmes, places ASEAN on a stronger footing to effectively implement the strategies and actions as laid out in the Roadmap for an ASEAN Community 2009 – 2015. Existing and potential partners will gain a better understanding of ASEAN program priorities, and mechanisms for collaboration with ASEAN based on mutually beneficially interests and arrangements.

ASEAN FACTS AND FIGURES

Policy Framework for Sustainable Development Cooperation in ASEAN *(derived from)*	• ASEAN Vision 2020 (15 December 1997) • ASEAN Concord II (7 October 2003) • ASEAN Charter (15 December 2008) • Roadmap for an ASEAN Community (1 March 2009)
Strategic Objectives and Actions on Environment	Section D: Promoting Environmental Sustainability of the ASEAN Socio-Cultural Community Blueprint (2009 – 2015)
Most Recent Declarations/Agreements related to Environment	• The Cebu Resolution on Sustainable Development (2006)(ASEAN Environment Ministers) • The ASEAN Declaration on Environmental Sustainability (2007) (ASEAN Summit) • The ASEAN Declaration on the 13th Session of the Conference of the Parties to the UNFCCC and the 3rd Session of the CMP to the Kyoto Protocol (2007) (ASEAN Summit) • The Singapore Declaration on Climate Change, Energy and the Environment (2007) (EAS Summit) • The Cha-Am Hua Hin Declaration on the Roadmap for the ASEAN Community (2009 – 2015) (ASEAN Summit) • Joint Statement to the 15th Meeting of the Conference of Parties to the UN Framework Convention on Climate Change and the 5th Meeting of the Parties to the Kyoto Protocol (2009) (ASEAN Summit) • Singapore Resolution on Environmental Sustainability and Climate Change (2009) (ASEAN Environment Ministers)

Policy Framework

The ASEAN Charter was adopted by the ASEAN Leaders on 20th November 2007 and entered into force on 15th December 2008. The ASEAN Charter heralded a momentous and historic transformation of ASEAN which hitherto had operated as a loose coalition of nations since its founding in 1967. It transformed ASEAN into a rules-based organisation and attained for itself a legal personality and a new institutional framework.

ASEAN's commitment towards a more sustainable path to development was recognised as early as 1997 in the ASEAN Vision 2020, which 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 peoples"

In the preamble to the ASEAN Charter, the ASEAN Leaders resolved to ensure sustainable development for the benefit of present and future generations and to place the well-being, livelihood and welfare of the people at the centre of the ASEAN community building process. The Charter reaffirms, as one of its fundamental principles, to promote sustainable development so as to ensure the protection of the region's environment, the sustainability of its natural resources, the preservation of its cultural heritage and the high quality of life of its people.

ASEAN cooperation is now geared toward achieving the ASEAN Community goal by the year 2015. Before this, the attainment of the goals of ASEAN Vision 2020 was made through a series of medium-term action plans, which 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 as the Vientiane Action Programme (VAP) commenced in 2004 and is scheduled to be completed by 2010.

ASEAN Leaders adopted the Declaration of ASEAN Concord II (Bali Concord II) in 2003 resolving to realise the ASEAN Community by the year 2020, which was subsequently accelerated to the year 2015. The ASEAN Community shall be based on three mutually supporting pillars namely the ASEAN Political-Security Community, the ASEAN Economic Community and the ASEAN Socio-Cultural Community. Environmental cooperation essentially comes under the ambit of the ASEAN Socio-Cultural Community. However, considering the cross-sectoral nature of environment, the other two pillars contain, where appropriate, relevant elements related to environment, forging strong linkages and ensuring mutually coordinated development across all pillars.

Box 9.1: Section D: Ensuring Environmental Sustainability, ASCC Blueprint 2009 – 2015

ASEAN shall work towards achieving sustainable development as well as promoting clean and green environment by protecting the natural resource base for economic and social development including the sustainable management and conservation of soil, water, mineral, energy, biodiversity, forest, coastal and marine resources as well as the improvement in water and air quality for the ASEAN region. ASEAN will actively participate in global efforts towards addressing global environmental challenges, including climate change and the ozone layer protection, as well as developing and adapting environmentally-sound technology for development needs and environmental sustainability.

To realise the ASEAN Community by 2015, ASEAN Leaders adopted a new framework for regional cooperation known as the Roadmap for an ASEAN Community 2009 – 2015. The Cha-am Hua Hin Declaration on the Roadmap for the ASEAN Community adopted by the Leaders on 1st March 2009 states that the ASEAN Political-Security Community (APSC) Blueprint, the ASEAN Economic Community (AEC) Blueprint, the ASEAN Socio-Cultural Community (ASCC) Blueprint, and the Initiative for ASEAN Integration shall constitute the Roadmap for an ASEAN Community 2009 – 2015. The Roadmap replaced the Vientiane Action Programme.

The ASCC Blueprint elaborates on strategies and actions for 11 thematic areas namely:

D.1. Addressing global environmental issues
D.2. Managing and preventing transboundary environmental pollution (transboundary haze pollution, and transboundary movement of hazardous wastes)

D.3. Promoting sustainable development through environmental education and public participation
D.4. Promoting environmentally sound technology
D.5. Promoting quality living standards in ASEAN cities/urban areas
D.6. Harmonizing environmental policies and databases
D.7. Promoting the sustainable use of coastal and marine environment
D.8. Promoting sustainable management of natural resources and biodiversity
D.9. Promoting the sustainability of freshwater resources
D.10. Responding to climate change and addressing its impacts
D.11. Promoting sustainable forest management

In addition to the Roadmap for an ASEAN Community, ASEAN regional cooperation on environment is guided by Agreements and Declarations issued by the Leaders and the Environment Ministers from time to time.

Box 9.2: ASEAN Leaders' Declarations Related to Environment, 1981 – 2009

- Joint Statement to the 15th Meeting of the Conference of Parties to the UN Framework Convention on Climate Change and the 5th Meeting of the Parties to the Kyoto Protocol, 24 October 2009, Cha-Am Hua Hin Thailand.
- Cha-am Hua Hin Declaration on the Roadmap for the ASEAN Community (2009 – 2015), 1 March 2009, Cha-am Hua Hin, Thailand
- ASEAN Declaration on the 13th session of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) and the 3rd Session of the Conference of the Parties serving as the meeting of the Parties (CMP) to the Kyoto Protocol, 20 November 2007, Singapore
- ASEAN Declaration on Environmental Sustainability, 20 November 2007, Singapore
- Singapore Declaration on Climate Change, Energy and the Environment; 3rd East Asia Summit (EAS), 21 November 2007, Singapore
- Cebu Declaration on East Asian Energy Security, 15 January 2007, Cebu, Philippines

Box 9.3: ASEAN Environment Ministers' Agreements/Declarations Related to Environment, 1981 – 2009

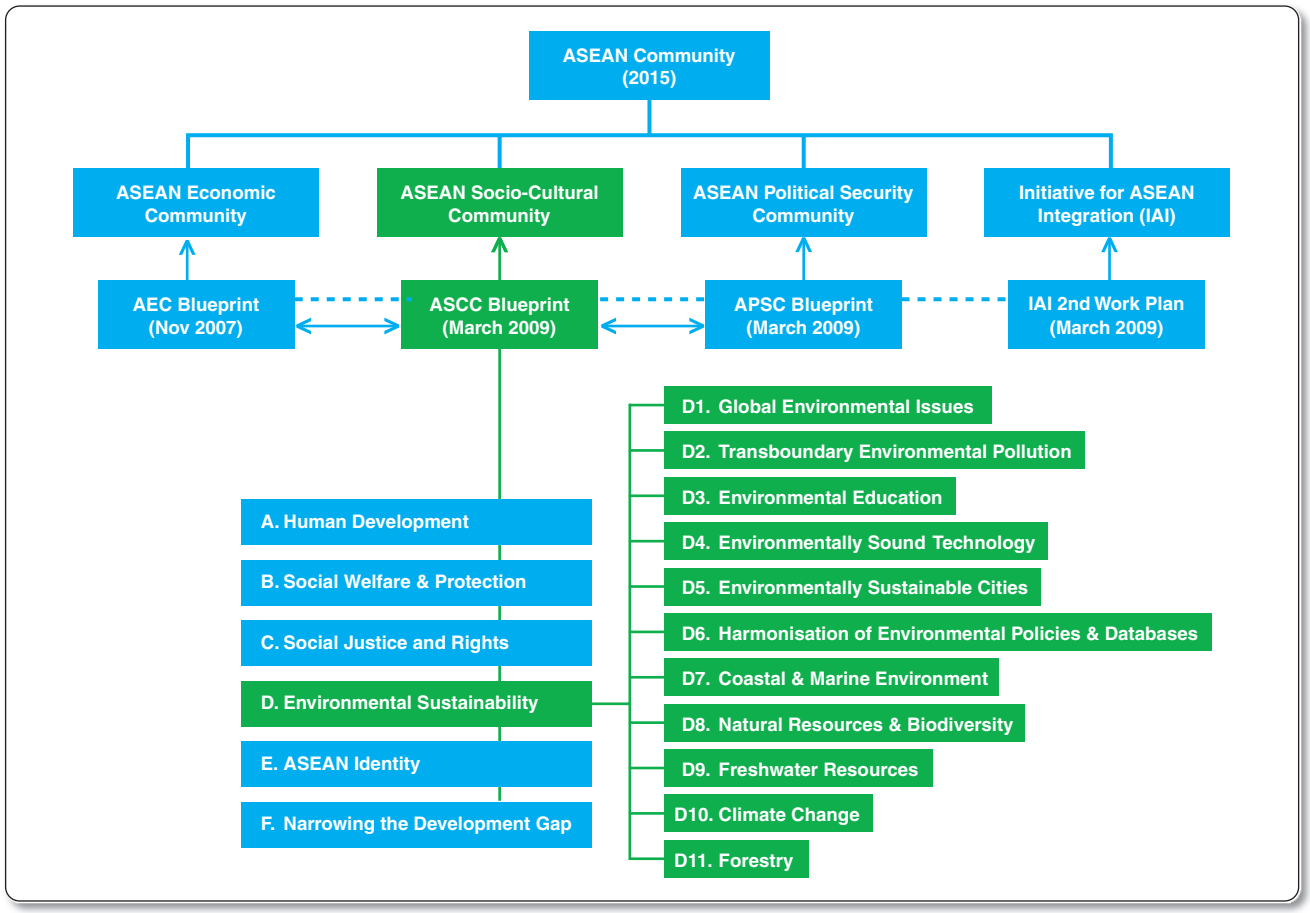
- Singapore Resolution on Environmental Sustainability and Climate Change, 29 October 2009, Singapore.
- Cebu Resolution on Sustainable Development, 10 November 2006, Cebu, Philippines
- Agreement for the Establishment of the ASEAN Centre for Biodiversity, 2005 – signed *ad-referendum*
- ASEAN Declaration on Heritage Parks, 18 December 2003, Yangon, Myanmar
- Yangon Resolution on Sustainable Development, 18 December 2003, Yangon, Myanmar
- ASEAN Agreement on Transboundary Haze Pollution, 10 June 2002, Kuala Lumpur, Malaysia
- Kota Kinabalu Resolution on the Environment, 7 October 2000, Kota Kinabalu, Sabah, Malaysia
- Jakarta Declaration on Environment and Development, 18 September 1997, Jakarta, Indonesia
- Bandar Seri Begawan Resolution on Environment and Development, 26 April 1994, Bandar Seri Begawan, Brunei Darussalam
- Singapore Resolution on Environment and Development, 18 February 1992, Singapore
- Kuala Lumpur Accord on Environment and Development, 19 June 1990, Kuala Lumpur, Malaysia
- Jakarta Resolution on Sustainable Development, 30 October 1987, Jakarta, Indonesia
- Agreement on the Conservation of Nature and Natural Resources, 9 July 1995, Kuala Lumpur, Malaysia
- Bangkok Declaration on the ASEAN Environment, 29 November 1984, Bangkok, Thailand
- ASEAN Declaration on Heritage Parks and Reserves, 29 November 1984, Bangkok, Thailand
- Manila Declaration on the ASEAN Environment, 30 April 1981, Manila, Philippines

Institutional Framework

The ASEAN Charter while rationalizing and maintaining existing institutions, has created several new institutions to better coordinate, enhance and streamline the work of the various sectoral bodies. The ASEAN Summit, the supreme policy-making body of ASEAN, now meets twice a year in addition to having special or ad-hoc meetings. The ASEAN Leaders provide the vision and broad thrust for co-operation in various sectors, including co-operation on environment.

A newly constituted ASEAN Coordinating Council comprising the ASEAN Foreign Ministers will, among others, coordinate with the ASEAN

Figure 9.1: Environmental Cooperation in the Roadmap for an ASEAN Community 2009 – 2015



Community Councils to enhance policy coherence, efficiency and cooperation among them. Each of the three Communities will have a new ASEAN Community Council which will, among others, ensure the implementation of the relevant decisions of the ASEAN Summit, and coordinate the work of the different sectors under its purview and on issues which cut across the other Community Councils. The ASEAN Socio-Cultural Community Council will oversee the work of the ASEAN Environment Ministers.

The ASEAN Environment Ministers are primarily responsible for policy and strategic matters related to the environment. The Environment Ministers meet on a formal basis once every three years and since 1994, have also been meeting on an informal basis annually.

The ASEAN Senior Officials on the Environment (ASOEN) meet annually and are responsible for supporting the ASEAN Environment Ministers in terms of formulation, implementation and monitoring of regional programmes and activities. 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 ASEAN Working Group on Coastal and Marine Environment (AWGCME), the ASEAN Working Group on Environmental Education (AWGEE), the ASEAN Working Group on Environmentally Sustainable Cities (AWGESC), the ASEAN Working Group on Multilateral Environmental Agreements (AWGMEA), the ASEAN Working Group on Nature Conservation and Biodiversity (AWGNCB), and the ASEAN Working Group on Water Resources Management (AWGWRM). The ASEAN Secretariat coordinates and reports to ASOEN on all other activities that do not fall within the purview of the respective working groups, such as promoting environmentally sound technology and harmonizing environmental policies and databases.

Figure 9.2: ASEAN Institutional Framework for Environmental Cooperation

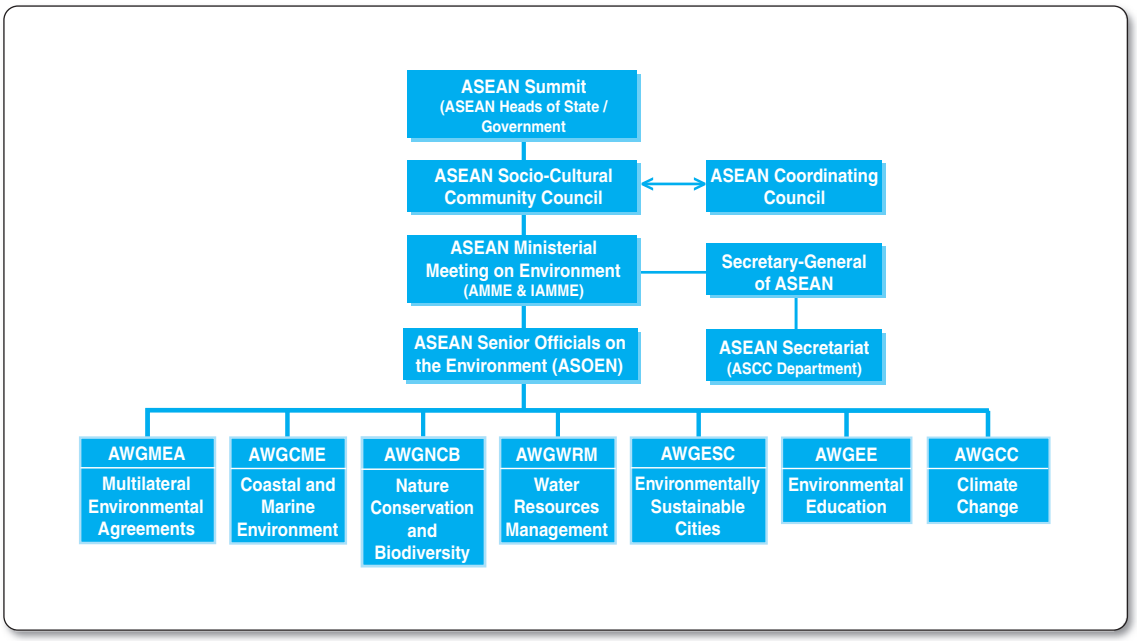
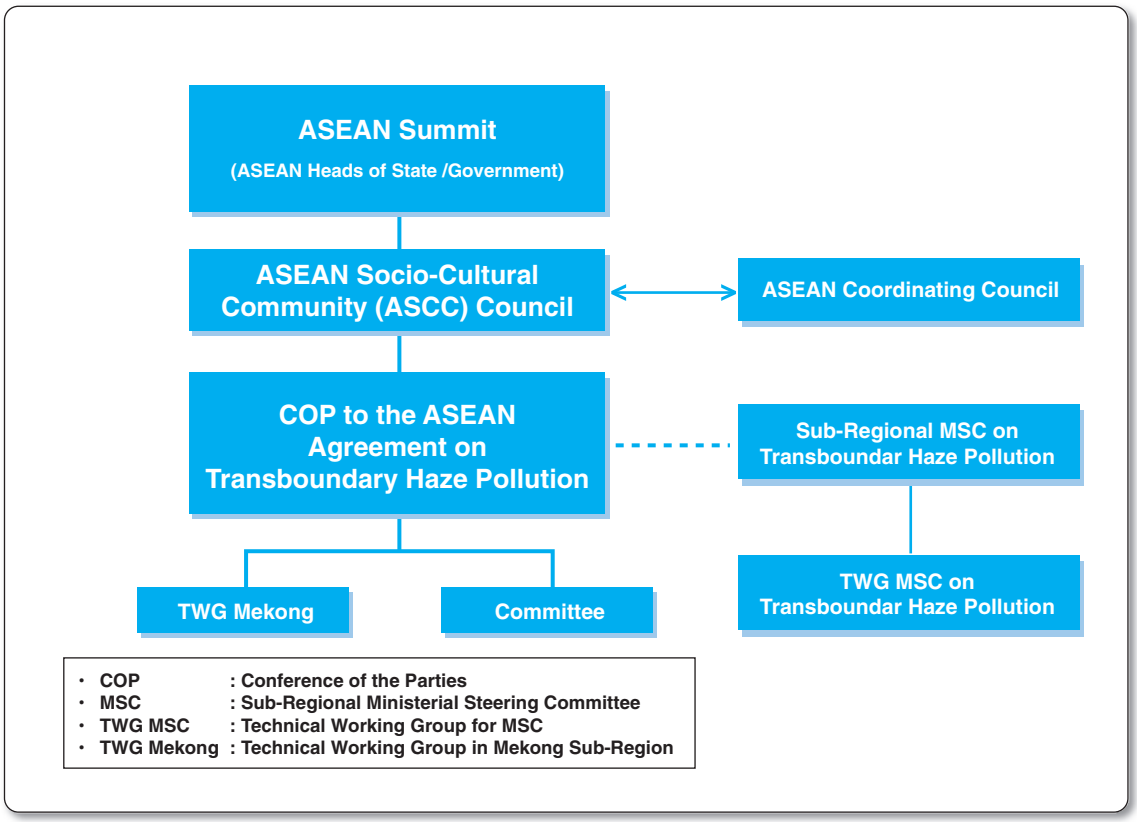


Figure 9.3: ASEAN Institutional Framework for Cooperation on Transboundary Haze Pollution



The ASEAN Environment Ministers meeting as the Conference of the Parties (COP) are responsible for the implementation of the ASEAN Agreement on Transboundary Haze Pollution (Haze Agreement). In addition, considering the different circumstances and weather patterns in the southern ASEAN and Mekong regions, sub-regional institutional frameworks have been established to address the fire and haze situations in the respective regions. Environment Ministers from Brunei Darussalam, Indonesia, Malaysia, Singapore and Thailand meet regularly as the Sub-Regional Ministerial Steering

Committee (MSC) on Transboundary Haze Pollution to undertake activities for the southern region. The MSC is supported by a Technical Working Group comprising senior officials.

There are two subsidiary bodies established under the COP, namely: (i) the Committee comprising senior officials to support implementation of the Agreement and provide relevant information to the COP for decision and guidance; and (ii) the Technical Working Group on Transboundary Haze Pollution in the Mekong Sub-Region to develop and implement programmes and activities to enhance cooperation among AMS in the Mekong sub-region, i.e. Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam on fire and haze pollution control.

The ASEAN Secretariat provides support for all these institutional bodies. 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 providing support services for the meetings of the ASEAN bodies. The ASEAN Secretariat ensures proper coordination on related activities of various other sectoral bodies 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 ASEAN Dialogue Partners and other international organisations in terms of resource mobilisation, programme implementation and in general enhancing institutional linkages.

Major Regional Programmes and Activities

In order to achieve meaningful and focused regional cooperation in line with national priorities and to contribute to addressing global environmental issues, the ASEAN Environment Ministers at their 7th Informal ASEAN Ministerial Meeting on the Environment (7th IAMME) in 2002 prioritised environmental cooperation in ten areas. The Ministers also agreed to each AMS spearheading programmes of specific interest to them in order to create better platforms for regional cooperation on the environment with the meaningful participation of all AMS. This arrangement of lead country/chairmanship is for a period of three years and is based on expression of interest, rather than by alphabetical rotation. The next review of this arrangement will take place in 2010 during the 21st ASOEN Meeting. At the 10th IAMME in September 2007, the ASEAN Environment Ministers agreed to rationalise the priority areas of sustainable forest management and sustainable management of protected areas into one priority area, namely sustainable management of biodiversity.

Table 9.1: Lead Countries/Chairperson for the Priority Areas of Cooperation on Environment

Priority Areas For Regional Cooperation	Lead Country/ Chairperson	Subsidiary Body of ASOEN
Addressing global environmental issues (focus on MEAs)	Thailand	AWGMEA
Promoting sustainable development through environmental education and public participation	Brunei Darussalam	AWGEE
Promoting environmentally sound technology	Malaysia	[ASEAN Secretariat]
Promoting quality living standards in ASEAN cities/urban areas	Indonesia	AWGESC
Harmonising environmental policies and databases	[ASEAN Secretariat]	[ASEAN Secretariat]
Promoting the sustainable use of coastal and marine environment	Viet Nam	AWGCME
Promoting sustainable management of natural resources and biodiversity	Thailand	AWGNCB
Promoting the sustainability of freshwater resources	Philippines	AWGWRM
Responding to climate change and addressing its impacts	Thailand	AWGCC
Land and forest fires and transboundary haze pollution	The institutional mechanism is indicated in Figure 9.3	

The above areas of cooperation continue to be of priority to ASEAN and the ASCC Blueprint has set out various strategies and actions to realise the ASEAN Community by the year 2015.

Addressing Global Environmental Issues

AMS continues to be actively engaged in various global environmental fora, particularly through participation in atmosphere- and chemicals-related international conventions, such as: (i) the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal; (ii) Montreal Protocol on the Substances that Deplete the Ozone Layer; (iii) Convention on Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (the Rotterdam Convention); (iv) Stockholm Convention on Persistent Organic Pollutants; and (v) United Nations Framework Convention on Climate Change and its Kyoto Protocol.

ASEAN cooperation in addressing global environment issues focuses on sharing of experiences and information, developing common understanding/positions, and capacity building to meet the obligations of the relevant conventions (as detailed in Chapter 8). These programmes are

Box 9.4: Section D.1: Addressing Global Environmental Issues, ASCC Blueprint 2009 – 2015

D.1: Addressing global environmental issues

Strategic Objective: Effectively address global environmental issues without impinging on competitiveness, or social and economic development based on the principle of equity, flexibility, effectiveness and common but differentiated responsibilities, respective capabilities as well as reflecting different social and economic conditions.

Actions:

i. Intensify regional cooperation to enhance and strengthen national and regional capacities to address issues and commitments to relevant Multilateral Environmental Agreements (MEAs) through regional research, promoting awareness, capacity building programmes and informed policy choices
ii. Promote synergies in the implementation of related MEAs through strengthening of regional cooperation to address measures related to the thematic clusters of MEAs on atmospheric issues such as climate change and ozone depleting substances, and MEAs on chemicals and chemical wastes
iii. Promote ASEAN common understanding/common position on relevant MEAs
iv. Adopt a holistic approach in fostering regional cooperation on environmental issues, with the participation of all relevant stakeholders including business, academics, non-governmental organisations (NGOs) and civil society organisations (CSOs)

Box 9.5: Section D.2: Managing and Preventing Transboundary Movement of Hazardous Wastes, ASCC Blueprint 2009 – 2015

D.2. Managing and preventing transboundary environmental pollution

Strategic Objective: Implement measures and enhance international and regional cooperation to combat transboundary environmental pollution, including haze pollution, transboundary movement of hazardous wastes through, among others, capacity building, enhancing public awareness, strengthening law enforcement, promoting environmentally sustainable practices as well as implementing the ASEAN Agreement on Transboundary Haze Pollution.

D.2.2 Transboundary Movement of Hazardous Wastes

Actions:

i. Enhance regional coordination and exchange of information, experience and expertise in hazardous waste management
ii. Optimise the use of Basel Convention Regional Centre for Training and Technology Transfer for Southeast Asia and the role of its Steering Committee in providing regional services of technology transfer and capacity building of hazardous waste management
iii. Establish effective and fully functioning regional mechanisms to address transboundary hazardous wastes, including illegal traffic of hazardous wastes, in line with the Basel Convention procedures and modalities

carried out under the purview of the AWGMEA. To intensify its work, the AWGMEA in 2006 formed two technical clusters, i.e. the Atmosphere Cluster and the Chemical Cluster. The Clusters serve as the platform for the AMS to discuss further and exchange views on technical matters and to provide recommendations as necessary to the AWGMEA. The activities of AWGMEA are guided by the ASCC Blueprint in the ASEAN Roadmap towards an ASEAN Community (2009 – 2015).

Information exchange and other activities on transboundary hazardous wastes also continue to be carried out among AMS. A Regional Training Workshop on Familiarisation and Use of United Nations Environment Programme (UNEP)'s Standardised Toolkit on Identification and Quantification of Dioxins and Furan Releases is planned in 2010. The Training Workshop aims to build the capacity and assist AMS in fulfilling the obligations under Stockholm Convention. A project proposal on Regional Database Development on Hazardous Chemicals and Wastes Management in AMS is also being developed in cooperation with the Basel Convention Regional Centre for Training and Technology Transfer for Southeast Asia, to promote environmentally sound management of hazardous chemicals and wastes in ASEAN through provision of accessible and reliable data and information.

Transboundary Haze Pollution

After the severe fires and transboundary haze pollution of 1997, AMS have been undertaking enhanced joint efforts in monitoring, preventing and mitigating transboundary haze pollution, based on the Regional Haze Action Plan and the ASEAN Agreement on Transboundary Haze Pollution (ASEAN Haze Agreement) which entered into force on 25th November 2003. The UNEP hailed the Agreement 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. To date eight AMS, namely Brunei Darussalam, Cambodia, Lao PDR, Malaysia, Myanmar, Singapore, Thailand and Viet Nam, have ratified the Agreement.

The Agreement comprehensively addresses all aspects of fire and haze including monitoring and assessment, prevention, preparedness, national and joint emergency response, procedures for deployment of people, materials and equipment across borders, and technical cooperation and scientific research through concerted national efforts, regional and international cooperation.

Substantial progress has been made in the implementation of the Agreement, including the establishment of the ASEAN Transboundary Haze

Box 9.6: Section D.2.1: Managing and Preventing Transboundary Environmental Pollution, ASCC Blueprint 2009 – 2015

Strategic Objective: Implement measures and enhance international and regional cooperation to combat transboundary environmental pollution, including haze pollution, transboundary movement of hazardous wastes through, among others, capacity building, enhancing public awareness, strengthening law enforcement, promoting environmentally sustainable practices as well as implementing the ASEAN Agreement on Transboundary Haze Pollution.

D.2.1. Transboundary Haze Pollution
Actions:

i. Operationalise the ASEAN Agreement on Transboundary Haze Pollution through the implementation of concrete preventive, monitoring and mitigation measures and to initiate the process of developing protocols for the implementation and operationalisation of the Agreement
ii. Develop mutually beneficial cooperation amongst AMS that acknowledge each country's laws, rules, regulations, and national policies, whether it is multilateral or bilateral cooperation, which put more focus on prevention activities
iii. Operationalise the ASEAN Coordinating Centre for Transboundary Haze Pollution Control to facilitate cooperation and coordination, including joint emergency response among AMS
iv. Secure funds for the ASEAN Transboundary Haze Pollution Control Fund, with voluntary contributions from the Parties, and in cooperation with ASEAN partners to provide additional resources for the effective implementation of the ASEAN Agreement on Transboundary Haze Pollution
v. Control and monitor land and forest fire occurrence in the region and promote the sustainable management of peatlands in the ASEAN region to reduce risk of fire and associated transboundary haze pollution through the implementation of the ASEAN Peatland Management Initiative by the year 2015

Pollution Control Fund; implementation of various activities under the ASEAN Peatland Management Strategy (APMS); the conduct of simulation exercises to familiarise AMS with the regional 'Standard Operating Procedure for monitoring, assessment and joint emergency response', and coordination and communication mechanisms in joint emergency response; implementation of zero burning and controlled-burning practices; establishment of community fire brigades at the village level; development of an online inventory of available fire fighting resources in AMS that could be made available in case of emergency; the establishment of the Panel of ASEAN Experts on Fire and Haze Assessment and Coordination for deployment during impending critical periods; and the ASEAN Haze Action Online website[1] to facilitate information sharing and dissemination on fire and haze issues.

At the sub-regional level, collaborative capacity building programmes among Brunei Darussalam, Indonesia, Malaysia, Singapore and Thailand (MSC countries) have been implemented in fire-prone areas under the framework of Indonesia's Comprehensive Plan of Action in Dealing with Transboundary Haze Pollution, namely Indonesia-Malaysia collaboration in Riau Province, and Indonesia-Singapore collaboration in Muaro Jambi Regency, Jambi Province.

A US$ 15 million regional peatland project, comprising a grant of US$ 4.3 million from the Global Environment Facility, is being implemented to undertake measures to prevent peatland fires, the major source of smoke haze in the region.

Box 9.7: IFAD-GEF Project on Rehabilitation and Sustainable Use of Peatland Forests in Southeast Asia

A Grant Agreement to implement the "Rehabilitation and Sustainable Use of Peatland Forests in Southeast Asia" project was signed in March 2009 by the Secretary-General of ASEAN and the President of the International Fund for Agricultural Development (IFAD). The four-year project received a grant of US$ 4.3 million from the Global Environment Facility (GEF) and will mobilise an additional US$ 10.2 million in co-financing during the implementation phase. IFAD has been designated as the implementing agency for GEF while the ASEAN Secretariat will coordinate the execution of the project in AMS.

ASEAN has more than 30 million hectares of peatlands comprising 60% of global tropical peatland resource. Peatlands are primarily water-logged areas containing centuries-old decayed vegetative matter up to several metres deep. While being significantly important for development, livelihood, environment and biodiversity, unsustainable practices and adverse climate conditions have severely degraded the peatlands, making them the primary source of fires and smoke haze that affects the region regularly. Degraded peatlands are also a major source of greenhouse gases contributing to global warming. ASEAN, through the ASEAN Agreement on Transboundary Haze Pollution, is undertaking a concerted effort to address forest and land fires in fire prone areas such as the peatlands.

This Project takes a holistic approach to promote sustainable management of peatlands, sustain local livelihoods, reduce risk of fire and associated smoke haze, and contribute to global environmental efforts particularly biodiversity conservation and climate change mitigation. It consists of both national activities undertaken in participating countries with major peatland areas, namely Indonesia, Malaysia, the Philippines and Viet Nam and regional activities involving all AMS to share best practices, technology and experience. On-the-ground activities will be undertaken at several identified peatland areas together with the local governments, private sector and local communities.

Box 9.8: Indonesia-Singapore Collaboration in Jambi Province

The Letter of Intent for the collaboration between the governments of Indonesia and Singapore to enhance the capacity to deal with land and forest fires in Muaro Jambi Regency, Jambi Province was signed in Singapore on 7th November 2007. Seven action programmes identified under the Jambi Master Plan for a period of 2 years have been completed, namely: (i) capacity development of relevant officers in Jambi Province in reading and interpreting satellite pictures for hotspot information; (ii) socialisation workshop on sustainable farming and zero-burning practices; (iii) development of land-use map for Muaro Jambi Regency; (iv) installation of a Geographical Information System to support regional fire and haze monitoring and assessment; (v) development of Fire Danger Rating System for Muaro Jambi Regency; (vi) review of fire prevention and suppression capability and

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capacity of plantation companies, local communities and relevant stakeholders in Muaro Jambi Regency; and (vii) technical training workshop on fire prevention and suppression. In addition to the above action programmes, two new action programmes have been identified and are currently on-going, namely Training Programme and Freshwater Aquaculture Training, and Jambi Peatland Management Knowledge Base. The latter aims to reduce fires in peatlands through science-based implementation of mitigative water management and conservation methods, and will involve international experts on peatland management to develop training programmes, awareness building and guidance materials for proper peatland management.

Box 9.9: Indonesia-Malaysia Collaboration in Riau Province

The Memorandum of Understanding for the collaboration between the governments of Indonesia and Malaysia in preventive measures to deal with land and forest fires and haze in Riau Province was signed in Jakarta on 3 June 2008. Since then, various activities have been implemented, including: (i) Training Workshop on Zero Burning Techniques for Community Leaders and Farmers from Rokan Hilir Regency, Riau Province (14 – 17 July 2008, Sepang, Selangor); (ii) Training for Community Fire-Fighting Units (4 – 8 August 2008, Fire and Rescue Department Academy, Kuala Kubu Bharu, Selangor); (iii) installation of air quality monitoring station in Bagan Siapi-api, Rokan Hilir Regency which began operation on 29 May 2009 and was handed over to the Indonesian Government on 8 August 2009; (iv) stakeholders seminar on zero burning techniques in Riau Province; and (v) fire and haze prevention programmes through rehabilitation and improved management of peatlands in 5 selected villages in Rokan Hilir Regency. The on-going activities are, among others, canal blocking, promoting zero burning techniques through composting methods, construction of water storage wells in Desa Mumugo, and development and dissemination of fire prevention awareness materials to multi-stakeholders.

Box 9.10: Indonesia's Comprehensive Plan of Action in Dealing with Transboundary Haze Pollution

ASEAN has continued to implement focused and concrete on-the-ground activities to tackle land and forest fires. In 2006, the Sub-Regional Ministerial Steering Committee (MSC) on Transboundary Haze Pollution, comprising the five AMS most affected by smoke haze (Brunei Darussalam, Indonesia, Malaysia, Singapore and Thailand) endorsed Indonesia's Comprehensive Plan of Action in Dealing with Transboundary Haze Pollution. Some of the MSC countries, through the Central Government of Indonesia, adopted fire-prone districts/regencies to assist in enhancing its capacity to deal with land and forest fires. Singapore is assisting Indonesia in developing a master plan for the Muaro Jambi Regency in Jambi Province, while Malaysia is providing technical assistance to the Riau Province.

Under its National Action Plan on Climate Change, Indonesia has targeted to reduce the number of hotspots by 50% in 2009, 75% in 2012 and 95% in 2025, with the 2006 figures as the baseline. The targets will be used as guidance for both central and local governments in implementing their activities.

Enhanced efforts in August 2009 by Indonesia in implementing its Plan of Action to prevent and mitigate land and forest fires include:

- Issuance of warning letters to local governments and companies in fire-prone provinces
- Cloud seeding operations
- Fire suppression activities including mobilisation of *Manggala Agni* fire brigade in relevant operation areas
- Training on zero burning for 600 oil palm farmers and 240 people in 8 *Manggala Agni* operation areas
- Pilot project on zero burning in 5 provinces covering 8 districts
- Revision of Law no. 23/1997 on Environmental Management for enhanced law enforcement
- Enforcement actions against offenders in fire-prone provinces
- Provision of equipment for mechanical land clearing for communities
- Ban on open burning by Central Kalimantan provincial government since early August 2009 and to subsequently impose ban on open burning in other fire-prone provinces

In the last 3 years Indonesia has undertaken preventive efforts in the area of community capacity building such as promoting awareness, providing training, equipment, and technical assistance on making compost, charcoal and briquette. These measures have contributed to the decrease in the number of hotspots in the assisted fire-prone areas.

Table 9.2: Completed and On-Going Programmes and Activities to Control Transboundary Haze Pollution

Project Title	Description
1. AADCP-RPS Project on Capacity Building to Improve Peatland Management & Reduce Land & Forest Fires & Associated Transboundary Haze Pollution in the ASEAN Region	**Objectives:** Strengthen knowledge and capacity to address gaps in the implementation of the ASEAN Peatland Management Strategy and ASEAN Agreement on Transboundary Haze Pollution. **Current status:** Completed in April 2008.
2. 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 fires and transboundary haze pollution. **Current status:** Completed.
3. IFAD/GEF Project on the Rehabilitation and Sustainable Use of Peatland Forests in Southeast Asia	**Objectives:** Strengthen capacity for sustainable peatland management, minimise the degradation of peatlands in relevant AMS, rehabilitate and sustainably manage targeted peatlands, and enhance the livelihood of local communities through sustainable peatland management. **Current status:** On-going. The project commenced in July 2009.
4. Inventory of Fire Fighting Resources	**Objective:** Provide online information on fire fighting resources available in AMS that could be shared in situations where such need arises. The information is available on the ASEAN Haze Action Online website with password restriction. **Current status:** On-going/continuous.
5. Regional Response for Land and Forest Fire and Transboundary Haze Pollution: Fire and Haze Simulation Exercises	**Objective:** Create a practice field for AMS 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 have been conducted in 2004 and 2006. A simulation exercise involving mobilisation of resources across borders is included in the comprehensive work programme being developed by the Committee under COP to the Haze Agreement.
6. Workshop on the ASEAN Policy on Zero Burning	**Objective:** Promote the use of the Guidelines on the ASEAN policy on zero burning to plantation companies, timber concessionaires, and other relevant stakeholders. **Current status:** At regional level, dialogues with plantation companies and workshops on zero burning have been conducted from 2000 to 2007. Individual AMS have also conducted dialogues with plantation and timber companies to promote zero burning.
7. Development of a Comprehensive Regional Early Warning System to Support the Successful Implementation of the ASEAN Agreement on Transboundary Haze Pollution	**Objective:** To enhance monitoring of fire and haze to support the implementation of the Haze Agreement. **Current status:** Regional Fire Danger Rating System developed, hosted by the Malaysian Meteorological Department. The ASEAN Specialised Meteorological Centre is monitoring the dispersion of haze in the region, in addition to reporting on the number of hotspots and weather outlook.
8. 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:** Operational procedure of the Panel developed, future activities for the Panel planned.

Box 9.11: ASEAN Peatland Management Strategy 2006 – 2020

The ASEAN Peatland Management Strategy (APMS), which was endorsed by the ASEAN Environment Ministers in November 2006, guides actions to support management of peatlands in the region in the period 2006 – 2020. The APMS was prepared due to the pressing need for wise use and sustainable management of peatlands as well as the emerging threat of peatland fire and its associated haze to the economy and health of the region, and its contribution to addressing global climate change. The APMS was developed within the framework of the ASEAN Peatland Management Initiative and the ASEAN Agreement on Transboundary Haze Pollution.

The Strategy primarily focuses on the following 4 objectives:

- Enhance Awareness and Knowledge on Peatlands
- Address Transboundary Haze Pollution and Environmental Degradation
- Promote Sustainable Management of Peatlands
- Enhance and Promote Collective Regional Cooperation on Peatland Management

The Strategy contains operational actions in the following focal areas:

- Inventory and Assessment
- Research
- Awareness and Capacity Building
- Information Sharing
- Policies and Legislation
- Fire Prevention, Control and Monitoring
- Conservation of Peatland Biodiversity
- Integrated Management of Peatlands
- Promotion of Demonstration Sites for Peatland
- Restoration and Rehabilitation
- Peatland and Climate Change
- Regional Cooperation
- Financing of the Implementation of Strategy

National Action Plans on peatlands have been developed by AMS to implement activities contained in the Strategy at the national level.

Promoting Sustainable Development through Environmental Education and Public Participation

Environmental Education (EE) has been defined as the process of helping people, through formal and non-formal/informal education, to acquire understanding, skills and values that will enable them to participate as active and informed citizens in the development of an ecologically-sustainable and socially-just society.

ASEAN developed and implemented the ASEAN Environmental Education Action Plan 2000 – 2005 (AEEAP) which ended in 2005. The ASEAN Environment Ministers at their 10th Informal Meeting in Bangkok, Thailand endorsed the AEEAP 2008 – 2012 as the successor plan to the AEEAP 2000 – 2005 and in particular as ASEAN's contribution to UN Decade of Education for Sustainable Development. The AEEAP 2008 – 2012 serves to realise a clean and green ASEAN, rich in cultural traditions, with citizens who are environmentally literate, imbued with environmental ethic, willing and capable to ensure the sustainable development of the region through environmental education and public participation efforts. The AEEAP 2008 – 2012 focuses on the formal sector; non-formal sector; human resources capacity building; and networking, collaboration and communication.

AMS have agreed that the initial implementation of the Action Plan will focus on the following regional-level activities:

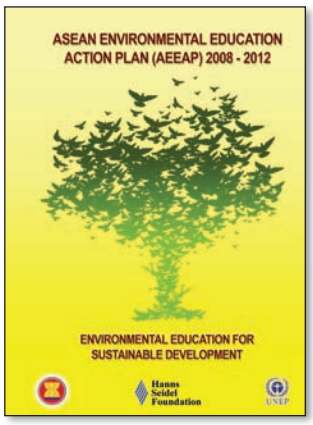
- To promote sustainable schools (such as eco-schools/green schools concept) throughout ASEAN and establish an ASEAN sustainable/green/eco-school network
- To conduct ASEAN EE for Sustainable Development Leadership Training Programme for key target groups (such as government officials, members of parliament and other elected officials, media and communications professionals, youth, women etc)
- To promote and manage ASEAN Environmental Education Inventory Database as the central platform for information exchange, dissemination and learning for environmental education and environmentally sound development in ASEAN
- To develop ASEAN Youth for Sustainable Environment Network
- To organise an ASEAN Environmentally Sustainable Development Film Festival

Box 9.12: Section D3: Promoting Sustainable Development through Environmental Education and Public Participation, ASCC Blueprint 2009 – 2015

Strategic Objective: Establish a clean and green ASEAN, rich in cultural traditions where the values and practices of the people are in accordance with the rhythm and harmony of nature, with citizens who are environmentally literate, imbued with environmental ethic, and willing and capable to ensure the sustainable development of the region through environmental education and public participation efforts.

Actions:

i. Implement the ASEAN Environmental Education Action Plan 2008 – 2012
ii. Establish a baseline assessment on the extent to which national curricula in the basic education system include Environmental Education (EE) and Environmentally Sustainable Development (ESD) content
iii. Establish a baseline assessment on the extent to which teacher education programmes and in-service and pre-service training address EE/ ESD theory and practice
iv. Ensure that Quality Assurance systems for formal education (that is, national standards) require the inclusion of EE/ESD issues in the relevant disciplines
v. Promote research on EE/ESD issues to ensure continuing development in formal education
vi. Promote sustainable schools (for example, eco-schools/green schools) concept and practice throughout ASEAN
vii. Develop EE curricula, materials and resources that are locally relevant and complement ESD at the local/community level
viii. Promote EE as a key integrating tool for the development of 'environmentally sustainable cities' in each ASEAN Member State
ix. Use appropriately designed and targeted EE for promotion of environmentally sustainable business practices
x. Promote ASEAN Environment Week which serves as platform for national level activities to celebrate and raise awareness of the region's environment with all stakeholders in each of the AMS
xi. Establish a baseline of EE for sustainable development training needs for stakeholders in both the formal and non-formal sectors
xii. Provide EE and ESD training opportunities for key stakeholders
xiii. Provide ASEAN EE for Sustainable Development Leadership Training Programmes for key target groups (e.g., government officials, members of parliament and other elected officials, media and communication professionals, youth, women, etc.)
xiv. Create an ASEAN EE/ESD scholarship scheme for the region's stakeholders
xv. Actively promote and manage the ASEAN Environmental Education Inventory Database as the central platform for information dissemination, exchange and learning for EE and ESD in ASEAN
xvi. Develop an ASEAN-wide 'Youth for Sustainable Environment' Network
xvii. Establish an ASEAN sustainable/green/eco-school network
xviii. Establish an annual ASEAN EE Conference/ Forum for the region's EE stakeholders as a platform for the exchange of information, materials, experience, networking, etc
xix. Build and strengthen existing networks of NGOs, universities and media throughout the region to be effective practitioners, promoters, communicators and agents of change for EE and ESD
xx. Enhance the participation of community leaders, such as those religious leaders who have close contact with local communities, in promoting public awareness on the importance of sustainable development and environmentally sustainable practices



The ASEAN Environment Ministers also approved the establishment of an ASEAN Working Group on Environmental Education to oversee and coordinate the implementation of AEEAP 2008 – 2012. The Working Group is chaired by Brunei Darussalam.

A Partnership Meeting on the Implementation of AEEAP 2008 – 2012 was held on 6 July 2009 in Brunei Darussalam. The Meeting explored possibilities of collaborative partnerships with ASEAN Dialogue Partners and relevant organisations to implement the AEEAP 2008 –

2012. The Partners showed interest and enthusiasm in collaborating with ASEAN in the implementation of the five initial activities above, and agreed to continue communication with ASEAN Secretariat to explore the common areas of cooperation on environmental education. The ASEAN Secretariat and the Institute of Advanced Studies of United Nations University organised the 2nd ASEAN Plus Three Leadership Programme on Sustainable Production and Consumption in Hua Hin, Thailand on 8th August 2009, as one of the activities of the AEEAP 2008 – 2012.

The ASEAN Environment Year (AEY) celebration is held once every three years as a part of ASEAN's efforts in promoting environmental awareness at all levels of society, highlighting ASEAN's environmental achievements, and strengthening partnerships among AMS as well as with ASEAN Dialogue Partners, private sector, civil society and non-governmental organisations, in addressing environmental challenges in the region. The first AEY was held in 1995, followed by AEY 2000, 2003, 2006, and 2009.

Box 9.13: ASEAN Environment Year 2006 & 2009

The ASEAN Environmental Year (AEY) 2006 Celebration was held on 18 May 2006 in Bogor, Indonesia, with the theme, "Biodiversity: Our Life, Our Future". The theme provided an excellent opportunity to highlight ASEAN's biological richness, and ASEAN's work to conserve and sustainably use these resources. An Exhibition on Biodiversity and Tree Planting were also held alongside the Celebration.

The Celebration of AEY 2009 was held in Champasak Province, Lao PDR, on 30 – 31 March 2009. The theme of the celebration, "Ecotourism: Our Nature, Our Culture", reflected ASEAN's commitment to achieve the vision of a Clean and Green ASEAN where the values and practices of the people are in harmony with nature.

A series of national and regional activities addressing the AEY 2009's theme will be carried out by each ASEAN Member State throughout the year. A Regional Workshop on the Identification of Ecotourism Best Practices in AMS, spearheaded by the ASEAN Centre for Biodiversity, was held on 29 March 2009 as a side event supporting the AEY 2009. Exhibition on Ecotourism and Logo Competition were also held as part of the Celebration.

The ASEAN Youth Environment website[2] is being developed as a follow-up activity to the ASEAN Youth Forum on Environment which was held from 8th – 10th January 2007 in Bandar Seri Begawan, Brunei Darussalam. The ASEAN Environmental Education Inventory Database (AEEID)[3] is also being continuously promoted as an interactive on-line database of materials, experiences, and best practices on environmental education in the ASEAN region. The AEEID provides an opportunity for greater sharing of environmental education resources and networking within the region and beyond.

Promoting Environmentally Sound Technology

ASEAN is actively engaged in ensuring sustainable production and consumption through promotion of environmentally sound technology and cleaner production processes. Following the ASEAN Workshop on Environmentally Sound Technology (EST) and Cleaner Production (CP) in 2004, an ASEAN Network on Environmentally Sound Technologies was proposed to be established as a forum to share experiences and information. A website prototype is also being developed as an ASEAN databank on EST and CP, containing among others, information on the needs and priorities of EST, challenges in promoting EST, and policies and strategies relating to EST applications in AMS.

As a follow-up to the Workshop held in 2004, Malaysia as the lead country for EST, also organised the ASEAN Plus Three Seminar on the Promotion of Environmentally Sound Technologies and Cleaner Production on 27 – 28 November 2007

Box 9.14: Section D.4: Promoting Environmentally Sound Technology, ASCC Blueprint 2009 – 2015

Strategic Objective: Use environmentally sound technologies (EST) to achieve sustainable development with minimal impact on the environment

Actions:

i. Operationalise the ASEAN Network on EST by 2015
ii. Work towards the adoption of region-wide environmental management/labelling schemes to promote economic growth and environmental protection by 2015
iii. Facilitate an EST Forum to develop technology needs assessment and develop cooperation among AMS
iv. Enhance cooperation among AMS within the framework of South-South and North-South cooperation to promote technology transfer
v. Explore the establishment of a clearing house centre on EST for AMS (i.e. Cleaner Production Centre)
vi. Intensify cooperation on joint research, development, deployment and transfer of EST

in Kuala Lumpur. Apart from the ASEAN Plus Three countries, the workshop was also attended by various stakeholders from universities, research institutes, and local and multinational industries in Malaysia. The workshop provided an opportunity for the stakeholders to share information and best practices on EST and CP.

Promoting Quality Living Standards in ASEAN Cities/Urban Areas

With a relatively high population of about 580 million people compounded by high rates of rural-urban migration, rising affluence and expectations of the people, cities in ASEAN are facing numerous challenges to make them environmentally sustainable and liveable. Various programmes have been implemented by ASEAN cities to tackle those challenges and improve their environmental performance. However, by simply ensuring and maintaining good environmental performance is inadequate. ASEAN cities have to strive to go beyond environmental performance and move towards achieving environmental sustainability. ASEAN commitments to ensure that cities/urban areas in ASEAN are environmentally sustainable, while meeting the social and economic needs of the people are outlined in the ASCC Blueprint (2009 – 2015).

The ASEAN Initiative on Environmentally Sustainable Cities (AIESC) which was endorsed by the ASEAN Environment Ministers in 2005 serves to assist ASEAN cities, especially the smaller and rapidly-growing, to pursue environmental sustainability. The programme covers 25 participating ASEAN cities. As participating cities of AIESC, regional activities are focussed on these cities, especially in terms of capacity building to implement clean water projects, twinning partnerships such as Ilo-ilo – Phnom Penh (on hygiene promotion), Putrajaya – Ha Long (on Waste Water Treatment Operation and Management), and Manila – Danang (on water quality) organised by the US Agency for International Development.

Box 9.15: Section D.5: Promoting Quality Living Standards in ASEAN Cities/Urban Areas, ASCC Blueprint 2009 – 2015

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

Actions:

i. Expand the existing work under the ASEAN Initiative on Environmentally Sustainable Cities
ii. Intensify individual and collective efforts to improve the quality of air and water within ASEAN through regional or national initiatives to reduce industrial and transportation pollutions
iii. Share experiences, expertise and technology in areas such as urban planning including transportation, green building, water management, urban greenery and urban biodiversity conservation, sanitation and waste management, 3Rs (Reduce, Reuse and Recycle) and air, noise, water, and land pollution control, through among others twinning cities programme
iv. Work towards initiatives such as “Low Carbon Society”, “Compact Cities”, “Eco-Cities” and “Environmentally Sustainable Transport”
v. Develop internationally comparable measures for environmental sustainability for major cities in ASEAN by 2015
vi. Introduce and implement an ASEAN Environmentally Sustainable Cities (ESC) Award by 2008 as an incentive to promote ESC practices

Box 9.16: Network of Participating Cities of the AIESC

Brunei Darussalam:	Bandar Seri Begawan
Cambodia:	Phnom Penh, Siem Reap
Indonesia:	Padang, Palembang, Pekanbaru
Lao PDR:	Luang Prabang, Vientiane, Xayabouri
Malaysia:	Kuantan, Putrajaya, North Kuching City Hall
Myanmar:	Mandalay, Yangon
Philippines:	Cagayan de Oro, Ilo-ilo, Quezon
Singapore:	Singapore
Thailand:	Bangkok, Chiangmai, Krabi, Phuket
Viet Nam:	Ha Noi, Ha Long, Da Nang

To stimulate, benchmark, and recognise exemplary efforts on environmental sustainability, ASEAN has initiated the ASEAN Environmentally Sustainable City (ESC) Award programme. The inaugural ASEAN ESC Award ceremony was held in Ha Noi, Viet Nam on 8th October 2008, on the occasion of the 11th IAMME. The ASEAN Environment Ministers presented the awards to ten cities/townships/districts in ASEAN that had made exemplary efforts towards environmental sustainability. The ESC Award aims to make ASEAN cities environmentally sustainable by recognising exemplary efforts and sharing best indigenous practices to keep cities clean, green, and liveable.

Box 9.17: ASEAN Environmentally Sustainable City Award 2008

The ASEAN Environmentally Sustainable City (ESC) Award 2008 was presented by the ASEAN Ministers responsible for environment to ten cities in ASEAN on 8 October 2008 in Ha Noi, Viet Nam. The ten recipients of the inaugural Award 2008 had undertaken exemplary measures to keep their cities clean, green, and liveable even as they continue to grow as centres of economic and industrial activity. Each city tells a compelling story of how it has placed environment and nature at the core of city planning, the challenges it faced, and its resolve to ensure the cities remain environmentally sustainable as it develops and modernises.

The Award not only recognises their exemplary efforts, the richness of their experience in varied circumstances, and different models and paths to urbanisation and environmental stewardship, but more importantly, it confirms that indigenous solutions and the attendant peoples' participation are the best in dealing with the unique local issues and settings.

Recipients of the ASEAN ESC Award 2008

Brunei Darussalam:	Temburong District
Cambodia:	Municipality of Phnom Penh
Indonesia:	Palembang City
Lao PDR:	Luang Prabang District
Malaysia:	North Kuching City Hall
Myanmar:	Taungyi City
Philippines:	Puerto Princesa City
Singapore:	South West Community Development Council
Thailand:	Bangkok City
Viet Nam:	Ha Long City

Harmonising Environmental Policies and Databases

ASEAN publishes its State of the Environment Report (SoER) once every three years. The Report, among others, showcases the status of environmental performance and state of natural resources, highlights emerging challenges and policy responses, and serves to inform and invite collaboration for regional cooperation in ASEAN. The first ASEAN SoER was published in 1997. The second and third SoER were published in 2000 and 2006 respectively, while in 2002 a special issue of the SoER was published as the ASEAN Report to the World Summit on Sustainable Development, held in Johannesburg, South Africa. This Fourth ASEAN State of the Environment Report was launched by the Ministers during the 11th AMME in October 2009.

As a long-term measure, the ASCC Blueprint also mandates the harmonising environmental policies and databases. The strategic objective and actions of the ASCC Blueprint will guide ASEAN towards the establishment of harmonised quantitative information databases, both at national and regional levels.

Box 9.18: Section D.6: Harmonising of Environmental Policies and Databases, ASCC Blueprint 2009 – 2015

Strategic Objective: Promote feasible efforts to harmonise, on a step-by-step basis, environmental policies, and databases, taking into account the national circumstances of AMS, to support the integration of the environmental, social and economic goals of the region.

Actions:

i. Work towards the implementation of the thirteen priority environmental parameters and undertake efforts to ensure region-wide harmonisation in terms of measurement, monitoring and reporting by 2015
ii. Strive for harmonisation of standards and conformity assessment procedures for environmental performance/programmes by 2015
iii. Continue producing informative periodic state of the environment reports for policy making and addressing impacts on the environment
iv. Promote environmental sustainable/green procurement practices in AMS and develop a region-wide strategy by 2015
v. Encourage regional cooperation on Strategic Environmental Assessment of large-scale projects and other activities which may cause significant environmental impacts in the region

Table 9.3: AMS National State of the Environment Reports

Country	Latest SOER Published	Frequency	Website
Brunei Darussalam	Brunei Darussalam State of Environment Report 2006	5 years	http://www.env.gov.bn
Cambodia	State of the Environment Report 2004	Occasional	
Indonesia	State of the Environment in Indonesia 2006	Annual	http://www.menlh.go.id
Lao PDR	Lao PDR Environment Monitoring Report 2004	Occasional	
Malaysia	Malaysia Environmental Quality Report 2007	Annual	http://www.doe.gov.my
Myanmar	National Environment Performance Assessment Report 2006	Occasional	
Philippines	Philippine Environmental Quality Report 1990 – 1995	5 years	http://www.emb.gov.ph
	National Air Quality Status Report 2003 – 2004	2 years	
	Department of Environment and Natural Resources Annual Report 2004	Annual	
Singapore	State of the Environment Report 2008	Annual	http://www.mewr.gov.sg
Thailand	State of the Environment 2008	Annual	http://www.onep.go.th
	Thailand's State of Pollution Report 2007	Annual	http://www.pcd.go.th
Viet Nam	State of the Environment Report 2008	Annual	http://www.nea.gov.vn

Apart from the ASEAN SoER, AMS also publish their national state of environment reports periodically.

One important component for harmonising environmental policies is the regular publication of reports, books and other informational materials for dissemination by the ASEAN Secretariat. Many of these publications arise from regional environmental programmes and projects implemented by AMS and coordinated by the ASEAN Secretariat. These publications serve as valuable reference materials for government officials, researchers, civil society organisations and the general public.

Promoting the Sustainable Use of Coastal and Marine Resources

Coastal and marine resources provide a wide range of essential ecological, economic and social benefits. A large number of people in ASEAN depend, directly and indirectly, on these natural resources for their livelihood. The marine waters provide food, regulate climate conditions, maintain environmental cycles and serve as sinks for materials from land-based resources. ASEAN's commitment to promote sustainable use of coastal and marine environment is reflected in the ASCC Blueprint (2009 – 2015).

Box 9.19: Section D.7: Promoting the Sustainable Use of Coastal and Marine Resources, ASCC Blueprint 2009 – 2015

Strategic Objective: 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.

Actions:

i. Enhance inter-agency and inter-sectoral coordination at the regional and international levels for achieving sustainable development of ASEAN's coastal and marine environment
ii. Build capacities to develop national marine water quality standards by 2015 using the ASEAN Marine Water Quality Criteria as a reference
iii. Establish a representative network of protected areas to conserve critical habitats by 2015 through further implementation of the ASEAN Criteria for Marine Heritage Areas, and ASEAN Criteria for National Protected Areas
iv. Promote conservation and sustainable management of key ecosystems in coastal and marine habitats, such as joint efforts to maintain and protect marine parks in border areas, and the "Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security"
v. Enhance the capacity and capability of, as well as economic benefits for the fishery and other coastal community to encourage their active participation in promoting environmental sustainability
vi. Promote the sustainable use of coastal and marine environment through public awareness campaign to highlight the global importance of coastal and marine environment in addressing food security, maintaining ecosystem services, as well as protecting marine environment
vii. Promote collaboration among AMS in responding to transboundary pollution due to the oil spill incidents
viii. Promote cooperation in addressing pollution of coastal and marine environment from land-based sources

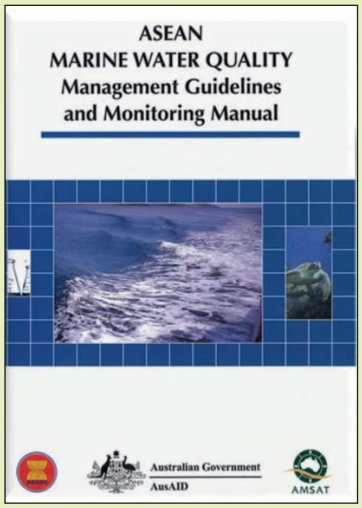
To help protect these shared marine waters in the region, ASEAN adopted the ASEAN Marine Water Quality Criteria (AMWQC) in 2002. Seventeen parameters based on key pollutants were adopted as AMWQC. With funding and technical support from Australia, ASEAN published the *ASEAN Marine Water Quality Criteria: Management Guidelines and Monitoring Manual* in 2008. The publication serves as a regional mechanism for collective and harmonised efforts at the national level to sustain the quality of marine waters by providing management guidelines, and building monitoring and analytical capability.

Box 9.20: ASEAN Marine Water Quality Criteria: Management Guidelines and Monitoring Manual

The Management Guidelines have been developed to provide guidance on a set of common approaches and methodologies that address marine water quality issues within the ASEAN region. They provide a shared set of broad objectives across the ASEAN region and provide information from which to derive flexible, alternative approaches that can be considered, as appropriate, by each member state to meet the differing needs for various bodies of water and to fit the differences in governance institutions and financial and human capacities that exist.

The Monitoring Manual has been developed as a guide, documenting recommended methods for the implementation of marine water quality monitoring programmes. Methods for programme design, sampling, data analysis and interpretation and reporting and information dissemination have been selected on the basis of their suitability for use in the ASEAN region.

The Publication is expected to assist in the improvement of marine water quality in ASEAN and deliver lasting benefits to the people of the region.



Promoting Sustainable Management of Natural Resources and Biodiversity

ASEAN is biologically rich with over 20 percent of all known species of plants, animals and marine organisms found in the region. The region is also home to three mega-diverse countries – Indonesia, Malaysia and Philippines. Philippines, for instance, holds the world's fifth highest number of endemic mammals and birds. As of 2008, Malaysia, Indonesia and the Philippines each have about 1,000 recorded endangered species.

ASEAN's commitment to ensure that the rich biological diversity is conserved and sustainably managed toward enhancing social, economic and environmental well-being is reflected in the ASCC Blueprint (2009 – 2015).

The ASEAN Centre for Biodiversity (ACB) established in 2005 as a dedicated regional centre of excellence on biodiversity promotes biodiversity conservation and sustainable use through policy support, networking, training, research, and database management.

AMS share many species with their neighbours and as a whole are rather biologically distinct from the rest of the world. Five AMS are linked by the Mekong River while three AMS share the great island of Borneo, and therefore the coordinated conservation and sustainable use of this richness is crucial. In recognition thereof, ASEAN signed the ASEAN Declaration on Heritage Parks and Reserves in 1994, and agreed to designate 11 protected areas to be inscribed as the ASEAN Heritage Parks (AHP). The AHP Programme serves as a regional network of national protected areas of high conservation importance preserving a complete spectrum of representative ecosystem to generate greater awareness, pride, appreciation, enjoyment, and conservation of ASEAN's rich natural heritage. The declaration was revitalised in 2003, designating 27 protected areas as AHP.

Box 9.21: Section D.8: Promoting Sustainable Management of Natural Resources and Biodiversity, ASCC Blueprint 2009 – 2015

Strategic Objective: Ensure ASEAN's rich biological diversity is conserved and sustainably managed toward enhancing social, economic and environmental well-being.

Actions:

i. Achieve by 2010, a significant reduction in the current rate of loss of biodiversity through implementing relevant national, regional and international programmes of work
ii. Promote collaboration, sharing of lessons learnt on access and equitable sharing of genetic and biological resources by 2015
iii. Promote further listing and coordinated management of ASEAN Heritage Parks as an effective platform for ecosystem-based protected areas management by 2015
iv. Enhance cooperation in the management of transboundary protected areas between neighbouring AMS
v. Take appropriate measures to minimise impacts of transboundary movement of living modified organisms in accordance with the Cartagena Protocol on Bio-safety by 2015
vi. Establish a functional regional network to promote capacity building in developing inventory of the biological resources and bio-safety measures of the ASEAN Region by 2015
vii. Enhance the role and capacity of the ASEAN Centre for Biodiversity to function as an effective regional centre of excellence in promoting biodiversity conservation and management
viii. Promote the involvement of local community to maintain biodiversity conservation and forest health by 2015
ix. Promote effective management policies and practices to reduce the impact of invasive alien species at the regional and international levels
x. Promote regional cooperation on sustainable management of biodiversity such as sharing research and development experiences, exchange of experts, and training
xi. Strengthen efforts to control transboundary trade in wild fauna and flora through the ASEAN Action Plan on Trade in Wild Fauna and Flora 2005 – 2010 and the ASEAN Wildlife Enforcement Network to implement commitments to Convention on International Trade in Endangered Species of Wild Fauna and Flora
xii. Explore cooperation among AMS to conduct joint survey and monitoring of migratory wildlife
xiii. Promote cooperation among AMS in combating land degradation for sustainable land management to support sustainable agriculture and environment

Box 9.22: ASEAN Centre for Biodiversity

ASEAN Centre for Biodiversity (ACB) was established in 2005 to assist the AMS to protect and conserve its valuable and unique biodiversity resources.

The ACB supports ASEAN governments in the following areas that are of global and regional importance: agriculture and food security; access to, and fair and equitable sharing of benefits from biological and genetic resources; climate change and biodiversity conservation; ecotourism and biodiversity conservation; payment for ecosystems services scheme and valuation of biodiversity; wildlife enforcement; managing invasive alien species; peatland management and biodiversity; Global Taxonomic Initiative; support to the Programme of Work on Protected Areas; and managing biodiversity information and knowledge. These areas have been identified in the various global biodiversity related agreements such as the CBD, CITES, Ramsar Convention and the Cartagena Protocol on Biosafety.

ACB's core strategic goals are expected to benefit the AMS as follows:

- serving as an effective coordinating body to facilitate discussion and resolution of cross-country biodiversity conservation issues
- providing a framework and mechanism for sharing information, experiences, best practices and lessons learned for efficient access of AMS
- implementing a pro-active approach in monitoring and assessing biodiversity conservation status as a strategic approach towards identifying critical issues and future trends
- delivering/facilitating conduct of capacity-building services and technology transfer through engaging relevant and appropriate expertise
- enhancing common understanding of biodiversity conservation issues strengthening ASEAN regional common understanding in negotiations and in compliance with relevant multilateral environmental agreements
- promoting regional public awareness to develop champions and enhance support at different stakeholder levels on biodiversity concerns
- undertaking innovative resource generation and mobilisation measures to pursue impact activities that will enhance biodiversity conservation in the region

Box 9.23: ASEAN Heritage Parks

The ASEAN Heritage Parks (AHP) was established to foster greater awareness, pride, appreciation, enjoyment, and conservation of the ASEAN region's rich natural heritage through the creation and support for a regional network of representative protected areas, and to generate greater collaboration between AMS in preserving their shared natural heritage. Each site is nominated by its government and evaluated by the other governments through peer review. An ASEAN Heritage Park designation must be approved by the ASEAN Environment Ministers based on Guidelines for the Nomination and Management of ASEAN Heritage Parks, 2003.

The key activities of the AHP Programme include:

- Develop and implement regional conservation and management action plans as well as regional mechanisms complementary to and supportive of national efforts to implement conservation efforts
- Promote a common identity and collective action in terms of education and public awareness and eco-tourism
- Promote exchange of information, best practices and management experiences
- Promote training and build capacity
- Promote partnerships with relevant national, regional and international organisations to enhance the conservation and management of protected areas
- Develop and maintain an information database on AHP

The AHP Programme continues to serve as a basis for the preservation of the region's rich biodiversity, protecting cultural identity and spiritual values, and strengthening the appreciation of such biodiversity within the ASEAN's community and the world.

The ASEAN Ministers responsible for the implementation of CITES officially launched the ASEAN Wildlife Enforcement Network (ASEAN-WEN), and endorsed the ASEAN Regional Action Plan on Trade in Wild Fauna and Flora 2005 – 2010 in December 2005. ASEAN-WEN is the world's largest wildlife law enforcement network that involves police, customs and environment agencies of all 10 AMS (see Chapter 5, Box 5.5).

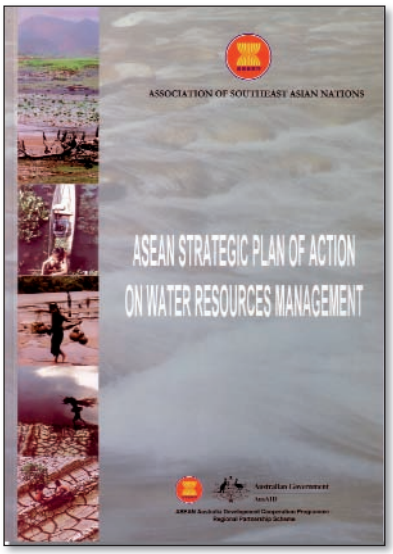
Under the forestry agenda, AMS have taken a number of initiatives, including a Work Plan for Strengthening Forest Law Enforcement and Governance (2008 – 2015), developing a regional framework for a Pan-ASEAN Certification Initiative, ASEAN Criteria and Indicators for sustainable management of tropical forests, a Regional Action Plan on the Trade of Wild Fauna and Flora (2005 – 2010), and the Heart of Borneo initiative.

Promoting the Sustainability of Freshwater Resources

The overall availability of quality freshwater in the ASEAN region is generally sufficient. However some AMS do experience seasonal scarcity, and freshwater resources are under increasing pressures due to rapidly rising demand from industrial activities, agricultural use, and a growing population. The variability of conditions in AMS also affects how water resource issues and their management are addressed. Nonetheless, there are some common issues cutting across AMS, such as supply, demand, water conservation, and water quality management.

To ensure equitable access and sufficient water quantity of acceptable quality, the ASCC Blueprint promotes regional cooperation on integrated water resources management.

Recognising the importance of freshwater resources, ASEAN formed the AWGWRM in 2002. Following the endorsement of the ASEAN Long Term Strategic Plan for Water Resources Management in 2003 by the ASEAN Environment Ministers, ASEAN adopted the ASEAN Strategic Plan of Action on Water Resources Management (2005) which aims to promote the sustainability of water resources to ensure equitable accessibility and sufficient water quantity of acceptable quality.



The ASEAN Strategic Plan of Action on Water Resources Management contains actions on four key issues, i.e.: (i) supply; demand and allocation; (ii) water quality and sanitation; (iii) climate change and extreme events; and (iv) governance and capacity building. The four key issues have been translated into ten project concepts. To date, five project proposals have been endorsed/ implemented, namely:

- Workshop on the Existing Guidelines, Action Plans and Strategies related to Integrated

Box 9.24: Section D.9: Promoting the Sustainability of Freshwater Resources, ASCC Blueprint 2009 – 2015

Strategic Objective: Promote sustainability of water resources to ensure equitable accessibility and sufficient water quantity of acceptable quality to meet the needs of the people of ASEAN.

Actions:

i. Continue implementation of the ASEAN Strategic Plan of Action on Water Resources Management
ii. Endeavour to reduce by half the number of people without sustainable access to safe drinking water by 2010
iii. Manage water resources efficiently and effectively in order to provide adequate and affordable water services by 2015
iv. Promote the implementation of integrated river basin management by 2015
v. Promote public awareness and partnership to enhance integrated water resources management
vi. Promote regional cooperation on water conservation measures and programmes as well as scientific and technological innovations in water quality improvement and supply

Water Resources Management (IWRM) (led by Malaysia, implemented in March 2009)
- Urban Water Demand Management Learning Forum (led by Singapore, implemented in June 2009)
- Water Resources Demand Management Learning Forums for Irrigation (led by Thailand)
- Risks and Impacts from Flood Extreme Events in AMS (led by Indonesia)
- Risks and Impacts from Drought Extreme Events in AMS (led by Thailand)

Malaysia organised the Workshop on the Existing Guidelines, Action Plans and Strategies related to IWRM from 16 – 18 March 2009 in Kuala Lumpur. The Workshop was conducted to prepare for the development of the ASEAN IWRM Country Strategy Guidelines. The workshop agreed on 6 key water-related issues in the region, i.e.: (1) water supply; (2) irrigation; (3) stormwater management; (4) floods management; (5) water pollution management; and (6) sanitation management for the development of regional guidelines.

AMS also face significant challenges in managing urban water demand given rising populations, urbanisation and water scarcity. Depending on the countries' circumstances, AMS have responded to these challenges using tariff solutions, management solutions, technical/engineering solutions, institutional/ regulatory solutions and leadership, public education and community involvement. The ASEAN Workshop on Urban Water Demand Management Learning Forum (22 – 25 June 2009) organised by Singapore agreed that the above challenges could be dealt with short- and long-term solutions. While the short-term solutions include reducing commercial losses, improving the accuracy of water meters and reducing water pressure, the long term solutions could include, among others, pipe replacement programmes, 100 percent metering and introducing institutional reforms such as more effective regulation, private sector participation and financial restructuring of water utilities. The Workshop participants also agreed that capacity building programmes such as formal training, staff exchange, advisory services, twinning arrangement and networking with other similar initiatives and leadership development will be needed to implement these solutions.

Responding to Climate Change and Addressing Its Impacts

ASEAN has been actively engaged in international negotiations in ensuring a fair, effective and equitable outcome for a new climate change regime after 2012. Indonesia hosted the 13th Conference of Parties (COP13) of the UNFCCC in Bali in 2007, which set in place the Bali Roadmap initiating the current talks to conclude new global climate change deal in Copenhagen in December 2009 at COP15. The ASEAN Leaders at their 12th Summit in Singapore in November 2007 issued a Declaration highlighting ASEAN's concerns and expectations of the climate change talks for COP13 in Bali. In addition the Leaders also issued an ASEAN Summit Declaration on Environmental Sustainability, and together with their EAS counterparts issued the Singapore Declaration on Energy, Climate Change and Environment. Thailand, the current ASEAN Chair played host to the Bangkok Climate Change Talks for two weeks from 28th September 2009, a crucial event which will determine whether a new climate change deal can be reached in Copenhagen. The Prime Minister of Thailand attended the G20 Meeting in Pittsburgh in September 2009 where he articulated, among others, ASEAN's concerns and expectations on climate change.

The ASEAN Leaders who met at their 15th Meeting on 24th October 2009 issued a Joint Statement to the 15th Meeting of the Conference of Parties to the UN Framework Convention on Climate Change and the 5th Meeting of the Parties to the Kyoto Protocol.

ASEAN is committed to fully implement various measures to address climate change as outlined in the strategy and actions of the ASCC Blueprint 2009 – 2015. ASEAN Environment Ministers have endorsed the Terms of Reference of the ASEAN Climate Change Initiative (ACCI). ACCI is envisaged to be a consultative platform to further strengthen regional coordination and cooperation in addressing climate change, and to undertake concrete actions to respond to its adverse impacts. The scope of collaboration through the ACCI will include: (i) policy and strategy formulation; (ii) information sharing; (iii) capacity building; and

Box 9.25: Joint Statement to the 15th Meeting of the Conference of Parties to the UN Framework Convention on Climate Change and the 5th Meeting of the Parties to the Kyoto Protocol (2009)

The ASEAN Heads of State/Government who met during their 15th Meeting on 24 October 2009, in their Joint Statement to the 15th Meeting of Conference of Parties to the UN Framework Convention on Climate Change, and the 5th Meeting of the Parties to the Kyoto Protocol emphasized the following:

1. Reaffirm ASEAN's right to sustainable development and resolve to achieve the ultimate objective of the UNFCCC with the aim to stabilise atmospheric greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference with the climate system and within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

2. Work closely to ensure that the agreed outcome of COP15 should incorporate long-term cooperative actions to address climate change in accordance with the principles and provisions of the Convention and the Bali Action Plan, in particular on adaptation, finance, technology transfer, capacity building and taking into account the specific national circumstances of Parties.

3. Urge the Annex 1 Parties to the UNFCCC to take deeper and early cuts on their greenhouse gas emissions to enhance implementation of their commitments given their historical responsibility, economic strength and capabilities.

4. Reaffirm that technology, financing and capacity building should be provided to support and enable adaptation efforts and nationally appropriate mitigation actions by developing countries through effective mechanisms and new institutional arrangements.

5. Urge Annex I Parties to ensure that their existing and future unilateral policies and measures as well as market-based mechanisms in addressing climate change will not negatively affect the sustainable economic and social development of developing countries.

6. Support efforts to enhance understanding and effective implementation of REDD-plus mechanisms in developing countries, with the view of enhancing biodiversity conservation and sustainable use of natural resources, as well as supporting the livelihoods of local communities in a sustainable manner.

7. Urge all Parties to reflect the importance of an integrated coastal and ocean management approach to prepare for and adapt to the adverse effects of climate change in the agreed outcome at COP15, taking into account the Manado Ocean Declaration resulting from the World Ocean Conference 2009.

8. Commit to continue actively contributing towards a successful outcome of the 15th session of the Conference of the Parties to the UNFCCC and the 5th session of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol.

(iv) technology transfer. The ASEAN Environment Ministers have also established an ASEAN Working Group on Climate Change (AWGCC) to implement the ACCI and the ASCC Blueprint actions.

Environmental Cooperation with Dialogue Partners/International Organisations

ASEAN has formal dialogue relations with Australia, Canada, China, European Union, India, Japan, Pakistan, Republic of Korea, New Zealand, Russian Federation, United States of America and the United Nations Development Programme. Various environmental cooperative activities have been developed and implemented through this channel which forms a major source of financial and technical support for ASEAN's programmes. ASEAN has also collaborated with several international organisations such as the UNEP, United Nations University, United Nations Educational Scientific and Cultural Organisation, Asian Development Bank and the Hanns Seidel Foundation.

Engagement with Civil Society

ASEAN has always welcomed and encouraged the participation of Civil Society Organisations (CSOs) in its regional programmes and activities. In the area of environment and sustainable development, ASEAN has worked with several CSOs on regional projects such as peatlands management and biodiversity conservation. In 1986, ASEAN adopted the Guidelines for ASEAN Relations with NGOs to draw them into the mainstream of ASEAN activities and to ensure meaningful interaction and fruitful relationship with ASEAN bodies.

Table 9.4: Major Cooperative Activities with ASEAN Dialogue Partners, 2006 – 2009

Dialogue Partner	Programme	Activities
Australia	ASEAN-Australia Development Cooperation Programme-Regional Partnerships Scheme (AADCP-RPS)	• ASEAN Strategic Plan of Action on Water Resources Management (2005 – 2006) • Capacity Building for the Implementation of the ASEAN Marine Water Quality Criteria Phase II (Development and Publication of ASEAN Marine Water Quality: Management Guidelines and Monitoring Manual) (June 2007 – February 2008) • Capacity Building to Improve Peatland Management and Reduce Land and Forest Fires and Associated Transboundary Haze Pollution in the ASEAN Region (November 2007 – April 2008)
Canada	ASEAN-Canada Joint Cooperation Work Plan (2007 – 2010)	• Regional Climate Change Conference, Bali, 2008
China	China-ASEAN Cooperation	• ASEAN-China Workshop on Botanical Gardens Management and Plant Conservation, May 2006 • China-ASEAN Seminar on Environmental Labelling and Cleaner Production, July 2007 • China-ASEAN EIA & Strategic Environmental Assessment Workshop, Beijing, October 2007 • China-ASEAN Workshop on Cleaner Production Technology and Product Policy, July 2009
European Union	ASEAN Regional Programme for Regional Integration Phase II	• ARPRIS II Workshop on Clean Development Mechanism, July 2008, Bangkok
	Regional EU-ASEAN Dialogue Instrument (READI)	• Inaugural READI on Climate Change, May 2007, Lao PDR • Second READI on Climate Change, July 2008, Bangkok
	ASEAN-EU Cooperation	• Financial and Technical Support for the first three years from 2006 of operations of the ASEAN Centre for Biodiversity
India	ASEAN-India Cooperation	• ASEAN-India Green Fund
Japan	Japan-ASEAN Dialogue on Environmental Cooperation	• The Fourth ASEAN State of the Environment Report (2006 – 2009) • ASEAN Environment Year 2009, March 2009
Republic of Korea	ASEAN-Republic of Korea Cooperation	• Flagship Project on "Restoration of the Degraded Forest Ecosystem in the Southeast Asian Tropical Region (Phase II) (2005 – 2008) • Study visit on integrated solid waste management, September 2007 • Flagship Project on "Restoration of the Degraded Forest Ecosystem in the Southeast Asian Tropical Region (Phase III) (2008 – 2011)
United States	Regional Development Mission-Asia-US Asia Environmental Partnership	• ESCs demonstration projects, 2006
	ASEAN-US Technical Assistance and Training Facility	• Technical assistance to further develop and implement the ASEAN Strategic Action Plan on Water Resources Management, 2007 • ASEAN Civil Society Organisations (CSOs) Consultative Forum on Environmental Protection and Sustainable Development, May 2007, Kuala Lumpur, Malaysia

The ASOEN recognizing the need for regular, sustained and more structured engagement among CSO's and ASEAN bodies, has supported the process of creating such mechanisms, in particular an ASEAN Civil Society Organisations Forum on Environmental Protection and Sustainable Development. This would bring multiple mutual benefits such as enabling CSOs to bring up

Box 9.26: Proposed ASEAN Civil Society Organisations Consultative Forum on Environmental Protection and Sustainable Development

The first ASEAN Civil Society Organisations Consultative Forum on Environmental Protection and Sustainable Development was held from 2 – 4 May 2007 in Kuala Lumpur, Malaysia. The Forum was organised by the ASEAN Secretariat and Global Environment Centre, and supported by Hanns Seidel Foundation and USAID. The Forum was attended by about 20 Civil Society Organisations (CSOs) from all ten AMS.

The Forum provided a platform for CSOs in ASEAN to exchange ideas on key environmental issues facing the region, to share experiences from working at the national level, and to explore and develop mechanisms and modalities for more formal and regular interaction, collaboration and consultation among ASEAN national CSOs, and between CSOs and the relevant ASEAN bodies on promoting environmental protection and sustainable development. The Forum acknowledged the significant role that CSOs with their grassroots level knowledge, experience and reach of the people could contribute to the region's environmental activities by working together.

The Forum was successful in reaching a consensus on approaches for CSOs to work with ASEAN for environmental protection and sustainable development. Participants identified initial priority key issues they could work on such as climate change, fires and transboundary haze pollution, biodiversity and environmental education and awareness.

The participants agreed to begin work to establish the ASEAN CSO Forum for environment and sustainable development. They established an interim organisation, temporarily dubbed the Southeast Asian Civil Society Environment Alliance, with Global Environment Centre acting as the interim secretariat. The participants agreed to endeavour to formally establish the Forum with its own constitution and thereafter work towards gaining ASEAN accreditation. Upon accreditation to ASEAN it was agreed the name would be changed to the ASEAN Civil Society Environment Alliance.

Participants also identified next steps, which included:

- To appoint national focal points for each country, and to hold national consultations to brief local CSOs on the proposed Alliance.
- To establish task forces and initiate collaborative activities.
- To compile an inventory of environmental and sustainable development CSOs, as well as on-going collaborative activities in the AMS.
- To hold the first meeting of the Steering Committee for the Alliance to assess progress and plan for future activities.
- To establish and launch the Alliance as an official ASEAN affiliated organisation.
- To generate funds needed to support the work of the secretariat, the task forces and the country coordination.

emerging issues and concerns on environment to ASEAN decision makers, support ASEAN in designing and implementing regional projects, effectively deliver people-centred programmes, gain formal recognition of CSOs as a key partner of ASEAN, and obtain the backing of ASEAN in mobilizing resources for CSO initiated programmes. The ASEAN Secretariat has assisted in convening the first meeting of the proposed CSO Forum which laid the basic groundwork for establishing the Forum and remains committed to follow through on the initiative.

Endnotes

1 http://haze.asean.org

2 http://youth4sd.asean.org

3 http://aeeid.aseansec.org

CHAPTER 10
The Way Forward: Green ASEAN

ASEAN shall promote sustainable development so as to ensure the protection of the region's environment, the sustainability of its natural resources, and the preservation of its cultural heritage and the high quality of life of its people

ASEAN shall be united by a common desire and collective will to live in a region of lasting peace, security and stability, sustained economic growth, shared prosperity and social progress, and to promote its vital interests, ideals and aspirations

ASEAN Charter

As ASEAN looks forward to becoming an environmentally-sustainable ASEAN Community, it must effectively adapt to the ever changing circumstances and continue improving the region's environmental sustainability. The region's future environmental sustainability depends on the directions and policies of individual AMS supported by regional and multilateral cooperation. AMS environmental performance is commendable; however, rapid development, increased urbanisation and agricultural expansion will affect environmental sustainability unless more effective measures are put in place. Understanding and adapting to future environmental and economic trends such as green economy – the newly-touted economic development model – and changes in international trade mix, particularly trade in environmental goods and services, are vital for this process.

ASEAN chose to celebrate the 2009 ASEAN Day with the theme "Green ASEAN". This demonstrates ASEAN's firm commitment to sustainable development. The theme essentially reflects the three-pronged challenge facing ASEAN: (i) building an environmentally sustainable clean and green ASEAN Community, (ii) transforming the "green shoots" of growth in the face of the 2008 global financial crisis into an economically resilient ASEAN anchored upon green growth, and (iii) nurturing the new ASEAN to be a people-centred organisation respecting and living in harmony with nature.

The way forward for ASEAN is therefore to work towards establishing a Green ASEAN. Noting that the environmental performance of AMS, as assessed by reputable studies, is above the world average, and its ecological footprint much lower compared to other nations, several challenges however need to be addressed in its pursuit of sustaining and improving environmental sustainability. The economic opportunities from ecosystem services and trade in environmental goods and services are highlighted to show the potential for ASEAN to pursue a win-win solution through greening its economy and promoting environmental sustainability. The globalized world driven by rapid technological progress, intense economic competition and unsustainable consumption of natural resources are practical realities that ASEAN has to face. If ASEAN can successfully green its economy, many of the challenges can be turned into opportunities that can benefit its people.

The Roadmap for an ASEAN Community 2009–2015 provides the way forward for ASEAN to realise the vast opportunities of a green economy in its pursuit of a Green ASEAN.

On 8th August 2009, 580 million people in ASEAN celebrated ASEAN Day, in commemoration of the birth of the Association 42 years ago. The celebrations were particularly significant this year since it marked two key developments which brought new meaning to, and heralded in a new phase for ASEAN regional cooperation and community building.

H.E. Dr Surin Pitsuwan, Secretary-General of ASEAN and Datuk Seri Tony Fernandes, Group CEO of Air Asia celebrating ASEAN Day 2009 which carried the theme 'Green ASEAN'.

First, the ASEAN Charter entered into force on 15th December 2008. The Charter bestowed a legal personality upon ASEAN, which for the past 42 years has operated as a coalition of nations born out of the Bangkok Declaration of 1967. To realise the purposes of the Charter, the ASEAN Leaders adopted a Roadmap comprising three community blueprints – political-security, socio-cultural, and economic – and the Initiative for ASEAN Integration 2nd Work Plan. The Roadmap for an ASEAN Community 2009 – 2015 lays out the goals, strategies and actions to realise the ASEAN Community by 2015 – an ASEAN Community that is politically cohesive and peaceful, economically integrated and vibrant, and socially responsible and caring.

Second, ASEAN chose "Green ASEAN" as the theme for this year's celebration. This demonstrates ASEAN's firm commitment to sustainable development. The theme essentially

reflects the three-pronged challenge facing ASEAN: (i) building an environmentally sustainable clean and green ASEAN Community, (ii) transforming the "green shoots" of growth in the face of the 2008 global financial crisis into an economically resilient ASEAN anchored upon green growth, and (iii) nurturing the new ASEAN to be a people-centred organisation respecting and living in harmony with nature.

In this globalised world, each of these challenges is intrinsically linked to each other. These have to be tackled in an integrated and cohesive manner to address the challenges and harness the opportunities that come along with them. The conventional means of driving economic growth have to be modified or abandoned. No longer can development be premised on wanton exploitation of natural resources and degradation of the environment which puts pressure on the planet's life support systems and fast depletes the natural resources.

Sustainable economic growth has come to be recognised as encompassing all aspects of environmental sustainability and social development. Sustainable growth should lead to actions that meet the needs of the present generation while preserving the earth's capacity to meet the needs of future generations. In the pursuit of this aim, the global community agreed to apply the precautionary approach placing more emphasis on preventive rather the curative measures. The global community also agreed to work together based on the principle of common but differentiated responsibilities where all nations have a collective responsibility to protect the planet's environmental commons, while each country acts and makes a contribution based on its respective capabilities and resources available.

However, the global community having agreed on this approach as the pathway to future development has in fact moved in the opposite direction. The world is now facing an environmental crisis, particularly due to climate change, which many have categorised as the greatest challenge facing humankind in the 21st century. There is more and more scientific evidence to show that survival beyond the 21st century is doubtful, unless the sustainable development pathway is implemented quickly and vigorously.

ASEAN is fully aware of the dangers it will face if it follows the conventional path of development. Although occupying only three percent of the earth's total surface, the ASEAN region contains over 20 percent of all known plant, animal, and marine species. This rich biological diversity significantly contributes to global environmental sustainability, providing foundations for life support systems and ecosystem services to which the well-being of human societies are intimately linked. The region is home to three of the 17 recognised mega-diverse countries (Indonesia, Malaysia, and the Philippines) and numerous centres of concentration of restricted-range bird, plant, and insect species. The region has 35 percent of the world's coastal mangrove forests and 34 percent of the world's coral reefs. These resources provide its people and the world with a wide range of essential goods and services and unparalleled commercial and recreational opportunities.

However, ASEAN, as elsewhere, is facing unsustainable exploitation of natural resources and degradation of environment, not only from internal pressures but increasingly from outside the region. ASEAN is working on several fronts to conserve and protect its environment. These include measures for sustainable forest management, biodiversity conservation, mitigation of land and forest fires, building environmentally-sustainable cities, applying integrated water resources management methods, putting in place coastal and marine protection strategies, encouraging sustainable agriculture and introducing environmentally-sound mining practices. The ASEAN Leaders have also shown their commitment to environment and sustainable development by emphasizing the need for sustainable actions at national, regional and international levels, when they focused on the theme of energy, environment, climate change and sustainable development at their Summit in 2007 and issued three Declarations.

Nevertheless, environmental protection cannot be realised by environmental activism alone. The global community has to act beyond the realm of the environmental sector, and address all external drivers that impact on the environment. All aspects of sustainable development – environmental protection, economic growth, and social

development – should contribute to each other, rather than affect each other adversely.

The climate change crisis aptly amplifies the consequences of not acting in a holistic and integrated manner. Climate change has become a defining and the most challenging development issue of the 21st century. It is defining in the sense that climate change is now dictating the pace and nature of economic growth, development and social progress, while posing the greatest threat to humankind. It is the most challenging because of its multifaceted nature. It cannot be fixed by technology or finite human and capital resources alone. It is also the most urgent in the sense that, if remedial measures are not taken, a point of no return would be reached in the next few decades.

In the on-going negotiations for renewed and urgent actions on climate change, the debate on mitigating greenhouse gases, essentially carbon dioxide, is fast turning into a development issue – how much growth each nation can pursue given the constraints on the limiting capacity of atmospheric carbon space. The key argument is that the developed countries, with their historically unfettered industrial growth, have enjoyed these rights and have crowded out the carbon space, which is now limiting the development potential of developing countries, given that they too should have the right to equitable development.

This draws attention to the stark reality that the environment cannot be separated from economic growth and social development. Each has to support and complement the other. There are encouraging signs that the global community is adopting and implementing green policies and strategies such as green growth and low-carbon growth trajectory, and placing importance on the environmental goods and services as the future growth sector. Many countries are also pursuing sound environmental programmes as a means to strengthen and diversify their economies, to sow the seeds to grow out of the current financial crisis and to establish the foundation for resilient and sustainable economic growth.

As ASEAN looks forward to becoming an environmentally-sustainable ASEAN community, it must effectively adapt to the ever changing circumstances and continue improving the region's environmental sustainability. The region's future environmental sustainability depends on the directions and policies of individual AMS supported by regional and multilateral cooperation. AMS performance on environmental sustainability is commendable; even better than some of the bigger and more developed countries outside of the grouping. However, rapid development, increased urbanisation and agricultural expansion will affect environmental sustainability unless more effective measures are put in place. Understanding and adapting to future environmental and economic trends such as green economy – the newly-touted economic development model – and changes in international trade mix, particularly trade in environmental goods and services, are vital for this process.

Environmental Sustainability

Environmental Performance Index

Attempts to quantify sustainability and/or environmental performance of countries have lead to various benchmarking exercises. The Yale and Columbia University, in collaboration with the World Economic Forum and the Joint Research Centre of the European Commission, originally developed the Environmental Sustainability Index (ESI) to evaluate environmental sustainability of countries. The ESI was later modified to the Environmental Performance Index (EPI). The EPI uses outcome-oriented indicators that can be more easily used by policy makers, environmental scientists, advocates and the general public.

The 2008 EPI offers a composite index of current national environmental protection efforts. Recognizing that on-the-ground conditions are the ultimate gauge of environmental performance, the EPI focuses on measurable outcomes that can be linked to policy targets and tracked over time. The EPI builds on measures relevant to two core objectives, namely: (i) reducing environmental stresses to human health (the Environmental Health objective); and (ii) protecting ecosystems and natural resources (the Ecosystem Vitality objective).

From the 2008 study, AMS had EPI scores ranging from 53.8 to 84.0 (the higher the better) compared to scores ranging from 39.1 to 95.5 for all the 149 countries assessed. This places the

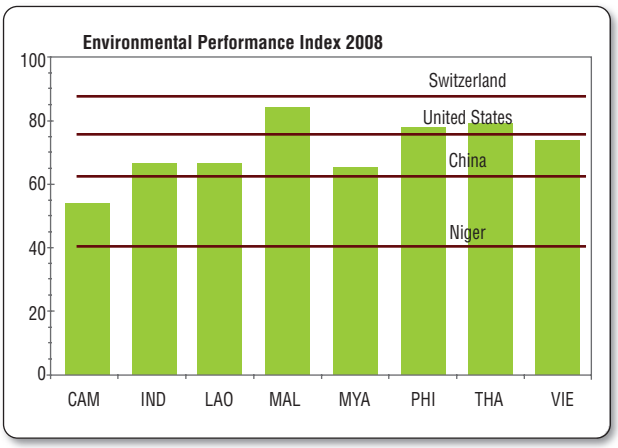
AMS performance as above average compared to all the countries assessed. Malaysia and Thailand have the highest scores amongst the AMS assessed.

Table 10.1: Environmental Performance Index for Selected AMS, 2008

Country	EPI Rank	EPI Score
Cambodia	136	53.8
Indonesia	102	66.2
Lao PDR	101	66.3
Malaysia	27	84.0
Myanmar	104	65.1
Philippines	61	77.9
Thailand	53	79.2
Viet Nam	76	73.9

Source: *Yale and Columbia University[1]*
Notes: *(1) EPI score, higher the better*
(2) A total of 149 countries were assessed

Figure 10.1: EPI of AMS Compared to Selected Countries outside the Region

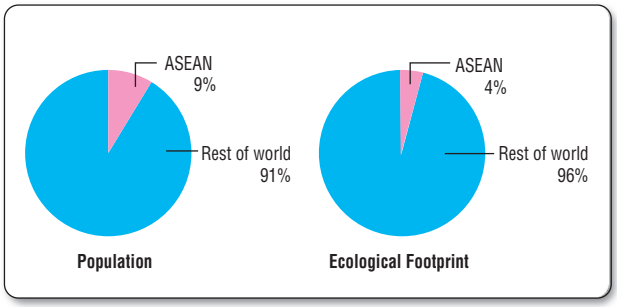


Source: *Yale and Columbia University[2]*

Ecological Footprint

Ecological footprint (EF) can be defined as a measure of human demands on the earth's ecosystems and the capability of earth's natural resource to satisfy that demand. Based on the analysis carried out by the Global Footprint Network[3] in 2005, ASEAN's EF is only 4 percent of the global total. This goes to show that ASEAN uses less than its share of resources given that its population is 9 percent of the global total. However, five AMS today show a deficit in their ecological footprint bottom-line (compared to only three AMS reported in the Third ASEAN State of the Environment Report). This trend has to be addressed so that the region as a whole can move towards a more sustainable future.

Figure 10.2: ASEAN Population and Ecological Footprint



Source: *Global Footprint Network*

The need for a shift in the production and consumption patterns of AMS economy is evident. In understanding the processes and baselines as summarised in the results of EPI and ecological footprint, it is clear that AMS have within their capacity to initiate efforts towards greening of the region's economy. This includes the further development of sustained measures to promote the use of environmental goods and services. As AMS continue to develop, they will have to pursue measures that will encourage the growth of green cities, the use of clean and efficient technology and increased use of renewable energy and initiatives that ensure a sound ecosystem.

Greening ASEAN's Economy

In the midst of the global economic crises of 2008 – 2009, the United Nations Environment Programme (UNEP) called for a "Global Green New Deal (GGND)" according to which governments were encouraged to support the transformation to a greener economy[5]. The green economy is the new economic development model that is based on the knowledge of ecological and green economics. The model calls for a global plan for a green industrial revolution which is supported by strong and convincing evidence of income generated, decent jobs created and poverty reduced through investing in a new generation of assets including:

- Ecosystems (or environmental infrastructure);
- Clean and efficient technology;

Table 10.2: Ecological Footprint and Bio-capacity for Selected AMS, 2005

Country	Population (million)	Total EF	Cropland Footprint	Grazing Footprint	Forest Footprint	Fishing Ground Footprint	Carbon Footprint	Built-up Land	Total Bio-capacity	Cropland	Grazing Land	Forest	Fishing Ground	Built Land	Ecological Deficit () or Reserve
Cambodia	14.1	**0.9**	0.44	0.08	0.21	0.04	0.14	0.04	**0.9**	0.46	0.14	0.15	0.14	0.04	**(0.0)**
Indonesia	222.8	**0.9**	0.50	0.00	0.12	0.16	0.09	0.08	**1.4**	0.56	0.07	0.22	0.46	0.08	**0.4**
Laos	5.9	**1.1**	0.48	0.14	0.33	0.01	0.00	0.10	**2.3**	0.39	1.25	0.55	0.04	0.10	**1.3**
Malaysia	25.3	**2.4**	0.55	0.04	0.44	0.23	1.07	0.09	**2.7**	1.00	0.02	0.56	1.00	0.09	**0.3**
Myanmar	50.5	**1.1**	0.62	0.05	0.26	0.05	0.06	0.06	**1.5**	0.48	0.20	0.44	0.32	0.06	**0.4**
Philippines	83.1	**0.9**	0.42	0.01	0.08	0.25	0.07	0.04	**0.5**	0.28	0.07	0.07	0.08	0.04	**(0.3)**
Thailand	64.2	**2.1**	0.64	0.01	0.16	0.37	0.89	0.06	**1.0**	0.65	0.01	0.09	0.16	0.06	**(1.2)**
Viet Nam	84.2	**1.3**	0.56	0.00	0.15	0.03	0.46	0.07	**0.8**	0.33	0.05	0.12	0.24	0.07	**(0.5)**

Source: *Global Footprint Network*[4]

- Renewable energy;
- Biodiversity-based products and services (such as organic foods);
- Chemical and waste management and mitigation technologies; and
- "Green Cities" – tomorrow's habitat for humanity – with ecologically friendly buildings, construction, and transport systems.

The GGND has three broad objectives. It should make a major contribution to reviving the world economy, saving and creating jobs, and protecting vulnerable groups. It should promote sustainability and inclusive growth and the achievement of the MDGs, especially ending extreme poverty by 2015. Also, it must reduce carbon dependency and ecosystem degradation – these are key risks along a path to a sustainable world economy.

Green economy initiatives include green energy production based on renewable energy resources and energy conservation to promote more efficient energy use. The green economy concept has the potential to create green jobs and ensure real economic growth. It also prevents environmental pollution and helps curb global warming, and further resource depletion.

Detachment from the underlying dependence on fossil fuel and moving forward from the traditional "Black Economy" will have an overwhelming impact on many oil dependant AMS. Localising the production and supply of renewable energy such as biofuels will help reduce their dependency on crude oil. For example, Thailand aims at introducing 10 percent of locally produced biofuel into its gasoline usage by 2012, providing a boost for its farmers and reducing its oil dependence. However, there has to be a balanced approach to use of scarce agricultural land for energy and food.

Box 10.1: United Nations Environment Programme – Green Economy Initiative: A Global Green New Deal

At the onset of the global economic recession of 2008, a Global Green New Deal was proposed by UNEP to focus on wide ranging reforms, similar to the New Deal concept of the 1930's. Set as a globally coordinated large-scale stimulus package and policy measures, the proposal has the potential to improve the global economy in the short term, and at the same time, lay the foundation for sustainable and economic and environmental growth in the medium and long terms. The Global Green New Deal will also enhance the involvement of all participants – workers; employers; and local, regional, and sub regional governments. The concept attempts to address the multitude of economic crises facing the world, by emphasising green sector development and changing the approach of economic re-growth to incorporate the needs of global environmental governance. The new Green Economy will be able to allocate natural capital and financial capital in a more effective and efficient manner in the foreseeable future.

Trade in Environmental Goods and Services

The issue of trade in environmental goods and services (EGS) has been addressed in many international fora such as the Millennium Declaration, the Monterrey Consensus, the World Trade Organisation (WTO) Doha Ministerial Declaration, and the World Summit on Sustainable

Development Plan of Implementation. These commitments support the liberalisation and market expansion of the EGS sector as a strategy to support the pursuit of sustainable development. Today, as ASEAN looks forward to becoming a productive global economic player, it must embrace the challenges and opportunities to trade in environmental goods and services.

EGS as a subset of goods and services was singled out for attention in the negotiating mandate adopted at the Fourth Ministerial Conference of the WTO in November 2001. Increasing access to and use of EGS can yield a number of benefits including reducing air and water-pollution, improving energy and resource-efficiency and facilitating solid waste disposal.

It is predicted that gradual trade liberalisation and carefully managed market opening in these sectors can be powerful tools for generating employment and enabling the transfer of valuable skills and technology. This can indirectly result in advancing economic growth for AMS. In short, well-managed trade liberalisation in EGS among AMS can facilitate the achievement of sustainable development goals.

Green Jobs

Green jobs are defined as work – in agriculture, industry, services and administration that contributes to preserving or restoring the quality of the environment[6]. Green jobs help protect ecosystems and biodiversity by reducing the consumption of energy, materials, and water through high efficiency strategies such as de-carbonising the economy; and minimising or altogether avoiding the generation of all forms of waste and pollution.

Introducing green jobs in AMS will be challenging but the move towards sustainable consumption and production (as discussed in Chapter 7) will change the way people perceive the environment and encourage the expansion of a green economy. People's livelihoods and sense of dignity are bound up tightly with their jobs. As such, green jobs should offer adequate wages as well as provide safe working conditions, job security, reasonable career prospects, and worker rights. Jobs that fail to provide these benefits cannot be termed as green. Even though there are many jobs today in sectors that are in support of environmental goals – such as the electronics recycling industry or bio-fuel feedstock plantations, these occupations should not involve poor work practices such as exposing workers to hazardous substances. Sustainable development should also embrace the principle of social equity.

As the move toward a low-carbon and more sustainable economy gathers momentum, growing numbers of green jobs will be created. Companies and regions that become leaders in green innovation, design, and technology development are more likely to retain and create new green jobs. However, countries dependent on mining and fossil fuels for example will face a greater challenge to diversify their economies. This will no doubt be of great concern and challenge for those that are unprepared for the onset of this new green economy. AMS should adopt public policies that minimise disparities among putative winners and losers that arise in the transition to a green economy, and avoid these distinctions becoming permanent features.

Payment for Ecosystem Services

Payment for ecosystem services (PES) is a performance-based financing tool that can be used to mobilise government and private sector resources to maximise sustainable development and environmental values. PES is being applied to serve a variety of objectives. Some use PES for national forest management and biodiversity conservation targets, while some use it to produce energy and clean water efficiently. Some applications are meant to meet international treaty and convention targets, while some attempt to contribute to poverty alleviation.

A number of challenges remain. More awareness raising and political support are needed. Roles of the government and the private sector in implementing PES need to be clarified and distinguished from each other. In particular, public policy work such as resolving land tenure issues and coordinated land use planning need to be undertaken. Scientific baselines and cost-benefit analyses still have to be established for many of the services in question, and in most areas throughout the region. Finally, monitoring and enforcement need to be pursued with more vigor and determination.

Box 10.2: PES Case Studies – Viet Nam

Pilot schemes on PES to protect watersheds of hydropower dams were established in two provinces. Forest labor in providing environmental services (ES) was considered as inputs for production, while environmental services were treated as part of people's livelihoods. Households were allocated with forest lands and were contracted to protect these lands on a long-term basis, mainly through integrated agro-forestry activities as well as forest and wildlife patrolling. At the first stage of piloting, only a few environmental services were subjected to PES; soil conservation and maintenance of water supply were treated as inputs to production of hydropower plants. Nevertheless, it was recognised that protection of watersheds would result in providing more environmental services such as improved air quality, carbon sequestration, conservation of genetic resources and biodiversity, disaster prevention and protection of the natural landscape.

ES providers have since experienced higher household incomes because of the scheme. On the other hand, ES buyers are supportive of PES as they experience lower maintenance costs. Protecting the watershed has helped regulate water entering their reservoirs. Floods have been reduced thus decreasing damage to infrastructure during the rainy season. Finally, erosion and sedimentation have been controlled, thus reducing dredging costs. Consumers initially experienced higher electricity costs, but the scheme is expected to stabilise electricity supply, thus benefitting the end-consumers eventually.

Another PES case study in Viet Nam involves green contracts between manufacturing businesses and farmers planting bamboo, cocoa and high-value timber in Da Te District in Lam Dong province. Private sector investors enter into contracts with the farmers to buy their forest products, which are further processed into consumer items. The contracts allow the farmers to increase their income, while they engage in environment-friendly activities such as elimination of slash-and-burn practices. One particular contract was entered into by Pole Position Co., a French company engaged in bamboo processing for furniture and handicrafts for export. The company contracts bamboo growers and guarantees the purchase of the latter's products. The farmers in turn engage in forest-friendly agricultural activities, e.g. sustainable bamboo planting and harvesting practices. Raw materials are processed on-site, allowing a significant number of locals to be employed by the company.

Source: *Excerpt from PES Workshop Report, Bangkok, July 2009*[7]

Box 10.3: PES Case Studies – Cambodia

Three types of PES schemes have been set up in the forest villages in northern Cambodia. The schemes involve different types of arrangements among the buyers and sellers, and different types of environmental services.

- The first scheme deals with biodiversity payments to individual households for protecting nests of important bird species.
- The second involves agro-environment payments to individual households and villages for zoning agricultural land and limiting field boundaries cleared for planting. The agricultural produce is labeled as wildlife-friendly and sold to hotels and restaurants that cater to international tourists.
- The third scheme engages villages with key bird species to sign up to "no hunting" agreements and to undertake ecotourism services as part of their livelihoods in exchange for tour groups brought to their areas.

All schemes were supported by Wildlife Conservation Society (WCS) which acted as either the buyer or the broker in each of them.

Although the schemes were different from each other, common lessons have emerged. PES -enabling factors include defining the environmental services (ES) clearly and setting up adaptive management arrangements on-site. Enhancing the subject ES did not result in loss of other ES critical for livelihoods. Property and management rights were clear from the start, and government policies were supportive of decentralised natural resources management. Village groups had ownership of the scheme and were relied on to lead in decision making. In terms of socio-economic gains, all three schemes resulted in higher incomes and did not entail high transaction and opportunity costs for the local people.

In the Cambodian experience, one of the most important elements of a successful PES scheme was the building of confidence and trust among the buyers and sellers of environmental services. In this regard, proper monitoring and measurements of the service were crucial. There are a number of on-going PES schemes in the country, most of which involve carbon emission reduction. Still, a number of challenges

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remain, such as weak property rights, poor law enforcement, low pricing of environmental services, lack of a legal framework, population pressures in the uplands, and low capacity and awareness in local communities. There is still the need to clearly define which environmental services can be subjected to PES, identify the sellers and buyers accurately and provide the necessary property rights for the schemes to work. Finally, legislation is still needed to determine how public payments can be made, how budgets can be allocated for setting up such schemes and, and how the terms of payment are specified.

Source: *Excerpt from PES Workshop Report, Bangkok, July 2009*

Box 10.4: PES Case Study - Indonesia

Payment for watershed services (PWS) in Lombok, Indonesia is part of the Rewarding Upland Dwellers for Providing Environmental Services (also called RUPES) project being implemented by the World Agroforestry Centre. The project started in 2002 with water assessment studies, followed by awareness raising activities on the water crisis and community action meetings to address the crisis. Capacity building and institutional formation activities were implemented in the next two years, until PWS fees were voluntarily paid in 2005. The fees were endorsed by law the following year, and a more formal transaction between the upland communities and the water district ensued in 2007. The scheme has resulted in higher incomes for the local households, as well as an increased number of visitors to the Park.

Lessons learned include the importance of economic valuation, hydrology assessments, land use mapping and determination of "Willingness to Accept" amounts as prerequisite studies for PES schemes. Institutional mechanisms such as forming an intermediary group are likewise crucial. Buyers of the scheme may be expanded to include their national airlines.

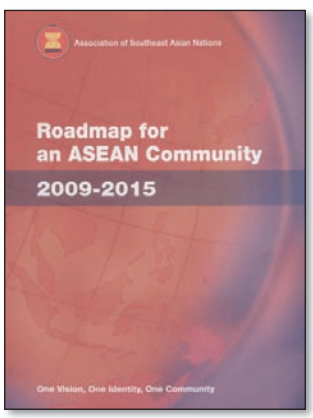
There are plans to replicate the project in Aceh, Indonesia. There appears to be strong political will to implement green policies in the province coupled with an interest on the part of international donors and NGOs to support such programmes. On the other hand, awareness and capacity are still very low among the local stakeholders particularly on setting the proper legal framework and appropriate coordination mechanisms.

Source: *Excerpt from PES Workshop Report, Bangkok, July 2009*

PES is being initiated in many AMS. For example, there is a heightened interest in pursuing Reducing Emissions from Deforestation and Forest Degradation (REDD), developing ecotourism industries and tapping existing hydropower companies for future PES schemes. PES schemes for biodiversity conservation in protected areas are also emerging.

Green ASEAN

The ASEAN Leaders, inspired by the spirit of a new ASEAN as symbolised by the ASEAN Charter, have reaffirmed their commitment to the establishment of ASEAN Community by 2015. The Leaders have adopted the Roadmap for an ASEAN Community 2009 – 2015 comprising the Political-Security Community Blueprint, the ASEAN Economic Community Blueprint, the ASEAN Socio-Cultural Community Blueprint and the Initiative for ASEAN Integration (IAI) 2nd Work Plan as the primary means to achieve the goals of an ASEAN Community. The Roadmap essentially forms the sustainable development framework for ASEAN Community building. Led by the environmental sustainability strategies and actions in the ASEAN Socio-Cultural Community Blueprint, and embedded in the relevant economic, political, security, and social strategies and actions of the three Community Blueprints, the Roadmap spells out the efforts and means to achieve a Green ASEAN Community.



However, the path to a green ASEAN is not going to be smooth. Though ASEAN through the ASEAN Charter and the Roadmap for an ASEAN Community 2009 – 2015 have laid out its ambitious goals and plans, the success of the Roadmap depends very much on developments outside the region, especially for environmental issues which are complex, multifaceted and transboundary in nature.

First, ASEAN must continue to vigorously pursue its sustainable development framework as embodied in the Roadmap for an ASEAN Community 2009 – 2015. The **greening of the ASEAN economy** requires that ASEAN must increasingly pursue market based approaches. This is not going to be easy, especially in the short term. The potential for trade in environmental goods and services are huge, and is certainly sustainable in the longer term, compared to the conventional exploitative use of ecosystem resources. However, as developing nations, with social and economic development as the main priority, such an approach has to be judiciously implemented. About 185 million people in ASEAN still earn less than US$2 a day. Greening of the economy involves not only reallocation of resources but also changes in production systems and processes and use of green technology. There is bound to be protectionist measures applied to international trade to preserve existing markets and comparative advantages. This is where the global partnership in protecting the environmental commons has to come in. Nations should play their enabling role based on the principle of common but differentiated responsibility and respective capabilities, and also ensure that markets are guided in their actions towards environmental sustainability.

Second, ASEAN has to ensure that all member states achieve sufficient development potential and capacity to fully its goals and aspirations for an ASEAN Community. Therefore **narrowing the socio-economic divide** among and within the member states of ASEAN, and to ensure environmental sustainability in the process of catching up with economic growth and social development remains a priority. The ASEAN Leaders, in the Roadmap for an ASEAN Community 2009 – 2015 emphasised that "narrowing the development gap shall remain an important task to ensure the benefits of ASEAN integration are fully realised through effective implementation of the Initiative for ASEAN Integration and other sub-regional frameworks". The ASEAN Leaders have also 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 AMS to move forward in a unified manner."

Third, **damage caused by natural and man-made disasters** not only sets back years or even decades of development, but significantly retards the capacity of people and nations to recover from the damage inflicted. Several recent devastating disasters remind us of the increasing frequency and severity of disasters the ASEAN region is exposed to. Many of these disasters, such as forest fires, are caused by environmental degradation which in turn causes further ecosystem disruption. Therefore addressing environmental sustainability is of paramount importance to reduce the severity of hazards, minimise loss of life and suffering, and to progressively move up the economic and social ladders. The Roadmap for an ASEAN Community 2009 – 2015 calls upon AMS to strengthen effective mechanisms and capabilities to prevent and reduce disaster losses, and to jointly respond to disaster emergencies through concerted national efforts and intensified regional and international cooperation within the framework of the ASEAN Agreement on Disaster Management and Emergency Response.

Fourth, the current **climate change crises** is the embodiment of what can go wrong, if action is not taken globally based on the principle of common but differentiated responsibility. ASEAN is particularly vulnerable to the impacts of climate change due to the concentration of people and economic activities in the coastal areas, its rich biological diversity, mainly resource-based economies, and the increased vulnerability of the people especially the poor. The climate change crisis also demonstrates the need for action, not only in the environment area, but also in the economic and social sectors through changes of wasteful affluent lifestyles especially. The ASEAN Leaders have expressed their concern and

commitment for ASEAN to play a proactive role in addressing climate change through their declarations to the 2007 Bali and 2009 Copenhagen UN Conferences on Climate Change.

Fifth, ASEAN needs to pursue even greater efforts to address **land and forest fires to minimise transboundary smoke haze pollution**. ASEAN has made commendable progress to put in place institutional mechanisms and programs to prevent, monitor and mitigate fires, and to assist each other during periods of escalation of fires through the ASEAN Agreement on Transboundary Haze Pollution. Apart from region-wide actions, ASEAN is also pursuing concrete on-the-ground activities in the Mekong and southern regions of ASEAN, and through bilateral initiatives by Malaysia and Singapore with Indonesia. Regional and national plans of actions and targets have been set to reduce fires through monitoring of hotspot activities and preventive actions. The ASEAN Peatland Management Strategy is in place, and a major regional peatland project with activities in several pilot sites across the region is being implemented to address the major source of fires. However, increased fires are closely associated with the dry and hot El Nino period that overwhelms the capacity of member states to mitigate the fires. As forest fires destroy ecosystem and biodiversity, and contributes to climate change by releasing carbon, it is important that the global community becomes more engaged and work with ASEAN to address this recurring problem.

Sixth, ASEAN has to protect its **freshwater resources and marine and coastal ecosystems**. These are important life-sustaining and economic resources. The rising population and increasing industrial and agricultural activities will continue to exert pressure on these resources. The Roadmap for an ASEAN Community 2009 – 2015 stresses the need for AMS to promote sustainability of water resources to ensure equitable accessibility and sufficient water quantity of acceptable quality to meet the needs of its people. The ASEAN Strategic Plan of Action on Water Resources Management will continue to be implemented. ASEAN is also on track to reduce by half, the number of people without sustainable access to safe drinking water by 2010, and promote integrated river basin management by 2015. The ASEAN Marine Water Quality Criteria and the ASEAN Criteria for National

Leaders of 6 countries at the CTI Summit, Manado, 15 May 2009.
Photo by WWF/Justin Woolford

Protected Areas will form the basis for sustaining coastal and marine water quality, and to establish a regional network of representative marine protected areas to conserve critical habitats. Several AMS have taken the lead to establish the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security to protect the rich marine biological resources.

Seventh, ASEAN has to further **reduce the rate of deforestation and loss of biodiversity** in the region which hosts an abundance of flora and fauna, many of which are found nowhere else in the world. Already there are encouraging signs of reduction of the rate of deforestation. However, the rate of deforestation is still high compared to the world's average, and further reducing it will remain challenging considering the primarily resource-based economy of the region. The Roadmap for an ASEAN Community 2009 – 2015 calls for the region's rich biological diversity to be conserved and sustainably managed toward enhancing social,

Sealing the deal to conserve the Heart of Borneo
Photo by WWF-Indonesia/Jimmy

economic and environmental well-being. The role and capacity of the ASEAN Centre for Biodiversity will be further enhanced to enable it to effectively function as a regional centre of excellence in promoting biodiversity conservation and management. The ASEAN Heritage Parks Programme will be strengthened and utilised as a platform for ecosystem-based protected areas management by 2015. The Heart of Borneo Initiative by Brunei Darussalam, Indonesia and Malaysia to collectively protect the tropical rainforests of Borneo is another exemplary effort to conserve some of the most important forest ecosystems in the world.

Eighth, ASEAN has to further pursue efforts to ensure **its cities and major urban settlements are environmentally sustainable**. The increasing population, rapid rate of urbanisation, and rising affluence, among others, will exert greater pressure on the limited resources and capacity of the cities. The Roadmap for an ASEAN Community 2009 – 2015 aims to ensure urban areas in ASEAN are environmentally sustainable while meeting the social and economic needs of the people. Priority has to be given to the development of better public transportation systems, introduction of cleaner energy technologies, establishment of more green spaces, and the promotion of more sustainable production and consumption practices. ASEAN has awarded the inaugural ASEAN Environmentally Sustainable Cities Award in 2008 to ten cities in ASEAN to showcase and promote exemplary efforts, and will work on initiatives such as low carbon society, compact cities, eco-cities and environmentally sustainable transport. ASEAN is also promoting the "Cool ASEAN, Green Capitals" initiative, a city-led endeavour to promote environmental sustainability through mutually beneficial actions on addressing climate change and improving the basic needs of major cities in ASEAN.

Ninth, while addressing the pressing national and regional economic, social and environmental issues, ASEAN is fully committed to play a proactive role to address **global environmental issues**. All AMS have ratified the major multilateral environmental agreements and have demonstrated their capability to fulfil their obligations and commitments ahead of their deadline, such as in the Montreal Protocol. AMS have intensified cooperation to enhance and strengthen national and regional capacities through regional research, increased awareness, capacity building and informed policy choices.

Finally, ASEAN has strengthened its **regional institutional and policy framework**. The ASEAN Charter has established several new institutions to implement effectively its mandate and to strengthen coordination among the three community pillars. The Roadmap for an ASEAN Community 2008 – 2009 provides the policy and strategic framework to achieve the ASEAN Community by the year 2015. The vision of a clean and green ASEAN Community will require strong institutions able to make timely decisions, mobilise resources and support worthwhile programmes and projects; and to engage other countries, international and regional organisations, civil society organisations and the private sector in meaningful partnerships. In line with this development, the ASEAN Secretariat has also been restructured and strengthened to support the implementation of the Roadmap for the ASEAN Community 2009 – 2015.

ASEAN is committed to a clean and green ASEAN Community. The 580 million people in ASEAN aspire to improve their quality of life while cherishing their cultures and way of life and sustaining the natural ecosystems within which they live. Alleviating poverty, providing adequate shelter and food, boosting national economies and protecting the environment, appear at times, to be at odds and incompatible. The globalizing world which is driven by rapid technological progress, intense economic competition and the unsustainable consumption of natural resources are realities that ASEAN has to face. However, in the midst of these difficult challenges, there are always opportunities. If ASEAN can successfully green its economy, many of the challenges can be turned into opportunities for the benefit its people.

The Roadmap for an ASEAN Community 2009 – 2015 provides the way forward for ASEAN Member States to act collectively to realise the vast opportunities of a green economy in its pursuit of a Green ASEAN.

Endnotes

1 Yale and Columbia University. (2008) *Environmental Performance Index*. Available online at http://epi.yale.edu/Home

2 Yale and Columbia University. (2008) *Environmental Performance Index*. Available online at http://epi.yale.edu/Home

3 Global Footprint Network 2008. *World's Ecological Footprint*. Available online at http://www.footprintnetwork.org/en/index.php/GFN/page/footprint_for_nations/

4 Carbon Footprint of a nations' consumption includes direct carbon dioxide emissions from fossil fuel combustion, as well as indirect emissions for products manufactured abroad. It also includes carbon dioxide emissions associated with extraction of these fossil fuels, such as flaring of gas. Other consumption-related carbon dioxide emissions included in the accounts only of the global total are from cement production and tropical forest fires.

(Population data from the UN FAO for year 2005; Forest Footprint includes fuelwood; Built-up land includes areas dammed for hydropower; and Biocapacity includes built-up land.)

5 United Nations Environment Programme. (2009). *Global Green New Deal: Policy Brief*. Available online at http://www.unep.org/pdf/A_Global_Green_New_Deal_Policy_Brief.pdf

6 United Nations Environment Programme. (2008) *Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World*. Nairobi, Kenya: United Nations Environment Programme.

7 Excerpts from PES Workshop Report, Bangkok, July 2009.

Appendix

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Regular ASEAN Meetings on the Environment: 2006 – 2009

1. ASEAN Ministerial Meeting on the Environment

30 October 2009	11th ASEAN Ministerial Meeting on the Environment	Singapore
6 September 2009	Special ASEAN Ministerial Meeting on the Environment	Thailand
8 October 2008	11th Informal ASEAN Ministerial Meeting on the Environment	Viet Nam
6 September 2007	10th Informal ASEAN Ministerial Meeting on the Environment	Thailand
10 November 2006	10th ASEAN Ministerial Meeting on the Environment	Philippines

2. Meeting of the Conference of the Parties to the ASEAN Agreement on Transboundary Haze Pollution

29 October 2009	5th Meeting of the Conference of the Parties (COP) to the ASEAN Agreement on Transboundary Haze Pollution	Singapore
8 October 2008	4th Meeting of the COP to the ASEAN Agreement on Transboundary Haze Pollution	Viet Nam
5 September 2007	3rd Meeting of the COP to the ASEAN Agreement on Transboundary Haze Pollution	Thailand
1 March 2007	2nd Meeting of the COP to the ASEAN Agreement on Transboundary Haze Pollution 12th ASEAN Ministerial Meeting on Haze (subsequently meeting as Conference of Parties)	Brunei Darussalam

3. Sub-Regional Ministerial Steering Committee (MSC) on Transboundary Haze Pollution

19 August 2009	8th MSC on Transboundary Haze Pollution	Singapore
29 April 2009	7th MSC on Transboundary Haze Pollution	Brunei Darussalam
22 October 2008	6th MSC on Transboundary Haze Pollution	Thailand
28 June 2008	5th MSC on Transboundary Haze Pollution	Singapore
8 April 2008	4th MSC on Transboundary Haze Pollution	Malaysia
20 June 2007	3rd MSC on Transboundary Haze Pollution	Indonesia
28 February 2007	2nd MSC on Transboundary Haze Pollution	Brunei Darussalam
9 November 2006	1st MSC on Transboundary Haze Pollution	Philippines

Members

1. *Brunei Darussalam*
   H.E. Pehin Dato Haji Abdullah Bakar
   Minister of Development

2. *Cambodia*
   H.E. Dr. Mok Mareth
   Senior Minister,
   Minister for the Environment

3. *Indonesia*
   H.E. Prof. Rachmat Witoelar
   Minister for Environment

4. *Lao PDR*
   H.E. Mme Khempheng Pholsena
   Minister to Prime Minister's Office and Head of the Water Resources and Environment

   H.E. Prof. Dr. Bountiem Phitsamay
   Minister to Prime Minister's Office and President of Science, Technology and the Environment Administration
   (until 11th IAMME, 12th AMMH, 4th COP)

5. *Malaysia*
   H.E. Douglas Uggah Embas
   Minister of Natural Resources and the Environment

   H.E. Dato' Seri Haji Azmi Bin Khalid
   Minister of Natural Resources and the Environment
   (until 11th IAMME, 12th AMMH, 4th COP, 6th MSC)

6. *Myanmar*
   H.E. Brig. Gen. Thein Aung
   Chairman of National Commission for Environmental Affairs and Ministry of Foreign Affairs

7. *Philippines*
   H.E. Jose L. Atienza, Jr.
   Secretary,
   Department of Environment and Natural Resources

   Hon. Mr. Angelo T. Reyes
   Acting Secretary,
   Department of Environment and Natural Resources
   (until 10th IAMME, 12th AMMH, 3rd COP)

8. *Singapore*
   H.E. Dr. Yaacob Ibrahim
   Minister for the Environment and Water Resources

9. *Thailand*
   H.E. Suwit Khunkitti
   Minister of Natural Resources and Environment

   H.E. Anongwan Thepsutin
   Minister of Natural Resources and Environment
   (until 11th IAMME, 4th COP, 6th MSC)

   H.E. Kasem Snidvongs
   Minister of Natural Resources and Environment
   (until 10th IAMME, 12th AMMH, 3rd COP, 3rd MSC)

10. *Viet Nam*
    (AMME, AMMH)
    H.E. Pham Khoi Nguyen
    Minister of Natural Resources and Environment

    H.E. Mai Ai Truc
    Minister of Natural Resources and Environment
    (until 10th IAMME, 12th AMMH)

    H.E. Cao Duc Phat
    Minister of Agriculture and Rural Development

11. *ASEAN Secretariat*
    H.E. Dr. Surin Pitsuwan
    Secretary-General of ASEAN

    H.E. Ong Keng Yong
    Secretary-General of ASEAN
    (until 10th IAMME, 12th AMMH, 3rd COP, 3rd MSC)

4. ASEAN Plus Three Environment Ministers

9 October 2008	7th ASEAN Plus Three Environment Ministers	Viet Nam
7 September 2007	6th ASEAN Plus Three Environment Ministers	Thailand
11 November 2006	5th ASEAN Plus Three Environment Ministers	Philippines

Members

1. *ASEAN Environment Ministers*

2. *People's Republic of China*
   H.E. Mr. ZHOU Shengxian
   Minister of Environment

3. *Japan*
   H.E. Mr. Tetsuo SAITO
   Minister for Environment

4. *Republic of Korea*
   H.E. Dr. Maanee LEE
   Minister of Environment

5. *Secretary-General of ASEAN*
   H.E. Dr. Surin Pitsuwan
   Secretary-General of ASEAN

   H.E. Ong Keng Yong
   Secretary-General of ASEAN
   (until 6th ASEAN+3 MME)

5. East Asia Summit (EAS) Environment Ministers

9 October 2008	Inaugural EAS Environment Ministers Meeting	Viet Nam

Members

1. *ASEAN Environment Ministers*

2. *Australia*
   H.E. Hon Peter Garrett AM, MP
   Minister for the Environment, Heritage and the Arts

3. *People's Republic of China*
   H.E. Mr. ZHOU Shengxian
   Minister of Environment

4. *India*
   H.E. Sh. Jairam Ramesh
   Minister of State for Environment and Forest

5. *Japan*
   H.E. Mr. Tetsuo SAITO
   Minister for Environment

6. *Republic of Korea*
   H.E. Dr. Maanee LEE
   Minister of Environment

7. *New Zealand*
   H.E. Trevor Colin Mallard
   Minister for the Environment

8. *Secretary-General of ASEAN*
   H.E. Dr. Surin Pitsuwan
   Secretary-General of ASEAN

6. ASEAN Senior Officials on the Environment (ASOEN)

5 – 6 August 2009	20th ASEAN Senior Officials on the Environment	Thailand
4 – 6 August 2008	19th ASEAN Senior Officials on the Environment	Singapore
12 – 13 June 2008	Special Meeting of ASOEN on the Draft ASEAN Socio-Cultural Community (ASCC) Blueprint	Brunei Darussalam
6 – 8 August 2007	18th ASEAN Senior Officials on the Environment	Philippines
5 – 7 September 2006	17th ASEAN Senior Officials on the Environment	Myanmar

Members

1. *Chairperson*
   Mr. Vann MONYNEATH
   Deputy Director-General of Technical Affairs
   Ministry of Environment
   Cambodia

   Dato Paduka Haji Rashid Bin Haji Abd. Rahman
   Permanent Secretary
   Ministry of Development *(until 19th ASOEN)*

   Mr. Hj. Mohd. Said POKPS DP Hj. Hashim
   Permanent Secretary,
   Ministry of Development
   Brunei Darussalam *(until 18th ASOEN)*

2. *Brunei Darussalam*
   Dato Paduka Haji Rashid Bin Haji Abd. Rahman
   Permanent Secretary
   Ministry of Development

   Mr. Hj. Mohd. Said bin POKPS DP Hj. Hashim
   Permanent Secretary,
   Ministry of Development *(until 18th ASOEN)*

3. *Cambodia*
   Mr. Vann MONYNEATH
   Deputy Director-General of Technical Affairs
   Ministry of Environment

   Dr. Lonh Heal
   Chairman ASOEN-Cambodia
   Technical Director-General
   Ministry of Environment *(until 19th ASOEN)*

4. *Indonesia*
   Ms. Liana Bratasida
   Special Assistant to the Minister on Global Affairs and International Cooperation
   Ministry of the Environment

5. *Lao PDR*
   Mdm. Keobang A. Keola
   Deputy Permanent Secretary
   Prime Minister's Office
   Water Resources and Environment Agency

6. *Malaysia*
   Dato' Zoal Azha Yusof
   Secretary General,
   Ministry of Natural Resources and the Environment

   Dato' Suboh Mohd Yassin
   Secretary General
   Ministry of Natural Resources and the Environment *(until 19th ASOEN)*

7. *Myanmar*
   U Sann Lwin
   Secretary
   National Commission for Environmental Affairs (NCEA)
   Director General
   Planning and Statistics Department
   Ministry of Forestry

   U Than Swe
   Secretary,
   National Commission for Environmental Affairs
   Director-General,
   Ministry of Forestry *(until 18th 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

10. *Thailand*
    Dr. Saksit Tridech
    Permanent Secretary
    Ministry of Natural Resources and Environment

    Mr. Petipong Pungbun Na Ayudhya
    Permanent Secretary,
    Ministry of Natural Resources and Environment
    (until 18th ASOEN)

11. *Viet Nam*
    Assoc. Prof. Dr. Bui Cach Tuyen
    Director-General
    Viet Nam Environmental Administration
    Ministry of Natural Resources and Environment

    Dr. Tran Hong Ha
    Director-General,
    Viet Nam Environmental Protection Agency,
    Ministry of Natural Resources and Environment
    (until 19th ASOEN)

12. *ASEAN Secretariat*
    Dr. Raman Letchumanan
    Head,
    Environment Division
    Cross-Sectoral Cooperation Directorate
    ASEAN Socio-Cultural Community (ASCC) Department

7. ASOEN-Haze Technical Task Force

22 – 24 January 2007	23rd ASOEN Haze Technical Task Force (subsequently meeting as Committee Under the Conference of the Parties to the ASEAN Agreement on Transboundary Haze Pollution)	Cambodia

Members

1. *Chairperson*
   Ms. Liana Bratasida
   Assistant to the Minister for Global Environmental Affairs and International Cooperation,
   Ministry of the Environment,
   Indonesia

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*
   Mdm. Keobang A. Keola
   Deputy Permanent Secretary
   Prime Minister's Office
   Science Technology and Environment Agency (STEA)

5. *Malaysia*
   Dato' Suboh Mohd Yassin
   Secretary General,
   Ministry of Natural Resources and the Environment

6. *Myanmar*
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   Director-General
   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. 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. Committee Under the Conference of the Parties to the ASEAN Agreement on Transboundary Haze Pollution

28 October 2009	5th Meeting of the Committee Under the Conference of the Parties to the ASEAN Agreement on Transboundary Haze Pollution	Singapore
4 June 2009	4th Meeting of the Committee Under the Conference of the Parties to the ASEAN Agreement on Transboundary Haze Pollution	Viet Nam
6 October 2008	3rd Meeting of the Committee Under the Conference of the Parties to the ASEAN Agreement on Transboundary Haze Pollution	Viet Nam

6 – 7 March 2008	2nd Meeting of the Committee Under the Conference of the Parties to the ASEAN Agreement on Transboundary Haze Pollution	Thailand
3 September 2007	1st Meeting of the Committee Under the Conference of the Parties to the ASEAN Agreement on Transboundary Haze Pollution	Thailand

Members

1. *Chairperson*
   Mr. Vann MONYNEATH
   Deputy Director-General of Technical Affairs
   Ministry of Environment
   Cambodia

2. *Brunei Darussalam*
   Dato Paduka Haji Rashid Bin Haji Abd. Rahman
   Permanent Secretary
   Ministry of Development

3. *Cambodia*
   Mr. Vann MONYNEATH
   Deputy Director-General of Technical Affairs
   Ministry of Environment

4. *Indonesia*
   Ms. Masnellyarti Hilman
   Deputy for Nature Conservation Enhancement and Environmental Destruction Control
   Ministry of Environment,
   Indonesia

5. *Lao PDR*
   Mdm. Keobang A. Keola
   Deputy Permanent Secretary
   Prime Minister's Office
   Water Resources and Environment Agency

6. *Malaysia*
   Dato' Zoal Azha Yusof
   Secretary General,
   Ministry of Natural Resources and the Environment

7. *Myanmar*
   U Sann Lwin
   Secretary
   National Commission for Environmental Affairs (NCEA)
   Director General
   Planning and Statistics Department
   Ministry of Forestry

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

10. *Thailand*
    Dr. Saksit Tridech
    Permanent Secretary
    Ministry of Natural Resources and Environment

11. *Viet Nam*
    Mr. Nguyen Huu Dung
    Deputy Director General
    Forest Protection Department
    Ministry of Agriculture and Rural Development

12. *ASEAN Secretariat*
    Dr. Raman Letchumanan
    Head,
    Environment Division
    Cross-Sectoral Cooperation Directorate
    ASEAN Socio-Cultural Community (ASCC) Department

9. ASEAN Plus Three Senior Officials on the Environment

7 August 2009	6th ASEAN Plus Three Senior Officials on the Environment	Thailand
8 August 2008	5th ASEAN Plus Three Senior Officials on the Environment	Singapore
9 August 2007	4th ASEAN Plus Three Senior Officials on the Environment	Philippines
8 September 2006	3rd ASEAN Plus Three Senior Officials on the Environment	Myanmar

Members

1. *ASEAN Senior Officials on the Environment*

2. *People's Republic of China*
   Mr. Xu Qinghua
   Director General
   State Environmental Protection
   Agency (SEPA)

   Other contact details:

   Ms. Fang Li
   Director
   Regional Environment Cooperation Division,
   International Cooperation Department,
   Ministry of Environmental Protection

3. *Japan*
   Mr. Takashi Omura
   Director
   Environmental Cooperation office, Global
   Environment Bureau
   Ministry of the Environment

4. *Republic of Korea*
   Mr. Chan-woo Kim
   Director General
   International Cooperation Office
   Ministry of Environment

5. *ASEAN Secretariat*
   Dr. Raman Letchumanan
   Head,
   Environment Division
   Cross-Sectoral Cooperation Directorate
   ASEAN Socio-Cultural Community (ASCC)
   Department

10. Technical Working Group (TWG) for MSC on Transboundary Haze Pollution

18 August 2009	8th Meeting of the Technical Working Group (TWG) for MSC on Transboundary Haze Pollution	Singapore
28 April 2009	7th Meeting of the Technical Working Group (TWG) for MSC on Transboundary Haze Pollution	Brunei Darussalam
21 October 2008	6th Meeting of the Technical Working Group (TWG) for MSC on Transboundary Haze Pollution	Thailand
22 June 2008	5th Meeting of the Technical Working Group (TWG) for MSC on Transboundary Haze Pollution	Singapore
7 April 2008	4th Meeting of the Technical Working Group (TWG) for MSC on Transboundary Haze Pollution	Malaysia
19 June 2007	3rd Meeting of the Technical Working Group (TWG) for MSC on Transboundary Haze Pollution	Indonesia
26 February 2007	2nd Meeting of the Technical Working Group (TWG) for MSC on Transboundary Haze Pollution	Brunei Darussalam
11 January 2007	1st Meeting of the Technical Working Group (TWG) for MSC on Transboundary Haze Pollution	Indonesia

Members

1. *Chairperson*
   Dato' Hajah Rosnani Ibarahim
   Director General
   Department of Environment
   Ministry of Natural Resources and the
   Environment,
   Malaysia

   Ms. Masnellyarti Hilman
   Deputy for Nature Conservation Enhancement
   and Environmental Destruction Control
   Ministry of Environment,
   Indonesia (until 6th TWG)

2. *Brunei Darussalam*
   Haji Mohd Zakaria Haji Sarudin
   Director
   Department of Environment, Parks and Recreation
   Ministry of Development

3. *Indonesia*
   Ms. Masnellyarti Hilman
   Deputy for Nature Conservation Enhancement and Environmental Destruction Control
   Ministry of Environment

4. *Malaysia*
   Dato' Hajah Rosnani Ibarahim
   Director General
   Department of Environment
   Ministry of Natural Resources and the Environment

5. *Singapore*
   Mr. Andrew Tan
   Chief Executive Officer
   National Environment Agency

   Mr Lee Yuen Hee
   Chief Executive Officer, National Environment Agency *(until 6th TWG)*

6. *Thailand*
   Dr. Supat Wangwongwatana
   Director General
   Pollution Control Department
   Ministry of Natural Resources and Environment

7. *ASEAN Secretariat*
   Raman Letchumanan
   Head,
   Environment Division
   Cross-Sectoral Cooperation Directorate
   ASEAN Socio-Cultural Community (ASCC) Department

11. Technical Working Group (TWG) on Transboundary Haze Pollution in the Mekong Sub-Region

3 June 2009	3rd Meeting of the Technical Working Group (TWG) on Transboundary Haze Pollution in the Mekong Sub-Region	Viet Nam
25 – 26 September 2008	2nd Meeting of the Technical Working Group (TWG) on Transboundary Haze Pollution in the Mekong Sub-Region	Cambodia
4 – 5 March 2008	1st Meeting of the Technical Working Group (TWG) on Transboundary Haze Pollution in the Mekong Sub-Region	Thailand

Members

1. *Chairperson*
   Dr. Supat Wangwongwatana
   Director General
   Pollution Control Department
   Ministry of Natural Resources and Environment, Thailand

2. *Cambodia*
   Dr. Srey Sunleang
   Assistant to Senior Minister/Minister for Environment
   Ministry of Environment

3. *Lao PDR*
   Mdm. Keobang A. Keola
   Deputy Permanent Secretary
   Prime Minister's Office
   Water Resources and Environment Agency

4. *Myanmar*
   Dr. San Win
   Joint Secretary
   National Commission for Environmental Affairs (NCEA)
   Ministry of Forestry

5. *Thailand*
   Dr. Supat Wangwongwatana
   Chairman of TWG Mekong
   Director General
   Pollution Control Department
   Ministry of Natural Resources and Environment

6. *Viet Nam*
   Mr. Nguyen Huu Dung
   Deputy Director General
   Forest Protection Department
   Ministry of Agriculture and Rural Development

7. *ASEAN Secretariat*
   Raman Letchumanan
   Head,
   Environment Division
   Cross-Sectoral Cooperation Directorate
   ASEAN Socio-Cultural Community (ASCC)
   Department

12. Working Group on Coastal and Marine Environment (AWGCME)

29 June – 1 July 2009	10th ASEAN Working Group on Coastal and Marine Environment	Singapore
3 – 4 July 2008	9th ASEAN Working Group on Coastal and Marine Environment	Philippines
31 July – 01 August 2007	8th ASEAN Working Group on Coastal and Marine Environment	Myanmar

Members

1. *Chairperson*
   Prof. Dr. Nguyen Chu Hoi
   Institute of Fisheries Economics and Planning
   Ministry of Fisheries,
   Viet Nam

2. *Brunei Darussalam*
   Dr. Hj Muhd. Majdi Pehin Dato Haji Abdul Aziz
   Environment Officer
   Department of Environment, Parks & Recreation
   Ministry of Development

   Hj Mohd Zakaria bin Hj Sarudin
   Director
   Department of Environment, Parks and Recreation
   Ministry of Development *(until 8th AWGCME)*

3. *Cambodia*
   Mr. Vann MONYNEATH
   Deputy Director-General of Technical Affairs
   Ministry of Environment

4. *Indonesia*
   Ms. Wahyu Indraningsih
   Assistant Deputy for Sea and Coastal
   Degradation Control Ministry of the Environment

   Ms. Liana Bratasida
   Special Assistant to the Minister on Global
   Affairs and International Cooperation
   Ministry of the Environment
   (until 8th AWGCME)

5. *Lao PDR*
   Mdm. Keobang A. Keola
   Deputy Permanent Secretary
   Prime Minister's Office
   Water Resources and Environment Agency

   Mr. Soukata Vichit
   Department of Environment
   Science Technology and Environment Agency
   (until 8th AWGCME)

6. *Malaysia*
   Dato' Zoal Azha Yusof
   Secretary General,
   Ministry of Natural Resources and the Environment

   Dato' Suboh Mohd Yassin
   Secretary General,
   Ministry of Natural Resources and the Environment

   Dato' Dr. Isahak Yeop Mohamad Shar
   Secretary General
   Ministry of Natural Resources and the Environment *(until 8th AWGCME)*

7. *Myanmar*
   U Soe Htun
   Professor
   Department of Marine Science
   University of Mawlamyine
   Ministry of Education

Dr. Swe Thwin
Professor, Department of Marine Science
University of Mawlamyine
Ministry of Education,
Mawlamyine *(until 8th AWGCME)*

8. *Philippines*
Mr. Robert S. Jara
Executive Director
Coastal and Marine Management Office (CMMO)
Department of Environment and Natural Resources (DENR)

Mr. Florendo Barangan
Director
Coastal and Environment Program
Department of Environmental and Natural Resources *(until 8th AWGCME)*

9. *Singapore*
Dr. Nigel Goh
Assistant Director (Marine)
Biodiversity Centre
National Parks Board

Mr Bin Chee Kwan
Deputy Director, International Relations
National Environment Agency
(until 8th AWGCME)

10. *Thailand*
Dr. Chuttamat Ruttikansukha
Acting Director
Marine Environment Division
Pollution Control Department
Ministry of Natural Resources and Environment

12. *Viet Nam*
Prof. Dr. Nguyen Chu Hoi
Institute of Fisheries Economics and Planning
Ministry of Fisheries

11. *ASEAN Secretariat*
Dr. Raman Letchumanan
Head,
Environment Division
Cross-Sectoral Cooperation Directorate
ASEAN Socio-Cultural Community (ASCC)
Department

13. Working Group on Environmental Education (AWGEE)

7 July 2009	1st ASEAN Working Group on Environmental Education	Brunei Darussalam

Members

1. *Chairperson*
Hj. Mohd Zakaria Hj. Sarudin
Director
Department of Environment, Parks and Recreation
Ministry of Development
Brunei Darussalam

2. *Brunei Darussalam*
Hj. Mohd Zakaria Hj. Sarudin
Director
Department of Environment, Parks and Recreation
Ministry of Development

3. *Cambodia*
Mr ROATH Sith
Deputy Director,
Department of Environmental Education and Communication
Ministry of Environment

4. *Indonesia*
Ms. Siti Aini Hanum
Assistant Deputy for Environmental Education and Communication
Ministry of the Environment

5. *Lao PDR*
Mdm. Keobang A. Keola
Deputy Permanent Secretary
Prime Minister's Office
Water Resources and Environment Agency

6. *Malaysia*
Madam Choong Mei Chun
Director
Strategic Communications Division
Department of Environment
Ministry of Natural Resources and Environment

7. *Myanmar*
Dr. Kyaw Kyaw Gaung
Professor
Department of Botany
Yangon University

8. *Philippines*
   Ms. Elenida del Rosario – Basug
   Chief
   Environmental Education and Information Division
   Environmental Management Bureau
   Department of Environment and Natural Resources

9. *Singapore*
   Mr. Ng Meng Hiong
   Deputy Director,
   3P Partnership Department
   National Environment Agency

10. *Thailand*
    Ms. Savitree Srisuk
    Director of Environmental Education Sub-division,
    Public Education and Extension Division
    Department of Environmental Quality Promotion

11. *Viet Nam*
    Assoc. Prof. Dr. Bui Cach Tuyen
    Director-General
    Viet Nam Environmental Administration
    Ministry of Natural Resources and Environment

12. *ASEAN Secretariat*
    Dr. Raman Letchumanan
    Head,
    Environment Division
    Cross-Sectoral Cooperation Directorate
    ASEAN Socio-Cultural Community (ASCC) Department

14. Working Group on Environmentally Sustainable Cities (AWGESC)

16 – 17 July 2009	7th Meeting of ASEAN Working Group on Environmentally Sustainable Cities	Lao PDR
23 – 25 July 2008	6th Meeting of ASEAN Working Group on Environmentally Sustainable Cities	Indonesia
14 – 15 June 2007	5th Meeting of ASEAN Working Group on Environmentally Sustainable Cities	Cambodia
7 – 8 June 2006	4th Meeting of ASEAN Working Group on Environmentally Sustainable Cities	Brunei Darussalam

Members

1. *Chairperson*
   Ms. Liana Bratasida
   Special Assistant to the Minister on Global Affairs and International Cooperation
   Ministry of the Environment
   Indonesia

   Mr. Loh Ah Tuan
   Deputy CEO/Director-General for Environmental Protection
   National Environment Agency,
   Singapore *(until 5th AWGESC)*

2. *Brunei Darussalam*
   Mr. Hj Shaharuddin Khairul bin Hj Anuar
   Senior Environment Officer
   Department of Environment, Parks and Recreation
   Ministry of Development

   Ms. Martinah Haji Tamit
   Senior Environment Officer
   Department of Environment, Parks and Recreation
   Environmental Planning and Management Division
   Ministry of Development *(until 5th AWGESC)*

3. *Cambodia*
   Mr. Chiek Ang
   Deputy Director
   Department of Environment Phnom Penh

   Dr. Lonh Heal
   Chairman ASOEN-Cambodia
   Technical Director-General
   Ministry of Environment *(until 5th AWGESC)*

   Mr. In Vong
   Counsellor
   Royal Embassy of Cambodia in Singapore
   (until 4th AWGESC)

4. *Indonesia*
   Mr. Tri Bangun L. Sony
   Assistant Deputy
   Domestic Waste and Small Scale Enterprise Pollution Control

   Mr. Bambang Setyabudi
   Assistant Deputy for Regional Analysis
   Deputy for Regional Capacity Building for Environmental Management
   Ministry of Environment *(until 4th AWGESC)*

5. *Lao PDR*
   Ms. Chanthanom SOULINGO
   Department of Planning and Cooperation
   Ministry of Public Works and Transports (MPWT)
   Specific on Public Works and Transports
   (Ministry Focal Point)

   Mr. Bounnao FONGKHAMDENG
   Urban Planning Division
   Department of Housing and Urban Planning
   Ministry of Communications, Transport, Post and Construction

   Mr. Aphisayadeth Insisiengmay
   Director, Urban Planning Division
   Department of Housing and Urban Planning
   Ministry of Communications, Transport, Post and Construction *(until 4th AWGESC)*

6. *Malaysia*
   Madam Choong Mei Chun
   Chairperson of the Steering Right Helper
   Strategic Communication
   Department of Environment

   Mr. Patrick Tan Hock Chuan
   Director, Strategic Communications
   Department of Environment
   (until 5th AWGESC)

7. *Myanmar*
   Mr. Myint Thein
   Deputy Head
   Yangon City Development Committee

   U Than Swe
   Secretary,
   National Commission for Environmental Affairs
   Director-General,
   Ministry of Forestry *(until 5th AWGESC)*

8. *Philippines*
   Mr. Julian D. Amador
   Director
   Environmental Management Bureau (EMB)
   Department of Environment and Natural Resources (DENR)

   Mr. Demetrio L. Ignacio, Jr.
   Chairman ASOEN – Philippines
   Undersecretary for Planning and Policy
   Department of Environment and Natural Resources (DENR) *(until 6th AWGESC)*

8. *Singapore*
   Mr. Bin Chee Kwan
   Deputy Director, International Relations
   Planning & Development Department
   National Environment Agency

   Mr. Loh Ah Tuan
   Deputy CEO/Director-General for Environmental Protection
   National Environment Agency, Singapore
   (until 5th AWGESC)

10. *Thailand*
    Ms. Usa Kiatchaipipat
    Director
    Urban Environment and Area Planning Division
    Office of National Resources and Environmental Policy and Planning

11. *Viet Nam*
    Dr. Nguyen Thi Kim Thai
    Vice Dean
    University of Civil Engineering

    Ms Nguyen Thi My Hoang
    Officer
    International Cooperation Division
    Vietnam Environmental Protection Agency
    Ministry of Natural Resource and Environment
    (until 4th AWGESC)

12. *ASEAN Secretariat*
    Dr. Raman Letchumanan
    Head,
    Environment Division
    Cross-Sectoral Cooperation Directorate
    ASEAN Socio-Cultural Community (ASCC) Department

15. Working Group on Multilateral Environmental Agreements (AWGMEA)

23 – 25 July 2009	13th ASEAN Working Group on Multilateral Environmental Agreements	Myanmar
19 – 20 June 2008	12th ASEAN Working Group on Multilateral Environmental Agreements	Malaysia
28 – 30 May 2007	11th ASEAN Working Group on Multilateral Environmental Agreements	Lao PDR
18 – 20 May 2006	10th ASEAN Working Group on Multilateral Environmental Agreements	Indonesia

Members

1. *Chairperson*
   Mrs. Aree Wattana Tummakird
   Acting Director for Office of Climate Change Coordination
   Office of Natural Resources and Environment Policy and Planning,
   Ministry of Natural Resources and Environment

   Mrs. Keobang A. Keola
   Deputy Director General
   Department of Environment
   Science, Technology and Environment Administration
   Lao PDR *(until 12th AWGMEA)*

   Ms. Liana Bratasida
   Assistant to the Minister for Global Environmental Affairs and International Cooperation,
   Ministry of the Environment
   Indonesia *(until 11th 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

4. *Indonesia*
   Ms. Liana Bratasida
   Special Assistant to the Minister on Global Affairs and International Cooperation
   Ministry of the Environment

5. *Lao PDR*
   Mdm. Keobang A. Keola
   Deputy Permanent Secretary
   Prime Minister's Office
   Water Resources and Environment Agency

6. *Malaysia*
   Ms. Hj. Rosnani Ibarahim
   Director General
   Department of Environment
   Malaysia

7. *Myanmar*
   Dr. San Win
   Joint Secretary/ Director
   National Commission for Environmental Affairs
   Ministry of Forestry

   Mrs. Yin Yin Lay
   Joint Secretary/ Director
   National Commission for Environmental Affairs
   Ministry of Forestry *(until 11th AWGMEA)*

8. *Philippines*
   Mr. Demetrio L. Ignacio
   Undersecretary for Policy and Planning
   Department of Environment and Natural Resources (DENR)

9. *Singapore*
   Mr. Bin Chee Kwan
   Deputy Director, International Relations
   Planning & Development Department
   National Environment Agency

   Miss Jacin Chan
   Senior External Cooperation Executive
   Planning & Development Department
   National Environment Agency
   (until 11th AWGMEA)

10. *Thailand*
    Mrs. Aree Wattana Tummakird
    Acting Director for Office of Climate Change Coordination
    Office of Natural Resources and Environment Policy and Planning,
    Ministry of Natural Resources and Environment

Mrs. Wantanee Petchampai
Environmental Specialist,
Office of International Cooperation on Natural Resources and Environment
(until 13th AWGMEA)

11. Viet Nam
Mr. Nguyen Xuan Bao Tam
Deputy Director
International Cooperation Department
Ministry of Natural Resources and Environment

Mr. Nguyen Minh Cuong
Officer,
Vietnam Environmental Protection Agency (VEPA)
Ministry of Natural Resources and Environment
(until 11th AWGMEA)

12. *ASEAN Secretariat*
Dr. Raman Letchumanan
Head,
Environment Division
Cross-Sectoral Cooperation Directorate
ASEAN Socio-Cultural Community (ASCC) Department

16. Working Group on Nature Conservation and Biodiversity (AWGNCB)

15 – 17 June 2009	19th ASEAN Working Group on Nature Conservation and Biodiversity	Indonesia
22 – 23 September 2008	3rd Special Meeting of the ASEAN Working Group on Nature Conservation and Biodiversity	Philippines
2 – 4 July 2008	18th ASEAN Working Group on Nature Conservation and Biodiversity	Cambodia
28 – 29 February 2008	2nd Special Meeting of the ASEAN Working Group on Nature Conservation and Biodiversity	Philippines
28 April 2007	1st Special Meeting of the ASEAN Working Group on Nature Conservation and Biodiversity	Malaysia
3 – 4 July 2007	17th ASEAN Working Group on Nature Conservation and Biodiversity	Brunei Darussalam
16 – 18 August 2006	16th ASEAN Working Group on Nature Conservation and Biodiversity	Viet Nam

Members

1. *Chairperson*
Ms. Nisakorn Kositratna
Office of Natural Resources and Environmental Policy and Planning
Thailand

Dr. Kasemsun Chinnavaso
Chairperson of the AWGNCB
Secretary-General
Office of Natural Resources and Environmental Policy and Planning
Ministry of Natural Resources and Environment
Thailand *(until 3rd Special AWGNCB)*

Dr. Theresa Mundita S. Lim
Director
Protected Areas and Wildlife Bureau
Department of Environment and Natural Resources,
Philippines *(until 1st Special AWGNCB)*

2. *Brunei Darussalam*
Mr. Haji Omar bin Haji Md. Tahir
Deputy Director
Dept. of Environment, Parks and Recreation (DEPR), Ministry of Development

Ms. Martinah Haji Tamit
Senior Environment Officer
Department of Environment, Parks and Recreation
Environmental Planning and Management Division
Ministry of Development *(until 17th AWGNCB)*

3. *Cambodia*
Ms. Somaly Chan
Director
Department of International Convention & Biodiversity, GDANCP
Ministry of Environment

Mr. Pisey Oum
Deputy Director
Ministry of Environment
(until 3rd Special AWGNCB)

4. *Indonesia*
Mr. Tonny Soehartono
Director of Biodiversity Conservation
Directorate General for Forest Protection and Nature Conservation
Ministry of Forestry

5. *Lao PDR*
Mr. Bouaphanh Phanthavong
Head of Technical Unit
Department of Forestry
Division of Forest Resources Conservation

6. *Malaysia*
Dr. Lian Kok Fei
Undersecretary, Conservation and Environment Management Division
Ministry of Natural Resources and the Environment

7. *Myanmar*
Mr. Tin Tun
Director
Nature and Wildlife Conservation Division
Forest Department, Ministry of Forestry

Mr. Htun Paw Oo
Director
Nature and Wildlife Conservation Division,
Forest Department *(until 1st Special AWGNCB)*

9. *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. Kasemsun Chinnavaso
Chairperson of the AWGNCB
Secretary-General
Office of Natural Resources and Environmental Policy and Planning
Ministry of Natural Resources and Environment
(until 3rd Special AWGNCB)

10. *Viet Nam*
Mr. Le Xuan Canh
Director
Institute of Ecology and Biological Resources

11. *ASEAN Secretariat*
Dr. Raman Letchumanan
Head,
Environment Division
Cross-Sectoral Cooperation Directorate
ASEAN Socio-Cultural Community (ASCC) Department

17. Working Group on Water Resources Management (AWGWRM)

20 – 21 July 2009	9th ASEAN Working Group on Water Resources Management	Lao PDR
23 – 26 June 2008	8th ASEAN Working Group on Water Resources Management	Singapore
23 – 25 July 2007	7th ASEAN Working Group on Water Resources Management	Malaysia
26 May 2006	6th ASEAN Working Group on Water Resources Management	Philippines

Members

1. *Chairperson of AWGWRM*
   Mr. Ramon B. Alikpala
   Executive Director
   National Water Resources Board
   Philippines

   Dr. Siripong Hungspreug
   Chairman of ASEAN Working Group on Water Resources Management
   Director General
   Department of Water Resources
   Ministry of Natural Resources and Environment
   Thailand *(until 7th AWGWRM)*

2. *Brunei Darussalam*
   Awang Abu Hanipah Haji Talip
   Assistant Director of Water Services
   Public Works Department

   Mr. Hj Suhaimi bin Hj Ghafar
   Director of Water Services
   Public Works Department *(until 6th AWGWRM)*

3. *Cambodia*
   Mr. BUL Delly
   Deputy Technical General Director
   Ministry of Water Resources and Meteorology

   Mr. Am Norin
   Deputy Director
   Department of Water Resources Management and Conservation
   Ministry of Water Resources and Meteorology
   (until 6th AWGWRM)

4. *Indonesia*
   Mr. Leonarda Ibnu Said, M. Eng
   Head,
   Sub-directorate for Hydrology and Water Quality
   Directorate Water Resources Management
   Ministry of Public Works

   Dr. Ir. Sutardi, M.Eng (Mr)
   Head of Sub Directorate for Hydrology
   Directorate General of Water Resources
   Ministry of Settlement and Infrastructure
   (until 8th AWGWRM)

5. *Lao PDR*
   Mr. Aloune SAYAVONG
   Director of Water Resources Management Division
   Water Resources Department,
   Water Resources and Environment Administration

   Mr. Chanthanet Boulapha
   Deputy Director of Water Resources Coordination Committee Secretariat (WRCCS),
   Prime Minister Office
   Science, Technology and Environment Administration *(until 8th AWGWRM)*

6. *Malaysia*
   Dato' Ir. Hj. Ahmad Husaini bin Hj. Sulaiman
   Director General
   Department of Irrigation and Drainage
   Ministry of Natural Resources and Environment

   Datuk Ir. Hj. Keizrul Abdullah
   Director General
   Department of Irrigation and Drainage
   Ministry of Natural Resources and Environment
   (until 8th AWGWRM)

7. *Myanmar*
   Mr. Sein Tun
   Deputy Director
   Directorate of Water Resources and Improvement of River Systems
   Ministry of Transport *(until 7th AWGWRM)*

8. *Philippines*
   Mr. Ramon B. Alikpala
   Executive Director
   National Water Resources Board

10. *Singapore*
    Mr. Chan Yoon Kum
    Director
    Water Department
    Public Utilities Board

11. *Thailand*
    Dr. Siripong Hungspreug
    Director General
    Department of Water Resources
    Ministry of Natural Resources and Environment

Mr. Adisak Thongkaimook
Director General
Department of Water Resources
Ministry of Natural Resources and Environment
(until 8th AWGWRM)

Dr. Siripong Hungspreug
Chairman of ASEAN Working Group on Water Resources Management
Director General
Department of Water Resources
Ministry of Natural Resources and Environment
(until 7th AWGWRM)

12. *Viet Nam*
    Dr. Nguyen Thai Lai
    Director General
    Department of Water Resources Management
    Ministry of Natural Resources and Environment

13. *ASEAN Secretariat*
    Dr. Raman Letchumanan
    Head,
    Environment Division
    Cross-Sectoral Cooperation Directorate
    ASEAN Socio-Cultural Community (ASCC)
    Department

Preparation of the Fourth ASEAN State of the Environment Report

(A) Designated Focal Points

1. *Brunei Darussalam*
   Ms. Martinah bt. Haji Tamit
   Senior Environment Officer
   Department of Environment, Parks and Recreation, Ministry of Development

2. *Cambodia*
   Mr. SREY Sunleang
   Deputy Director
   Ministry of Environment

   Mr. Ma Chan Sethea
   Deputy Director
   Ministry of Environment

3. Indonesia
   Mr. Aksa Tejalaksana
   Head,
   Sub-division for Clearing House
   Ministry of the Environment

   Mr. Harimurti
   Head,
   Sub-division for Geography Information System
   Ministry of the Environment

4. Lao PDR
   Mr. Singsavanh Singkavongxay
   Chief,
   Environment Data Information Management Division
   Department of Environment
   Water Resources and Environment Administration, Prime Minister's Office

5. Malaysia
   Mdm. Noor Baizzura Azizan bt Mohd. Ali Azizan
   Environmental Control Officer
   Department of Environment, Ministry of Natural Resources and Environment

6. Myanmar
   Mr. Hlaing Min Maung
   Head of Branch
   National Commission for Environmental Affairs, Ministry of Forestry

7. Philippines
   Ms. Elenida Basug
   Chief,
   Environmental Management Specialist
   Environmental Management Bureau,
   Department of Environment and Natural Resources

8. Singapore
   Mr. Koh Joon Hong
   Senior Assistant Director
   Ministry of the Environment and Water Resources

9. Thailand
   Dr. Nawarat Krairapanond
   Acting Director
   Monitoring and Evaluation
   Office of Natural Resources and Environmental

10. Viet Nam
    Mr. Nguyen Van Thuy
    Government Officer
    Centre for Environmental Monitoring, Vietnam Environment Administration,
    Ministry of Natural Resources and Environment

11. ASEAN Secretariat
    Dr. Raman Letchumanan
    Head,
    Environment Division
    Cross-Sectoral Cooperation Directorate,
    ASEAN Socio-Cultural Community (ASCC) Department

(B) Planning and Review Meeting

Meeting of the Task Force for the Fourth ASEAN State of the Environment Report (SoER4), 18 – 19 June 2009, Jakarta, Indonesia

Brunei Darussalam	:	Ms. Martinah bt. Haji Tamit
Cambodia	:	Mr. Srey Sunleang
		Mr. Ma Chan Sethea
Indonesia	:	Mr. Aksa Tejalaksana
		Mr. Harimurti
Lao PDR	:	Mr. Singsavanh Singkavongxay
Malaysia	:	Mdm. Noor Baizzura Azizan bt Mohd. Ali Azizan
Myanmar	:	Mr. Hlaing Min Maung
Philippines	:	Ms. Elenida Basug
Singapore	:	Mr. Koh Joon Hong
Thailand	:	Dr. Nawarat Krairapanond
Viet Nam	:	Mr. Nguyen Van Thuy
ASEAN Secretariat	:	Dr. Raman Letchumanan
		Mr. John De Guia
		Mrs. Riena Prasiddha
		Mr. M. Tanzir Wilson
		Ms. Natalia Derodofa
		Ms. Vinca Safrani