





**ASEAN** Centre for Biodiversity

# **ASEAN Biodiversity Outlook 2**

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ASEAN Centre for Biodiversity (2017). ASEAN Biodiversity Outlook 2. Philippines. (220 pages).

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ISBN	978-971-9668-02-2
Printed by	VG Printing Services
Publisher	ASEAN Centre for Biodiversity
Year of publication	2017

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# **Acronyms and Abbreviations**

5NR	Fifth National Report
AAP-JRC	ASEAN Action Plan on Joint Response to Climate Change
ABCDNet	Asia Biodiversity Conservation and Database Network
ABO	ASEAN Biodiversity Outlook
ABS	Access to Genetic Resources and the Fair and Equitable Sharing of Benefits
	Arising from their Utilization
ACB	ASEAN Centre for Biodiversity
ACB2016	ASEAN Conference on Biodiversity 2016
ACCI	ASEAN Climate Change Initiative
ACN	ASEAN CSR Network
ADB	Asian Development Bank
AEC	ASEAN Economic Community
AEZ	Agro-ecological zone
AF	ASEAN Foundation
AFCC	ASEAN Multi-Sectoral Framework on Climate Change
AHP	ASEAN Heritage Park
AIESC	ASEAN Initiative on Environmentally Sustainable Cities
AIJC	Asian Institute of Journalism and Communication
AIPA	ASEAN Inter-Parliamentary Assembly
AMS	ASEAN Member State
ANRES	Agriculture, Natural Resource, and Environment Staff
AP-BON	Asia Pacific Biodiversity Observation Network
APEC	Asia-Pacific Economic Cooperation
APMS	ASEAN Peatland Management Strategy
APRIL	Asia Pacific Resources International Limited
APSC	ASEAN Political-Security Community
ARBCP	Asia Regional Biodiversity Conservation Program
ARIAHS	ASEAN Regionally Important Agro-Ecological Heritage Systems
	Architectural Students' Association of the Philippines – University of the Philippines
ASCC	ASEAN Socio-Cultural Community
ASEAN	Association of Southeast Asian Nations
	ASEAN Chiefs of Police
	ASEAN Wildlife Enforcement Network
ASLO	Association for the Sciences of Limnology and Oceanography
ASPA-WRM	ASEAN Strategic Plan of Action on Water Resources Management
ASPEN	ASEAN Strategic Plan on Environment
AWGCC	ASEAN Working Group on Climate Change
AWGCME	ASEAN Working Group on Coastal and Marine Environment
AWGCW	ASEAN Working Group on Chemicals and Waste Management
AWGESC	ASEAN Working Group on Environmentally Sustainable Cities
AWGNCB	ASEAN Working Group on Nature Conservation and Biodiversity
BANCA	Biodiversity and Nature Conservation Association
BAPPENAS	Badan Perencanaan Pembangunan Nasional/Ministry of National Development
<b>B</b> 4 1 1	Planning, Indonesia
BAU	Business-as-usual
BBP	Biodiversity-Based Products
BCCP	Biodiversity and Climate Change Project
BIFA	Biodiversity Information Fund for Asia
BIM	Biodiversity Information Management
BIP	Biodiversity Indicators Partnership
BIOFIN	Biodiversity Finance Initiative
BIOTEC	National Center for Genetic Engineering and Biotechnology

BMB BOCM BOD CABI CBD CBFM CBI CCCSP CCRF CEBREM CEP CEPA CEPA CEPA-Net CEPF	Biodiversity Management Bureau Bilateral Offset Credit Mechanism Biological Oxygen Demand Centre for Agriculture and Biosciences International Convention on Biological Diversity Community-Based Forestry Management City Biodiversity Index Cambodia Climate Change Strategic Plan Code of Conduct for Responsible Fisheries Center for Biodiversity Research and Extension in Mindanao Core Environment Program Communication, Education and Public Awareness CEPA and Media Network for Biodiversity Critical Ecosystem Partnership Fund
CFNR CFS	College of Forestry and Natural Resources Central Forest Spine
CHM	Clearing-House Mechanism
CI	Conservation International
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CL	Converted Lands
CMS	Convention on Migratory Species
COBSEA	Coordinating Body on the Seas of East Asia
COP CPUE	Conference of Parties Catch per unit effort
CR	Critically Endangered
CSR	Corporate Social Responsibility
CTC	Coral Triangle Center
CTI-CFF	Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security
CWR	crop wild relatives
DA-BAR	Department of Agriculture – Bureau of Agricultural Research
DAD-IS	Domestic Animal Diversity Information System
DBM	Department of Budget and Management
DENR	Department of Environment and National Resources
DOA	Department of Agriculture
DOF DRR	Department of Finance Disaster Risk Reduction
EAAF	East Asian-Australasian Flyway
EAAFP	East Asian-Australasian Flyway Partnership
EAS	East Asia Summit
Eco-DRR	Ecosystem-based disaster risk reduction
ECOSORN	Economic and Social Relaunch of Northern Provinces
EEA	Experimental Ecosystem Accounting
EEPSEA	Economy and Environment Program for Southeast Asia
EIA	Environmental Impact Assessment
ELC	Economic Land Concessions
EN ENSO	Endangered El Niño-Southern Oscillation
ERC	Ecosystems Resource Concessions
ESA	Environmentally sensitive areas
ESABII	East and Southeast Asian Biodiversity Information Initiative
EU	European Union
EW	Extinct in the wild
EX	Extinct
FALUPAM	Forest and Land Use Planning, Allocation and Management
FAO	Food and Agriculture Organization of the United Nations

FAOSTAT	FAO Statistics Division
FEOW	Freshwater Ecoregions of the World
FFI	Fauna & Flora International
FLEGT	Forest Law Enforcement, Governance and Trade
FOMACOP	Forest Management and Conservation Project
FORCAP	Forest Conservation and Afforestation Project
FORIS	Forest Invasive Species in Southeast Asia
FPDF	Forest Protection and Development Fund
FRIM	Forest Research Institute Malaysia
FSC	Forest Stewardship Council
GAP CC	ASEAN-German Programme on Response to Climate Change
GBIF	Global Biodiversity Information Facility
GBO	Global Biodiversity Outlook
GDP	Gross Domestic Product
GE	Green Economy
GEF	Global Environment Facility
GEO	Global Environment Outlook
GEO BON	The Group on Earth Observations Biodiversity Observation Network
GFRA	Global Forest Resource Assessment
GHG	Greenhouse gas
GHI	Global Hunger Index
GIAHS	Globally Important Agricultural Heritage Sites
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit <sup>1</sup>
GMS	Greater Mekong Subregion
GMS BCI	Greater Mekong Subregion Biodiversity Corridors Initiative
GPA	Global Plan of Action
GTI	Global Taxonomy Initiative
GWG	Governance Working Group
HF	Human Footprint
HHI	Hutan Harapan Initiative
HoB	Heart of Borneo
IAS	Invasive Alien Species
IBA	Important Bird Area
IBSAP	Indonesian Biodiversity Strategy and Action Plan
ICM	Integrated Coastal Management
InaBIF	Indonesia Biodiversity Information Facility
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IPLC	Indigenous Peoples and Local Communities
IPM ISB	Integrated Pest Management
ITPGRFA	Institutional Strengthening of the Biodiversity Sector in ASEAN Project International Treaty on Plant Genetic Resource for Food and Agriculture
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation of Nature
IUCN ISSG	International Union for Conservation of Nature Invasive Species Specialist Group
	Illegal, unreported and unregulated
JAIF	Japan-ASEAN Integration Fund
JAUH	Jaringan Untuk Hutan
JCM	Joint Crediting Mechanism
JICA	Japan International Cooperation Agency
KBA	Key Biodiversity Area
KGV	Kitanglad Guard Volunteers

<sup>&</sup>lt;sup>1</sup>No official English translation. The German name 'Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)' is being used in English texts. Terms such as 'German development cooperation' and 'German international cooperation' merely denote the fields of work of GIZ.

KHJL	Koperasi Hutan Jaya Lestari
KPI	
	Key Performance Indicator
LC	Large Cities
LGU	Local Government Unit
	Lembaga Ilmu Pengetahuan Indonesia/Indonesian Institute of Sciences
	Las Piñas-Paranaque Critical Habitat and Ecotourism Area
MAT	Mutually Agreed Terms
MDG	Millennium Development Goals
MEA	Multilateral Environmental Agreement
METT	Management Effectiveness Tracking Tool
MFI	Malampaya Foundation Incorporated
MoEF	Ministry of Environment and Forestry, Indonesia
MOF	Ministry of Forestry, Indonesia
MOU	Memorandum of Understanding
MPA	Marine Protected Area
MRC	Mekong River Commission
MyBIS	Malaysia Biodiversity Information System
NBSAP	National Biodiversity Strategy and Action Plan
NCA	Natural Capital Accounting
NCMP	Nature Conservation Master Plan
NDC	Nationally Determined Contribution
NEDA	National Economic Development Authority
NIMM	National Institute of Medicinal Materials
NISM	National Information Sharing Mechanism
NISSAP	National Invasive Species Strategy and Action Plan
NP-ABS	Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable
	Sharing of Benefits Arising from their Utilization
NParks	National Parks Board, Singapore
ODA	Overseas Development Assistance
OPIF	Organizational Performance Indicator Framework
	Protected Area Distanted Area Management Enhancement
	Protected Area Management Enhancement
PEMSEA	Partnerships in Environmental Management for the Seas of East Asia
PES	Payment for Ecosystem Services
	Payment for Forest Environmental Services Philippines-Wealth Accounting and the Evaluation of Ecosystem Services
Phil-WAVES PIC	Print Prior Informed Consent
PIC PoWPA	
PPP	Programme of Work on Protected Areas Public-Private Partnership
PROSEA	Plant Resources of South-East Asia
PSA	Philippine Statistics Authority
PSI	Pollutant Standard Index
QSBG	Queen Sirikit Botanic Garden
RAP	Regional Action Plan
RCP	Representative Concentration Pathways
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RIL	Reduced Impact Logging
SAFE	Stability of Altered Forest Ecosystems
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
SCBD	Secretariat of the Convention on Biological Diversity
SEA	Strategic Environmental Assessment
SEAFDEC	Southeast Asian Fisheries Development Center
SEAMEO	
BIOTROP	Southeast Asian Regional Centre for Tropical Biology
SEARCA	Southeast Asian Regional Center for Graduate Study and Research in Agriculture

SEARRP SEEA SFM SGP SLR SMART SOMTC	South East Asia Rainforest Research Partnership System for Environmental Economic Accounting Sustainable Forest Management Small Grants Programme Sea-level rise Spatial Monitoring and Reporting Tool Senior Officials Meeting on Transnational Crime
SPREP	Secretariat of the Pacific Regional Environment Programme
SSB	Sustainable Singapore Blueprint
SSC	Species Survival Commission
SSCA	Stung Sen Core Area
SWA	Surface Water Abstraction
TBCA	Transboundary Conservation Area
TBPA	Transboundary Protected Area
TEEB	The Economics of Ecosystems and Biodiversity
TFT	The Forest Trust
TK	Traditional Knowledge
TNC	The Nature Conservancy
TSBR	Tonle Sap Biosphere Reserve
TWG UBD	Technical Working Group Universiti Brunei Darussalam
ULC	Urban Land Cover
UMS	Universiti Malaysia Sabah
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNODC	United Nations Office on Drugs and Crime
UNSD	United Nations Statistical Division
UNWTO	United Nations World Tourism Organization
UPA	Urban and Peri-urban Agriculture
UPLB	University of the Philippines Los Baños
USAID	United States Agency for International Development
USAID-	United States Agency for International Development-Regional Development
RDMA	Mission for Asia
V-GIS	Vegetable-Geographic Information System
VPA	Voluntary Partnership Agreement
VU	Vulnerable
WAVES	Wealth Accounting and the Valuation of Ecosystem Services
WCMC	World Conservation Monitoring Centre
WCS	Wildlife Conservation Society
WMO	World Meteorological Organization
WWF	World Wide Fund for Nature
YSEALI	Young Southeast Asian Leaders Initiative

# Acknowledgements

he ASEAN Centre for Biodiversity (ACB) recognizes the significant support of various partners in the development of the second edition of the ASEAN Biodiversity Outlook (ABO 2). The publication was drafted in collaboration with the ASEAN Member States (AMS) — Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Singapore, Philippines, Thailand, and Viet Nam. The AMS provided key resources for the ABO 2, including the Fifth National Reports to the Convention on Biological Diversity (CBD), as well as experts who extended significant support and guidance in its development.

ACB appreciates the efforts of biodiversity experts in and beyond ASEAN who took the time to review, provide direction, and improve the publication. ACB thus acknowledges the experts nominated by the ASEAN Member States, and members of the Peer Review Group, ACB Governing Board, Scientific Advisory Committee, and the ASEAN Working Group on Nature Conservation and Biodiversity for providing significant guidance to the development of ABO 2.

ACB is grateful for the financial support of the Biodiversity Management Bureau, Department of Environment and Natural Resources, Philippines in the production of the second ASEAN Biodiversity Outlook.

The Centre also wishes to acknowledge those who have contributed, in one way or another, to the preparation of this report. The arduous task of putting the ABO 2 together goes beyond the efforts of the core team.

Great care has been taken to ensuring the accuracy of the information presented in the report.



### Message of the Secretary-General of ASEAN

am pleased to be part of the second edition of the ASEAN Biodiversity Outlook (ABO 2), which takes off from the ASEAN Centre for Biodiversity's flagship publication released in 2010. ABO 1 charted the progress of the ASEAN Member States in their efforts to significantly reduce biodiversity loss from 2002 to 2010. Since then, the ASEAN Member States and other Parties to the Convention on Biological Diversity (CBD) have been taken on a new journey to biodiversity conservation with the adoption of the Strategic Plan for Biodiversity 2011–2020, which embodies strategic goals and 20 targets known as the Aichi Biodiversity Targets.

ABO 2 aims to provide highlights of the path to 2020 to determine where ASEAN stands as it continues to conserve the region's rich biodiversity resources. ASEAN's forests, lakes, rivers, peatlands, and seas provide



the foundations for the region's economies, energy security, social welfare, and political stability that are crucial to sustaining the well-being and survival of around 632 million residents. However, the region's species and ecosystems remain under threat with increasing pressures from habitat change, poaching and illegal wildlife trade, invasive alien species, pollution, overexploitation and poverty, and increasingly devastating impacts of climate change.

The ASEAN Member States continue to work on national development and sustainability goals and collaborate on regional initiatives to strengthen the conservation of ASEAN's shared natural wealth. ASEAN Community Vision 2025 provides a framework for community building and cooperation to attain common goals and aspirations for a politically cohesive, economically integrated, and socially responsible ASEAN. Longstanding regional initiatives, such as the ASEAN Heritage Parks Programme, the Heart of Borneo Initiative, the Coral Triangle Initiative, and the Greater Mekong Subregion Biodiversity Conservation Corridors Initiative, continue to build on the accomplishments that have generated greater support for biodiversity-rich but increasingly vulnerable areas. Specific conservation programs for ASEAN's most iconic species and unique wildlife, such as orangutans, tigers, elephants, and eagles, are in place to prevent their extinction. The discovery of new species in remote and under-researched sites in the ASEAN Member States attests to the potential benefits of biodiversity to society, particularly in the areas of food security and medicine.

ABO 2 adds to the growing body of information on the challenges that need to be overcome and opportunities for collaboration to achieve the Aichi Biodiversity Targets and fulfill the ASEAN Community Vision 2025. Determining the current conditions of species and ecosystems in the region and the impacts of cross-cutting issues on conservation measures may provide additional direction and call for renewed commitment and action among stakeholders to ensure a better future for ASEAN's biodiversity.

I hope that ABO 2 will continue to provide the impetus for increased collaboration among ASEAN Member States and regional and international partners to realize a common vision for development in ASEAN and conserve the natural resources that will sustain ASEAN nationals for generations to come.

**LE LUONG MINH** Secretary-General Association of Southeast Asian Nations

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### Message of the Executive Director of the ASEAN Centre for Biodiversity

n 2010, Parties to the Convention on Biological Diversity met in Nagoya, Japan for the Tenth Conference of Parties to discuss progress in the achievement of global biodiversity targets. As the cornerstone of the social, economic, and political well-being of the world's populations, biodiversity conservation has become an increasingly urgent issue, underpinning economies, livelihoods, health, food security, and poverty alleviation, particularly of the world's poorest populations. Addressing biodiversity conservation became even more crucial with the progressively damaging impacts of climate change.

In preparation for COP 10, the ASEAN Centre for Biodiversity published the ASEAN Biodiversity Outlook 1, which aimed to assess the progress of ASEAN Member States in the achievement of the 2010 biodiversity targets. It reported that ASEAN's rich biodiversity was



significantly threatened by ecosystems and habitat change, climate change, invasive alien species, overexploitation, pollution, and poverty. The AMS also reported relevant progress, particularly in the expansion of coverage for marine and terrestrial protected areas and regional initiatives in biodiversity conservation.

In Nagoya, ASEAN and the rest of the world acknowledged that the nations failed in their 2002 promise to significantly reduce the rate of biodiversity loss at the global, regional, and national levels as a contribution to poverty alleviation and to the benefit of all life on Earth. As a result, Parties to the CBD adopted the Strategic Plan for Biodiversity 2011–2020 in response to mounting challenges to biodiversity. The Strategic Plan serves as a flexible framework for the establishment of national and regional targets and promotes the effective implementation of the three objectives of the CBD. The plan also encompasses strategic goals and 20 ambitious yet achievable targets, collectively known as the Aichi Biodiversity Targets.

In its second edition, the ASEAN Biodiversity Outlook aims to provide a picture of the progress towards the achievement of the Aichi Biodiversity Targets and the implementation of the Strategic Plan for Biodiversity 2011-2020. ABO 2 aims to highlight challenges in biodiversity conservation in the region, efforts by AMS to strengthen biodiversity conservation at the national and regional levels, and prospects for achieving biodiversity targets by 2020.

ABO 2 embodies the contribution of the ASEAN Centre for Biodiversity in its mandate to facilitate biodiversity conservation in the region. The preparation of ABO 2 is a product of passion and purpose of the officers and staff of ACB; members of the ASEAN Working Group on Nature Conservation and Biodiversity; members of the ACB Governing Board; and scientists, policy makers, and other biodiversity champions from the ASEAN Member States.

ABO 2 is a product of passion. Writers, contributors, critics, and editors have spent countless hours in coming up with a publication that will reflect the status of biodiversity in the ASEAN region and what needs to be done in a holistic yet simplified presentation.

ABO 2 is a product of purpose. It intends to guide the AMS and the region as a whole, on what needs to be done to conserve and sustainably manage ASEAN's immense biodiversity wealth.

In the next three years leading to 2020, the final year for the assessment of the Aichi Biodiversity Targets, ACB will simplify and popularize ABO 2 for dissemination in ASEAN to advocate stronger actions to meet the targets. With partners in government institutions, conservation organizations, business, media, academe, and indigenous peoples and local communities, ACB aims to work with various stakeholders to spread the biodiversity message and generate action to protect the region's significant, but fragile, wealth of biodiversity.

We hope that the ASEAN Member States will make ABO 2 a product of action in the quest for the sustainable management of biodiversity in the region.

ROBERTO

Executive Director ASEAN Centre for Biodiversity

# Executive Summary

Photo by Jeremy Mendoza

ive years after the publication of the first ASEAN Biodiversity Outlook (ABO 1), the ASEAN Centre for Biodiversity (ACB) once again reviews the progress of the ASEAN towards the achievement of milestone targets in global efforts to reduce biodiversity loss. In the midst of the implementation of the Strategic Plan for Biodiversity 2011-2020 and Aichi Biodiversity Targets of the Convention on Biological Diversity (CBD), the second edition of the ASEAN Biodiversity Outlook (ABO 2) discusses ASEAN's progress in achieving the Aichi Biodiversity Targets, the state of major habitats in the region, and the many factors that influence and contribute to their effective management.

The Fifth National Reports (5NRs) to the CBD highlight extensive efforts of each AMS to reduce threats to biodiversity within their borders. With more clearly defined targets and in collaboration with other AMS and regional and international partners, ASEAN has been expanding programs and activities to protect the region's rich but vulnerable biodiversity. The Aichi Targets Traffic Lights: Progress of the Implementation of the Strategic Plan for Biodiversity 2011-2020 in the ASEAN Region (see page 21) indicate that the AMS have achieved significant headway, but despite these efforts, the gaps to achieving the Aichi Biodiversity Targets present tremendous challenges conservation efforts. to The analysis of actions towards achieving the Aichi Biodiversity Targets in ASEAN underscores some key points:

- A common biodiversity conservation agenda and its region-wide understanding have to prelude implementation at the national and local levels of governance. A common understanding of biodiversity, its values and ecosystem services, and the consequences of its loss have to permeate the individual ASEAN person to form the base of concerted conservation action.
- ASEAN has made positive inroads in increasing coverage for protected areas where AMS with large geographic jurisdictions are key to achieving areabased Aichi Biodiversity Targets. However, there is a need to ensure effective management of protected areas as well as establish functional protected area networks. The assessment of the rest of the targets indicates that all AMS need to mobilize initiatives across sectors and generate greater participation to ensure that biodiversity targets are within reach.
- The regional conservation community has to expand beyond the usual conservation support groups and reach out to the unconvinced. ABO 2 is a call for shared responsibility of the region's biodiversity to those who continue to exercise largescale deforestation, pollute rivers and lakes, overexploit seas in the conduct of their business, mail-order threatened wildlife, and completely ignore principles of sustainability and accountability for the region's biodiversity.

The region is poised to lose 70-90 percent of habitats and 13–42 percent of species by 2100. Assessments of forest ecosystems indicate an average annual rate of loss of 1.26 percent from 2000 to 2010. AMS actions have caused this rate to decline to 0.26 percent in the last five years (2010–2015). However, despite this significant progress, this decline will translate to 5,261.62 square kilometers of forest area loss per year if threats such as habitat fragmentation. clearing for agriculture, and infrastructure and housing development continue. The growing ASEAN population is raising the demand for food, and thus, agricultural areas are increasing, along with a host of problems, such as the loss of habitats, increasing use of chemical pesticides, and other threats to agrobiodiversity. The productivity and viability of the region's lakes, rivers, and peatlands continue to decline. Coastal and marine areas are significant to ASEAN as they are primary food sources for millions of residents in the region. However, studies show that most of the region's seas are overfished and degraded, threatening marine health and the food security of the region.

The AMS are ramping up efforts to address a host of issues that cut across species and ecosystems management and pose both challenges and opportunities to conservation management. ASEAN is increasing efforts to raise interest in taxonomy through field expeditions, skills training, data and information sharing, and publication and awareness campaigns to identify more species, support science-based conservation decisions, draw attention to biodiversity issues, and engage academics and citizen scientists in taxonomy. A stronger taxonomic base will aid the management of invasive alien species (IAS). The AMS have been sharing expertise and success stories, forging transboundary collaborations, as well as developing national IAS strategies to prevent the spread of IAS and reduce impacts, particularly to endangered and indigenous species.

The AMS are working on national access and benefit-sharing protocols to promote equitable benefits from genetic resources among stakeholders, particularly indigenous peoples and local communities that have nurtured natural resources for centuries. Biodiversityrich nations are burdened with poaching and illegal wildlife trade. Collaboration with regional and international wildlife enforcement networks, demand reduction, species and habitat specific programs, community and institutional

support, and various other measures have helped strengthen wildlife conservation in the region. ABO 2 also recognizes the need to generate greater support among stakeholders, particularly the business sector, most of whom derive significant benefits from biodiversity. Urbanization and city development are on the rise, adding to encroachment on natural spaces and pressures on ecosystem services.

Climate change garners more attention among multiple stakeholders, but there is also increasing recognition of the interrelationship between climate change and biodiversity. All AMS have signified commitments to address urgent climate change concerns in their National Biodiversity Strategy and Action Plans (NBSAPs). The ratification of the Paris Agreement on Climate Change strengthens the argument for integrating climate change solutions and approaches to biodiversity conservation, and as of publication, only Myanmar has yet to sign its instrument of ratification.

Updated NBSAPs, development of relevant biodiversity laws, policies, and action plans, collaborations among AMS with international organizations, increased capacity building among conservation actors, and greater public support midway to 2020 may propel AMS to a stronger performance in achieving the Aichi Biodiversity Targets. A more comprehensive approach will be delivered through ASEAN Vision 2025, which will be articulating the ASEAN Strategic Plan on Environment (ASPEN) through the ASEAN Socio-Cultural Community. ASPEN aims to achieve a sustainable ASEAN Community that promotes social development and environmental protection, which also complements the UN 2030 Agenda for Sustainable Development.

The ACB will continue to facilitate programs and activities across its priority thematic areas to strengthen biodiversity conservation and assist AMS in the implementation of the Strategic Plan for Biodiversity 2011-2020. ACB's Strategic Plan 2016–2025 will be updated in line with the ASPEN and the emerging gaps and priorities assessed in ABO 2. The Centre will also continue to strengthen its flagship programs on ASEAN Heritage Parks; biodiversity information management; and communication, education and public awareness to build capacities and share skills and knowledge among stakeholders to ensure the sustainable management of biodiversity and contribute to the management and reduction of biodiversity loss by 2020.

# Introduction

of the ASEAN he second edition Biodiversity Outlook provides an assessment of the implementation of the Strategic Plan for Biodiversity 2011–2020 and the Aichi Biodiversity Targets in the ASEAN region. Through a "Threats, Response, and Way Forward" framework, it discusses the state of major habitats found in the terrestrial and aquatic realms of the ASEAN Member States, how these are affected by drivers of biodiversity loss, and how the AMS have stepped up to address such issues and articulated ways forward to meet the Aichi Biodiversity Targets.

#### Looking back

In 2010, the first edition of the ASEAN Biodiversity Outlook provided the baseline for the forthcoming series of ABO reports. ABO 1 reported that the region was losing biodiversity at an alarming rate at the same time that the Global Biodiversity Outlook 3 (GBO 3) reported that the world failed to meet targets to significantly reduce biodiversity loss. The drivers of biodiversity loss in the ASEAN region identified in the course of preparing the ABO 1 include habitat change, overexploitation, pollution, climate change, invasive alien species, and poverty. In recognition of these drivers, ABO 1 highlighted areas in need of immediate actions and discussed numerous possibilities. It emphasized that current efforts were inadequate to curb the negative impacts of such drivers. ABO 2, now guided with the indicators associated with the Aichi Biodiversity Targets, will look into how the AMS have responded to these drivers of biodiversity loss.

#### ASEAN and global environment commitments

AMS are signatories to various multilateral environmental agreements (MEAs), such as

Photo by Tinh Mau Tu

the Convention on Biological Diversity (CBD), United Nations Framework Convention on Climate Change (UNFCCC), and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The AMS are also in various stages of processing national commitments to other MEAs including the Convention on Migratory Species (CMS), Ramsar Convention, Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization, and International Treaty on Plant Genetic Resource for Food and Agriculture (ITPGRFA), among others.

Actions in compliance with global environmental commitments are in conjunction with the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals. Biodiversity conservation is particularly relevant to Goals 14 and 15, which encompasses the conservation and management of all ecosystems and the biodiversity within. Goal 14 aims to conserve and sustainably use the oceans, seas, and marine Coastal and marine resources resources. provide tremendous resources, including food, water, medicine, and vital ecosystem functions such as climate regulation. The world's oceans facilitate trade and transportation, and support industries that sustain economies and the survival and well-being of millions of people. Goal 15, on the other hand, aims to sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss. Forests and inland waters provide food security and shelter, habitats for millions of species, and the foundation for agriculture, aquaculture, and other important industries. Strengthening biodiversity conservation initiatives thus contributes to these two goals that are vital to the attainment of a sustainable future.

Regional implementation of MEAs is done through the ASEAN Working Group on Nature Conservation and Biodiversity (AWGNCB), ASEAN Working Group on Climate Change ASEAN (AWGCC), Working Group on Chemicals and Waste Management (AWGCW), and ASEAN Working Group on Coastal and Marine Environment (AWGCME). Activities that promote capacity building and sharing of experiences have been instrumental in building confidence among AMS and synergizing efforts in the collective implementation of MEAs. Addressing global environmental issues is also indicated in the ASEAN Socio-Cultural Community (ASCC) Blueprint 2009-2015, which emphasized the need to strengthen national and regional capacities to address commitments to MEAs, promote synergies in the implementation of related MEAs, promote a common ASEAN understanding and unified position on relevant MEAs, and adopt a holistic approach in fostering regional cooperation on relevant environmental issues with the participation of all stakeholders (ASEAN Cooperation on Global Environmental Issues, n.d).

#### Progress in the ASEAN economic community

The AMS signed the ASEAN Economic Community (AEC) Blueprint 2008-2015 in November 2007. This master plan was envisioned to provide a common framework and standards of practice in several aspects of economy and policy where a single market and production base will enable the free flow of goods, services, investments, skilled labor, and capital (ASEAN, 2015a). The elimination of market restrictions, simplification of procedures, and availability of skills where they were needed resulted in a more innovative and businessfriendly environment.

#### ASEAN 2025: A stronger, more resilient ASEAN

The AEC Blueprint 2025, ASEAN Community Vision 2025, ASEAN Political-Security Community (APSC) Blueprint 2025, and the ASEAN Socio-Cultural Community (ASCC) Blueprint 2025 that succeeded the AEC Blueprint 2008–2015 were adopted by the ASEAN Leaders at the 27th ASEAN Summit in November 2015. All these now constitute the ASEAN 2025: Forging Ahead Together.

This new roadmap envisions an empowered, peaceful, stable, and resilient ASEAN community that is able to respond to the needs of its people and enable them to enjoy fundamental freedoms, higher quality of life, and other benefits that accompany a common regional identity, purpose, and principles.

The market opportunities of this integration are in the vicinity of USD 3 trillion annually and will likely influence the lives of over 632 million people in an economy that was, in 2014, identified as collectively the seventh largest economy in the world and the third in Asia (ASEAN Secretariat, 2015a).

#### The regional challenge

With its vast resources, the ASEAN economy is likely to continue growing in the coming years. Hence, there is no better time than now to commit to ASEAN 2025 and support it with a resilient natural environment that is able to secure and continuously provide necessary resources and ecosystem services. Maintaining the balance of economy and ecology is therefore the challenge before an ASEAN–wide stakeholdership that should adopt the concepts of and implement best practices on sustainability and biodiversity conservation.

The ABO 2 reports on how the region has fared based on the indicators of the agreed Aichi Biodiversity Targets. It discusses the gains in conservation, particularly on the quick rate by which protected areas are being established. lt admits the challenges. realities. and shortcomings in achieving the more difficult tasks of dealing with pollution; illegal, unreported, and unregulated (IUU) fishing; and issues related to addressing the needs of a growing regional population.

This publication aims to paint a picture of what the ASEAN Member States have achieved in the implementation of the Strategic Plan for Biodiversity 2011–2020, the challenges ahead towards achieving biodiversity goals by 2020, the state of ecosystems and biodiversity in the region, and the impacts of many issues that cut across the complexity of biodiversity conservation and management. Frameworks, mechanisms, and programs for moving forward, through ASEAN 2025 and in partnership with international and regional partners, such as the ASEAN Centre for Biodiversity, provide significant support in national and regional efforts to protect the region's globally significant wealth of biodiversity.

The ABO 2 delivers messages through powerful infographics that are supported with data and narratives. It is hoped that the ABO 2 catches the attention of those at the helm of governance, from the local all the way to the global community, to engage their interest and summon their renewed commitments to restore the ASEAN region as the Earth's haven of biodiversity.

CHAPTER 1 Progress in ASEAN's Efforts towards Achieving the Aichi Biodiversity Targets

Photo by Joel Forte



A t the Tenth Meeting of the Conference of the Parties of the Convention on Biological Diversity in October 2010 in Nagoya, Japan (CBD COP 10), Parties adopted a revised and updated Strategic Plan for Biodiversity 2011–2020, including the Aichi Biodiversity Targets. The plan provides a global framework on biodiversity actions to be achieved by 2020.

Parties agreed to translate this overarching international framework into revised and updated national biodiversity strategies and action plans. Additionally, it was agreed that the Fifth National Reports (5NRs) to the CBD should focus on the progress of the implementation of the Strategic Plan for Biodiversity 2011–2020 and the Aichi Biodiversity Targets.

This first chapter presents summaries of selfassessments as reported in the 5NRs of the ASEAN Member States (AMS). These summaries demonstrate the distinct strategies of the AMS to achieve the Aichi Biodiversity Targets as these apply to their unique political, economic, and environmental circumstances. At this point in the implementation of the Strategic Plan for Biodiversity 2011–2020, it is important to reflect on the achievements of the AMS in biodiversity conservation to see if the AMS and the region, in general, are on track towards achieving the Aichi Biodiversity Targets by 2020. Reflecting on accomplishments, lessons learned, and gaps and opportunities will allow the region to prioritize activities and make significant inroads on the path to achieving the Aichi Biodiversity Targets.

#### Accomplishments towards achieving the Aichi Biodiversity Targets among ASEAN Member States

several AMS report on processes, In the 5NRs, development, mainstreaming and implementation of plans, reforms in policy, engagement through collaboration and partnerships, and acknowledgement of the relevance of site- and people-based implementation—all important elements of the foundations of biodiversity conservation. Some AMS report on achievements related to protected areas designations, species conservation, enforcement of policies in protected areas, and engagement of various sectors through shared responsibility of agreed strategies.

The 5NRs also provide substantial input to the Fourth Edition of the Global Biodiversity Outlook (GBO 4) of the Convention on Biological Diversity and achievement of the Sustainable Development Goals.

The following infographics highlight the key achievements of AMS in efforts to achieve the Aichi Biodiversity Targets.

# The CBD Strategic Plan for Biodiversity 2011–2020 and the Aichi Biodiversity Targets

The Strategic Plan for Biodiversity 2011–2020 is a ten-year framework for action by all countries and stakeholders to save biodiversity and enhance its benefits for people.

The Strategic Plan is comprised of a shared vision, a mission, strategic goals, and 20 ambitious yet achievable targets, collectively known as the Aichi Targets.

VISION: "By 2020, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people."

MISSION: "Take effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services, thereby securing the planet's variety of life, and contributing to human well-being, and poverty eradication. To ensure this, pressures on biodiversity are reduced, ecosystems are restored, biological resources are sustainably used and benefits arising out of utilization of genetic resources are shared in a fair and equitable manner; adequate financial resources are provided, capacities are enhanced, bioliversity issues and values mainstreamed, appropriate policies are effectively implemented, and decision-making is based on sound science and the precautionary approach.'

# THE AICHI **BIODIVERSITY TARGETS**

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society



#### PUBLIC AWARENESS

By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.



#### MAINSTREAMING BIODIVERSITY VALUES

By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.



#### ELIMINATION OF INCENTIVES HARMFUL TO BIODIVERSITY

By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.



#### SUSTAINABLE PRODUCTION AND CONSUMPTION

By 2020, at the latest, Governments, business and stakeholders at all levels by 2020 after a test to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use



By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.



#### RESOURCES

By 2020, all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of the species of the species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological



limits

#### AGROBIODIVERSITY

By 2020, areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.



#### POLLUTION

By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

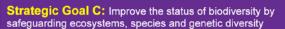


#### NVASIVE ALIEN SPECIES

By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

#### IMATE CHANGE AND MARINE ECOSYSTEMS

By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.



#### **PROTECTED AREAS**



By 2020, at least 17 percent of terrestrial and inland water, and 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider londerson and searcases landscape and seascapes.

#### SPECIES EXTINCTION



By 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.



#### GENETIC EROSION OF AGROBIODIVERSITY

By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services





# By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local com munities, and the poor and vulnerable.



#### ECOSYSTEM RESTORATION AND CARBON STOCKS

By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 percent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.



#### ACCESS AND BENEFIT-SHARING

By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building



### NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLANS



By 2015, each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

#### TRADITIONAL KNOWLEDGE



By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.



### SCIENCE-BASED KNOWLEDGE

By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.



#### RESOURCE MOBILIZATION

By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan 2011-2020 from all sources and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resources needs assessments to be developed and reported by Parties.

Penanic Tutong á

Medit C

# Darussalam

Academic sector has begun to estimate the monetary values of environmental services, although this is not yet integrated into the national accounting system.

Forest

will be

reserves

increased

from 41%

to 55% of

the total

land area.

Littond

бмы





The management of

agriculture, fishery,

and forestry are placed under the Ministry of Industry and Primary

Resources to ensure

that issues among

these sectors are

addressed.

Ω

There is active implementation of biodiversity awareness programs at all levels of society with significant private sector participation.

Timber harvesting has been stopped in all production forest reserves to increase forest conservation areas. Timber harvesting will be reallocated in areas intended for timber plantation development.





Use of inorganic fertilizers is highly regulated and the use of organic fertilizers is encouraged.





Studies of invasive alien species have increased

and government has strengthened its

quarantine

service.

Threatened species are protected by law and conserved in collaboration with scientific and academic communities.

**Environmental Impact** 

Assessment System is in

impacts on coastal and

marine ecosystems.

place to mitigate adverse

Efficient fish

culture farms

and marine

protected

areas have

established.

been

monitored and will be increased. Livestock

Conserved

areas are

Muara

●-⁄ Bangar

BAN

breeding centers and gene banks conserve genetic resources of farm animals and crops.



Laws protect vital ecosystems and recognize the rights and roles of indigenous peoples and local communities.

Timber harvesting and related utilization of forest resources inside the country's peat swamp forests are not allowed.



#### A Biodiversity Law to consolidate biodiversity regulations and ensure effective implementation of

the National Biodiversity Strategy and Action Plan is under development.



Local and traditional knowledge, innovations, and practices are widely recognized and integrated into resource management regulations.

The Brunei Tropical **Biodiversity Centre and** Brunei Agro Technology Park undertake related research for biodiversity conservation and management. Field expeditions and collaborations help expand the knowledge base and increase capacity.





Financing and implementation of biodiversity strategies are stipulated in Wawasan 2035.



#### Efforts are ongoing to develop more

communication, education, and public awareness materials to change and educate stakeholders.

Strategic plans are in place to reduce habitat loss and deforestation,



increase conservation areas, strengthen law enforcement, and monitor biodiversity conservation efforts.

There are increasing efforts in the sustainable management of the agriculture, aquaculture, and forestry sectors resulting in higher harvests

and fish yields.

Solid waste management programs are sub-national level. Water quality monitoring and

workplans.



Effective

15%.

implementation of

fishery legislation has reduced illegal fishing,

increased and fostered

fish sanctuaries, and

increased annual

effective management of

aquaculture fish yield by

Biodiversity incentives and schemes, such as Payment for Ecosystem Services, are being considered for development, pilot testing, and implementation.



Authorities are addressing issues established and implemented.



related to lost crop varieties and use of agricultural pesticides. Legislation and programs supporting sustainable development have been



# Cambodia

National protected area system

decentralized to the education on pollution issues are integrated into sub-national



Priority invasive alien species, such as Mimosa pigra, are addressed through the National Invasive Species Strategy and Action Plan in Invasive Species and other tools.

Mangrove restoration areas have been increased Locations of coral reefs have been

identified and are being considered for designation as protected areas.

> Funds and technical support are needed for the implementation of a strategic framework for the conservation of the genetic diversity of crops and livestock.





encouraged.



Payment for Ecosystem Services has been identified for pilot testing in some areas Ecosystem resilience and the contribution of carbon stocks are promoted through the Reducing Emissions from Deforestation and Forest Degradation

species.

Programme.

The Cambodia National **Clearing-House** Mechanism (CHM) and Biosafety CHM have been developed.



National Biodiversity Status Report

2016 identifies status and trends in

biodiversity. On the ground efforts

are in place to conserve endangered

on Access and Benefit-Sharing (ABS) has been mainstreamed into the draft **Environmental Code** and national ABS legislation is being developed.



Funds for biodiversity conservation have been mobilized from government and development

partners.

#### The National **Biodiversity Strategy** and Action Plan (NBSAP) has been

updated and mainstreamed into related sectoral plans. The strategies and actions in the NBSAP are mainly based on the National Biodiversity Status



Indigenous peoples and local communities (IPLCs) are involved in decision-making and the national law and policy development process. IPLCs have the right to own and use their land in a sustainable manner.



Source: Cambodia Fifth National Report to the CBD



Awareness programs target all stakeholders, from students (e.g. Biodiversity Warrior Program) to government officials (Satuan

> Towards Green Indonesia Program provides incentives to districts that excel in conservation and environmental damage control. There are also incentive programs for greenhouse gas emission reduction and biodiversity conservation and community development.

Fisheries protection is implemented

through the National Action Plan for Prevention and Anticipation of Illegal, Unreported, and Unregulated Fishing (IUU Fishing 2012-2016).

Rehabilitation of conservation forests, city forests, mangroves and critical lands has reached 25,000 sq km.

The government has identified and inventoried invasive alien species (IAS), documented IAS management strategies, developed an IAS strategy and action plan, and promulgated

Indonesia

Ministry of Environment and Forestry Decree Number P49/MENLHK/SETJEN/ KUM.1/12/2016 on IAS.

For 2014–2019, the government aims to boost

the population of 25 endangered species, including buffalo, Javan rhino, Sumatran tiger,

Sumatran elephant, Roussa pig, anoa, Javan gibbon, orangutan, proboscis monkey, Komodo dragon, Bali starling, maleo, Javan

eagle, and small yellow crested caccatua. 25

botanical gardens have been established to

16

conserve plant species.

Pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity. In general, level of compliance from 2012-2013 reached 65%, slightly down

compared to 69% in 2011.

DONESIA

Forest protection and rehabilitation significantly reduce greenhouse gas emissions. The Ministry of Environment and Forestry reported that areas for forest rehabilitation continuously increased from 2010 to 2013.

> Completion of the Indonesia Biodiversity Information Facility will make biodiversity information interoperable and facilitate information exchange across the country.



year 2013 on Genetic Resources Management. The Ministry of **Environment and Forestry has** drafted the decree regarding access to and equitable sharing from the utilization of wildlife genetic resources. A strategic plan

The Nagoya Protocol was ratified through the

Law of the Republic of

Indonesia number 11

is being developed for resource mobilization under the Biodiversity Finance Initiative.

Source: Indonesia Fifth National Report to the CBD



Coral reef conditions have improved compared to observed data from 1993 to 2013.



established. The Division of Plant Variety Protection also collects and preserves genetic material.



Law and database on genetic resources, traditional knowledge, and folklore have been developed. Numerous books on useful and medicinal plants have been published.





Government supports organic agriculture: 8 organic certification institutions have been established and certified organic agriculture areas have reached 901.35 sq km.

The National Long-Term

biodiversity conservation as

Development Plan

a foundation for

development.

2005-2025 enhances

Law of the Republic of Indonesia number 41 year 2009 on the Protection of Sustainable Agriculture Land for Food was established. The law provides for programs to enhance sustainable use of biodiversity in cities and villages through models of

through models of sustainable housing and food production areas (m-KRPL).







The government

campaigns and regulations to

protect and ensure the sustainable

utilization of water

source areas.

promotes



Environmental awareness has been promoted through outreach activities, media training and environmental journalism, development of an environmental curriculum, and capacity building for government staff.

Legislation and agreements on environmental and forest conservation and timber harvesting are being revised. Initiatives are in place to promote the conservation and sustainable use of biodiversity, Payment for Ecosystem Services, and Village Forest Management Agreements, support livelihood and community development, engage local people in biodiversity monitoring, and advance efforts in Reducing Emissions from Deforestation and Forest Degradation.



Integrated Water Management Plans have been developed for 10 priority river basins. The

revised Water Law provides guidelines for preventing negative socio-economic and environmental impacts. Research priorities for water bodies, watersheds, and aquifer recharge areas have been identified and a centralized pollution database covering solid waste, hazardous material, soil pollution, air and noise emissions, and wastewater has been made for six targeted cities. Research projects that focus on risks and impacts of pesticide use in agriculture in northern Lao PDR are being developed.

Biodiversity values have been integrated into policies on urban and land use planning, disaster and climate change, compensation and resettlement, natural resources and environmental management,

human resources, and tourism. Biodiversity values have also been integrated in the revised National Strategy on Environmental and Climate Change Education and Awareness 2016-2030, Decree on Strategic Environment Assessment (SEA), environmental compliance certificates, National Master Land Use Plan, and criteria for sustainable cities.



promoted. There is ongoing re-delineation of forest areas. An improved Participatory Forest and Land Use Planning, Allocation and Planning Process is being implemented to stabilize upland land use, prevent habitat loss, and rejuvenate lost habitats. The Forest Law Enforcement Governance and Trade process has been established and Provincial Law Enforcement Action Plan has been officially endorsed. 15 of 24 national protected areas now have management plans and two Ramsar sites have been established.



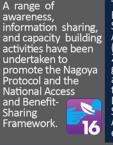
Improved forest management plans, community-based patrolling, agreements on co-management of protected areas, and management effective assessments have been implemented. Law enforcement, zoning, and SMART system training have been conducted. There are increasing efforts in capacity building and education of protected area staff. State forest lands are being re-delineated to improve management and representativeness of ecosystems. and representativeness of ecosystems.



The Biotechnology Safety Law has been approved and the National Policy on Rice Production for Food Security has been drafted. Research has been conducted on relevant taxa including wild mushrooms, medicinal plants and orchids indigenous rice varieties, and fungi diversity. The Biotechnology and Ecology Institute has been established. Demonstration gardens and ethno-botanical plots serve as repositories for ex situ conservation. Various activities promote agrobiodiversity.



The Carbon Fund Emission Reduction Programme was established to restore forest lands.





(NBSAP) 2016-2025 is being finalized. Technical groups monitor NBSAP activities and a National Steering Group for the Convention on Biologica Diversity has been created. A Sub-Sector Working Group on Agrobiodiversity has been established.



Herbicide awareness and

livelihoods with ecosystem health have been implemented. The Forest and Land Use Planning, Allocation and Management (FALUPAM) program was established for sustainable ecosystem management.

The forest and land use planning process incorporates traditional knowledge and management of upland landscapes reflect customary use of natural resources. Village and District Conservation Areas have been established for non-timber forest products while

other projects have been developed based on the local management of agrobiodiversity resources. Hin Nam No National Protected Area incorporates traditional knowledge in decisionmaking processes. The PA has been divided into management blocks based on customary rights from 18 guardian villages, and villagers have management responsibilities, 18 and access and use rights.





management. The Forestry Strategy 2020 guides sustainable forest management. 51 Production Forest Areas have detailed management plans. Integrated Pest Management has been carried out and farmer field schools have been established for rice and vegetable production. Various education and research initiatives on NTFPs and forest management have been implemented.

Wildlife surveys have updated the status of 112 threatened wildlife and generated action plans for the conservation of critical species. Law enforcement strategies, patrolling systems, and countermeasures against illegal timber and wildlife trade have been improved with enhanced capacity, collaboration with Wildlife Enforcement Networks and other organizations, and new technologies and approaches. A National Ivory Action Plan for Lao PDR 2015-2016 was implemented.





protection and restoration interventions. There has also been an emphasis on biosafety, with the creation of the Lao Information Sharing and Biosafety Clearing House and promotion of the Biosafety Law.

Funding sources for biodiversity conservation include the Environment Protection Fund, Forest Resource Development Fund, World Bank, Global Environment Facility, ecotourism, and payment for ecosystem services.

Source: Lao PDR Fifth National Report to the CBD



Lao PDR

aquifer recharge.

Control measures have

The Aquatic Resources Law has been

developed. Programs continue to improve fishery management practices,

prevent fishery declines, and support breeding and distribution of indigenous fish species. Fish conservation zones

been developed for invasive plant and animal species. Improved regulations protect crops and

livestock in priority areas. The Biotechnology Safety Law has created opportunities to train government staff, while addressing Biosafety issues.

and regulations and

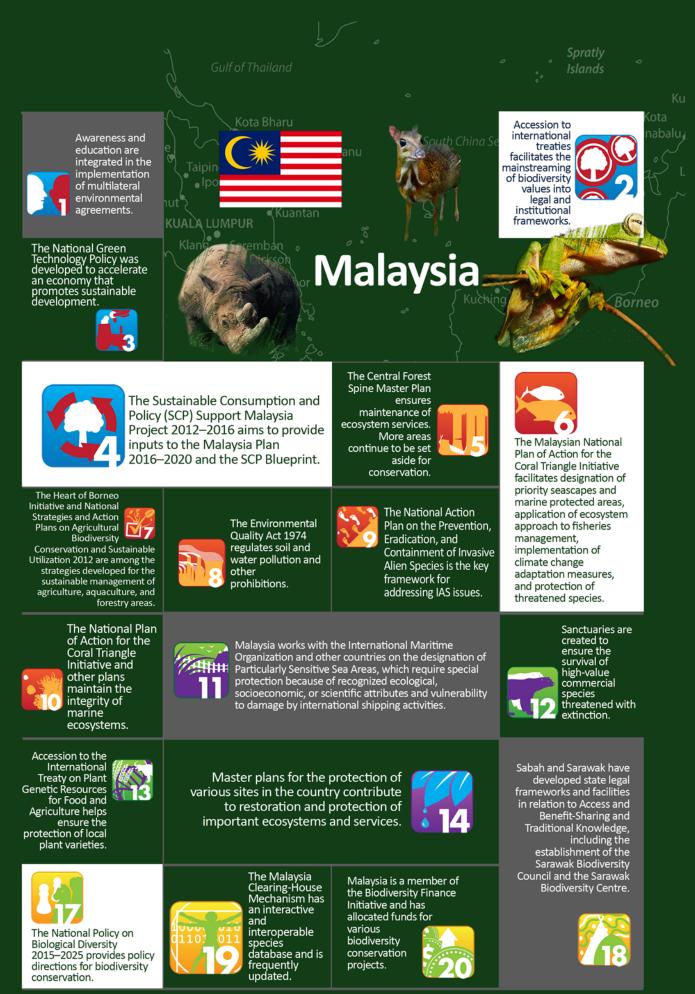
systems have been

appropriate aquaculture

established and improved.

Organic farmers' markets have been promoted, a Lao Certification Body and procedures for organic certification have been established, and a National

Steering Committee for forest law enforcement has been implemented. There have been improvements in mining legislation and licensing systems, systems of villager generated quotas for non-timber forest products (NTFPs) extraction, and assessments of



Source: Malaysia Fifth National Report to the CBD



Awareness and education Awareness and education campaigns on biodiversity conservation, protected areas, solid waste management, food security, biosafety, and other issues are being implemented and promoted.

Organic farming, ecotourism, and other livelihood options provide incentives to biodiversity

Implementation and monitoring of management plans, **V**7 stronger law enforcement, improved buffer zone management, bans on illegal and unsustainable harvesting practices, biodiversity surveys and research aim to improve sustainable management of agriculture, aquaculture, and forestry resources.

conservation.

Measures to protect coral reefs include a ban on destructive fishing practices, regular patrols and effective law enforcement, community-based fisheries management, establishment of coastal and marine research



centers, and promotion of sustainable fisheries management.

Multi-stakeholder support; benefit-sharing mechanisms; buffer zone management; ecotourism; and livelihood options will benefit loca communities and enhance Δ environmental protection.

**Biodiversity Strategy** and Action Plan is being implemented with the participation of multiple stakeholders.

Participatory approaches for community-based resource management and Environment Impact Assessments are implemented to strengthen



Various laws and programs monitor timber, forest, fishery, and agriculture management to ensure sustainability.

technologies.

744HH

Sustainable forest management;

strengthen ecosystem resilience.

rehabilitation and protection of critical

will help increase carbon storage and

watersheds; land use planning; sustainable

agriculture; and reclamation of mining areas

Biodiversity surveys, studies of priority species, and support of indigenous peoples and local

communities will increase

protection of critical and

vulnerable ecosystems.

# Myanmar

MYANMAR

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The government aims to adopt an integrated land use plan, establish a Land Use Commission, conduct environmentalimpact assessments, and rehabilitate mining and degraded forest areas to prevent further habitat loss.

Survival of vulnerable

biodiversity status and studies of priority species, effective law

enforcement, increased ex situ programs, effective implementation and monitoring of biodiversity plans, and collaboration with multiple

Pollution will be addressed through environmental

impact assessments; efficient sewage and wastewater

treatment systems; monitoring of air, water, and soil

quality; capacity building among relevant personnel;

**12** 

stakeholders.

education and awareness campaigns on pollution

issues; and collaboration with international

organizations on the development of clean

Government aims to reduce environmental damage to coastal areas and ban destructive fishing practices.

Myanmar aims to collaborate with other countries to monitor impacts and management of invasive alien species.



Stronger ex situ programs, extension services on sustainable food production, promotion and certification of organic farming, capacity building, development of gene banks and greater conservation will aid the conservation of the genetic diversity of crops and livestock.

The National

Indigenous peoples and local communities will benefit from participation in buffer zone management in protected areas, benefit sharing programs, and legislative support.



Mvanmar is monitoring the progress of the implementation of the country's Clearing-House Mechanism.

The International Union for Conservation of Nature is assisting the updating of the National Biodiversity Strategy and Action Plan with provisions on sustainable financing.



#### Source: Myanmar Fifth National Report to the CBD



biodiversity values.



The communication, education, and public awareness plan drafted in 2012 is being updated to reflect the increased scope of the Biodiversity Management Bureau and new PHILIPPINE SEA donor-funded projects.

Biodiversity conservation values are being integrated in national and sectoral development plans.

The Philippine Environment Partnership Program recognizes industry organizations that self-regulate and demonstrate superior environmental performance. 57 firms have been awarded with a Department of Environment and Natural Resources Seal of Approval for going beyond compliance and showing exemplary performance. The Protected Areas Recognition Awards recognize PA Superintendents and staff for efforts, initiatives, and innovations in PA management.

A moratorium on timber harvesting in natural and residual forests, the National Greening Program, and reforms in the mining sector help reduce habitat loss.

> The draft National Invasive Species Strategy and Action Plan (NISSAP) aims to provide an enabling policy and institutional framework for coordinated and multi-sectoral management of invasive alien species.

Critical habitats were created to afford protection of threatened species. To date protection of threatened species. Io date, seven critical habitats (CH) covering about 100 sq km were established. These are the Las Piñas–Parañaque CH, Cabusao Wetland CH, Rafflesia schadenbergania CH, Malasi Tree Park and Wildlife Sanctuary CH, Carmene CH, Adame Wildlife Carmen CH, Adams Wildlife CH, and Magsaysay CH for the Hawksbill Turtle. 12

> The Philippines acceded to the Nagoya Protocol through Senate Resolution No. 85 adopted on 25 May 2015.

National Clearing-House Mechanism activities are being mainstreamed into regular operations. The Biodiversity Management Bureau is collaborating with the ASEAN Centre for Biodiversity to improve the interoperability of the species and protected areas databases.

Coastal and marine conservation issues are managed through the implementation of the Coral Triangle Initiative, National Integrated Coastal Management Program for Sustainable Development of the Coastal and Marine **Environment and Resources** of the Philippines, and Sustainable Coral Reef Ecosystems Management Program, among others.

The Global Environment

The Global Environment Facility-Food and Agriculture Organization Project on Globally Important Agriculture Heritage Systems has increased awareness of the importance of agrobiodiversity, recognized traditional crop varieties and livestock breeds, and facilitate conservation programs. The Program to Restore National Germplasm of the University of the Philippines Los Baños and Department of Science and Technology aims to restore crop diversity and develop new in-vitro conservation strategies.

The Philippine Biodiversity Strategy and Action Plan 2015–2028 provides directions for biodiversity-related actions.



Funding for conservation, such as the Integrated



such as the Integrated Protected Areas Fund and Wildlife Management Fund, are established through various environmental laws. The Philippines is part of the Biodiversity Finance (BIOFIN) initiative through which finance solutions, such as budget realignment, private sector engagement increased private sector engagement, increased access to earmarked funds, and exploring new finance mechanisms, are being undertaken



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Philippines

Special attention has been paid to balancing conservation

and the economic needs of indigenous peoples and local

communities. Assessments of biodiversity-friendly

Pollution and its impacts on various ecosystems are addressed in various environmental

programs.

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(NIPAS), which is complemented by Indigenous Community Conserved Areas. Measures are being undertaken to address a 2013 management effectiveness assessment stating poor ranking of 25% of PAs.

The National Climate Change Action Plan seeks to enhance the adaptive capacity of communities and the resilience of natural ecosystems to climate change with initiatives being implemented in collaboration with the Global Green Growth Institute, United States Agency for International Development, and Asian **Development Bank** The Indigenous People's Rights Act of 1997 gives IPs the rights to cultural identity; full ownership and protection of their cultural and intellectual rights; and restitution of any cultural, intellectual, religious, and spiritual property that have been taken without consent (Sec. 32). Free Prior and Informed Consent is required for activities that may affect spiritual and religious traditions, customs, and ceremonies including the conduct of research on Indigenous Knowledge Systems and Practices.



support for sustainable livelihood initiatives. 68 Protected Area Community-based Management Agreements occupying a total area of 391.38 sq km has benefited 5,457 households and 15,568 individuals in 21 protected areas.

Majority of these households engage in agricultural **V**7 activities.

Legislation has been implemented to protect islands and island passages that are considered vulnerable and critical hot path for highly and passages. are considered vulnerable and ortical hotspots for biodiversity including Mindoro, Palawan, Verde Island Passage Marine Corridor, and Sulu Sulawesi Marine Ecoregion. Under Executive Order 79 (2012), island ecosystems are among the "No-Go-Zones," which are considered closed to princed cortext-consessions mineral contracts, concessions, and agreements.

Various programs focus on ensuring the protection, conservation, and sustainable use of watersheds, including the Department of Environment and Natural Resources-River Basin Control Office-led preparation of river basin master plans of 18 major river basins. The National Convergence Initiative of various government departments aims to improve, conserve, protect, and rehabilitate patural resources and tarets 100

natural resources and targets 100 watersheds, many of which are outside priority river basins. 14







livelihoods in 8 demonstration sites and trainings on the value chain were conducted under the Partnerships for Biodiversity Project. The United Nations Development Programme- Global Environment Facility, Foundation for the Philippine Environment, Philippine Tropical Forest Conservation Foundation, and other partners provide



In Singapore, many different organizations and nature interest groups have been conducting outreach activities targeted at the community. These include guided walks, seminars, workshops, exhibitions, and competitions to engage the public and increase appreciation of biodiversity among Singaporeans. Some examples include:

- Community in Nature Initiative a National Parks Board, Singapore (NParks) initiated movement to engage different groups in the community to conserve Singapore's biodiversity by bringing together all of NParks' nature-related events, activities, and programs under a single umbrella.
- Festival of Biodiversity an annual signature community outreach event organized by the Biodiversity Roundtable (a group of stakeholders within the nature community, including NParks) for the conservation of Singapore's Natural Heritage.

#### Under the Species Recovery programmatic thrust

of NParks' Nature Conservation Master Plan, threatened species are

identified and prioritized based on endemism, conservation status, and habitat range. This will help to guide actions towards increasing populations of the species identified. Various species conservation and recovery programs are in place, such as the giant clam restocking program and the freshwater crab conservation the freshwater crab conservation working group, for the conservation of the critically endangered Singapore freshwater crab (Johora singaporensis). NParks also propagates rare native plants for reintroduction into their natural habitats.



research is well established, and the policy for commercial research is currently being reviewed. Singapore is not yet a Party to the Nagoya Protocol, but national consultations are currently ongoing to consider if Singapore

should accede to the Protocol.

Access and Benefit-

non-commercial

Sharing processes for



The vision of molding Singapore into a City in a Garden is recognized at the highest levels, where the Prime Minister acknowledged the need to enhance greenery in Singapore in the 2011 National Day Rally speech. Detailed land use planning takes biodiversity into consideration with impact assessments required for development near Nature Areas (areas recognized under the Urban Redevelopment Authority's land use planning as having high biodiversity, to be retained for as long as possible). The Sustainable Singapore Blueprint (SSB) 2015 outlines the national vision and plans for a more liveable and sustainable Singapore, and incorporates targets in various sectors that track efforts in environmental protection such as green and blue spaces.

Various species conservation and recovery programs are

Various species conservation and recovery programs are in place, such as the coral nursery project and the giant clam restocking program. Singapore established the Sisters' Island Marine Park, the country's first Marine Park in 2014, which is intended to protect marine habitats and act as a protected area for species conservation programs. Singapore also developed the Integrated Urban Coastal Management Framework with

Partnerships in Environmental Management for the Seas of East Asia to encourage sustainable development of the coastal environment within an urban context.

One of Singapore's strategies in the NBSAP is to Safeguard Our Biodiversity. Numerous measures have been taken to maintain or enhance natural areas and to increase habitat connectivity. Some examples of these measures are the recent addition of two new Nature Areas in January 2013 (Jalan Gemala and Pulau Unum/Beting Bronok) and the development of the Sisters' Islands Marine Park announced in July 2014. Measures to improve habitat connectivity include the Eco-Link@BKE, Nature Ways, Round Island Route, Park Connector Network and the Rail Corridor. Finally, reforestation efforts at Nature Reserves and habitat enhancement in parks such as Bishan-Ang Mo Kio Park, Tampines Eco-Green, Sungei Pandan. and Pulau Ubin help enhance existing habitats. Eco-Green, Sungei Pandan, and Pulau Ubin help enhance existing habitats.

Singapore has made great efforts to preserve native habitats intact, and to restore connectivity between patches to enhance ecosystem services. Vulnerable groups highlighted in the target are not reliant on biodiversity for their livelihoods in

Singapore. The initiatives that contribute towards Aichi Targets 5 and 11 also contribute to the achievement of this target.





Singapore

Various alien species are present in Singapore, but have yet to demonstrate have yet to demonstrate significant impacts on biodiversity. Initial steps have been taken to identify species and pathways, with some limited attempts at control measures within Nature Reserves. Some species known to be invasive elsewhere are also being observed for signs of invasive behavior in Singapore.



Under Strategy 1 of Singapore's NBSAP, which is to Safeguard Our Biodiversity, efforts include identification of specific sites with biodiversity significance, such as the habitat ranges of endangered animals; initiatives to improve the connectivity between habitats such as the Eco-Link@BKE, Nature Ways, Round Island Route, Park Connector Network, and the Rail Corridor; as well as other restoration and habitat enhancement initiatives such as the Bishan-Ang Mo Kio Park stream rehabilitation and Tampines Eco-Green. Tampines Eco-Green.

Singapore's NBSAP Strategy 2, Consider Biodiversity Issues in Policy and Decision-making, is also relevant to this target as the Sisters' Islands Marine Park and the two new Nature Areas (Jalan Gemala and Pulau Unum/Beting Brench under decimants the Bronok) were designated under the URA Parks and Waterbodies Plan, providing some administrative protection for these sites.

NParks has developed a Nature Conservation Master Plan, which includes a thrust on Conservation of Key Habitats that will help in management of areas with significant biodiversity in all habitat types. terrestrial, freshwater, and marine

Knowledge of the biodiversity of Singapore is gained primarily through academic research, and this is facilitated through the research permit system of NParks. The information from this research is then disseminated to managers of the areas with biodiversity, to be incorporated into the way the sites are managed.



Biodiversity related information is collated and managed, and tools such as the BIOME database are developed to analyze the data in order to provide timely and relevant information to policy and decision makers.

Biodiversity related information is then disseminated using the various initiatives under Strategy 4 - Enhance Education and Public Awareness. Events such as the Festival of Biodiversity are very useful in communicating information on biodiversity to the general public.

Source: National Parks Board, Singapore 2015





to improve their resilience as ecosystems, the additional planting also contributes towards sequestration of carbon. In addition, various tree planting programs outside of the Nature Reserves can also contribute to this target, e.g., in habitat enhancement and restoration efforts in areas such as Pulau Ubin and Tampines Eco-Green and also Singapore's streetscape planting, including Nature Ways and Southwest Community Development Council's One Million Tree Planting Programme. Singapore's efforts in actively greening urban infrastructure in the form of vertical greenery and rooftop gardens as part of the City in a Garden vision also greatly increases the capacity of urbanized areas to contribute to climate change mitigation.

Ongoing reforestation programs at Nature Reserves not only help

Singapore's NBSAP is currently undergoing review and national targets are being developed. In addition, NParks' Nature Conservation Master Plan is intended to support the implementation of Singapore's NBSAP.

#### **Biodiversity value assessment** has been conducted through the Payment for Ecosystem Services project.





With forest cover at 31.57% of the total land area in 2013, the Master Plan on National Forest Resources Protection aims to allocate 40% of the total land areas to forests by 2024.

The national list of invasive alien species has been updated with measures for their control. Invasive alien species used for commercial purposes is a maior





Germplasm of plant resources, particularly of rare plants, are collected by the Plant Genetic Conservation Project under the Royal Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn.

Sustainable fisheries strategies include control measures for particular gear during

Sustainable

The Royal Forest Department has

Award, which recognizes the best

conservation projects.

established the Model Community Forest

application of local wisdom on and use of community forests. The Green Globe Award recognizes outstanding environmental

Sustainable management of agriculture, and forestry resources need to be strengthened due to increasing land conversion and demand for food and raw materials.

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At least 20% of marine and coastal areas have been designated as protected areas. There are 22 marine national parks and five Ramsar sites.

Efforts to maintain genetic diversity include the collection of the germplasm of native rice varieties, certification of the pure line of three native rice varieties, and the Agricultural Development Strategy of the 11th National Economic and Social Development Plan 2012 – 2016 which strategy to growth of 2016, which stresses the growth of climate-resilient species. Funds from the Global Environment Facility helped strengthen biodiversity conservation measures



The Ministry of industry promotes environmental care as a shared responsibility of government and the business sector through programs on sustainable production and consumption, eco-labelling of environmentally friendly products and processes, and pollution control.

Thailand aims to combat rising issues in pollution and solid waste management.







Development Plan 2017-2021.



Funds for biodiversity come from the national budget, Global **Environment Facility** replenishment funds on catalyzing Sustainability of Thailand's Protected Area System, and the GEF Small Grants Programme and other funding organizations.



concern.

About 12 species of fauna in Thailand have become extinct and many more are on the brink of extinction. An ongoing campaign protects the rosewood, which is threatened due to its high market value. Other measures to protect species include collaborations with international organizations on wildlife trafficking, a Memorandum of Agreement with the Convention on Migratory Species to protect the dugong, protection of the Irrawaddy dolphin under the patronage of Queen Sirikit, and the "Return Wildlife to Heal the Forest" project, which raises 31 species of wild animals in breeding stations in 29 conserved forests.

About 12 species of fauna in Thailand have become extinct

Various strategies promote reforestation and forest rehabilitation such as the Master Plan on Water **Resources Management** 2013-2017 and ASEAN Forest Project and Mangrove Forest Strategic Plan 2014 - 2018. Other programs that promote climate resiliency are the Low Carbon Municipality, Green City and pollution - free and sustainable city projects.



Although Thailand has yet to ratify the Nagoya Protocol, mechanisms are being set for its implementation. 

The government recognizes traditional knowledge, innovation and practices of local communities; has developed a database on traditional knowledge; and encourages community participation in natural resource management.



plans include the National Biodiversity Strategy and Action Plan 2008–2012 and the current plan, the Master Plan for Integrated Biodiversity Management 2015–2021.

The Thailand Clearing-House Mechanism is maintained at http://chm-thai.onep.go.th/ and the NBSAP has an action plan on research and inventory of biodiversity.









information sharing. The National Clearing-House Mechanism is not maintained. Viet Nam is currently working with the Japan International Cooperation Agency on establishing a database for selected protected areas. Plan will include a priority to increase state investments in baseline resources for conservation to include biodiversity inventories, monitoring systems to track biodiversity changes, database systems for information sharing and exchange, capacity building for technical staff, and other biodiversity conservation activities.



Source: Viet Nam Fifth National Report to the CBD



Brunei Darussalam has created awareness of and mainstreamed biodiversity through the development of communication, education, and public awareness (CEPA) materials, technology development and incentives in biodiversitydependent industries, and increased regulations for timber production. The country is best known for the protection of its ecosystems. There have been increased efforts to reduce pressures on and promote sustainable use of biodiversity. Moreover, there has been an increase in forest and marine protected areas and better management of agriculture, fishery, and forestry sectors. with environmental assessment systems in place to mitigate impacts from threats, such as invasive alien species (IAS) and pollution, among others. Critical ecosystems and endangered wildlife are protected by law while programs have been established to protect genetic resources. Brunei Darussalam has specifically crafted a biodiversity law to enhance benefits derived from biodiversity. Policies and government institutions have also been created to generate greater participation, capacity, and funding for conservation efforts.

Cambodia has sought to mainstream biodiversity concerns through CEPA campaigns, allocation of budgets for biodiversity conservation, and Champion for Biodiversity programs and Payment for Ecosystem Services (PES). There has been a focus on the sustainable management of agriculture, aquaculture, forestry, and protected areas and issues such as solid waste management and IAS (e.g., Mimosa pigra). Efforts to safeguard biodiversity include increasing the number of protected areas, updating the National Red List, expanding ex situ programs, and creating relevant laws on genetic resources. The government has updated its National Biodiversity Strategy and Action Plan (NBSAP) and crafted the Cambodia Climate Change Strategic Plan (CCCSP) 2014–2023. Implementation of biodiversity conservation programs are further enhanced with greater participation from indigenous peoples and local communities, development of a national Clearing-House Mechanism (CHM) and creation of a Biodiversity Trust Fund to enhance financing of conservation initiatives.

In Indonesia, mainstreaming biodiversity issues is facilitated by an awareness program that targets all stakeholders; development of the National Long-Term Development Plan 2005-2025; and incentive programs for excellence in conservation, environmental damage control, greenhouse gas emissions reduction, and community development, among others. Various programs are in place to increase protection for organic agriculture, conservation forests, and marine protected areas; and improve standards in environmental protection in industries. Programs have been developed to protect 25 endangered species and plant genetic resources. Massive reforestation projects protect vital ecosystem services. Programs and policies to implement biodiversity conservation measures include the Indonesia Biodiversity Strategy and Action Plan, Indonesia Biodiversity Information Facility, and resource mobilization under the Biodiversity Finance Initiative (BIOFIN).

Lao PDR has created policies to integrate biodiversity into urban and land use planning, climate change, environmental management, law enforcement, livelihood and community development, human resources, and tourism, among others. Measures to address threats to biodiversity include laws and strategies that increase coverage and ensure protection of forest, freshwater, and marine resources and prevent the spread of IAS. Biodiversity is safeguarded through assessments of ecosystems and wildlife; improved monitoring, patrolling, and law enforcement; and increased taxonomic research and activities on taxa such as wild mushroom, orchids, and fungi, Benefits from biodiversity are enhanced with a national access and benefit-sharing framework and carbon reduction program. The NBSAP 2016-2025 and Environment Protection Fund aim to facilitate biodiversity conservation projects in the country.

Malaysia has developed programs to mainstream biodiversity into sustainable development, including the National Green Technology Policy. Policies, such as the Malaysian National Plan of Action for the Coral Triangle Initiative, Environmental Quality Act, and National Agro Food Policy, among others, safeguard biodiversity in the areas of agriculture, fisheries, and pollution prevention and reduction. Master plans have been developed to restore and protect important ecosystem services. Malaysia has also created a National Biodiversity Policy and Clearing-House Mechanism (CHM), and allocated funds to implement biodiversity conservation measures.

There have been a number of initiatives in Myanmar to mainstream biodiversity into the national development plan such as applying CEPA strategies on biodiversity, solid waste, and other issues; implementing environmental impact assessments (EIAs); and crafting laws and projects to monitor the sustainable use of resources. Land use plans, EIAs, communitybased management, stronger law enforcement, research, and increased collaboration among are envisioned to address stakeholders threats to ecosystems and wildlife. Stronger ex situ programs, such as botanical gardens, zoos, and gene banks, protect endangered species and the genetic diversity of crops and livestock. The government has plans to multi-stakeholder strengthen participation, benefit-sharing mechanisms, livelihood options, and improve sustainable management of forest, watershed, agriculture, and mining areas to enhance ecosystem services. A CHM has been established and the NBSAP will provide funding for biodiversity conservation programs.

In the case of the Philippines, government agencies and foreign-funded projects are instrumental in raising awareness of and mainstreaming biodiversity efforts into national sectoral development plans. Incentives and programs have been created to facilitate biodiversity concerns in industry practices. Various conservation projects in the country targeted critical biodiversity hotspots such as protected forest, coastal, and marine areas. A national protected areas system safeguards ecosystems, wildlife, and genetic resources. Local and international organizations collaborate to conserve crop varieties and livestock breeds. There are also programs implemented to restore ecosystem services. The Philippine Biodiversity Strategy and Action Plan directs biodiversity conservation action with funding





from the national budget. The Philippines also hosts the ASEAN Centre for Biodiversity, an intergovernmental organization that facilitates coordination and cooperation among the AMS in conserving the rich biodiversity of the ASEAN region.

Singapore has made concerted efforts in biodiversity conservation despite its small size, and implemented numerous projects and programs under the broader umbrella of the National Biodiversity Strategy and Action Plan (NBSAP, 2009). At a more detailed level, the National Parks Board's (NParks) Nature Conservation Master Plan (NCMP) consolidates, coordinates, strengthens, and intensifies the biodiversity conservation efforts initiated by the NBSAP to support its implementation in four thrusts: Conservation of Key Habitats; Habitat Enhancement, Restoration, and Species Recovery; Applied Research in Conservation Biology and Planning; and Community Stewardship and Outreach in Nature. Greenery has always been an integral part of Singapore's urban development, and this is recognized in the vision to make Singapore into a City in a Garden. NParks, as the agency responsible for greening Singapore, incorporates biodiversity into these plans, and reaches out to stakeholders through programs such as the Community in Nature initiative and events such as the Festival of Biodiversity.

In Thailand, the NBSAP and National Economic and Development Plan 2012–2016 mainstream biodiversity issues in national development plans, along with recognition programs in forestry and conservation, and promotion of shared environmental responsibility in industry. Increased coverage and sustainable management of protected areas, fisheries, and agriculture areas aim to reduce threats to biodiversity. Expanding terrestrial, coastal, and marine protected areas, implementing species-specific conservation programs, and protecting native rice varieties are among the country's strategies to safeguard biodiversity. Ecosystem rehabilitation through reforestation, watershed management, and water resources management aim to enhance benefits from ecosystems. The Master Plan for Integrated Biodiversity Management 2015–2021 and funding from the national government and international organizations facilitate biodiversity conservation measures in the country.

Plans and policies, collaboration with relevant stakeholders, and incentive programs help raise awareness of and contribute to mainstreaming biodiversity into sustainable development in Viet Nam. Sustainable management measures are being developed to protect agriculture, aquaculture, forestry, and coastal and marine resources against threats such as pollution, uncontrolled commercial logging, and IAS, among others. There are calls to review the protected area system and other conservation initiatives to protect biodiversity. PES, access and benefit-sharing mechanisms, and other measures are being explored to maintain ecosystem services. The NBSAP aims to address the need to provide alternative livelihoods, generate greater participation in conservation, enhance biodiversity information generation and sharing, and explore increased funding options for biodiversity conservation.

### Assessment of ASEAN's accomplishments towards the achievement of global biodiversity goals

With information derived from key sources such as the Fifth National Reports to the CBD, the ASEAN State of the Environment Report, and publications from international and regional conservation organizations, ABO 2 paints a regional picture on the achievement of the Aichi Biodiversity Targets through the Aichi Targets Traffic Lights: Progress of the Implementation of the Strategic Plan for Biodiversity 2011– 2020 in the ASEAN Region. The assessment of the implementation of each of the Aichi Biodiversity Targets is viewed through a regional looking glass while acknowledging the contributions of each of the AMS. This assessment endeavors to express a fair presentation of the state of the implementation of the Aichi Biodiversity Targets, demonstrates the links between targets, and suggests the way forward. It likewise presents the challenges that the region needs to overcome on the road to 2020.



### Aichi Targets Traffic Lights:

### Progress of the implementation of the Strategic Plan for Biodiversity 2011-2020 in the ASEAN Region



Most, if not all of the ASEAN Member States (AMS) have taken the necessary actions towards the achievement of this target, as part of national and local plans and programmes and have registered positive outcomes in the 5th National Reports (5NR) to the Convention on Biological Diversity (CBD).



At least half of AMS report that they have mobilized necessary actions towards the achievement of this target.

Less than half of the ASEAN Member States have mobilized initiatives leading towards the achievement of this Aichi Target and have not demonstrated related positive impacts.

### Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society



promote awareness and understanding of biodiversity, its values and the actions that people can take to conserve it. Several campaigns focus on the youth sector. Other target audiences identified in the AMS' 5NRs include the government, local governments, non-government organizations, and the private sector.

ASEAN Member States are undertaking various types of campaigns to



Awareness of biodiversity values: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Poaching, pollution in various forms and sources, conflict of resource use e.g. mining and protected areas, and other threats to biodiversity in the region, continue to be reported and reflect the lack of understanding of some sectors that remain uninformed and unconvinced of the need for biodiversity conservation. AMS need to institutionalize their national CEPA strategies through multi-sectoral approaches that involve a wider stakeholdership, including countries and regions outside of the ASEAN region, that need to be made aware of the global implications of biodiversity loss in the ASEAN. Champions for each of the Aichi Biodiversity Targets need to be mobilized in each AMS.



Integration of biodiversity values: By 2020, at the latest, biodiversity values have been integrated into national and local development and

poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems. Half of the AMS have now recognized biodiversity values in their national development plans. Other AMS are in various stages of reviewing national frameworks, polices, and international treaties to consider the necessary alignments. There is a need to expedite this process as several other Aichi Biodiversity Targets depend on the integration of biodiversity into national and local development plans and strategies.





Incentives:

By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are

eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives and safeguards for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions. Incentives for biodiversity-friendly performance are demonstrated in a variety of forms and for different stakeholder groups. These include recognition and awards for exemplary environmental performance of private corporations; dedication, innovation, and commitment of park staff; model communities; and outstanding projects. Some AMS have incorporated incentives into policy and in the implementation of projects. However, certain concessions and auxiliary rights afforded to some sectors of industry (industrial forests and mining) need to be re-examined. AMS should consider a review of subsidies harmful to biodiversity. It is important to note that there is a need to scale up the utility of incentives to pursue the attainment of other Aichi Biodiversity Targets, such as 4, 7 and 15, as reforms policy these call for in to favor biodiversity-friendly technology in agriculture and accelerate the region's transformation towards the sustainable energy era.



Sustainable production and consumption: By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits. AMS report that projects and policies are reducing impacts on forests, demonstrated through sustainable use strategies and certifications, investments in enforcement of policies against trafficking of threatened species, reducing pressures through the diversification of livelihoods, and promoting the concepts and practice of shared environmental care.



Steps taken towards sustainable production and consumption include the development of policies such as the Sustainable Consumption and Production Policy Support of Malaysia. Other AMS promote sustainability as a shared responsibility among government and business and monitor the harvest and use of forest, aquatic, and agricultural products.

On the other hand, the population of ASEAN has increased by 72 percent since 1980, and this has prompted the increase in areas allocated to food, timber, and natural resource production, as well as the acquisition of technologies to improve agricultural efficiency. Such demands impose corresponding increases in inputs such as pesticides and herbicides that impact adjacent habitats. The introduction of genetically modified varieties in the region has to be further evaluated against trends in fertilizer, herbicide, and pesticide inputs. It is imperative that policies are reformed to make sure that all technology in the region is sustainable in the near future. Business as usual will result in the failure of the region to achieve this Target.

#### Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use



Habitat loss, fragmentation and degradation: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

In aggregate, ASEAN forests continue to fragment and deplete, despite positive net changes attributed to reforestation efforts of some AMS. The challenge of the growing need for agricultural areas for food and industry remains unresolved. Illegal activities driven by the demand for timber and markets for high value forest products challenge AMS' enforcement capacities. The increasing frequencies of floods appear to be a natural indicator where terrestrial habitat loss is experienced. The contribution to this target by Brunei Darussalam is particularly noteworthy, as it has retained 100 percent cover within its protected areas. Several AMS have committed to significant reforestation targets including an increase in mangrove cover. However, despite responses in the form of policies, projects and programs, the trends in forest cover continue to decline at the regional level indicating that current actions are inadequate to respond at the scale at which pressures and illegal activities persist. Enforcement capacities have to be significantly improved, monitoring and reporting systems established or enhanced and implemented with a renewed commitment, and global threats addressed in sync with Aichi **Biodiversity Target 1.** 



Sustainable exploitation of marine resources:

By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Several AMS have reported an increase in demand for fisheries products, which is consistent with rising populations in ASEAN. The 2014 Food and Agriculture Organization (FAO) Report on Fisheries and Aquaculture revealed that ASEAN ranks as the second highest in per capita fish consumption in the Asia-Pacific. The AMS' 5NRs report that illegal, unreported, and unregulated (IUU) fishing is still prevalent in the region. National policies on gear and seasonal catch controls, conservation partnerships, and integrated land and sea use plans have been mobilized. Initiatives on ecosystem-based resource management projects, control and handling of illegal activities, and establishment of fisheries conservation areas contribute to some advancement, but despite these efforts, marine capture trends demonstrate a decline in capture fisheries in some AMS. Aquaculture appears to pick up the slack in marine capture fisheries but with significant environmental tradeoffs. FAO (2014) recommends a more sustainable treatment of the blue world by looking beyond economics and promoting a more environmentally responsible and sustainable fisheries. FAO likewise underscores the importance of securing the sustainability of small-scale fisheries as this sector contributes to poverty alleviation and food security. The development of an ASEAN-wide strategy on sustainable fishing practices may be a means to address this.





Biodiversityfriendly agriculture, forestry and aquaculture: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity. Forest encroachment, agricultural land conversion, and heavy reliance on chemical production inputs threaten ecosystem services essential to the conduct of agriculture in the ASEAN region. Being the major producer of palm oil globally and supplier of about 90 percent of natural rubber to the world market, the area allocated to these plantation crops continuously increases while forest areas decrease. At the same time, lowland agricultural areas are being threatened by urbanization, i.e. conversion of agricultural lands to residential and commercial areas. The proportion of agricultural land to total land area declines as the urban population of the region increases. There is a growing recognition of the negative impacts of biodiversity-unfriendly agriculture and aquaculture. AMS have, in several ways, mobilized more sustainable and biodiversity-friendly agriculture and aquaculture technologies. As the region is primarily agricultural and one of the most productive in the world, there is a need to support and promote agro-ecological farming practices and initiatives, thereby striking a balance between increasing food production for its significantly increasing population and conserving agricultural biodiversity. The region could take a cue from an existing initiative in Malaysia - Malaysian Good Agricultural Practices (MyGAP). Recognizing sustainable agricultural farm practices, MyGAP employs farm certification schemes for Malaysia's crops, livestock, and aquaculture sectors. Such schemes could be emulated and adopted by other AMS.





Pollution reduction: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity. AMS have incorporated planned remediation measures in their National Biodiversity Strategy and Action Plans (NBSAPs), conducted communication campaigns, monitored compliance of industry, and mobilized action in selected priority sites. However, despite various legislation, policies, and actions, AMS report on the persistence of pollution. Biodiversity in inland aquatic, coastal, and marine ecosystems at the receiving end are most at risk from sedimentation from unsound land use and cultivation techniques, logging, variable scale mining, runoff from built up areas and excess agricultural inputs, indiscriminate dumping of solid wastes in waterways, and overstocking in fish cage operations, among others. Decisions related to Target 7 on the conversion of peatlands to accommodate the expansion of oil palm plantations have caused the haze-producing fires affecting several AMS. There is a need for better understanding of nitrogen in the environment, impacts of pollution on the ecology and economy of the AMS, and the lag time between legislation, action, and clear results. A region-wide value change among stakeholders demonstrated through practices that target minimum waste (recycling, segregating at source, use of compostable materials, and others) should be a major focus of AMS' CEPA activities. Similar to Target 12, this issue cannot be resolved if actions only come from within ASEAN. Shared technologies from industry partners outside the region should, at the very minimum, be sustainable and wastes should not be exported to AMS for disposal.



Control of invasive alien species

By 2020, By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

AMS are aware of the existence of IAS through information from academic institutions and readily available materials made accessible by: International Union for Conservation of Nature-Invasive Species Specialist Group (IUCN-ISSG), Centre for Agriculture and Biosciences International (CABI) (global resources), and the ASEAN Clearing-House Mechanism (regional resource). Knowing the existence of such threats partly addresses the requirements of Target 9. There is, however, a need to identify the pathways of their introduction, plans to prevent their establishment, and agreed actions towards their planned eradication. Cambodia, Philippines, and Indonesia have drafted their National Invasive Species Strategy and Action Plan (NISSAP). Malaysia has operationalized its National Action Plan for Prevention, Eradication, Containment and Control of IAS since 2008. Thailand has established a list of IAS and developed national IAS control measures. A strong legal regulation system on biological import and export is in place in Viet Nam.





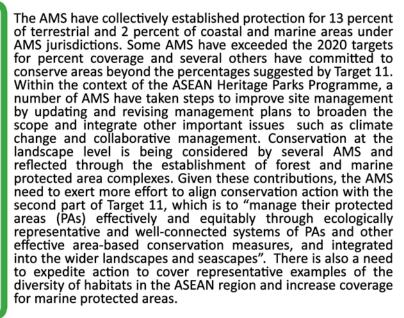
Coral reefs and other vulnerable ecosystems: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

Target 10 is interpreted to cover coastal habitat building species including coral reefs, seagrass meadows, mangrove forests, and associated marine habitats. Annual economic benefits from these resources are estimated to exceed USD 2 billion per year. There is large-scale acknowledgement of the importance of these vulnerable ecosystems and efforts for their integrated and collaborative conservation are underway. Some AMS have reported modest improvements in the condition of coral reefs and gains in mangrove reforestation. Island ecosystems are now given special consideration through policy and acknowledged in the operationalization of the Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security, to which four AMS have signed on to. However, some AMS reported declining coral reef cover and seagrass habitat health related to gaps in governance, land based sources of stress (sedimentation, unsustainable fishing practices, excess agricultural inputs), coral harvesting and exporting, and issues related to conflicts in coastal and marine area use (aquaculture, infrastructure). The 5NRs indicate that land-based sources of threats, destructive fishing practices, and increasing coastal populations, that drive the loss of coastal and marine biodiversity, have not abated. To minimize these threats and complex factors, achieving Target 10 requires making coastal communities aware of the values of vulnerable ecosystems (Target 1). Recommendations to further decrease pressures on vulnerable ecosystems include integrating costs of maintaining coastal and marine ecosystems in resource management, establishing proper incentives and penalty systems, and reducing land-based sources of pollution and sedimentation.





By 2020, at least 17 percent of terrestrial and inland water, and 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.







By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained. As host to mega-diverse countries, the ASEAN region bears the burden of heavy wildlife traffic. Some AMS have declared that despite the dismantling of some criminal organizations and the confiscation of tons of illegal cargo, trafficking remains rampant. A number of species have gone extinct. This threat is real and the relief of such pressures cannot and will not be abated if actions only come from within the region. The market demands for wildlife from other countries and regions of the world have to stop. The issue does not go unnoticed and neither are efforts in decline. A comprehensive collaborative species conservation approach to address multiple threats has to happen on a global scale that includes elimination of threats within national jurisdictions, among AMS, and other regions of the world. The approach needs to be augmented with active conservation action both *in situ* and *ex situ* and considered in the delivery of other Aichi Biodiversity Targets.





#### Genetic diversity of socio-economically and culturally valuable species:

By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

In livestock, eight percent of endemic pig, chicken, and cattle are critically endangered, five percent have gone extinct. In situ and ex situ efforts are in place to conserve native and wild varieties of crops and livestock. Several gene banks have been established for important crops and livestock species. Out of 7.4 million accessions of plant genetic resources for food and agriculture maintained globally, eight percent are safely stored in gene banks in the ASEAN region. Moreover, evaluation and characterization of these accessions are also being done. There is a need to ensure the safety of these genetic resources and regularly monitor storage facilities. Furthermore, there is a need to establish an interoperable database platform that can access all the information and data available for both plant and animal genetic resources in ASEAN. Likewise, there is a need to document and disseminate best in situ practices of farmers in the region. To date, only one AMS has joined the FAO initiative on Globally Important Agricultural Heritage Sites (GIAHS). Nine potential GIAHS in four AMS have been identified. Seven AMS are Parties to the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA).

### Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services

Ecosystem services:

By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable. Critical ecosystem services in the ASEAN region, such as access to and availability of fresh water, coastal and marine capacity to support livelihoods, and food for a growing population, are taken for granted, undervalued and fail to reflect in market prices. On water supply, the annual per capita water resources of 12,980 cubic meters in the region are close to double that of the world average. However, this resource is threatened by lack of access to safe drinking water, poor sanitation, chemical pollution, sea-level rise, and gaps in proper resource valuation in policy and practice. Some AMS have engaged in massive reforestation actions, region-wide campaigns, and management approaches deemed necessary to ensure a continuing supply in the region. The sustainable management of marine and coastal resources in ASEAN is necessary to support the livelihood of around 632 million people who are dependent on this ecosystem. Actions towards achieving related Targets (4-15) should consider maintaining ecosystem services and restoration of ecosystems. AMS may learn from pro-active approaches such as the "Healthy Parks, Healthy People" (Parks Victoria - http://parkweb.vic.gov.au/) approach that underscore the links between a healthy environment to human health.





By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 percent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification. The need to establish resiliency to climate change in the ASEAN region has been recognized and AMS have responded by developing climate-smart policies, strategic plans, and made commitments to reduce emissions, reduce vulnerability to climate change impacts, increase awareness, improve the capacity of agencies, and increase resilience of ecosystems.

Restoration efforts in the form of large scale reforestation are in the midst of implementation in at least three AMS. There is a need to focus efforts in the restoration of ecosystems with greater CO<sub>2</sub> sequestration value, such as mangrove forests, to attain a better value for effort. The need for energy in the region will continue indefinitely but dependence on fossil fuels and other non-sustainable sources of energy should no longer be considered. AMS should expedite the transition towards sustainable energy through policies that remove incentives to use fossil fuels, enable the consideration of its externalities in the market system, and favor a clean energy future for the ASEAN region.



Access and Benefit Sharing: By 2015, the Nagoya Protocol on ABS is in force and operational, consistent with national legislation. Two AMS have ratified and four have acceded to the Nagoya Protocol on access and benefit-sharing (ABS). Regional capacity building activities on the development of draft national ABS frameworks and enhancement of AMS' regulatory and institutional frameworks on ABS have been conducted. Regional cooperation on capacity building activities for AMS to develop and implement national measures on ABS will be sustained.



### Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building



Nine out of ten AMS have developed and submitted their respective NBSAPs to the Convention on Biological Diversity, two of which have submitted post-2010 versions that take the Strategic Plan for Biodiversity 2011–2020 into account. All AMS have submitted their Fifth National Reports to the CBD. Efforts on addressing overlaps between plans and programs and actions are ongoing.





By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels. The endangerment of traditional knowledge and customary use may be felt in two AMS, based on the index of linguistic diversity. The Biodiversity Indicators Partnership (BIP) has indicated the direct correlation between linguistic diversity and biodiversity and has suggested this as an indicator. The change from the use of geographically restricted languages to more cosmopolitan forms threatens the existence of traditional knowledge associated with local languages.

Two AMS have taken steps to document the occurrence, associated remedies, and uses of medicinal plants. Efforts of indigenous peoples and local communities (IPLCs) in protecting biodiversity through "holy forests and watersheds" have been duly recognized. Some IPLCs have turned community gardens into ecotourism sites such as the Penan Community of Long Iman, Malaysia. The Philippines has legally recognized the value of traditional knowledge and provides for IPLC's rights to full ownership and protection of their cultural and intellectual rights.



By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied. Half of the AMS have taken initiatives to utilize their National Clearing-House Mechanisms (CHMs) as biodiversity information repositories and the rest are in various stages of organizing their CHMs towards full functionality. The AMS collect biodiversity knowledge for a number of purposes and document these in variable formats. They are thus not available in interoperable forms that ease sharing and use for regional and global analyses. A regional CHM was developed to provide an interoperable framework and the means to share and analyze data at the regional level.

AMS should avail of regional partnerships that promote biodiversity information management, increase regional capacity, and optimize the use of national CHMs as knowledge platforms.





Resources in support of the Convention: By 2020, at the latest, the mobilization of financial resources for effectively the Convention for

implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties. Recognition of the importance of biodiversity conservation has spurred financial allocations for various activities from local to the national level, although not always in an organized fashion nor streamlined with National Plans and Programs and the Strategic Plan for Biodiversity 2011–2020.

As a positive action towards this target, Viet Nam has identified a range of options to finance biodiversity conservation that includes PES, Carbon Finance, Reducing Emissions from Deforestation and Forest Degradation (REDD+), biodiversity offsets, and contributions from the private sector. The implementation of the Biodiversity Finance Initiative (BIOFIN) has lent a structure by which support for conservation activities lined up in the NBSAPs of four AMS are identified.





### Overcoming challenges to achieving the Aichi Biodiversity Targets

The ASEAN Member States cite a number of challenges in the implementation of the Strategic Plan for Biodiversity 2011–2020 and the achievement of global biodiversity targets in the Fifth National Reports. The AMS recognized the need to strengthen the following:

- Understanding of the function and significance of biodiversity – there is still a lack of awareness and understanding among stakeholders of the values of biodiversity. CEPA campaigns must be strategically planned to generate support for biodiversity among politicians and decision-makers, students and the youth, business owners, media, local government agencies, indigenous peoples and local communities (IPLCs), and other relevant stakeholders.
- 2. Funding for biodiversity conservation programs – national and state budget allocations must be increased for biodiversity conservation. Sustainable financing mechanisms must be developed and alternative funding sources must be tapped to support conservation projects. Industries and business owners should be encouraged to invest in biodiversity and the environment.

- Research on the values and benefits of biodiversity – further studies in taxonomy and the socio-economic benefits of biodiversity will reinforce CEPA campaigns.
- 4. Human capacity and skills in biodiversity conservation – staff need to strengthen knowledge and expertise in various areas and components of biodiversity conservation and management, including ecosystems management, wildlife conservation, law enforcement, biodiversity information management, and CEPA, among others.
- 5. Monitoring and evaluation cohesive and comprehensive monitoring mechanisms and indicators should be developed to measure actual progress in conservation and sustainable development.
- Law enforcement funding is necessary to upgrade skills and knowledge, support adequate staff, and purchase necessary equipment for effective implementation of environmental laws and policies.
- Community and stakeholder involvement in biodiversity conservation and management – the support of IPLCs and other stakeholders are crucial to successful conservation interventions. Certain policies may be necessary to encourage community participation. For instance, the lack of



specific relevant policies and operational mechanisms for equitable sharing of benefits from biodiversity resources has been seen as an obstacle to the promotion of large-scale community participation in conservation activities.

- 8. Development and review of biodiversity laws and policies – some AMS need to develop specific biodiversity policies while others acknowledge that available guidelines, such as those in the areas of wildlife, forestry, agriculture, fisheries, protected areas, ecotourism and environmental regulations, have been found to be inadequate, fragmented, or poorly implemented.
- Synergy among laws relevant to biodiversity conservation – in some AMS, rights accorded in certain laws, such as mining, conflict with biodiversity conservation laws and policies.
- Review of strategic plans and actions in biodiversity and specific environmental sectors – some strategies and plans lack definite implementation timelines, particularly for critical targets, and details regarding the delegation of tasks and identification of responsible agencies.

- 11. Synergy and coordination among biodiversity conservation programs and relevant agencies there should be better coordination among conservation projects across agencies and sectors to complement efforts and ensure positive outcomes.
- 12. Mainstreaming of biodiversity across sectors - this includes application of economic instruments in biodiversity and integration of biodiversity values and ecosystems services into development planning and allocation. Ongoing resource efforts among AMS on biodiversity economic and financing initiatives would build a sound business case for increased investment in the management of ecosystems and biodiversity. In many cases, the integration of biodiversity and environment protection into development socio-economic programs has begun but has not yet been fully implemented.
- 13. Coordination with regional and international partners in biodiversity – regular cooperation with partners, such as the Secretariat of the Convention on Biological Diversity, United Nations environment and development programs, and other environment institutions, are necessary to facilitate information sharing, collaboration, and capacity building.

n its assessment of the progress of ASEAN Member States (AMS) towards the implementation of the Convention on Biological Diversity (CBD) Strategic Plan for Biodiversity 2011–2020 and achievement of the Aichi Biodiversity Targets, the second edition of the ASEAN Biodiversity Outlook (ABO 2) considers the various actions that have been undertaken in the conservation of ecosystems and species. The first part looks into the state of ecosystems, focusing on the status, challenges, and actions taken to conserve the region's forests, agrobiodiversity resources, inland waters, and coastal and marine resources.

The second part highlights issues that cut across biodiversity issues and concerns, specifically taxonomy, access and benefit-sharing, wildlife conservation, invasive alien species, climate change, cities and biodiversity, and economics and business. Responses to these concerns are significant to the sustainable use and management of biodiversity, and the success of ASEAN's collective efforts to achieve the Aichi Biodiversity Targets and ensure a sustainable future for the region.

The assessments come from the Fifth National Reports to the Convention on Biological Diversity, National Biodiversity Strategy and Action Plans, long-term development plans, and reports from conservation and development organizations, among others.

# CHAPTER 2 ASEAN Biodiversity in a Changing Environment

Photo by Chan Wai Meng

Photo by Erwin James Agumbay32 ASEAN Biodiversity Outlook 2

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### Chapter 2A State of Ecosystems

The rich and diverse ecosystems of ASEAN provide significant benefits to millions, both within and beyond the borders of the region. The threats to ASEAN's natural resources remain, and addressing them require collaboration and participation among multiple stakeholders. Limitations in information, technical skills, and funding, among others, are immense, but governments have been exploring and implementing innovations and mechanisms that have improved biodiversity conservation and management and provided good practice examples for replication in other areas. While providing a picture of the state of the region's forests, agrobiodiversity resources, inland waters, and coastal and marine resources, the section also shows the various programs and activities that are underway that aim to halt the degradation and loss of vital habitats and ecosystems.



Landscape restoration and ecological and spatial principles in reforestation and rehabilitation programs



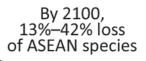
Green economy Reduced forest encroachment

Effective protected area programs

Reducing Emissions from Deforestation and Forest Degradation, The Bonn Challenge, and pledges on restoration

Ecological and green corridors





### Forest: Still an overdrawn natural resource

The forest is an important natural resource that provides life support through vital provisioning, regulating, cultural, and supporting ecosystem services. Forests provide basic human needs such as food, fresh and clean water, medicine, shelter, and fuel. Forests indirectly contribute to human health and safety by regulating climate and disease development, air and water purification, and prevention of soil erosion. Their aesthetic and cultural values provide nonmonetary benefits such as spiritual enrichment, cognitive development, and recreation. The most crucial supporting services of forests are oxygen production and soil formation for the maintenance of all the three other services (Mulan, 2014).

The forests of ASEAN are considered one of the most biologically rich and diverse in the world. The region has the highest mean proportion of country-endemic bird (9 percent) and mammal species (11 percent), and the second highest proportion of country-endemic vascular plant species (25 percent) compared to the other tropical regions of the world (Sodhi et al., 2010). Its high species diversity and endemicity makes ASEAN one of the world's critical habitats; thus, it is highly important to global environmental sustainability and stability (ACB, 2010).

Under Target 5 of the CBD Strategic Plan for Biodiversity 2011–2020, Parties, including the ASEAN Member States, are obliged to reduce or mitigate the: 1) loss of forests (and other natural resources), 2) loss of habitats, and 3) degradation and fragmentation of forest ecosystems through sustainable management

## **4**5

Forests of the ASEAN region abound with species and natural habitats that provide the ecosystem services to support humankind. The loss of this natural resource could lead to undesirable impacts to human well-being and the web of life. Target 5 recognizes the forest as one of the important natural habitats, the loss of which must be abated or mitigated through "improvements production efficiency and land use planning and enhanced mechanism for natural resource governance" (CBD, 2016).

and conservation. The progress for Target 5 is assessed on the following indicators (SCBD, 2014):

- Rate of loss of forests is at least halved and, where feasible, brought to zero.
- Loss of all habitats is at least halved and, where feasible, brought close to zero.
- Degradation and fragmentation of forest ecosystems are significantly reduced.

The first indicator (reduce forest loss) can be measured through available forest statistics. However, there are no simple statistics to show progress on the other two indicators as many biomes are measured differently. As a substitute indicator, programs or actions, which have been reported effective in reducing habitat loss and forest degradation and fragmentation, were used whenever data was available. These include forest and habitat protection in protected areas (PAs) or other effective area-based methods, reforestation and rehabilitation, forest management by local population, incentives such as Reducing Emissions from Deforestation and Forest Degradation (REDD+), and Payment for Ecosystem Services (PES), among others.

This section provides an interim perspective of the ASEAN region's progress in meeting Aichi Biodiversity Target 5. Statistics presented in this report are divided into two periods: 2000–2010 and 2011–2015. Comparisons were made to highlight changes in biodiversity conservation and management in the region in the last five years compared to previous years and identify lessons learned and areas for improvement.

The Global Forest Resource Assessment (GFRA) 2015 was used as reference for the forest statistics, augmented by data available from the ASEAN Member States' Fifth National Reports (5NRs).

### Threats to forest ecosystems

According to the 5NRs of the ASEAN Member States and GFRA 2015 statistics, the region's forest loss had been due to agricultural expansion and plantation establishment; increased use of forest resources of a growing population; pressures due to increasing timber demand; illegal logging; forest encroachment for human settlement; infrastructure development, shifting, and slash and burn cultivation; and forest fires, among others. Historical accounts of forest losses have been reported by the AMS to the CBD. Reported forest contractions were highly significant, losing as much as 30 to 45 percent of forest areas in the past four decades.

While forest areas declined, the production of plantation crops, such as oil palm (for food and bioenergy), rubber, coconut, and coffee, significantly increased. Production of these crops, particularly oil palm and rubber, were promoted through contract growing schemes with multinational corporations. Other plantations established were devoted to the production of sawlogs and pulpwood grown for timber, panel products, and pulp and paper.

The 5NRs likewise state that foreign investors were also provided access to estate lands through economic land concessions (ELCs) for conversion to agricultural crops. One AMS reported that ELCs were granted inside protected areas to boost local economy and employment in the area. In 2008, 3,126 square kilometers of degraded natural forests were reportedly converted into rubber plantation. The same AMS plans to convert 8,000 sq km more in the next five years as a strategy for reforestation while providing employment to local communities.

The aggregate production of plantation crops (e.g., oil palm, rubber, coffee, and coconut), timber and fuel products, and pulp and paper products continued to flourish from 2000–2014, registering average increases between two to five percent per year. On the average, gross

export receipts from the sale of these products were valued between USD 3.1 billion (fuel and timber products) to USD 44.44 billion (for plantation crops) per year in the same period.

Annex 1 presents details of the production and trade of plantation crops, fuel and timber, wood and wood-based products, and pulp and paper products.

As for illegally sourced timber, Cambodia, Indonesia, and Myanmar were reported as hotspots. This is attributed to their proximity to China, the region's largest timber destination and a transshipment point of raw timber where these are processed into expensive wood products before being re-exported to markets in Europe. From 2003 to 2006, about 1.3 billion cubic meters were exported to China by these countries, over 90 percent of which came from illegal logging (Suzuki, 2009).

ASEAN's current population of 632 million people is expected to grow by almost 27 percent (800 million) in 50 years (United Nations, 2015). This corresponds to a continued increase in domestic demand for wood and wood-based products for shelter, fuel, and household needs, indicating more pressure on forest areas for conversion and exploitation in the future unless improved forest management, policies, and laws are put in place and strictly implemented.





### Impacts on forest ecosystems

The loss of ASEAN's forests has resulted in fragmentation and habitat loss for important animals and plants, displacement of indigenous peoples, and more intense and frequent occurrence of flash floods, typhoons, and forest fires.

Of the total 14,591 species assessed by the International Union for Conservation of Nature (IUCN) in the ASEAN region from 1996 to 2015, about 16 percent or 2,296 plants and animals were threatened (Table 1). A comparative assessment of threat status per year is not possible as the type and number of species vary for each survey conducted by the IUCN. Of the threatened species, animals and plants comprised 39 percent and 61 percent, respectively. Table 1 further shows that six species had gone extinct (EX) and two plants became extinct in the wild (EW). Twenty-one percent are critically endangered (CR), 24 percent are endangered (EN), and over half (55 percent) are vulnerable (VU). Plants, mammals, and birds jointly accounted for 84 percent of all the plants and animals under threat in the region, as these were directly affected by deforestation. In particular, threatened plants include larger-sized trees such as teak, trees from the dipterocarp family, and evergreen montane forests, as these are valuable tree species in high demand for both commercial and illegal logging. For mammals, tigers, elephants, orangutans, and rhinoceros were directly affected by habitat fragmentation. Some fruit-eating birds (e.g., wreathed hornbill Aceros undulatus, and oriental pied hornbill Anthracoceros albirostris) were displaced from their perching and nesting habitats due to the loss of tall trees. Pollinators, which are necessary forest and agricultural production, have for also been affected. In the Philippines, island endemic species of tree hole nesters such as the writhed hornbill (Aceros leucocephalus), Palawan hornbill (Anthracoceros marchei), and Walden's hornbill (Aceros waldeni) are already

Таха	Extinct (EX)	Extinct in the Wild (EW)	Critically Endangered (CR)	Endangered (EN)	Vulnerable (VU)	Grand Total
Animals	3	-	121	279	494	897
Amphibians			9	48	99	156
Birds				67	153	266
Insects	1		7	23	56	87
Mammals	2		38	101	133	274
Reptiles			21	40	53	114
Plants	3	2	349	271	774	1,399
Cycads			7	7	13	27
Gymnosperms				1	2	3
Angiosperms			58	51	38	147
Dicotyledons	3	2	282	194	700	1,181
Conifers			2	18	21	41
Grand Total	6	2	470	550	1,268	2,296
Percent of Total	0.3	0.1	20.5	24.0	55.2	100.0

Table 1. Threatened species in ASEAN, 1996–2015

Source: IUCN Red List 2015, version 3.1, retrieved from www.iucnredlist.org on 18 May 2016.

listed as near threatened, vulnerable, and critically endangered, respectively, by the IUCN Red List in 2015.

The species-area relationship has been used in a number of studies in the region to predict the result of deforestation on species population. Using this methodology, it is predicted that 13– 42 percent of ASEAN's forest plant and animal species will be lost by 2100 owing to the loss of about 70–90 percent of habitats (Sodhi et al., 2010). Mega-diverse countries, such as Indonesia, Malaysia, and the Philippines, are the more vulnerable countries, as these had also reported the greater proportions of forest cover loss over the years.

Deforestation due to agricultural expansion has caused the displacement of indigenous peoples and local communities (IPLCs) particularly those occupying ancestral lands, which were allocated for high-demand plantation crops, particularly oil palm (Smolker et al., 2008). As access to ancestral lands are awarded to plantation establishment ventures, IPLCs are either involved as workers in the plantations or engaged in conflicts over unsanctioned conversion of their lands, and, in some cases, completely displaced and forced to leave their lands as in the case of oil palm establishments in the Philippines, Cambodia, Malaysia, and Indonesia (Colchester et al., 2011).

Road construction to facilitate the transfer of goods from sources to markets increased access to forests, rendering them vulnerable to further human encroachment by a growing rural population.

Deforestation greatly diminished the forest ecosystem's capacity to act as natural barriers to extreme weather conditions such as strong and frequent typhoons, flooding, and flash floods. In November 2013, typhoon Haiyan (known locally as Yolanda) battered the Philippines with maximum winds of 315 kilometers per hour, resulting in 6,300 casualties and property damages pegged at USD 2 billion (Philippine Commission on Audit, 2014).

### **Status of ASEAN forests**

Forest areas in the region showed a consistent decline in the last 15 years (Table 2). From 2.33 million sq km in 2000, forest areas contracted to 2.05 million sq km 10 years later, and 2.02 million sq km in 2015. In terms of percent coverage (to total area), forests occupied 51 percent of the region's land area in 2000, which decreased at 1.2 percent per year from 2000 to 2010, and 0.26 percent per year from 2011 to 2015. On the average (from 2000–2015), Indonesia's forest areas occupy 47 percent of the region's forests, followed by Myanmar at 16 percent, and Malaysia at 10 percent.

Several AMS, through forest conservation initiatives, demonstrated upward trends in forest areas. However, the region, as a whole, registered downward trends in both periods under study. There is a need to step up efforts in large jurisdictions to improve the overall performance of the region.

Country	Land Area	Forest Area (sq km)		Forest Cover (% Forest Area to Total Land Area)			Average Annual Change in Forest Cover (%)		
	(sq km)	2000	2010	2015	2000	2010	2015	2000-2010	2010-2015
Brunei Darussalam	5,765	4,130	3,800	3,800	71.6	65.9	65.9	(0.80)	-
Cambodia	181,035	111,043ª	103,638ª	94,570	61.3	57.2	52.2	(0.83)	(1.75)
Indonesia	2,010,000	1,185,450	944,320	910,100	59.0	47.0	45.3	(2.54)	(0.72)
Lao PDR	236,800	98,000 <sup>b</sup>	95,000 <sup>b</sup>	110,586 <sup>b</sup>	41.4	40.1	46.7	(0.38)	3.28
Malaysia	332,700	223,760	221,240	221,950	67.3	66.5	66.7	(0.11)	0.06
Myanmar	676,577	392,180	317,730	290,410	58.0	47.0	42.9	(1.90)	(1.72)
Philippines	300,000	65,550	68,400	80,400	21.9	22.8	26.8	0.43	3.51
Singapore	718	163.5	163.5	163.5	22.8	22.8	22.8	-	-
Thailand	513,104	140,050	162,490	163,990	27.3	31.7	32.0	1.60	0.18
Viet Nam	329,315	109,150°	133,881°	147,730	33.1	40.7	44.9	2.27	2.07
Total	4,586,015	2,329,477	2,050,662	2,023,700	50.8	44.7	44.1	(1.20)	(0.26)

Table 2. Forest area and forest cover in ASEAN, 2000, 2010, and 2015

Source of base data: Food and Agriculture Organization (FAO) Global Forest Resource Assessment (GFRA), 2015

#### Notes:

a. Based on reported forest areas of Cambodia in 2002 and 2010, Royal Kingdom of Cambodia, Fifth National Report to the CBD.

b. Based on reported forest areas in Lao PDR in 2002, 2010 and 2015, Lao PDR Fifth National Report to the CBD.

c. Based on reported forest areas in Viet Nam in 2002 and 2010, Viet Nam Fifth National Report to the CBD.



In terms of ownership, most of the region's forests are still publicly owned. However, a change to private ownership, particularly individuals, may affect how forests are sustained and managed for future use. Despite a significant area being managed by IPLCs, which contribute to the conservation of forests for future generations, it is disturbing to note that IPLCs own the least amount of forest among all categories of ownership. Further, the GEO-6 Regional Assessment for Asia and the Pacific (UNEP, 2016) reported that IPLC areas are declining. The same report identified poor tenure and rights to forest land, particularly of IPLCs, as contributing factors to deforestation and degradation.

### Initiatives to conserve and sustainably manage forests in ASEAN

Numerous initiatives to restore degraded forests and/or improve forest management are being conducted at the global, regional, and national levels. This section discusses some of these approaches.

### The Bonn Challenge and pledges on restoration

In 2011, Germany and the IUCN launched the Bonn Challenge, a global initiative targeting about 1.5 million sq km of deforested and degraded land under restoration by 2020. Endorsed by the UN Climate Summit in 2014, this target was increased to 3.5 million sq km under restoration by 2030. A new climate change agreement forged by world leaders and experts at the twenty-first Conference of Parties (COP 21) of the United Nations Framework Convention on Climate Change (UNFCCC) held in Paris in December 2015 gave a major push to the Bonn Challenge. The UNFCCC COP 21 climate change agreement elicited pledges to restore an additional 180,000 sq km of critical landscapes as part of the global target on forest restoration. The pledges, together with commitments from other world initiatives, brought together the Bonn Challenge commitment to 860,000 sq km, or 25 percent of the global target.

In response to this challenge, AMS have committed, among others, to increase forest cover and gazetted areas for conservation. Related to climate change, they also pledged to reduce emissions, indicate adaptation sections in their Nationally Determined Contributions (NDCs), reduce greenhouse gas emissions (GHGs), and use renewable energy in rural electrification programs (Carbon Brief, 2015), which could be linked with PES and REDD+ programs to facilitate and ensure funding and realization of these targets. (See Table 13 for the commitments of AMS indicated in their NDCs).

### Forest Law Enforcement, Governance, and Trade (FLEGT)

Established in 2009, the European Union's (EU) FLEGT Asia Regional Programme Facility promotes good forest governance and sustainable management of natural resources in collaboration with existing regional initiatives and partnerships in Asia. Indonesia was the first ASEAN Member State to sign up to a Voluntary Partnership Agreement (VPA) under the FLEGT Asia Programme for the export of "legally" harvested timber to EU and other markets such as China, Japan, and South Korea. Lao PDR, Malaysia, and Thailand are also implementing FLEGT in various stages.

### Forest Stewardship Council (FSC) Certification

From 2012 to 2015, the area of FSC-certified forest areas in ASEAN increased at a rate of 14 percent per year, from 21,045 sq km in 2012 to 31,059 sq km in 2015. About 68 percent of FSC-certified forest areas are located in Indonesia, followed by Malaysia at 21 percent. The remaining 11 percent of FSCcertified forest areas are located in Lao PDR, Viet Nam, Thailand, and Cambodia. The FSC system ensures that timber is sourced from sustainably managed forests. It is awarded to forest managers, community forest operators, manufacturers, financiers, and traders whose operations or forest products meet the edicts of environmentally appropriate, socially beneficial, and economically viable forest management.

### Subregional transboundary initiatives

Subregional initiatives are being undertaken in ASEAN such as the Heart of Borneo (HoB) and the Greater Mekong Subregion Biodiversity Corridors Initiative funded by the Asian Development Bank (GMS-ADB BCI). The HoB Declaration in 2007 included about 200,000 sq km of ecologically connected forests in a network of protected areas jointly managed by Indonesia, Brunei Darussalam, and Malaysia. The three countries collaboratively prepared the HoB Strategic Plan of Action (HoB SPA) in 2008, which consists of five directional programs and 21 accompanying actions (Ministry of Natural Resources and Environment, Malaysia, 2014). The directional programs include transboundary management, protected areas management, sustainable natural resource management,

ecotourism development, and capacity building.

Malaysia's commitments to the HoB program are incorporated in its Strategic Plan of Action 2014–2020. The country has accomplished the following: declaration of additional protected areas, which enhanced the connectivity between forests and protected areas in the central parts of the State of Sabah; conduct of numerous expeditions to establish baseline information on the biological resources of the PA network where new endemic species were discovered; and development of state level action plans to protect and conserve iconic mammals such as the orangutan, Bornean elephant, and Sumatran rhinoceros.

The GMS-ADB BCI, which is overseen by the GMS Working Group on Environment (composed of environment ministries of the six GMS countries with support from the ADB-administered Environment Operations Centre), aims to eradicate poverty and maintain the ecological richness of the GMS through sound environmental management across the development sectors within seven pilot biodiversity corridors (ADB GMS Environment Operations Center, 2013). In Phase 1 (2006-2012) of the initiative, various successful approaches were introduced, such as the use Strategic Environment Assessment of the valuable planning tool; linking the as a integrated conservation and development approach to conservation, which benefitted both environment and the poorest families in conservation corridors; multi-agency landscape approach over traditional sectoral approach; and increased acceptance of the corridor approach as an instrument for environment management and sustainable development. More importantly, the region has fully adopted the BCI concept as an integral part of the GMS Strategic Framework for economic cooperation and a platform for multi-country and multi-sectoral engagement to address key environmental challenges within the GMS.

### Protected areas program

Areas of forests under protection have been increasing. The AMS reported in their 5NRs that 29 percent of the total forest area in the ASEAN had been placed under protection. However, this represents only 13 percent of the region's total land area. It still falls short by 4 percent to meet the required 17 percent set for terrestrial ecosystems in Aichi Biodiversity Target 11 (Table 3). Moreover, the management of existing protected areas must be assessed to gauge their effectiveness in meeting their biodiversity targets. A recent survey conducted by the Deutsche Gesellschaft für Internationale Zusammenarbeit – Protected Area Management Enhancement (GIZ-PAME) program showed that protected areas in the Philippines rated "poor" to "fair" using the Management Effectiveness Tracking Tool (METT). This means protected areas have not been meeting their biodiversity targets (Custodio, personal communication, 20 July 2016).

At the regional level, sustainable and equitable management of protected areas are encouraged under the ASEAN Heritage Parks (AHP) Programme. To date, there are 38 AHPs, 33 of which are terrestrial protected areas covering a total area of 84,067 sq km.

### Reforestation/Afforestation/Rehabilitation

All AMS indicated the conduct of reforestation and rehabilitation programs in their 5NRs. However, only Indonesia, Malaysia, Philippines, and Thailand reported actual progress. Between 2009 and 2015, these four AMS aggregately reforested 16,859.93 sq km and rehabilitated 19,184.24 sq km of degraded forests. Under its National Greening Program, the Philippines is set to reforest another 4,851.73 sq km in the succeeding years (PIDS, 2016), which will bring the total reforested and rehabilitated forest areas of the four AMS to 40,895.90 sq km. This aggregate sum accounts for 1.52 percent of the total forest cover loss in the region since 2000.

### Sustainable Forest Management (SFM)

AMS employed various means to implement SFM:

- Malaysia remains committed to preserve at least 50 percent of its forest areas through forest protection and use of reduced impact logging (RIL) methods. As of 2012, about 210,100 sq km or 61 percent of Malaysia's total forest areas remain intact, of which 140,500 sq km have been designated as permanent forest reserve and permanent forest estates (Ministry of Natural Resources and Environment, Malaysia, 2014).
- Myanmar's Forest Certification Committee is developing certification schemes to ensure that all forest products are harvested under SFM and conform to a systematic legal step from cutting to end users (Ministry of Environmental Conservation and Forestry, Myanmar, 2014).

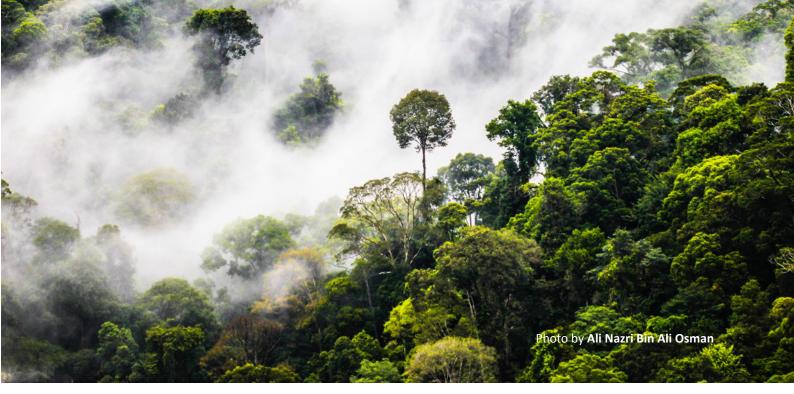
AMS	Land Area in sq kmª	Land Area Protected in sq km <sup>b</sup>	% of Land Area Protected in sq km
Brunei Darussalam	5,765	2,794	48%
Cambodia	181,035	47,503	26%
Indonesia	2,010,000	226,249	11%
Lao PDR	236,800	38,582	16%
Malaysia	332,700	63,474	19%
Myanmar	676,577	48,278	7%
Philippines	300,000	45,762	15%
Singapore	718	34	5%
Thailand	513,104	97,391	19%
Viet Nam	329,315	24,994	8%
Total	4,586,015	595,061	13%

Table 3. Total terrestria	I protected areas in AMS
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Sources:

<sup>a</sup> – Fifth National Reports of AMS

<sup>b</sup> – World Database on Protected Areas, 2015.



- Viet Nam's Strategy for Forest Development from 2006–2020 includes a comprehensive forestry development scheme based on the principles of SFM. The country targets about 162,000 sq km of land for forestry with the end view of increasing forest cover up to 42–43 percent in 2010 and 47 percent by 2020. Based on 2015 GFRA statistics, Viet Nam increased its forest cover from 33 percent in 2000 to 45 percent in 2015. It is likely to attain its 2020 target as well.
- The Philippines pioneered the Community-Based implementation of Forestry Management (CBFM) from 1971 to 1981 (Pulhin et al., 2005) where 60,000 sq km of government-led community forest programs and projects have been implemented. CBFM, however, has not attained desired results due to lack of monitoring and evaluation systems, conflict resolution mechanisms, and management plans (Mery et al., 2010).
- In Thailand, efforts to engage local people in forest management continue, with new community forestry sites and networks emerging. As of 2010, the Royal Forest Department formally recognized and 7,000 registered around community forests, all outside of protected areas, and it is actively seeking to register more (The Center for People and Forest, 2011). Recently, community forestry networks were establish at the national level and are proving to be important vehicles for sharing lessons learned and practical experiences for setting up and managing community forest sites as well as platforms for advocating legislative reforms.

### **Ways Forward**

The rate of forest loss from 2010–2015 was at a much lower pace at 0.26 percent per year compared to the 2000–2010 period at 1.2 percent. This indicates that AMS were successful in slowing the loss of forest areas. Bringing this figure to zero level would require extra effort on the part of Cambodia, Indonesia, and Myanmar. These countries reported more significant forest area losses from 2010–2015 compared to the 2000–2010 period.

AMS were less successful in reducing habitat loss and forest degradation and fragmentation. This could be indicated in reported losses of habitats of key species (e.g., orangutans, rhinoceros, elephants, tigers, and others), island tree hole nesters, and fruit-eating birds, among others. To effect change, AMS need to stop or abate factors that directly affect these indicators such as the conversion of forest for high-value plantation crops particularly oil palm and rubber, illegal logging, and forest encroachment, among others. Programs on restoration of forest habitats (rehabilitation) and reforestation need to be more focused to ensure that priority areas are indeed targeted.

It is worth mentioning that the establishment of ecological links/regions such as Malaysia's Central Forest Spine, GMS-ADB BCI, and transboundary initiatives such as the HoB of Brunei Darussalam, Malaysia, and Indonesia, could be the solutions to habitat loss and fragmentation.

Taking the above points into account, the following suggestions can be considered to move forward.

#### Box 1. Central Forest Spine (CFS) Master Plan of Malaysia

The CFS Master Plan was conceptualized in 2005 to link four major forest complexes through a network of green corridors to create one contiguous wildlife sanctuary to allow movement of wildlife and genetic resources, and for ecological functions to flourish. Covering 53,000 sq km, the four forest complexes supply 90 percent of the water requirements of Peninsular Malaysia, and serve as sanctuaries for the remaining population of Malayan tigers. Permanent reserve forests comprise 80 percent of the area, while 20 percent consists of national state parks under cultivation for oil palm, rubber, and planted forest. The challenge in these areas is to abate forest fragmentation and conserve biodiversity. In April 2011, the Federal Government of Malaysia allocated USD 53 million for the establishment of viaducts that serve as primary linkages for the green corridors. For CFS to succeed, the Malaysian government needs to address the following requirements: provide adequate framework for planning, compliance monitoring, and enforcement for integrated forest landscape management; support establishment of PES schemes and provide incentives for local communities affected by the CFS Master Plan; and strengthen political will (Ragavan, 2014).

### Establish an ASEAN Forestry Masterplan

ASEAN integration is an opportunity to unify actions on forest management and effect a holistic planning approach to address the requirements of forest sectors in each AMS while guided by regional forests management targets. The planning process should include multi-sectoral representation from forestry, agriculture, environment, economic and climate change sectors, IPLCs, and others. The ASEAN technical working groups of these sectors, including experts in ASEAN, can work together to:

- Agree on common terminologies such as forest, reforestation, degraded lands, rehabilitation, SFM, IPLCs, upland agriculture, and others.
- Consider developing regional forestry laws and policies that take into account both national and regional concerns on forest development and environmental and socioeconomic issues.
- Develop innovative forest management approaches that include the upland and lowland continuum, integrated land use and spatial concerns, ecological corridors, transboundary initiatives, and GMS-ADB BCI, among others.
- Identify regional targets that reflect the goals, objectives, and priorities of individual AMS, particularly on forest cover targets, reforestation, rehabilitation, carbon tracking, and others.
- Encourage synergy and sharing of resources whenever possible and draw more Overseas Development Assistance (ODA) funds to finance forestry-related programs.

- Identify successful forest management approaches/methods, which can be adopted by other AMS.
- Agree on common indicators for forest monitoring and evaluation, such as forest statistics on area, quality of existing degraded and primary forests, habitats restored, national Red Lists, forest conversions, fragmented forests restored, occurrence of illegal logging, and others.
- Create a simplified doable forest monitoring and evaluation system that considers the resources and capacities of AMS to implement.
- Encourage the establishment and use of an information platform for forest-related data to facilitate the sharing, use, and updating of forest statistics as a monitoring and evaluation tool.

The national forest plans of each AMS should be guided by the overall development goals and objectives set by the regional master plan.

### ASEAN Integration should foster a green economy

ASEAN Integration should help achieve economic advancement that takes into account socio-political development and equitable sharing of benefits in the use of forest resources. Strategies to be undertaken could include the following:

 Support the regional implementation of the UN-REDD Programme, which aims to reduce forest emissions and enhance carbon stocks in forests while contributing to national sustainable development. All AMS are partner countries except Brunei Darussalam, Singapore, and Thailand (UN-REDD Programme, n.d.).

#### Box 2. Ecosystems Resource Concessions (ERC) in Indonesia

Ecosystems restoration has been incorporated into the forest policies of Indonesia through the awarding of ERCs, which was initiated through the Hutan Harapan Initiative. The ERCs aim to conserve biodiversity, restore forests, generate economic livelihood, and produce economic value and ecosystem services. Indonesia's Ministry of Forestry\* (MOF) adopted ecosystems restoration in its operations. Since 2008, the MOF has approved 47 applications from the private sector and issued 13 licenses for the restoration of 5,195 square kilometers of degraded forests. The MOF also designated almost 27,000 sq km of production forest for ERCs (Ministry of Environment and Forestry, Indonesia, 2014).

\*The MOF merged with the Ministry of Environment in October 2014 to form the Ministry of Environment and Forestry (MoEF).

- Implement and integrate economic valuation and Payment for Ecosystem Services into national accounting systems to reflect the economic benefits that can be derived from carbon sequestration, water provisioning, and nutrient cycling, among others.
- Integrate the PES system into national economic indicators (e.g., gross domestic product and gross national product) to reflect the actual benefits derived from the forestry sector (not only direct sale of forest products and employment but also income and benefits derived from well-managed protected areas, water supply generated, ecotourism, and others) vis-à-vis other sectors and industries. The Payment for Forest Environmental Services (PFES) system of Viet Nam can be a valuable takeoff of this strategy.
- Develop, implement, and promote an ASEAN branding and labelling system for forest and agricultural products derived from sustainably managed forests and plantations.
- Develop a Communication, Education and Public Awareness (CEPA) program to raise

the awareness of various stakeholders (manufacturers and users of forest products) on the importance of producing consumer and industrial products that come from sustainably managed forests.

### Promote the establishment of ecological or green corridors

Initiatives, such as the Central Forest Spine of Malaysia, should be implemented wherever possible to connect and manage fragmented forest areas across boundaries.

#### Avoid cutting old-growth forests

The remaining primary forest is the region's last remaining frontier for tropical richness and should be conserved for future generations. Loss of the primary forest will cause further loss of important habitats that house diverse species in the region and the benefits of the ecosystem services they provide.

#### Reduce forest encroachment

Community forest resource development can reduce forest encroachment as it generates income and other benefits for communities on a sustainable basis. It also provides certain

#### Box 3. Payment for Ecosystem Services (PES) in Viet Nam

PES in Viet Nam is anchored on the successful implementation of a PES-based financing mechanism entitled "Payment for Forest Environmental Services (PFES) with the Da Nhim watershed in Lam Dong province as a pilot area from 2007–2010" (ADB Greater Mekong Subregion Environment Operations, 2013). Supported by appropriate baseline and valuation studies, policy makers were able to set the payment system for service providers on two key environmental services provided by intact forests: water regulation and soil conservation. Service providers (e.g., hydropower and water supply companies and ecotourism businesses) that were identified users of the water generated from a well-managed forest in the province were required to pay fees for the use of water. The money went to the Lam Dong Forest Protection and Development Fund (FPDF). The Da Nhim community was involved (through forest protection contracts) in protection activities in 2,100 sq km of forest areas where they received a certain percentage from the payments made to the FPDF. By 2010, a total of USD 5.5 million had been paid to the FPDF, which is overseen by a governing board (composed of national and provincial authorities) and monitored by independent auditors. Households involved in forest protection activities were paid about USD 460 each in 2009. This amount increased to USD 540–615 in 2010. This success story became the basis for the formulation and implementation of the PFES decree in Viet Nam (UN, 2011).



rights to develop the land. Several successful community-based forest resource projects have been implemented in ASEAN including the Forest Management and Conservation Project (FOMACOP) and Forest Conservation and Afforestation Project (FORCAP) in Lao PDR; Elcadefe CBFM Planters Association in the Philippines; and Reforestation with *Dendrocalamus barbatus* in Viet Nam (Krishnapillay et al., n.d.).

#### Landscape restoration and ecological and spatial principles in reforestation and rehabilitation programs

Forest reforestation and restoration activities should transcend traditional wood production to include ecological and ecosystems services and management of landscapes beyond the confines of forest reserves (FAO, 2016). With the participation of stakeholders with crucial roles in the management of restored forests, forest restoration must consider a full landscape that includes forests and other lands to effect multiple benefits. This holistic approach would bring together socio-economic and environmental considerations. Reforestation should also be more focused on planting native tree species to maintain local landscape heritage and nature conservation value. Further, these trees are more likely to thrive and produce more sustainable economic benefits (e.g., sources of quality hardwoods and non-timber forest products).

Rehabilitation programs should be reoriented to account for the ecological and socioeconomic soundness of policies and practices implemented. As reported in the AMS' 5NRs, rehabilitation of degraded forest ecosystems have been devoted to the development of plantations of fast-growing species for industrial purposes as well as conversion to rubber and oil palm plantations and other high value crops. Rehabilitation efforts should focus on restoring ecosystems services of degraded forest lands and involving IPLCs in biodiversity-friendly income-generating endeavors and making them rehabilitation partners.

### Revisit protected areas program implementation

It is not enough to increase forest areas under protection. It is equally important to ensure that existing protected areas contribute to biodiversity conservation. Thus, the implementation of the protected areas program in the ASEAN should be revisited and assessed in terms of its management effectiveness through the METT so that more appropriate measures can be established. Further, identification of additional protected areas should apply a more scientific method through the key biodiversity areas (KBAs) approach, which takes into consideration, among others, the vulnerability and conservation needs of endemic and threatened species in these areas.

To this end, the ASEAN Heritage Parks (AHP) Programme is being strengthened to effectively manage unique and globally significant protected areas in ASEAN region.

#### Box 4. The success of a forest cooperative in Indonesia

Motivated by the high demand for teak in the international market, 196 individuals managing 1.52 sq km of forest areas in the South Konawe District in Southeast Sulawesi formed the Koperasi Hutan Jaya Lestari (KHJL) in 2015. It became the first community forest cooperative to be awarded an FSC certificate. KHJL now has 744 members managing 7.5 sq km of forests. KHJL pursued the FSC certification to take advantage of the high demand for FSC-certified teak wood in the European and American markets, obtain accreditation to sell wood for a higher price directly to The Forest Trust (TFT) member factories in Java, and gain local government recognition for farmers' forest management abilities.

Much of the cooperative's success can be attributed to TFT and Jaringan Untuk Hutan (JAUH), which provided capacity building services and technical expertise in livelihood, community organizing and decision making, forest management, and wood processing. TFT also linked the cooperative to its member retailers seeking FSC-certified products. KHJL passed the surveillance audit, obtained re-certification in 2010, and acquired more members and area coverage. The cooperative was awarded the right to manage 46.40 sq km of state teak plantation area under the Community Plantation or Hutan Tanaman Rakyat legislation in 2008. KHJL became an inspiration to other farmer groups to obtain FSC certification for smallholder products such as cocoa, cashew nuts, and black pepper, and a source of information regarding other forms of labelling and links to markets promoting certified products.

The cooperative involves its members in obtaining FSC certification and the necessary legal permits to sell wood at more reasonable prices to international furniture markets. The members expect that there are still challenges ahead. However, they realized that frequent and transparent communication, which they lacked before the intervention of the two NGOs, is key to maintaining a fair, sustainable, and democratic relationship among members of the cooperative.

Source: Forest Stewardship Council International. (2013). Successful Forest Cooperative in Indonesia. Retrieved from https:// ic.fsc.org/preview.indonesia.a-614.pdf on 7 October 2015.

### PRESSURES

# Genetic erosion

Conversion of agricultural lands



Decline in pollination services

Invasive Alien Species



Increased production through high-yielding varieties and breeds



Agricultural area 1990: 1.07M sq km 2013: 1.31M sq km

Forest area 1990: 2.41M sq km 2013: 2.11M sq km

Urban population 1961: 42M 2013: 283M % Arable area 1990: 64 2013: 53

### Increased use of pesticides

2006: 42,773 tonnes 2013: 64,311 tonnes

# Agricultural Biodiversity:

Providing genetic diversity to enhance and sustain agricultural productivity

### **Ways Forward**

### Strengthen *ex situ* and *in situ* conservation





# Make crucial information available

- Ex situ accessions
- In situ best practices
- Status and trends of pollinators

Develop/establish ASEAN Regionally Important Agro-Ecological Heritage Systems (ARIAHS)

> Improve the ASEAN policy framework for agricultural biodiversity



### Agricultural Biodiversity: Providing genetic diversity to enhance and sustain agricultural productivity

The ASEAN region grows many of the world's most important crops such as mango, banana, and coconut, as well as a wealth of crop wild relatives (CWR) (Sajise, 2015). It has several major agro-ecosystems that include crop-based production areas for rice, corn, vegetables, oil palm, banana, and pineapple, to name a few.

ASEAN agriculture is one of the most productive in the world. Agriculture in Cambodia, Lao PDR, and Myanmar accounts for more than 25 percent of their respective GDPs (ASEAN Secretariat, 2013). In 2014, the region produced 210 million tons of rice and 41 million tons of corn that are harvested from a combined total area of 582,986 square kilometers. Seven ASEAN Member States (Indonesia, Viet Nam, Thailand, Myanmar, Philippines, Cambodia, and Lao PDR) are in the top 20 producers of rice globally (FAOSTAT, 2015).

In 2013, a total of 114 million heads of pigs were raised and slaughtered, producing 7.64 million tons of meat for consumption. Poultry farmers raised and slaughtered 6 billion broilers that produced 7 million tons of meat while 641 million layers were raised that produced 3.8 million tons of eggs. Cattle farmers produced 1.5 million tons of cattle meat from a total of 8 million heads of cattle (FAOSTAT, 2015).

In the next 50 years, the current population of 632 million people in the region is expected to reach 800 million (United Nations, 2015). With the rising number of people to feed, technological advancements in production are unavoidable. Development and production



Understanding the state of agricultural biodiversity, identifying the pressures, and suggesting ways to respond to such pressures are essential to achieving Aichi **Biodiversity Target 13**, which aims to develop and implement strategies to minimize genetic erosion and safeguard genetic diversity. Consequently, this would contribute to accomplishing other Aichi Biodiversity Targets, i.e. sustainable production and consumption (Target 4), sustainably managed agriculture (including aquaculture and forestry) (Target 7) and fully integrated and respected traditional knowledge, innovations, practices, and customary use of biological resources (Target 18).

of high-yielding crop varieties, as well as new breeds of livestock, are therefore intensified to meet the growing demands for food.

ABO 1 described the status of biodiversity as dismal and global targets have not been met. For food security and sustainable development, targets will not be met in the long term if present trends continue. Demands on natural resources have not abated worldwide and more so in ASEAN. In fact, demands are predicted to increase. Meeting these demands will only be possible if genetic diversity of crops and animals, as well as their wild relatives that provide breeders and farmers with the raw material required to sustain and improve their crops, is conserved (Sajise, 2015).

Unfortunately, crop wild relatives reside in adjacent natural ecosystems and protected areas, which are also experiencing pressures of

forest degradation and land conversion. Thus, CWRs, which are the fundamental source of genetic materials for further crop improvement programs of agriculture, are also threatened with extinction.

### Threats to agricultural biodiversity

In the ASEAN region, striking a balance between increasing production for its significantly increasing population while conserving the rich biodiversity and the ecosystem services essential to agriculture remains a big challenge. There exists an inevitable competition between demands on agriculture and pressures on biodiversity.

### **Genetic erosion**

ASEAN recognizes the importance of genetic diversity of crops and livestock to enhance agricultural productivity. The threat of genetic erosion is likewise recognized, as evidenced by the initiatives of the AMS to preserve genetic diversity of crops and livestock both *in situ* and *ex situ*. However, data are insufficient to establish trends in genetic diversity.

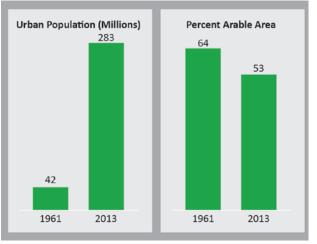
As reported in the 5NRs, the AMS identified recent introduction of new, modern, and highyielding varieties as one of the causes of genetic erosion of native crop varieties. A field survey conducted by the Myanmar Seed Bank in the eastern mountainous region of Myanmar revealed that the local crop landraces of cereals have been largely replaced with modern varieties. In Thailand, most farmers use highyielding rice varieties for cultivation rather than native rice species.

Replacement of traditional livestock breeds by exotic breeds was reported by Malaysia, Indonesia, Philippines, Thailand, and Viet Nam in the Food and Agriculture Organization's (FAO) The Second Report on the State of the World's Animal Genetic Resources for Food and Agriculture as one of the causes of genetic erosion in animal genetic resources. Highvielding imported breeds are preferred because of the poor performance of some local breeds to meet high demands and increase profitability. Data from FAO's Domestic Animal Diversity Information System (DAD-IS) show that out of the 177 endemic breeds of pig, chicken, and cattle, which are the main sources of protein needs of the ASEAN region, 8 percent are currently endangered and 5 percent have already gone extinct.

### Conversion of agricultural lands

The demand for agricultural land is in direct competition with the increasing land requirements of urban populations. As urban population increases in the region, the proportion of arable area to total agricultural area decreases (Figure 1). Viet Nam reports that, on average, approximately 0.43 percent of its agricultural land is lost annually due to urbanization and industrialization such as the conversion of agricultural lands into golf courses. In Thailand, the steady increase in urban population results in farm lands around the cities being converted to residential and industrial areas.

Figure 1. Trends in urban population and proportion of arable area, ASEAN, 1961–2013



Source: FAOSTAT. Retrieved from http://faostat3.fao.org/ home/E. on 30 September 2015.

### **Decline in pollination services**

Pollinators, such as bees, butterflies, wasps, birds, and bats, provide essential services for sustaining biodiversity and food production. It is estimated that the value of pollination services is approximately EUR 153 billion (USD 169 billion) per year (Rose et. al., 2016). A decline in pollination services would entail a reduction in production of crops that are pollinationdependent and would affect the richness and diversity of plant species that provide essential ecosystem services.

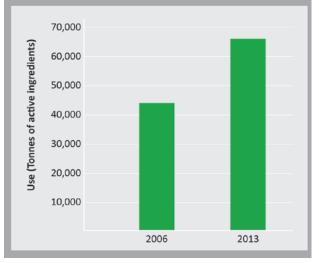
The ASEAN region is among the top producers and exporters of crops that are pollinationdependent. Examples of such crops are coconut, coffee, cocoa, mango, guava, and mangosteen. In 2013, Indonesia was the top exporter of coconuts, followed by Viet Nam, Malaysia, and Thailand, which ranked second, fourth, and fifth, respectively (FAOSTAT, 2016). As these exports contribute significantly to the ASEAN economy,



addressing threats to pollinators, which could directly or indirectly emanate from intensive production of the above-mentioned crops, is crucial. Moreover, pollinators provide livelihood opportunities, such as beekeeping, particularly to rural communities (IPBES, 2016).

The summary report for policymakers of the thematic assessment on pollinators, pollination, and food production of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) identified the threats to pollinators — land-use change, intensive agricultural management and pesticide use, environmental pollution, invasive alien species, pathogens, and climate change. Specifically, the report discussed the harmful effects of pesticides on pollinator species.

Data available from the FAO Statistics Division (FAOSTAT) show that the use of pesticides in the ASEAN region has increased by 50 percent, from 42,773 tons in 2006 to 64,311 tons in



#### Figure 2. Pesticide use in ASEAN, 2006–2013

Source: FAOSTAT. Retrieved from http://faostat3.fao.org/ home/E on 14 June 2016.

2013 (Figure 2). This could imply that pollinator species in the region are vulnerable to the harmful effects of pesticides.

#### Invasive Alien Species (IAS)

ASEAN Member States share many common characteristics such as climate, vegetation types, environment, trade, and others. With increasing trade in the region, the potential for IAS incursions has become increasingly important. Thus, countries in the region share many noxious weeds such as Mimosa pigra, Mikania micrantha and Chromolaena odorata. These shared IAS now impact a range of sectors, including crops and pasture production. Since the region shares many IAS, it makes sense to collaborate to counter and manage IAS (Witt, 2014). This collaboration is already being done in the region through the conduct of IASrelated workshops and meetings. More details are available in the section on Invasive Alien Species on page 114.

### Ways Forward

#### Ex situ and in situ conservation

Several gene banks have been established for important crop species such as rice, potato, legumes, and corn. Out of the 7.4 million accessions of plant genetic resources for food and agriculture maintained globally, 8 percent are safely stored in gene banks in the region (FAO, 2010). There is a need to ensure the safety of these genetic materials. Gene banks could also be maintained *in situ* through wildlife parks, nature reserves, and botanical gardens that widely exist in the region.

The FAO also stated that Indonesia, Malaysia, Philippines, Thailand, and Viet Nam have reported the establishment of *in situ* and *ex situ* 

conservation programs for animal genetic resources. Gene banks that store different types of animal genetic materials, including semen, embryos, oocytes, somatic cells, and isolated DNA, have already been established in Malaysia, Philippines, Thailand, and Viet Nam. These AMS, however, reported inadequate funding and infrastructure and lack of technical skills as some of the problems hindering further development of these gene banks (FAO, 2010).

Local communities in the region, particularly smallholder farmers, have long been practicing on-farm agro-ecological methods that conserve and enhance genetic diversity of crops. These practices, such as application of compost, crop rotation, and integrated pest management, should be promoted and supported by proper incentives; thereby, enhancing *in situ* conservation of biodiversity at the genetic, species, and landscape levels.

#### Development and establishment of ASEAN Regionally Important Agro-Ecological Heritage Systems (ARIAHS)

Efforts to conserve ASEAN's abundant agricultural biodiversity resources and diverse ecosystems should also consider traditional and indigenous cultures that are still being practiced in agricultural systems. Even with the increasing demands for intensification and higher production in agriculture, it is important to understand that there are still agricultural systems utilizing the wisdom of indigenous knowledge.

The development and establishment of ARIAHS are being proposed to address the growing recognition and need to conserve and protect agricultural heritage systems distinct to ASEAN countries. As a regional program, ARIAHS are envisioned to provide a platform to recognize agricultural heritage systems that are proven to be sustainable despite increasing modernization of agricultural production. Although still in the conceptual stage, ARIAHS will be closely linked and integrated with the ASEAN Heritage Parks (AHP) Programme. The criteria for ARIAHS will be patterned after the FAO criteria for the Globally Important Agricultural Heritage Sites (GIAHS), modified for the region, and will incorporate the AHP criteria. Characterizing and providing habitats for crop wild relatives and under-utilized species is proposed to be set as one of the major criteria.

Box 5. The Rice Roots Legacy: Building local capacity and enlisting communities in plant genetic resources conservation in critical eco-regions in the Philippines

Lorna E. Sister, Hidelisa D. de Chavez, Nestor C. Altoveros, and Teresita H. Borromeo

Integrating the Conservation of Plant Genetic Resources for Food and Agriculture into Decentralized Landscape Management for Food Security and Biodiversity Conservation in Critical Eco-regions of the Philippines or "The Rice Roots Legacy" aimed to integrate the conservation of plant genetic diversity with landscape-level planning and decentralized government programming. The project integrated biodiversity conservation in agricultural production systems and initiated *in situ* conservation strategies to mitigate biodiversity loss in target crops. The project was implemented by the University of the Philippines Los Baños, Department of Agriculture-Bureau of Agricultural Research, and local partners in the provinces of Quirino, Antique, Iloilo, and Davao Oriental.

The project focused on targeting, designing conservation interventions, and assessing and supporting potentials for mainstreaming conservation. The farmers maintained traditional varieties of rice (134), sweet potato (74), taro (65), and yam (37), driven by food security and survival, in areas characterized by very limited livelihood options and very high transaction costs to access basic needs. There was widespread interest in maintaining traditional varieties, but improvements in these livelihood options and inadequate conservation knowledge and practices threatened the long-term conservation of these genetic resources.

In conservation field schools, farmers learned new technical knowledge that can be combined with local conservation knowledge to keep seeds for a much longer period than the next year's cropping season. The communities planned gene banks with traditional rice varieties. The modalities that emerged had distinct management styles and sustainability plans laid by the communities with local governments that integrated new knowledge with their unique agro-climatic, biophysical, and socio-political environments. The key to sustainable management of agrobiodiversity may lie in customizing approaches and building local capacities, rather than in mass reproductions of conservation approaches. Conservation of plant genetic resources for food and agriculture must ensure the resilience of livelihoods of those in the margins of society, in addition to ensuring competitiveness in more favorable areas.

#### Box 6. Custodian farming in ASEAN: Cultivating diversity of mangoes in Thailand

Custodian farmers maintain diverse crop species and varieties, which are selected based on adaptability to local conditions and preferences. With or without direct monetary incentive, custodian farmers promote the use and conservation of such species and varieties among friends and neighbors and are acknowledged locally for these efforts. Mr. Suradech Tapuan is a well-recognized grafter and custodian farmer of mango varieties in Chiang Mai, Thailand. He realized that in cultivating fruit trees, corn, and upland and lowland rice, raising mixed crops increases the number of pollinators; decreases the infestation of pests, diseases, and weeds; and increases the population of large earthworms that increase soil fertility. Neighboring farms practicing monocropping were often attacked by pests.

Mr. Tapuan mastered the art of the side grafting technique using scions from wild varieties of mangoes, which increases the survival rate of mango trees grown in poor soil condition or are rain fed. He maintains 28 varieties of mangoes, four of which are wild mango species. Most of the grafts he shares are varieties that he discovered and cannot be found in commercial nurseries. They have strong roots and are fungus resistant. Mr. Tapuan continues to collect and maintain wild varieties not just from Chiang Mai but from other regions of Thailand to ensure the survival of these species.

Source: Bhuwon Sthapit, Hugo Lamers and Ramanatha Rao. (2013). Custodian farmers of agricultural biodiversity: selected profiles from South and South East Asia. Proceedings of the workshop on custodian farmers of agricultural biodiversity, 11-12 February 2013, New Delhi, India. Retrieved from http://www.bioversityinternational.org/uploads/tx\_news/Custodian\_farmers\_of\_agricultural\_biodiversity\_\_selected\_profiles\_from\_South\_and\_South\_East\_Asia\_1631.pdf on 18 September 2015.

ARIAHS endeavor to promote organic farming and other agro-ecological farming practices including but not limited to:

- 1. Landscape approach where elements such as hedges or agroforestry that could provide additional resources for farmers and habitat for essential pollinators are taken into account.
- 2. Crop rotation and growing diverse crops. Pests that thrive only on certain crops could be eliminated in rotations without the host crops. This would lessen the need for chemical pesticides. A crop rotation with integrated weed control could reduce the use of chemical herbicides. Furthermore, soil fertility could be enhanced by including nitrogen-producing leguminous crops in the rotations; thus, reducing reliance on synthetic fertilizers.
- 3. Crops and livestock integration could help reduce soil erosion, increase soil fertility, and provide habitats for pollinators and other beneficial species.

#### Making crucial information available

#### Ex situ accessions

Access to and monitoring of genetic resources in gene banks are essential for conservation planning and decision making. For instance, improvement of plant varieties with new traits, such as drought resistance or tolerance, can only be done if detailed information about the present characteristics of such varieties is made accessible. Currently, information on collections and accessions of plant genetic resources for food and agriculture in the ASEAN region are available in the National Information Sharing Mechanism (NISM) established in eight out of 10 AMS. The NISM is designed to support the implementation of the Global Plan of Action (GPA) for the conservation and sustainable use of plant genetic resources for food and agriculture (Sajise, 2015). As for animal genetic resources, FAO holds global information on livestock and poultry diversity through its Domestic Animal Diversity Information System.

There is a need to establish an interoperable database platform that can hold all the information and data available for both plant and animal genetic resources in the ASEAN region. This will ensure that *ex situ* accessions in the region are properly documented and made accessible.

#### In situ conservation best practices

There is a need to document and disseminate *in situ* best practices to encourage more smallholder farmers to switch to agro-ecological practices of farming.

#### Pollinators

According to the IPBES report, the status and trends of pollinators in ASEAN could not be established due to the lack of data although



there have been reports of decline locally. Creating a regional picture and monitoring the status and trends of pollinator species in the region would therefore necessitate the sharing of available data and information from the AMS and making it available in a common platform, i.e., the ASEAN Clearing-House Mechanism.

### Improving the ASEAN policy framework for agricultural biodiversity

All recommendations should be supported by strong regional policies that will balance the demands on agriculture and pressures on agrobiodiversity. The following should also be taken into account:

- 1. Provide financial incentives and capacitybuilding activities for farmers to adopt agroecological farming practices. The benefits of these practices must be properly communicated to the farmers through farmers' field schools, farmers exchange programs, and other extension activities.
- 2. Champion the best practices of "custodian farmers" by recognizing their roles, responsibilities, and rights, and supporting their very own systems of product development and marketing.
- 3. Support the establishment of ARIAHS.

### **Box 7.** Role of women in the conservation of traditional fruit trees in Thailand

*Garcinia cowa* Roxb., locally known as Cha Muang, is a tropical fruit tree that grows in the forests of Thailand. Generally grown from seed, no other type or variety is known for this species. It regularly produces young leaves, which are utilized as a food ingredient, and its bark and latex as medicine. Farmers in Chantaburi have been growing this tree in home gardens and orchards but only in limited numbers.

Farmers planting this tree increased after the Klong Narai women's group of Chantaburi province decided to market their very own special recipe of Moo Cha Muang, a spicy pork curry seasoned with broiled shallots, galangal rhizomes, dried chillies, and crushed leaves of G. cowa. They initially sold Moo Cha Muang in plastic packs in community markets. Eventually, the group managed to obtain food quality certification from Thailand's Food and Drug Administration and produced canned versions of Moo Cha Muang for local and external sale. The success of this venture resulted in an increased awareness of the value of G. cowa trees as more farmers planted G. cowa in their home gardens and orchards, intercropped mostly with durian and mangosteen. Other women's groups in the neighboring area were also encouraged to produce Moo Cha Muang.

Source: Somsri S., C. Noppornphan and M. Yoovatana (eds.) (2015). Good Practices for Diversity, Thailand. 68 pp. Retrieved from http://doa.go.th/hort/download/GPDThailand.pdf in June 2016.

### **Inland Waters: ASEAN's most threatened habitats**



### Threats to ASEAN's lakes, rivers, and peatlands



Source: AMS' Fifth National Reports to the CBD





Agriculture aquaculture



Destructive fishing and harvesting of resources





**Ways Forward** 

Establish a regional agenda that aligns social and political interests with responsible governance of inland waters.

Increase interest at all levels of governance in massive reforestation to reduce erosion and impacts from flooding and landslides.





Assess the importance and total economic value of inland waters and their benefits to the economy and the communities directly dependent on these areas for their livelihood.

Strengthen policies and laws on the management and sustainable use of inland waters and their resources.





Implement information dissemination program for policy makers and the general public on the values of inland waters in coordination with ASEAN Member States.

approach to management.



Employ an ecosystem-based



**ASEAN's Response** 

### **AMS** with policies on wetland conservation

 Indonesia Malaysia Philippines Thailand Viet Nam

25%



of the remaining tropical peat swamp forests in ASEAN are in designated protected areas.

Source: Biodiversity and Conservation of **Tropical Peat Swamp Forests** 



out of 10 AMS are parties to the Ramsar **Convention on** Wetlands designating a total area of 18,007 sq km of inland wetlands.



Source: Ramsar Convention on Wetlands

### Inland Waters: ASEAN's most threatened habitats

Inland waters support several components of aquatic biodiversity including reptiles, amphibians, fish, molluscs, worms, insects, other aquatic invertebrates, and water plants (Table 4).

### Table 4. Estimated number of inland water associated taxa in ASEAN (IUCN, 2015)

Inland Water Associated Taxa	Estimated Number
Insects	628
Mollusks	433
Fish	1,406
Amphibians	566
Birds	555
Reptiles	100
Mammals	26
Plants	505

Lakes, rivers, streams, ponds, freshwater swamps, marshes, peat swamp forests, and other aquatic ecosystems in the ASEAN region occupy close to 2 million square kilometers. The added dimension of water enables food to be available in the interstices of the sediment as epiphytes that attach to fronds of water plants and as suspended material along the depth of the water column. The diversity in species to habitat interactions provides countless niche Acti cons in t relev Biod redu loss and harv (Tar pollu effe man part biod serv resto

Actions directed at the conservation of inland waters in the ASEAN region are relevant to achieving Aichi Biodiversity Targets on: reducing the rate of habitat loss (Target 5), sustainable and legal management and harvesting of fishery resources (Target 6), reduction of pollution levels (Target 8), effective and equitable management of areas of particular importance for biodiversity and ecosystem services (Target 11) and the restoration and safeguarding of ecosystems and the services that they provide (Target 14).

possibilities; thus, inland waters are compared to coral reefs and forest ecosystems as one of the most diverse and productive natural habitats.

Water availability is influenced by seasonal changes in the tropics. It also plays particular roles in the life cycles of inland water species. The ASEAN region has abundant freshwater resources, receiving 9.5 percent of the total global precipitation volume every year, and is endowed with 16.2 percent of the world's total renewable water resources. The average annual per capita water resource available in the region is 12,980 cubic meters, and this is almost double the world average.

Inland waters provide the source and means to irrigate agricultural areas in ASEAN. The agricultural sector is the major freshwater consumer, sharing 85.5 percent of the total water withdrawals, followed by the industrial sector (7.8 percent) and domestic sector (6.6 percent) (UNEP, 2009). The well-being of ecosystems and humans strongly depends on

#### Table 5. Functions and services provided by inland waters

Provisioning Services	Regulating Services	Supporting Services	Cultural Services
Food Fisheries and aquaculture Human habitat Timber and non-timber products Medicines and herbs Gene pool Biodiversity values Pharmaceutical values	Carbon storage Micro-climate function Adaptation to climate change Agriculture pest control	Nutrient cycling Run-off regulation Greenhouse gas regulation	Transportation Recreation Watershed Tourism

Source: Forestry Department. (2014). The 5th National Report to the Convention on Biological Diversity. Ministry of Industry and Primary Resources. Bandar Seri Begawan, Brunei Darussalam.

the vital ecosystem services that these provide (Table 5). However, their ecosystem functions are often undervalued, consequently placing the rich biodiversity resources found in these areas at imminent risk.

Despite significant progress in land transportation, inland waters also remain one of the principal means of transporting and exchanging commodities among major towns and cities. Valuable regulatory functions of inland waters are greenhouse gas (GHG) regulation, run-off regulation, and nutrient cycling. In the Philippines, where energy in the form of fossil fuels is costly, inland waters are vital to energy security.

There is a particularly unique relationship between birds and inland waters. Migratory species use wetlands as staging or feeding sites along the path of their flyway journeys. The ASEAN region is positioned midway of the East Asian-Australasian Flyway (EAAF), one of nine global flyways where birds travel from the northernmost regions of Russia and North America to winter in countries as far south as Australia and New Zealand. The distance of about 11,000 kilometers from Alaska to New Zealand necessitates stopovers where adequate food, protection from predators, and areas to rest are available.

Inland waters also include peatlands and peat swamp forests, which cover 250,000 sq km in ASEAN, accounting for overhalf of the world's peat forests (D'Cruz, 2014). Majority (approximately 80 percent or 210,000 sq km) of these are distributed among Sumatra, Borneo, and Irian Jaya (Silvius, 1989; Rieley et al., 1996; Ministry of Environment and Forestry, 2014) and to a lesser extent in Brunei Darussalam, Philippines, Thailand, and Viet Nam. Peat swamp forests feature unique and diverse species of up to 927 flowering plants and ferns in Borneo (Anderson, 1963). In addition to supporting unique plant and animal diversity, peatlands contribute to climate regulation, provide significant timber and nontimber products, and possess a unique carbon sequestration function.

#### Box 8. The East Asian-Australasian Flyway, an important flyway for migratory birds in ASEAN

The East Asian-Australasian Flyway extends from Arctic Russia and North America to the southern limits of Australia and New Zealand. It encompasses large parts of East Asia, all of ASEAN, and includes eastern India and the Andaman and Nicobar Islands. The scale of avian movement along the flyway is tremendous, with over 50 million migratory waterbirds, including 8 million waders, using the route annually. Flyway population estimates for migratory waders include 2.88 million oriental pratincole (*Glareola maldivarum*) and up to one million marsh sandpiper (*Tringa stagnatilis*). Many waders travel all the way from high arctic breeding grounds to spend the northern winter in the temperate latitudes of the southern hemisphere. For the bar-tailed godwit (*Limosa lapponica*), this can entail an 11,000-kilometer non-stop flight from Alaska to New Zealand. Some species, such as the rednecked stint (*Calidris ruficollis*) and spotted greenshank (*Tringa quttifer*) (EN), also cross Bangladesh to spend the winter in eastern India.

Source: East Asian-Australasian Flyway Partnership Factsheet. Retrieved from http://www.birdlife.org in November 2015.



Addressing issues related to inland water ecosystems contributes towards achieving Aichi Biodiversity Targets 4 through 14, including concerns related to species and habitat conservation, pollution, invasive alien species (IAS), sustainable production, and the conservation of essential ecosystem services.

#### Threats to inland waters

The complexity of inland water habitats and their enclosed or semi-enclosed character renders them vulnerable to a range of threats. The transformation and decline of inland waters and other wetlands of ecological importance in the region have largely been attributed to the ever increasing food requirement of a growing ASEAN population, which is directly related to water requirements for agricultural, industrial, and domestic uses. This also entails more demand for areas to locate industry, business and tourism, land-based inputs (sediments, chemicals, sewage, and wastewater), and agriculture and livestock wastes. Dams and water management directed for intensive agriculture, though beneficial to the region's growing economy, pose a threat to the conservation of species in this ecosystem.

ABO 1 emphasized that inland water bodies in the region are the most threatened habitats on Earth. It has also been pointed out by reports from Hassan et al. (2005) that freshwater habitats and the diversity of the species they support are at greater risk compared to their terrestrial counterparts.

Rising temperatures and sea level brought about by climate change will most likely inundate lowlying lands. Cambodia anticipates that a rise in sea-level will affect the hydrology, freshwater fisheries, and agriculture of the Mekong and Tonle Sap (National Biodiversity Steering Committee, 2014). Rising sea levels will disrupt biodiversity, freshwater fisheries, and farming, The construction of hydropower projects and destructive human activities near freshwater ecosystems will complicate the situation and cause impacts on downstream ecosystems. Mangrove communities are particularly affected by sea-level rise (SLR), rainfall patterns, and runoff that change the flow of freshwater to the coastal zone and, consequently, the distribution of proper saline habitats for mangroves. Sealevel rise also contributes to saline-water intrusion into freshwater resources. Changes in runoff and freshwater flow patterns will put pressure on water management cost, and possibly add water stress to poor rural areas of the riparian states.

Inappropriate management through draining, vegetation clearance, and road construction, among others, has led to the degradation of inland waters and associated habitats, including peatlands. One of the most devastating effects of such mismanagement has been transboundary haze pollution and the large-scale emission of greenhouse gases resulting from extensive land and forest fires. Efforts have been made to overcome this issue. Indonesia has developed strong policies through presidential directives in 2017 to reduce the incidence of fire, implement land management measures, and strengthen law enforcement. In September 2014, Singapore

passed the Transboundary Haze Pollution Act to hold errant companies accountable for their irresponsible actions.

Inland water bodies are gravely at risk from modifications in water quality, depth, clarity, and ability to support native flora and fauna. The parameters of threat used to determine the degree of stress include the Human Footprint (HF), Urban Land Cover (ULC), Irrigation, Large Cities (LC), Converted Lands (CL), and Surface Water Abstraction (SWA). Results of a study of the Freshwater Ecoregions of the World (FEOW) using these parameters were discussed extensively in ABO 1, where the Philippines was identified as the country with freshwater resources under the gravest threat from population pressure and infrastructure development in the ASEAN region.

The growth in the demand for basic needs has caused tremendous pressure to allocate more land for agriculture use. Dams and reservoirs, initially intended as a method of water management, were later reported to cause the fragmentation of riverine ecosystems in Viet Nam and Lao PDR, affecting connections between rivers and the sea. A study on the threats from dams in Thailand (Jutagate et al., 2016) indicates impacts on freshwater fish migration, resulting in major changes in fish community structures.

In the Philippines, dams have changed the habitats of riverine flora and fauna and migratory fish species, allowing invasive alien species to displace indigenous species. The introduction of tilapia/mujair fish (*Oreochromis mossambicus*) in Indonesia exterminated the duck-beak fish (*Adrianichthys kruyti*) and sarasins minnow (*Xenopoecilus sarasinorum*) in Lake Poso.

Some lakes in Indonesia have been taken over by invasive water plants such as Eceng Gondok (*Eichhornia crassipes*).

Floodplains have been lost because of dam construction, agricultural practices that neglect responsible waste management, urban development, and river dredging. Geomorphological modifications are also alarming because the sustainability of habitats and species depends on floodplains. Affected species include migratory birds such as the critically endangered spoon-billed sandpiper (Eurynorhynchus pygmeus). The Biodiversity and Nature Conservation Association (BANCA) has monitored the species in the Gulf of Mottama since 2008 and reported that the Southern Myanmar and Nan Thar Island in Rakhine State, both along the 8,000-km EAAF, are critical wintering grounds for the species. Increased human activities and disturbance of these habitats can decrease the impacts of conservation efforts in the region.

A study done to understand the trade-offs among fish biodiversity, food security, and hydropower in the Mekong River Basin identified 484 fish species in this region (Ziv et. al., 2012). The study also found out that up to 103 of the fish species that migrate to the riparian states can potentially be impacted by hydrological power development. Two-thirds of about 6 million residents along the Mekong River Basin rely on sustainable fisheries for their food source. Sustainable fisheries and food security are major concerns in Cambodia and Viet Nam as both countries catch over 1 million tons of freshwater fish from the Mekong.

Inland waters are also threatened by pollution from destructive human activities such as



#### Box 9. The Mekong River Basin

The Mekong River provides habitats for 1,500 fish species with biodiversity richness next only to the Amazon (AMRC, 2008). In 2010, approximately 2.6 million tons of fish were harvested in the Lower Mekong Basin, which comprise up to 22 percent of the world's freshwater fish capture. It is a lifeline to significant populations of Myanmar, Lao PDR, Thailand, Cambodia, and Viet Nam, particularly in the agriculture, fishery, transport, tourism, and energy sectors.

The Mekong River is managed by the Mekong River Commission (MRC), which aims to conserve the Mekong River to ensure sustainability, and provide mutual and equitable benefits to member countries. Challenges faced by MRC include managing the cumulative impacts of hydropower development, irrigation, navigation, and drought. The dambuilding program of China, which is a dialogue partner but not a member of the MRC, will alter water flow and undermine future cooperative river basin management. Thus, it is important to have an initiative that will bring the missing co-riparian states into the Mekong River Basin planning process. Other challenges include:

- Energy security Peak demand for energy in the Greater Mekong Subregion (GMS) is expected to increase by 175 percent by 2025 compared to 2010, along with a significant increase in hydropower development. In Cambodia, 22 planned hydropower stations pose potential threats of flooding in large forest areas in the region. An increase in biofuel production threatens agricultural land, forest areas, food security, and ecosystem services. An expansion of coal-powered plants will increase atmospheric emissions of carbon dioxide and particulates.
- 2. Climate change Low-lying coastal areas with high concentrations of infrastructure and populations are vulnerable to sea-level rise. Agriculture, energy, and tourism sectors all depend on water supply from the Mekong River. The predicted cost of climate change can be as high as 6.7 percent of the Gross Domestic Product (GDP) per year in Thailand and Viet Nam, which is higher than the global average due to the large rural and agrarian population in the GMS.
- 3. Fisheries and food security Food demand in the GMS is projected to rise by 25 percent in 2050. Food security is aggravated by deteriorating sanitary and phyto-sanitary conditions. Dam development may change river flow patterns that can alter nutrient cycling in the food chain and reduce fish biodiversity and productivity.
- 4. Water supply/resources Increased infrastructure development; worsening cases of domestic, industrial, and agricultural pollution; limited wastewater treatment facilities; and inefficient handling of hazardous wastes have profound effects on water quality, food safety, and human health. About 66 million people living along the Mekong River will increase pressures on water resources and the extensive aquatic resources in the region.

Sources:

Fast Facts Environmental Challenges of Greater Mekong Subregion, retrieved from http://www.adb.org in October 2015.

1995 Mekong Agreement and Procedures–Mekong River Commission, retrieved from http://www.mrcmekong. org in February 2016. inappropriate land use practices, irresponsible mining practices, deforestation, improper waste disposal, and growth in urban development and populations. The Philippines' 5NR indicated that pollution from Biological Oxygen Demand (BOD) nutrients and other inputs mostly came from the domestic, industrial, commercial, and agricultural sectors, and sedimentation. The same report stressed that water quality in lakes and soil quality in watersheds have been steadily declining, resulting in more frequent flooding and disasters in more than 20 lakeside municipalities since 2009, which are further exacerbated by climate variability.

Factory and domestic wastewater discharged directly into Ciliwung River in Indonesia led to the decline in fish and crustacean diversity (Wowor et al., 2010) and further research indicated high extinction rates for both taxa. The same concern arose in Myanmar, when polluting industries such as small-scale gold mining in the headwaters of many rivers adversely affected aquatic diversity and human health. Myanmar's 5NR indicated that reduced water quality resulted in chronic negative impacts to the livelihoods of rural communities. Hardest hit are the landless, poor, rural, and disadvantaged people who rely on natural resources for subsistence.

Indonesia's 5NR indicated threats that biodiversity and ecosystems include to deficiencies in governance and management systems, allocation of human and financial resources, and policy and political support. Impacts on inland waters are exacerbated by gaps in the understanding of the interactions of the inland water environment in conjunction with other ecosystems and with factors that are anthropogenically influenced.

Similarly, the complexity of peatlands and their seeming unimportance have placed them at the background in the flurry of biodiversity conservation activities. Peatlands support an immense population of wildlife and specialized species and communities. The heterogeneous character of peatlands and their distribution over a large geographic area in the region have allowed their continuous utilization in agriculture. Upscaled consumption patterns and industrial demands have stimulated the clearing and draining of peatlands in favor of cash crops such as oil palm, timber, and plantation forests. Losses in peatlands, considered a primary concern, affect ecosystem services such as hydrological regulation and carbon sequestration that will increase the risk of fire. Brunei's Darussalam's 5NR cited peat fires as a major threat to biodiversity.



#### **ASEAN Response**

An issue-based strategic approach is one way to organize conservation efforts specially targeted for possibly the most threatened habitat in the region. Threats can likewise exist as gaps in a common understanding of ecosystem function, values, and the lack of collaboration among stakeholders. Brunei Darussalam and Malaysia, through Brunei Shell Petroleum and Wetlands International Malaysia, are collaborating to restore biodiversity in disturbed areas of the Belait peat swamp, including the Badas peat dome, and promote a better understanding of its ecological role and functions to prevent fire incidents. Brunei Darussalam does not allow timber harvesting and related use of forest resources inside the country's peat swamp forests.

Cambodia's Tonle Sap Lake, Tonle Sap River, and the Mekong River, with their reverse directional flow, provide a unique natural resource for tourism development. Prek Toal, one of the core zones of the Tonle Sap Biosphere Reserve, is recognized as ASEAN's premier habitat for large water birds. Floating villages moving with the tide illustrate the lifestyles of the people around the lake. In November 2013, Cambodia adopted the Cambodia Climate Change Strategic Plan (CCCSP) 2014–2023, which is a collaborative and strategic approach focused on averting climate-related issues in agriculture and proactively takes on climate adaptation, GHG mitigation, and low-carbon development. The country's Tonle Sap Environmental Management Project/Sustainable Livelihoods Project and the

Economic and Social Relaunch of Northern Provinces (ECOSORN) embody a sustainable and integrated management approach for the Tonle Sap.

In Indonesia, a review conducted by the Ministry of National Development Planning (BAPPENAS) in 2013 recommended the mainstreaming of biodiversity at all levels of governance, improving human and financial resources to strengthen documentation and management of biodiversity, and enhancing benefits from their sustainable use and management. Indonesia is upscaling conservation practices and governance of peatlands by updating policies including the development of an Indonesian invasive species strategy and action plan. Other comprehensive approaches aim to reduce GHG emissions through increased private and public sector compliance.

Myanmar has taken a ridge-to-reef approach by establishing forest plantations to conserve watersheds above dams, reservoirs, and rivers in central Myanmar, which contribute to the conservation of its many lakes.

Prominent champions of inland waters conservation in the region are the Ramsar Convention and the East Asian-Australasian Flyway Partnership (EAAFP). As of 2015, 48 Ramsar sites have been established within the AMS covering 22,801 sq km. Thailand, Viet Nam, and Indonesia have the most number of Ramsar sites in the region. In terms of coverage, Indonesia has the largest area (13,730 sq km), followed by Thailand (3,997 sq km), and the Philippines (1,544 sq km). Malaysia continues to designate wetlands of international significance, including the Kinabatangan Wetland Reserve in 2008, which has been under constant pressure from agricultural plantation expansion.

Sungei Buloh Wetland Reserve in Singapore, the 73<sup>rd</sup> site to be recognized by the EAAFP, has become a safe haven for migratory birds during the northern winter and provides habitats for mangroves and other species.

As a mitigation measure to the growing concern on the effect of dams and other infrastructures on migratory freshwater fish, the Royal Thai government directed that all sluice gates or major openings of the Pak Mun Dam be opened from mid-June to mid-October. This period coincides with the reversed flow from the Mekong River. rendering the hydropower generation unusable. Results of this measure have been tested and provided tremendous benefits to fish species that move within the main river channel and up and down tributaries. Appropriate mitigation measures are needed to balance infrastructure development and the integrity of the component ecosystem. Biological traits of the freshwater species in the region need to be studied further to determine other effects caused by the introduction of species.

The ASEAN Peatland Management Strategy (APMS) was endorsed during the Tenth Meeting of the ASEAN Ministers on Environment in 2006 in response to the growing need to conserve peat swamp forests. This regional strategy provides a framework for stakeholders in the sustainable management, wise use, fire prevention, and rehabilitation of peatlands. The four general objectives of the strategy are to enhance awareness and capacity building, address transboundary haze pollution and environmental degradation, promote sustainable management of peatlands, and promote regional cooperation. The AMS are currently undertaking assessments of and/or developing national action plans for their respective peatland resources. Indonesia, Malaysia, the Philippines, and Thailand have identified peatlands in some of their respective Ramsar sites.

#### **Ways Forward**

The inland water ecosystems of ASEAN are the initial frontiers for conversion for development expansion and thus, face more challenges and threats compared to other ecosystems. Hence, there is an increasing need for an integrated management of these ecosystems.

Consistent with achieving Aichi Biodiversity Targets 1, 2, and 15, there is a need for: 1) a long-term commitment from the AMS to educate respective constituencies to internalize the values, functions, and role of inland waters; and 2) operationalize such commitment by mobilizing citizens to collectively conserve and restore all forms of inland waters in the region. This is quite difficult and complicated to implement but nonetheless, these actions are urgent and necessary.

#### Box 10. Challenges to Tonle Sap Lake

Tonle Sap, also known as the "Grand Lake" in Cambodia, is the largest lake in ASEAN. It is one of the most important areas in the Mekong River Basin and contributes to livelihood in the area. It functions as a natural reservoir that helps lessen the magnitude of flooding downstream of the lake. It supports Cambodia's inland fishery industry as it is one of the world's most productive freshwater ecosystems. It is a spawning area and habitat for migratory fish species, including the giant catfish.

Major concerns in Tonle Sap Lake include:

- 1. Energy security 92 percent of Cambodia's households use wood for cooking fuel. With the consumption rate higher than the rate of renewal, there is a call to develop alternative energy sources and increase conservation and efficient use of wood.
- Fisheries/food security Inland fisheries play a major role in Cambodia's food security by providing more than 80 percent of the protein intake of the population. Other challenges include illegal fishing, mangrove forest destruction, overexploitation of fish stocks and wildlife resources, dry-season encroachment, and land clearance.
- 3. Water supply/resources Effective and efficient use of water resources in the region has become a growing concern because of its importance to agriculture, fisheries, environment, transportation, and energy sectors. Intensified water use due to infrastructure developments and population growth threatens sustainable use of water resources.

Source: Tonle Sap-Experiences and Lessons Learned Brief, retrieved from http://www.worldlakes.org in November 2015.



There is a need to have a clear understanding of the roles, functions, and ecosystem values associated with inland waters in ASEAN. In the Convention on Biological Diversity Conference of Parties (CBD COP) decision IV/4, it was stated that "inland waters provide both a challenge and an opportunity to educate the public and policy makers about the need to take an ecosystembased approach to management," emphasizing the links between inland waters and related ecosystems such as forests, and the need to consider these links in developing management practices as well as policies.

There is a need to have a more heightened commitment at the national level to establish a regional agenda that supports the alignment of social and political interests with responsible conservation governance of inland waters. Such alignments should consider a collaborative approach to managing land-based sources of threats including adequately sanctioning violations, acknowledging pollution and addressing sources of IAS, intensely protecting inland water biodiversity species and hotspots, and providing alternative means to those whose livelihoods are inextricably linked to inland water resources.

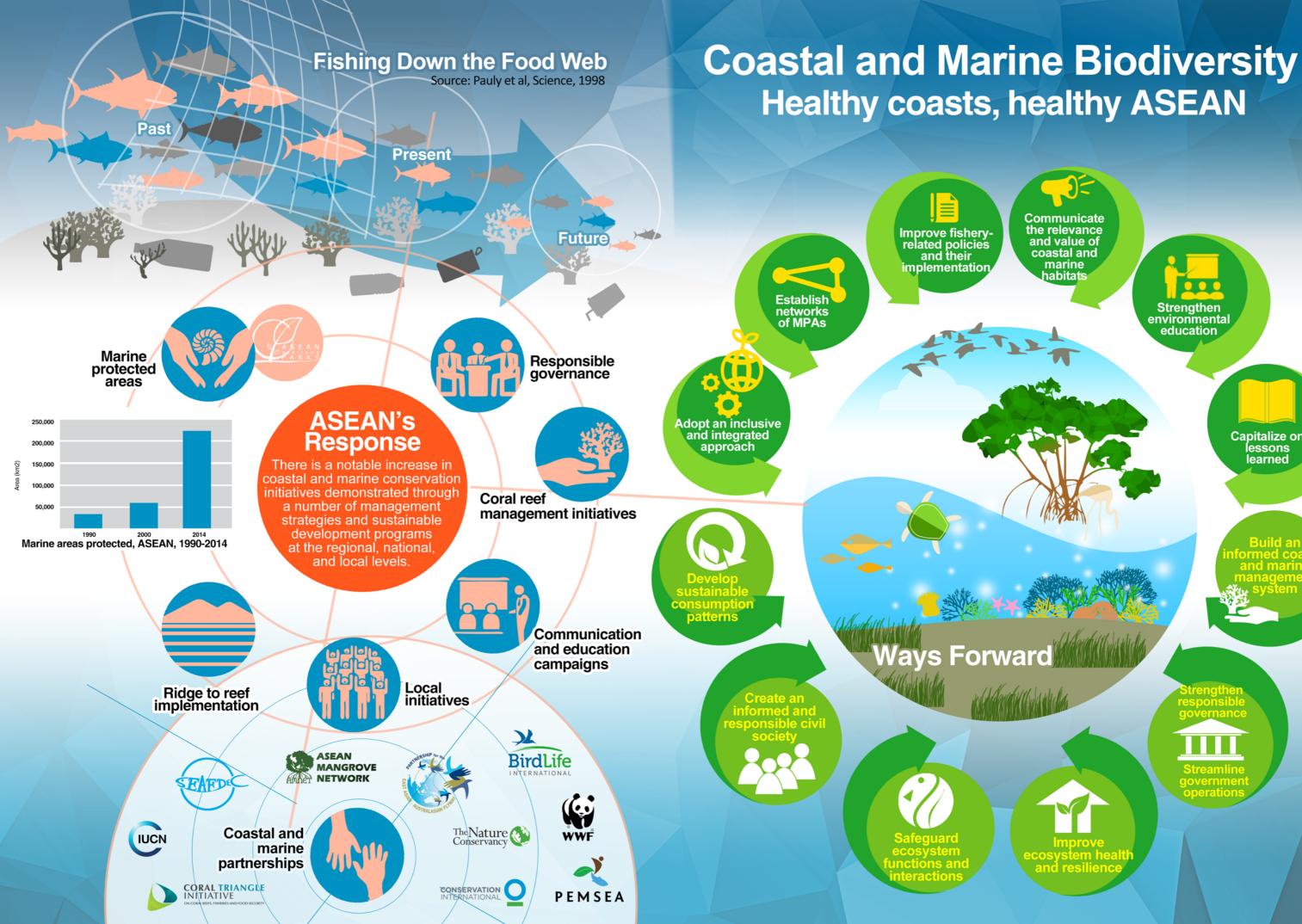
The restoration of ecosystems services of inland waters is the ultimate objective. There is a need for an ecosystem-based approach to management that considers appropriate scientific methodologies focused on essential structures, processes, functions, and interactions among organisms and their environment.

Parallel to current conservation actions, there is a need to increase, at all levels of governance, interest in massive reforestation with focus on riparian restoration; address erosion issues caused by deforestation; and reduce complications from impacts brought about by flooding and landslides. Such actions can be possible when national and local policies are aligned. These actions may be done by revisiting national policies on pollution to ensure that these incorporate stricter criteria and impose stiffer sanctions on pollution loads, and are adequately supported with communication campaigns that assure compliance through improved understanding.

National policies on pollution should be revisited to ensure that these incorporate stricter criteria and impose stiffer sanctions on pollution loads. These should be adequately supported with communication campaigns that assure compliance through improved understanding.

It recommended that AMS continuously adopt a holistic, multi-disciplinary and multi-stakeholder approach to policy reform. There is a need to strengthen existing laws and policies governing the management and sustainable use of the biodiversity and natural resources in these areas. Programs and activities related to the implementation of these laws and regulations should be developed.

Further research is recommended to assess the ecological and economic values of inland water ecosystems to their respective economies and the people who depend on these areas for their livelihoods. It is also imperative to continue and develop appropriate information dissemination programs for policy makers and the public to understand the importance of protecting and conserving inland waters.



Communicate the relevance and value of coastal and marine habitats

Strengthen environmental education

Capitalize on lessons learned

Improve ecosystem healt and resilience overnance

# Coastal and Marine Biodiversity: Healthy coasts, healthy ASEAN

A healthy coastal and marine environment is of utmost importance to the ASEAN region to ensure a renewable protein source for its steadily growing population, currently estimated at 632 million and expected to increase to 800 million in 2030 (UN, 2015). ASEAN hosts a third of the world's coastal and marine habitats that include coral reefs, mangroves, estuaries, sandy and rocky beaches, seagrass and seaweed beds, and other soft bottom communities. These habitats and their resident species provide various forms of ecosystem services. They provide breeding, nursing, and feeding grounds for marine plants and animals, food (fish, invertebrates, and seaweeds), and resources important to livelihoods of coastal communities. Carbon sequestration and storage (in mangrove tree trunks and roots, seagrass, seaweeds, and other algae), climate regulation, sediment protection, and shoreline retention to buffer coastal areas from storm surges, constitute regulatory services. Coastal habitats maintain nutrient cycles and provide media for the exchange of genetic materials. These habitats provide cultural services in the form of recreation and tourism, education, research, and places of worship.

There are various estimates of the monetary value of coastal habitats in the region. Coral reefs generate and may constitute a significant percentage of national economies where such habitats occur in large scale and where industries such as coral reef-related tourism, fisheries, live animal (fish), aquarium, and shell craft industries thrive. Coral reef-related tourism relies on water and habitat quality, the type and quality of services offered, and accessibility factors. The



This section assesses regional compliance to Aichi Biodiversity Targets 6 and 7 (sustainable management of fish and invertebrate stocks), Target 10 (minimizing anthropogenic pressures on coral reefs and other vulnerable ecosystems). Target 11 (10 percent of coastal and marine areas are conserved through effectively and equitably managed, ecologically representative and well connected systems) and Target 12 (extinction of known threatened species prevented and conservation status improved).

estimated ecosystem service value for coastal protection and maintenance of fisheries come to about USD 62,400 per square kilometer per year (Barbier et al., 2011). It is estimated that the total potential sustainable annual economic net benefits per square kilometer of healthy coral reefs in ASEAN ranges from USD 23,100 to USD 270,000 arising from fisheries, shoreline protection, tourism, recreation, and aesthetic values (Burke et al., 2002). Services that remain difficult to quantify include nutrient cycling, buffering storms, climate resilience, and carbon sequestration; although tools are now being developed for this purpose.

#### Threats to coastal and marine biodiversity

Close to 500 million people will be living in or near coastal and marine areas in the ASEAN region by 2050 (Population Reference Bureau, Indonesia and the Philippines were 2012). identified by the Reefs at Risk Revisited report as two countries that have tens of millions of coastal people living within 30 kilometers of reefs (Burke et al., 2011). Considering ASEAN is one of the fastest growing economies in the world, its nearshore ecosystems, based on the AMS' 5NRs, have become more vulnerable habitat change from overexploitation, to sedimentation, pollution, coastal development, ineffective governance, and collateral damage

from coastal tourism and climate change. The pressure to provide for a growing population; gaps in education and awareness; and the lack of commitment, funds, and actions to enforce laws and adhere to responsible practices in fishing, agriculture, aquaculture, including land conversion in favor of mariculture, waste from land sources, acidification, and tourism, have resulted in the degradation of coastal and marine habitats and fish and shellfish populations. Although not explicitly quantified across all AMS, mangrove forest losses have been reported in Thailand and related declines in biodiversity and ecosystem goods and services have likewise been reported in Cambodia, Indonesia, Myanmar, the Philippines, and Viet Nam, as a result of increased human utilization. Malaysia reports of increases in mangrove cover as a result of a massive and integrated approach to reforestation involving both the government and local communities. In addition, AMS report that poaching, sand mining, invasive alien species, and illegal bioprospecting continue. The mind map in Figure 3 demonstrates the threats (on the left side of the figure) and impacts of such threats to coastal and marine ecosystems (on the right side of the figure) in ASEAN as reported in the AMS' 5NRs.

Overexploitation of coastal and marine resources undermines marine biodiversity health. This is demonstrated in trends in marine capture fisheries, aquarium fish collection, and in the shell craft industry. Understanding these threats is a step towards modifying harvesting practices and ensuring the sustainability of these resources.

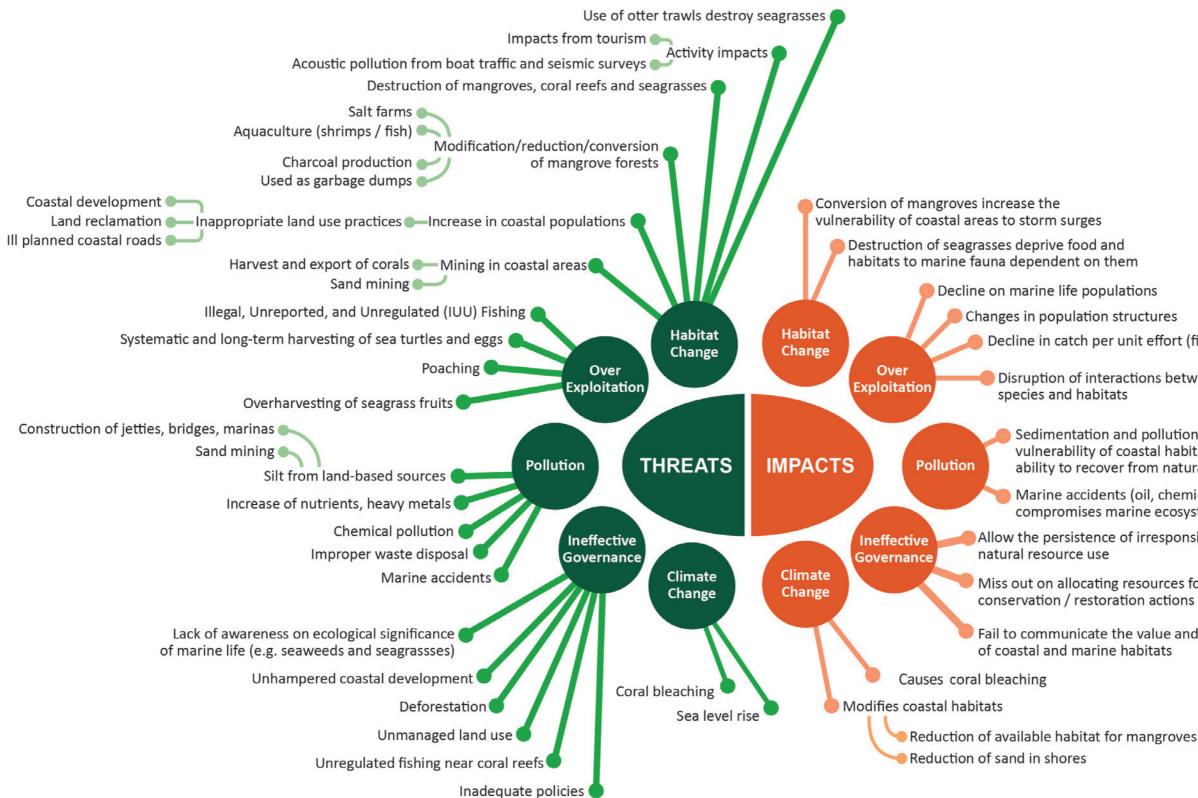
Fishing from the wild, technically known as marine capture fisheries, is best described by its catch composition of pelagic and demersal fish and invertebrates such as bivalves and crustaceans. It is a lucrative but relatively lowinput economic activity associated with the coastal and marine environment. Figure 4 presents trends in marine capture fisheries

production of ASEAN Member States from 1990 through 2014. From 1990 through 2000, marine capture fisheries production in ASEAN demonstrated increasing trends, with Indonesia having the highest volumes due to its significant resource base. However, major changes have been noted, in particular, the substantial production decline for Thailand since year 2000. Thailand's 5NR indicates that the seas of Thailand "are degraded from overfishing and use of destructive fishing gear, which drastically decrease the number of aquatic animals and impact the way of life of local fishermen." It likewise reports that the catch per unit effort (CPUE) estimated for the country dropped from 300 kilograms per hour in 1961 to 25 kilograms per hour in 2011. The same report approximates that 19 percent of fish caught were undersized, most likely harvested below mature sizes and about 40 percent were "without value," and were processed into animal feeds. Thailand reports a parallel decrease in culture areas and production volume for marine shrimps starting in 2009, which were attributed to declining areas of mangrove forests and diseases. Despite the noted decrease, Thailand's 5NR indicates that the total production remains "the same" since fishing activities have expanded to other countries such as Indonesia, East Timor, and Papua New Guinea.

A similar but less acute decline was experienced by the Philippines in 2010 (Figure 4). The Philippines' 5NR informs that some 60 percent of the population resides in coastal areas. This population density has attracted economic activities including agriculture, industrial and urban development, tourism, and production. As a consequence, pollution, overfishing, poaching, and the use of destructive means of fishing, have resulted in the decline in biodiversity and related ecosystems goods and services. This downward trend is associated with the decrease in productivity and yield from mangroves, seagrasses, and coral reefs, resulting in reduced incomes of businesses and



#### Figure 3. Mind map of threats and impacts of threats to coastal and marine ecosystems in ASEAN



Changes in population structures

Decline in catch per unit effort (fisheries)

Disruption of interactions between / among

Sedimentation and pollution increases vulnerability of coastal habitats and reduces ability to recover from natural disasters

Marine accidents (oil, chemical spills) compromises marine ecosystem health

Allow the persistence of irresponsible

Miss out on allocating resources for necessary conservation / restoration actions

Fail to communicate the value and importance of coastal and marine habitats

associated revenues for local governments. As early as 1989, an analysis indicated that most of the fishing areas in the Philippines were overexploited. The same report identified that in 2002, overfishing, followed by destructive fishing practices, were the largest threats to coastal and marine biodiversity, particularly coral reefs. Despite progress in reducing destructive fishing incidences and successful marine protected area (MPA) interventions, land-based threats, such as sedimentation and pollution, have destroyed habitats important to the survival of larval supply to the fishing industry.

It can be noted in Figure 4 that although production increases for Cambodia, Myanmar, and Viet Nam were observed from year 2000, production has started to plateau for Malaysia in the same year and later in 2010; in lesser magnitude for Indonesia, Myanmar, and Viet Nam; and a significantly lower production plateau for Thailand. Similarly, the 5NRs of Cambodia, Myanmar, and Viet Nam report issues related to habitat degradation, including unsustainable and destructive fishing practices, pollution, coastal development, and natural disasters.

The ornamental fish industry figures significantly in the ASEAN coastal and marine economy as the region supplies almost half of the 20 million ornamental marine fish traded annually. Indonesia's NBSAP reports that some 280 ornamental fish species associated with coral reefs and 170 coral species are traded commercially. ASEAN exports of ornamental marine fish rose from 127 tonnes in 1976 to 10,355 tonnes in 2011. The region supplies 43 percent of ornamental marine fish to the world market.

Prices of ornamental fish are attractive, exceeding those for food fish significantly. There is a tendency to overexploit the resource if demands continue to increase. In the course of collection, the use of destructive methods, such as cyanide, damage both the fish and their natural habitats. Fish species targeted for the ornamental trade are highly vulnerable to unsustainable harvesting practices that may lead to disruptions in their population structures.

Although shells have been traditionally traded and used in decorations, jewelry, and cultural events for hundreds of years, increase in demand for these products correlates to the fourfold increase in tourism over the last 30 years. Shells provide several ecological functions: they serve as surface attachments for algae and other

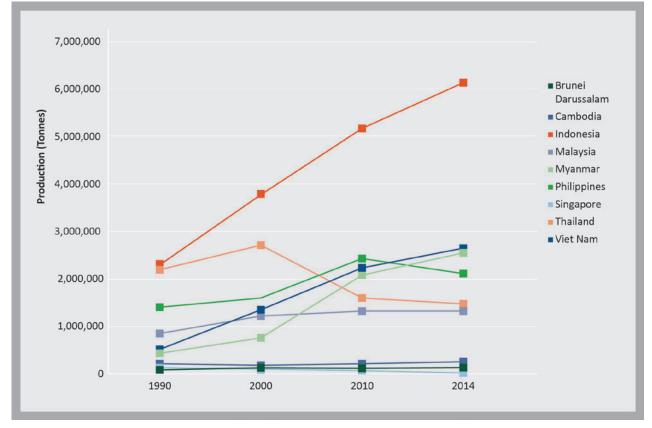


Figure 4. Trends in marine capture fisheries production, ASEAN Member States, 1990–2014

Source: FAO Fisheries and Aquaculture Statistics, retrieved from http://www.fao.org/fishery/statistics/en on 2 December 2016.



## Figure 5. Trends in export quantity and value of mother of pearl and other shell products in ASEAN (1990–2011)

Source: FAO Fisheries and Aquaculture Statistics, retrieved from http://www.fao.org/fishery/statistics/en on 8 September 2015.

marine macro-organisms, substitute homes for hermit crabs, provide food for other organisms, and contribute to the collection of sand that are in turn habitats and nests for several sanddwelling animals. The increase in the removal of shells may alter the ecology, dynamics, and ecosystem services that beaches provide. Figure 5 shows the trends in export quantity and value of mother of pearl and other shell products in the ASEAN region (1990–2011).

ABO 1 pointed out that the conversion of coastal habitats to less ecologically sound uses is one of the main causes of threats to coastal and marine ecosystems in the region.

The ASEAN Member States' 5NRs to the CBD revealed that such pressures persist and several threats are common to the coastal environments of the region. In varying degrees, the coral reefs of various AMS are subject to abuse from destructive means of fishing, pollution, and

coastal development. Mangroves are harvested for charcoal and construction materials or removed for the expansion of fishponds or salt farms. Seagrasses are similarly threatened with the misunderstanding of their importance and function in coastal and marine habitats.

Climate change has particular influences on the coastal and marine environment, demonstrated through the mass bleaching of corals directly correlated with increasing sea temperatures (Hoegh-Guldberg, 1999 in Ainsworth et al., 2008). The Global Coral Reef Monitoring Network reported on a region-wide bleaching event in 2010 that affected reefs in Brunei Darussalam, Cambodia, Indonesia, Malaysia, the Philippines, Thailand, and Viet Nam. No information was available for Myanmar and Timor Leste (GCRMN, 2013). Increasing sea temperatures likewise influence changes in both primary and secondary productivity, the structure of marine communities, water column



stratification, and the timing of coastal upwelling with resulting impacts on fish distribution, recruitment, migration patterns, predator-prey relationships, and growth (Mcllgorm et al., 2009).

Poaching occurs throughout the region, but is not often reported due to the difficulty of quantifying losses, the lack of documentation on the exact details of events, and apprehension from potential political issues that may arise. Poaching happens in marine protected areas, including transnational poaching, usually in the form of harvesting and transport of threatened species.

In addition to fish and shellfish, ASEAN is host to several species of migratory shorebirds that use intertidal habitats as staging or refueling sites to rest and feed as they migrate from their breeding grounds in arctic and temperate regions to spend the winter months in tropical areas. Recent changes in climate patterns are demonstrated through extremes in weather, specifically through changes in rainfall. These changes may parch some areas while flooding others; thus, affecting the timing of blooms and availability of food, disrupting life cycles and reproductive patterns of many species. The same sets of species are likewise vulnerable to habitat loss from sea-level rise (SLR). An analysis by Iwamura et al. (2013) on the vulnerability of a migratory network to the impact of habitat loss from SLR indicates that SLR may inundate up to 40 percent of intertidal habitats along migration routes in the East Asian-Australasian Flyway (EAAF) that may cause a reduction in population flow of up to 72 percent across taxa. The reduction of migration stopover habitats due to coastal development and hunting on the wintering grounds is responsible for the declines in migratory shorebird populations.

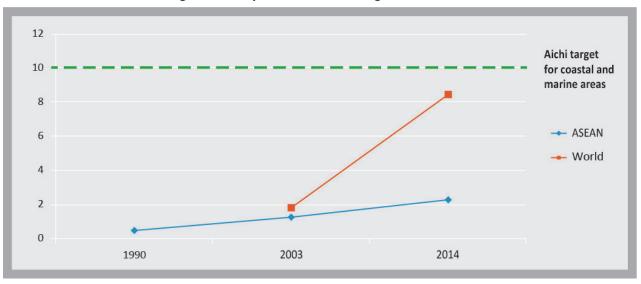
A larger threat is the predominantly backward governance systems covering coastal and

marine ecosystems and fisheries that are unable to adapt to the growing complexity of issues.

These findings are consistent with the Reefs at Risk Revisited in the Coral Triangle report (R@R, 2012) that identified overfishing and destructive fishing as the most widespread local threats in the region. The R@R 2012 also indicates that warming waters and increasing acidity from rising levels of carbon dioxide and the dependence of a growing population on coral reefs for food and other services compound local threats and contribute to the high vulnerability of coral reefs in the region. The low coverage of coral reefs within MPAs, as reported in the Coral Triangle, and the low management effectiveness of MPAs (compared to the global average) reflect gaps in coastal and marine governance. These challenges are consistent with the results of the United Nations Environment Programme-World Conservation Monitoring Centre (UNEP-WCMC) (2016) mid-term review of progress towards the Aichi Biodiversity Targets in Asia and the Pacific. Results highlighted overfishing; overexploitation; bycatch; illegal, unreported and unregulated (IUU) fishing; and the use of inappropriate fishing gear as current threats in the region.

The drivers of coastal and marine biodiversity loss in the ASEAN region have not been abated. Instead, they have increased in complexity, and are aggravated by contributing factors such as climate change, consumption patterns, increased sedimentation, and pollution from agricultural inputs, overexploitation of resources in response to increasing national and international market demands, and invasive alien species. The lack of understanding of the ecological interactions in the marine and coastal environment, on their vital functions, consequences of their loss, and gaps in the efficiency of governance allow the persistence of irresponsible natural resource use, and thus, undermine the natural capacities





#### Figure 6. Comparison of trends in growth in MPAs

Sources:

1. Territorial waters derived from the MDG

2. Juffe-Bignoli, D., Burgess, N.D., Bingham, H., Belle, E.M.S., de Lima, M.G., Deguignet, M., Bertzky, B., Milam, A.N., Martinez-Lopez, J., Lewis, E., Eassom, A., Wicander, S., Geldmann, J., van Soesbergen, A., Arnell, A.P., O'Connor, B., Park, S., Shi, Y.N., Danks, F.S., MacSharry, B., Kingston, N. (2014). Protected Planet Report 2014. UNEP-WCMC: Cambridge, UK

3. Global facts about MPAs and marine reserves. Retrieved from http://www.protectplanetocean.org/collections/introduction/ introbox/globalmpas/introduction-item.html on 28 September 2016.

4. IUCN and UNEP-WCMC (2016), The World Database on Protected Areas. Cambridge, UK: UNEP-WCMC, April 2016 Retrieved from www.protectedplanet.net.

of the coastal and marine environment to maintain their ecological functions, save species from extinction, and recover where and when disasters occur.

#### Responses

The first ASEAN Biodiversity Outlook (ABO 1) described the importance of marine species and habitats in the Coral Triangle as well as the launch of the Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF) in 2009 as a multilateral partnership of the governments of which ASEAN Member States Indonesia, Malaysia, and the Philippines are

· Althin

signatories to. Along with Papua New Guinea, Solomon Islands, and Timor Leste, these countries collaborate to sustain the marine and coastal resources of this subregion by tackling issues of marine biodiversity, climate change, and food security. Major milestones include the appointment of its first Executive Director on 1 April 2015, the signing of the Host Country Agreement with the Indonesian Government as a host for CTI-CFF Regional Secretariat on 1 December 2015, and the signing of Memoranda of Understanding (MoUs) with Southeast Asian Fisheries Development Center (SEAFDEC), Coral Triangle Center (CTC), Secretariat of the Pacific Regional Environment

#### Box 11. The Tubbataha Reefs Natural Park (TRNP) joins the ASEAN Heritage Parks Programme

TRNP was declared an ASEAN Heritage Park in 2015 in addition to distinctions as a UNESCO world heritage site and Ramsar wetland of international importance. TRNP lies close to the middle of the Sulu Sea in the Philippines at the center of the Coral Triangle, a region known globally as a hotspot for marine biodiversity. It covers approximately 970 sq km and is the Philippines' largest AHP. This AHP not only supports a vast array of marine life, but also plays a significant role in protecting important sites for migratory birds.

Source: The preservation of one of the Philippines' oldest ecosystems is clearly a step into the right direction. Retrieved from http://tubbatahareef.org/wp/location on 15 April 2015.



Programme (SPREP), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and Indonesian universities, namely Bogor Agricultural University, Institut Teknologi Sepuluh Nopember Surabaya, Hasanuddin University, and Sam Ratulangi University. These agreements have established mechanisms by which the CTI-CFF is able to implement activities through its Technical Working Groups (TWGs) and Governance Working Groups (GWGs) and pursue working visits to several potential partner institutions to further strengthen the CTI-CFF (CTI-CFF Regional Secretariat, 2015).

The ASEAN Heritage Parks (AHP) Programme, the flagship program for protected areas in the region, has established 38 AHPs in the course of 31 years. Five are categorized as marine AHPs. Some AHPs that are not in the marine category, such as the Gunung Leuser National Park in Indonesia, have coastal components and thus contribute to marine and coastal protection through an integrated approach. The need for more AHPs in coastal and marine areas has been acknowledged in the AHP Plan of Action and is featured in the development of upcoming projects.

The most evident response to the need to conserve marine biodiversity in ASEAN has been through the establishment of marine protected areas. Figure 6 demonstrates the three-fold increase in areas declared as MPAs in the ASEAN region and compares this progress to the recent global figure. A little over 2 percent or 229,534 sq km of the total territorial waters of the AMS have now been allocated to marine protected areas.

National policies on gear and seasonal controls, conservation partnerships, catch and integrated land and sea use plans have been mobilized to address issues such as IUU fishing. Initiatives on ecosystem-based resources management projects indicate some advancement in terms of local initiatives, including participatory approaches such as community-based coastal management. However, ASEAN-wide strategies on conserving biologically connected MPAs and sustainable fishing have yet to be established.

The increasing incidences of environmental disasters in coastal areas of the region have underscored the need for reducing impacts and improving coastal resilience. In response, Malaysia has begun mapping environmentally sensitive areas (ESAs) and undertaken the rehabilitation of mangroves. The Philippines has organized a National Climate Change

Action Plan focusing on "municipalities or a group of municipalities located within and around boundaries of critical key biodiversity areas, which are at high risk to climate change. This plan is augmented by related approaches that contribute to rebuilding the resilience of coastal areas to typhoons and storm surges, including a massive mangrove reforestation project under the National Greening Program (NGP). The Philippines' 5NR states that such initiatives engage the participation of some 80 local government units nationwide. This approach assures, to a certain degree, that governance mechanisms covering coastal and marine habitats have committed to adopting collaborative approaches and increasing local government investments in coastal and marine conservation. The AMS' 5NRs indicate reduced illegal fishing incidences (Cambodia), coral reef and mangrove recovery (Cambodia, Indonesia, and Malaysia), and most AMS have reported increased areas allocated to MPAs.

An integrated and collaborative approach to coastal and marine ecosystem management has largely been adopted in national strategies and in several subregional, regional, and intergovernmental initiatives that complement these national strategies. The role of nongovernment, local government, philanthropic, and inter-governmental organizations in coastal and marine conservation in ASEAN has become quite evident in the buildup of conservation frameworks, provision of technological support, large-scale coastal and marine conservation planning, development of conservation tools and knowledge systems, and sustainable management of coastal, marine and fisheries resources. Annex 2 summarizes the roles of each of these organizations.

#### Ways Forward

#### Adopt an inclusive and integrated approach

Intrinsically linked by nature, it is essential to use a comprehensive and inclusive approach in the management of the coastal and marine environment of ASEAN. Hughes et al. (2005) underscored the importance of an inclusive and integrated approach to understanding the social, ecological, legal, and economic dynamics of marine conservation, specifically fishing. The authors recommend that to ensure the sustainable use and conservation of living marine resources, it is necessary to consider the following: 1) both spatial and temporal scales of ecosystem dynamics and management, and 2) the relevance and role of biodiversity in the "functioning and resilience of marine systems."

In practice, the coverage of identified

Photo by Arturo De Vera Jr.

conservation areas needs to include as much habitat as necessary to sustain populations by reducing threats to particularly vulnerable species and maintain interactions between habitats that allow them to persist and provide inherent ecosystem continuously services. The importance of recognizing local and traditional knowledge and governance systems through appropriate forms of community-based coastal management underscores the power of communities to lead marine protected area management. Integrated coastal management (ICM) is being practiced in some parts of the ASEAN region where several lessons have been derived. Solutions can no longer be approached from a single or combined entry points. The governance of coastal and marine ecosystems should develop both pro-active and responsive mechanisms to provide appropriate solutions to issues and adapt to the increasing complexity of the drivers of biodiversity loss and complications brought about by climate change (Mcllgorm, 2009). These efforts include the participation of all stakeholders and corresponding investments of partner organizations.

## Increase the coverage and effectiveness of MPAs

The MPA approach is a widely accepted management tool that is available to local communities, but its concept has constantly been challenged. MPAs are area-defined conservation measures and often misconstrued to be ineffective as a buffer against impacts that occur in scales larger than their geographic coverage such as climate change or pollution. Benefits derived from the establishment of protected areas are often linked to activities that can be implemented within their confines such as delineation, activity-based zoning, and non-extractive income generating activities. The impacts of MPAs outside of their confines have not been widely publicized.

An experiment was conducted by Micheli et al. (2012) to answer the question of whether marine reserves increase the resilience of marine populations to widespread mortality. His team studied the response of a population of mollusk, *Haliotis corrugata*, to a mass mortality event possibly caused by climate-driven hypoxia. The population of *H. corrugata* declined with the mortality event both inside and outside reserves, but their results show that recovery in terms of density, size, structure, and reproductive output fared better within than outside reserves. Results of post-event monitoring demonstrated greater juvenile recruitment from post-mortality egg production.

Managed MPAs, as a matter of implementation and practice, are recipients of investments in management planning and implementation, monitoring, and policy enforcement support, among others. As a result, compared to areas outside of managed zones, MPAs are less exposed to pressures from exploitation and destructive means of fishing. This evidence can be used as a basis to encourage the establishment of more MPAs and MPA networks, keeping in mind Aichi Biodiversity Target 11.

#### Box 12. Consider investments in research

Kang and Kim (2015) documented the disastrous collapse of Pollock stocks, a culturally important species in Korea. Allowing the uncontrolled collection of spawners and juveniles (*nogari*) imposed high fishing pressure in both adult stocks and juvenile populations (recruitment overfishing). Their study identified gaps in management including the lack of transboundary arrangements to protect straddling stocks between countries. The lack of conservation measures was also surmised to have contributed to the collapse. In addition, the lack of understanding of the dynamics between habitat preferences, state, character, and size of spawning areas in the context of changes occurring in seawater temperatures were identified as gaps in knowledge necessary to support policy and management. The research work recommended investments in the understanding of feeding biology, ecology, growth rates, recruitment processes, and forecasting of stocks in the context of changing environmental conditions such as climate change, predator-prey relations, and changing food availability. Similar investments in fisheries research in the ASEAN and communicating the results of such research to target stakeholders may help avert the collapse of the region's fishing industry. The use of research outcomes is valuable in the design of policies that support the persistence of commercially important species while recognizing the larger ecological environment.

Despite significant efforts in marine conservation, the AMS, in aggregate, protect over 2 percent of coastal and marine areas within their jurisdictions. The impact of such work, is quite minimal at the global scale (Figure 6).

Spalding et al. (2013) acknowledged that the Aichi Biodiversity Targets encourage a comprehensive approach by reconciling conservation and development while emphasizing the conservation of ecosystem services for human well-being. He recommended that planning for MPAs be embedded in a wider and more comprehensive and integrated coastal management context and that greater emphasis be given to social and economic factors in the selection and designation of MPAs. Hence, there is a need for more aggressive establishment of MPAs, particularly in areas where the Aichi Biodiversity Target is not yet achieved.

#### **Consider connectivity**

Aichi Biodiversity Target 11, in addition to recommending the increase in areas allocated to conservation, calls for "effectively and equitably managed, ecologically representative and wellconnected systems of protected areas." Results of studies on connectivity based on larval migration patterns clearly indicate that certain areas may be sources or sinks of fish and invertebrate larvae, and, in some circumstances, some areas may be self-seeding. Such results underscore the need to protect pairs, groups, and networks of MPAs to ensure the survival of fish and invertebrate larvae; and thus the productivity of coastal and marine ecosystems. Another form of connectivity is defined by the migration patterns of species, i.e. migratory shorebirds, and call for the conservation of intertidal habitats that support them in the course of their long distance journeys. ASEAN is an important but threatened area for many

species of smaller shorebirds, including the critically endangered spoon-billed sandpiper that is dependent on high-quality intertidal areas as their stopover locations (Jardine et al., 2015). On the first few centimeters of the benthic mud, diatoms and bacteria concentrate and form a biofilm, an important component of the intertidal food web. Small aquatic animals living in the sediment (meiofauna) feed on the biofilm; and thus increase in numbers during summer and serve as food for birds that stop over, or during winter (Sain-Beat et al., 2013). The quality of the biofilm is highly dependent on inputs from land-based sources that may include sediments, garbage and sewage, mine tailings, and others.

A ridge-to-reef approach that emphasizes the interaction of more landward ecosystems with seaward and coastal habitats is another form of connectivity that defines the influence of terrestrial activities on coastal and marine habitats and, to some extent, the influence of marine habitats on land-based ecosystems. This linkage is important to understanding the need to manage agricultural inputs, urban planning, and related infrastructure development in the context of managing recipient coastal and marine habitats. On the other hand, the relevance of coastal forests and seagrass meadows in coastal protection and disaster risk management needs to be considered.

#### Communicate

AMS have reported various CEPA campaigns. These can be utilized to communicate to stakeholders on the relevance of marine species and habitats; impacts of natural and anthropogenic events on these habitats; climate change and ecological processes in the coastal and marine environment; and coastal and marine biodiversity in relation to human health, among others. It is expected that improved understanding, as a result of effective communication and environmental education, would encourage local and personal conservation action.

## Improve fisheries-related policies and their implementation

The Code of Conduct for Responsible Fisheries (CCRF) was developed by the FAO to guide and support the rational and sustainable utilization of fisheries and aquaculture. Its approach takes into account technical, socio-economic, and environmental factors, and its implementation is based on the contribution of the sector to food security (FAO Fisheries Department, 1998). This initiative was recognized as an important factor for achieving sustainable fisheries The Voluntary Guidelines for development. Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (2015) complements the CCRF and should be considered by AMS in the development and updating of national policies,

local plans, and programs on sustainable fisheries management.

#### Capitalize on lessons learned

Information supporting coastal and marine conservation has increased significantly in the past two decades. The AMS' 5NRs state that projects in the region report on lessons learned and good practices, and have provided sound advice in the form of the conservation of island ecosystems (Philippines), establishment of more conservation areas and mangrove rehabilitation (Indonesia), and the development of response mechanisms to events such as coral bleaching (Malaysia). The continuous collection of lessons learned and good practices on coastal and marine biodiversity conservation from both ASEAN and other countries and making these available in the AMS Clearing-House Mechanisms (CHMs) will provide ready access and reference to those in charge of coastal and marine conservation in the region.

Box 13. Fostering conservation partnerships with communities for marine biodiversity conservation in the impact areas of Malampaya Deepwater Gas to Power Project Karen H. Agabin and Pacifico D. Beldia II Malampaya Foundation Inc.

The concept of conservation partnership is an accepted and viable approach, but is also critiqued for its ambitious and multifaceted scale. There is a general notion that the approach is risky, thus swaying many national and regional conservation projects to focus on advocacy and policy work rather than investing in grassroots concerns. The Malampaya Foundation Inc.'s (MFI) Biodiversity Conservation Program took the latter route in helping address biodiversity loss in the impact areas of its benefactor Natural Gas to Power Project, which is a consortium of the Philippine Government, Chevron, and Shell. This project is being implemented in Northern Palawan and the Oriental Mindoro and Batangas City sides of the Verde Island Passage to support social preparation and advocacy, research, establishment of protected areas, and incentives or supplemental livelihood and other means of income generation, such as skills and academic scholarships.

MFI's biodiversity program works closely with 21 partner peoples organizations spread in two national parks, 10 marine Key Biodiversity Areas, three biodiversity conservation corridors, two MPA Networks, and 24 communitymanaged MPAs. In three years since 2012, the program has yielded over 120 sq km of new MPAs forged through 21 Conservation Covenants. The program supports school-based and community information campaigns conveying the simple fact, among others, that corals are animals and not just stones. Recipients of academic and skills scholarships come from the same provinces and are hoped to become champions of conservation in their respective areas in the near future. Conservation incentives are in place and bringing in a steady flow of supplemental income to recipients. The impact on biodiversity conservation is perceptible especially in No Take Zones and while the difficulties born from the lack of appreciation of the real value of natural resources remains common, MFI's partners continue to address biodiversity loss in their communities.

Among the major hurdles of biodiversity conservation in the country is the lack of a robust support base from Local Government Units (LGUs) and national parks. Recent work shows that during the last 10 years, LGUs and national parks in focal areas only invested PhP 0.69 and PhP 4.67 per hectare for protection and conservation. While this is far from the minimum needs of about PhP 124.50 per hectare to improve environmental law enforcement, the lack of technical staff to lead and sustain various conservation initiatives is another hurdle. MFI strengthens its alliances with the various partners by offering incentives to environmental law enforcement teams, thus pushing forward the immediate needs while at the same time helping educate partners on the need to integrate into the annual investment plans budgetary items that are needed to sustain biodiversity conservation in their jurisdictions.





## Chapter 2B Cross-cutting Concerns

Taxonomy, access and benefit-sharing, wildlife conservation, invasive alien species, climate change, expansion of cities, and economics and business are among a number of issues that are relevant to all aspects of biodiversity conservation. Reports from the AMS show that challenges are immense, particularly in the areas of wildlife conservation, management of IAS, and climate change mitigation and adaptation, but there are also opportunities for cooperation within the region and with partners in the international community. Urgent action on identified issues should have positive impacts on biodiversity conservation, and increase prospects for achieving global biodiversity targets.

# Taxonomy You cannot conserve what you do not know

585

identified

amphibians

A region known for its biodiversity richness, ASEAN is also the most vulnerable with most member states facing tremendous threats to their natural wealth. Identifying species before they go extinct is thus crucial to determining priorities in biodiversity conservation.

1,361 identified reptiles

> 3,258 identified birds

Efforts to Strengthen Taxonomy in ASEAN



Trainings

The extent of undiscovered species is high for all other taxa

> 56,120 identified plants

1,037 identified mammals



# **Ways Forward**



Chart the future of taxonomy in a Regional Action Plan for Taxonomy 2017–2020



Develop a communication, education, and public awareness plan for taxonomy in ASEAN



States

Improve ex situ programs in the region



Assess the Global Taxonomy Initiative Regional Action Plan 2010–2015



Survey taxonomy studies and research in ASEAN



Make taxonomic information interoperable among databases in ASEAN Member





## Taxonomy: You cannot conserve what you do not know

The number of species awaiting discovery far outweigh those that have been studied. Millions of plants and animals have yet to be studied and may hold tremendous potential as sources of food, medicine, and other benefits.

According to the CBD, in a world populated with more than 30 million species, taxonomists have identified only about 1.78 million species of animals, plants, and microorganisms in 250 years of research. It is estimated that only 10 percent of vertebrates remain to be described, but greater than 50 percent of terrestrial arthropods and up to 95 percent of protozoa are undescribed.

ASEAN is recognized for its rich biodiversity with more species being discovered by wide ranging expeditions each year. Its importance to conservation is highlighted by a high mean proportion of country endemics, particularly of bird and mammal species. Unfortunately, almost the whole region is considered a biodiversity hotspot as the high number of endemic species is threatened by more than 70 percent loss of their original habitats (Sodhi et al., 2010).

The sheer number of species that have yet to be discovered requires an army of scientists, each with their own area of expertise, to identify, name, classify, and study the millions of species on Earth. The issue is compounded by the unprecedented rate of global biodiversity loss due to habitat degradation, unsustainable use, pollution, climate change, and other pressures. These pressures increase the risk of extinction of vulnerable species and it is certain that some



Taxonomy is relevant to all Aichi Biodiversity Targets but is more specific to Targets 9 and 19. Knowledge of species facilitates steps to identify and prevent the establishment of invasive alien species as indicated in Target 9 and the conservation of indigenous and particularly vulnerable species. Improving taxonomic skills adds to the body of scientific knowledge; thus, forming the foundation for science-based approaches and appropriate decision-making in biodiversity conservation and management, and contributing to Target 19.

species are already lost even before they are named and described.

The global decline in taxonomy is more apparent in ASEAN. Only a number of academic institutions in AMS offer formal instruction in taxonomy. These institutions suffer from lack of interest among incoming students who may perceive taxonomy as a difficult subject, and one with limited career direction. There is also inadequate support from most governments in the region to strengthen the field of taxonomy, which limits research in species and biodiversity conservation. Those who do work in taxonomy are sometimes encouraged to move to countries that provide better opportunities for career advancement.

ASEAN should address the urgency of strengthening regional expertise in taxonomy as most AMS are biodiversity-rich but economically poor. There are far too few taxonomists compared to the overwhelming yet dwindling biodiversity of the region. Spurring interest in taxonomy, nurturing scientists, and improving taxonomic capacity are fundamental to attaining the goals of the CBD and the reduction of global biodiversity loss.

Taxonomy is also one of the fundamental tools required for the global community to implement the UN Sustainable Development Goals. Without sufficient long-term investment in the human, infrastructural, and information resources necessary to support the science of taxonomy, a weak taxonomic base will continue to prevent the implementation of sound, science-based, and sustainable environmental management and development policies.

#### **Global partnerships in taxonomy**

Taxonomy is increasingly relevant due to growing threats to biodiversity. In 2010, Giam et al. published a study that aimed to estimate the extent of undiscovered species in ASEAN. Comparing total species richness with species discovery, the study determined that many species are likely to go extinct before ever being discovered by science under the current rates of habitat loss, particularly in taxa that had the least complete inventory but high rates of discovery.

Using datasets from various organizations. includina the International Union for Conservation of Nature (IUCN), BirdLife International, and FishBase, Giam et. al. determined that birds, legumes, mosquitoes, and mosses showed recent declines in species discovery rate. Among these taxa that displayed a species discovery decline, legumes had the highest extent of undiscovered species while birds had the most complete species inventory. Although quantitative estimates of the number of undiscovered species for amphibians, freshwater fish, hawk moths, and mammals could not be derived, the extent of undiscovered species is likely to be high as their recent discovery rates showed a continued increase. Knowledge of the number of undiscovered species within each taxon and the extent of undiscovered species among different taxa could guide future species discovery and taxonomy research in ASEAN.

All signs point to the fact that taxonomy is in peril and poor knowledge of the world's species puts biodiversity increasingly at risk. The last few decades saw taxonomy falling off global political, funding, and academic agenda. However, the CBD has increasingly stressed the need to address taxonomy as a challenge to biodiversity conservation, prompting the creation of the Global Taxonomy Initiative (GTI). The GTI was established by the CBD to address the lack of taxonomic information and expertise available in many parts of the world to improve decision making in conservation, sustainable use, and equitable sharing of the benefits derived from genetic resources. The GTI is implemented by governments, non-government, and international organizations, in addition to the taxonomists and the institutions where they work. It highlights issues, facilitates exchange of information, and promotes technical cooperation among Parties to prioritize efforts and generate greater support for taxonomy.

Support for taxonomy is also provided by the Asia Pacific Biodiversity Observation Network (AP-BON), a regional network that focuses on observations, assessments, research, and management of biodiversity covering most countries of the Asia-Pacific region and all levels of biodiversity and ecosystems. AP-BON approaches biodiversity observation on three levels: remote sensing, focusing on ecosystem and land use types, vegetation structure, and temporal change in ecosystems; ecological process research on primary production, and nutrient cycling; ecohydrology, and species and genetic research on plant species distribution, wildlife habitat assessment, and biological interactions. AP-BON supports





projects that identify, monitor and conduct research on biodiversity; establish databases on biodiversity; and provide training on new methods and analyses for biodiversity studies.

The Global Biodiversity Information Facility (GBIF) is an international open data infrastructure that is funded by governments. It works with organizations around the world on taxonomy specimen database and information management. GBIF provides access to hundreds of millions of records, shared freely by hundreds of institutions worldwide, making it the biggest biodiversity database on the Internet. The data accessible through GBIF relate to more than 1.6 million species, collected over three centuries of natural history exploration and current observations from citizen scientists, automated researchers. and monitorina programs. It is an important source of data with thousands of research publications, covering issues such as climate change, invasive alien species, priority areas for conservation, and food security, among others.

#### Strengthening taxonomy in ASEAN

The ASEAN Member States recognize that taxonomy is crucial to the management and conservation of biodiversity in their respective countries. Efforts in taxonomy include the following, with specific examples provided by the AMS:

1. Development of action plans and guidelines and establishment of technical working groups – In Thailand, the Office of Natural Resources and Environmental Policy and Planning established the Thailand Taxonomy Working Group, which has formulated guidelines on personnel development in taxonomy, considered the establishment of the national taxonomy center, and created coordination networks across institutions. The Thailand Master Plan for Integral Biodiversity Management (2015–2021) includes research and taxonomy focusing on the sustainable utilization of biodiversity.

2. Operation of national biodiversity information and database system and Clearing-House Mechanism – In Thailand, two database networks on biodiversity and taxonomy were created and six taxonomy databases have been linked. Institutions that have developed taxonomy databases include Chiang Mai University (taxonomy information of Lejeuneaceae, Ptychanthoideae [Bryophyta, Hepaticae]); Department of Marine and Coastal Resources (marine resources); and the Fishery Department (aquatic animals). The National Science Museum has linked its database to the network of the **Biodiversity-Based Economy Development** Office, while the Department of Marine and Coastal Resources has linked its museum information system on marine resources with the fishery museum of the Fishery Faculty of Kasetsart University. The Department of National Parks, Wildlife and Plant Conservation has also linked its database on flora specimens with Sirindhorn Museum and the Department of Agriculture. Further collaboration will establish links between these datasets and the ASEAN Clearing-House Mechanism

for Biodiversity to expand knowledge of biodiversity in the region.

- 3. Development of projects Thailand aims to strengthen taxonomy through projects such as the Flora of Thailand Project and Fauna of Thailand Project.
- 4. Conduct of surveys and field expeditions to provide baseline inventories and update existing biodiversity databases – Sabah has conducted numerous field expeditions in protected areas such as the Telupid complex, Imbak Canyon and Maliau Basin, Kinabalu, and Crocker Range leading to the discovery of new species, some of which are endemic to Borneo.
- 5. Collaborations between the government and international academic institutions for research, information sharing, and conservation activities – These include the establishment of the Brunei Tropical Biodiversity Centre and Brunei Agro Technology Park in Brunei Darussalam.
- 6. Establishment of botanical gardens -Indonesia has established 25 new local botanical gardens covering 41.007 sg km and representing 15 eco-regions, as well as Biodiversity Parks, which are local biodiversity reserves with conservation functions located outside forest areas. The new botanic gardens are managed by local governments or private institutions, and scientifically supervised by four national botanic gardens under the Lembaga Ilmu Pengetahuan Indonesia (LIPI) or Indonesian Institute of Sciences. The longterm program of the botanic gardens is to facilitate information sharing and support the national strategy to conserve the genetic diversity of plant species.
- 7. Establishment of natural history museums – A number of institutions have been established or improved to strengthen *ex situ* conservation and research of rare indigenous species. *Ex situ* programs support taxonomy through education and public awareness of species and biodiversity and their importance to society.
- 8. Participation in conferences The Philippines shares taxonomic research through scientific conferences such as the Annual Symposia of the Wildlife Conservation Society of the Philippines and the Philippine Association of Marine Science, and the National Cave Congress, among others.

- 9. Documentation of traditional knowledge - The Sarawak Biodiversity Center aims to assist indigenous peoples and local communities (IPLCs) in preserving their traditional knowledge through proper recording or documentation techniques. Workshops are conducted to train IPLCs documentation, propagation, in management of useful indigenous plants. The project also encourages IPLCs to cultivate useful indigenous plants for their own use, as landscape for their surroundings, and for awareness and appreciation purposes. The project has been beneficial in identifying species and their traditional uses and benefits.
- Production of communication, education and public awareness (CEPA) materials

   CEPA materials in Thailand include the Checklist of Plants in Thailand Volume 1 (2014) focusing on pteridophytes, gymnosperms, and monocotyledons; Checklist of Species in Thailand, or Biodiversity Series, the latest of which is the Checklist of Basidiomycetes in Thailand (2011); List of Plants in Thailand: Book 1; and booklets and brochures on biodiversity for children, among others.
- 11. Development of education and capacity development programs AMS continue to integrate taxonomy in education and provide trainings to strengthen taxonomic capacity.

## ASEAN partners and institutions working on taxonomy

The ASEAN Centre for Biodiversity (ACB), with support from various partners, has implemented several taxonomic capacity building activities with financial assistance from the Japan-ASEAN Integration Fund (JAIF) and additional support from the East and Southeast Asian Biodiversity Information Initiative (ESABII), which has its secretariat at the Biodiversity Center of Japan, Ministry of the Environment of Japan. From 2010 to 2015, ACB and JAIF have worked together on the Taxonomic Capacity Building and Governance for Conservation and Sustainable Use of Biodiversity project, focusing on the taxonomy of corals; freshwater and brackish water fish; terrestrial plants such as dicotyledons, monocotyledons, bryophytes, and pteridophytes; and economically important insects.

Table 6. ASEAN	Member States delegates trained in taxonomy
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Year	BRU	CAM	IND	LAO	MLY	MYA	PHL	SIN	THA	VN	Total
2009	1	4	4	0	4	3	14	6	4	4	44
2010	5	5	6	5	7	0	4	5	5	2	44
2011	2	8	9	6	9	8	6	5	9	11	73
2012	8	11	11	8	10	11	12	11	15	11	108
2014	4	3	14	4	6	6	9	7	8	6	67
2015	2	5	9	11	21	17	52	9	15	4	227
Total	22	36	53	34	57	45	97	43	56	38	563

Source: Programme Development and Implementation, ACB.

\*No capacity development activity in taxonomy conducted in 2013.

Other issues tackled in the course of the project include the Convention on International Trade of Endangered Species (CITES) policies; identification of threatened species; interface of protected areas databases; organization and mapping of biodiversity data and taxonomic information; invasive alien species; CBD Aichi Biodiversity Targets; improvement of CEPA of taxonomy and biodiversity; and the preparation of various field guides and books.

These capacity building activities have generated partnerships with 29 organizations from various government, non-government, and international organizations; botanic gardens; and academic institutions from ASEAN and Japan.

Since 2009, ACB has provided training to 563 ASEAN nationals as well as 42 representatives from ESABII member countries, specifically Japan, Korea, China, and Mongolia (Table 6).

Other organizations in the region that focus on strengthening taxonomic knowledge are listed as follows (with descriptions in Annex 3):

#### Regional Organizations

- 1. Southeast Asian Regional Centre for Tropical Biology (SEAMEO BIOTROP)
- 2. Flora Malesiana Foundation
- 3. Plant Resources of South-East Asia (PROSEA)

#### Government Institutions

- 1. Indonesian Institute of Sciences (LIPI)
- 2. Herbarium Bogoriense (BO)
- 3. Forest Research Institute Malaysia (FRIM)
- 4. Office of the Forest Herbarium, Royal Forest Department

#### Academic Institutions

- 1. Universiti Brunei Darussalam (UBD)
- 2. National University of Laos
- 3. Universiti Sains Malaysia
- 4. Universiti Malaysia Sabah (UMS)
- 5. University of the Philippines System
  - The Institute of Biology of the University of the Philippines Diliman



- The College of Forestry and Natural Resources (CFNR) in the University of the Philippines Los Baños (UPLB)
- UPLB Museum of Natural History
- 6. Silliman University
- 7. Central Mindanao University
- 8. National University of Singapore
- 9. Kasetsart University

#### **Botanical Gardens**

- 1. Bogor Botanic Gardens
- 2. Cibodas Botanical Garden
- 3. Purwodadi Botanic Garden
- 4. Bali Botanic Garden
- 5. Singapore Botanic Gardens
- 6. Queen Sirikit Botanic Garden (QSBG)

#### Natural History Museums

- 1. National Museum of Brunei Darussalam
- 2. National Museum of the Philippines
- 3. Lee Kong Chian Natural History Museum

#### **Ways Forward**

The ASEAN region needs to build on current efforts to strengthen interest and support for taxonomy. Improved scientific knowledge will help institutions prioritize taxonomic research, particularly on undiscovered species. Discovery

#### Box 14. In Focus: Mr. Teguh Triono, Ph.D.

and understanding of species will facilitate knowledge of biodiversity, functional ecology, and ecological processes of understudied habitats in ASEAN that are undergoing rapid environmental change.

Some recommendations to strengthen taxonomy in ASEAN include the following:

- 1. Assess the Global Taxonomy Initiative Regional Action Plan (RAP) 2010–2015. ACB facilitated and organized the first ASEAN + 3 GTI Regional Workshop: Needs Assessment and Networking in 2009 in the Philippines to address gaps in taxonomy. The RAP 2010– 2015 served as the roadmap in addressing the GTI as implemented in ASEAN. The impacts of the RAP should be assessed to determine future directions for taxonomy in the region.
- 2. Update the RAP 2010–2015 to a Regional Action Plan 2017–2020 for Taxonomy. This updated regional action plan will chart the course for implementing the GTI in ASEAN until 2020.
- Develop an ASEAN program on taxonomy. ASEAN, through ACB, should develop a longterm program that will serve as a common platform to consolidate taxonomic research; facilitate research, including joint expeditions,

Dr. Teguh Triono completed his doctorate in ecology, evolution, and systematics at the School of Botany and Zoology, Australian National University. He specializes in the plant family Sapotaceae, which was also the focus of his master's degree at the School of Plant Sciences at Reading University in the United Kingdom. He has also studied pure and applied plant and fungal taxonomy. Dr. Triono has conducted fieldwork in various parts of Indonesia, ASEAN, and Australia; and shared his knowledge and experience in activities with LIPI, ACB, JAIF, ESABII, The Group on Earth Observations Biodiversity Observation Network (GEO BON), Arnold Arboretum of Harvard University, Department of Agriculture, Fisheries, and Forestry of Australia, and the CBD GTI.

"Fifteen years ago, I had a side job as a gardener and owner of a small plant shop in my final year of undergraduate study in Malang, East Java. That was my first contact with various plants, especially fern and fern allies, and it developed my eagerness to study plant diversity." Dr. Triono related that taxonomy is the primary tool for understanding biodiversity and capturing the linkage between the diversity of living organisms and their habitats. He added, "Knowledge and understanding of these linkages are the foundation of my teaching at the university, my program to document biodiversity with the help of citizen scientists, and my work in the conservation and sustainable use of biodiversity." As program director for biodiversity conservation and sustainable use at the Indonesian Biodiversity Foundation (Yayasan KEHATI), Dr. Triono and his team manage over 100 program sites in three different ecosystems – agriculture, forest, and costal and small islands – throughout Indonesia. He continues to teach taxonomy at the Bogor Agricultural University and works with colleagues at the Gunadarma University on a citizen science database on Indonesia's plant diversity.

Dr. Triono expressed hope for a new generation of taxonomists and the growth of citizen scientists. "In the last five years, I have seen massive environmental damage in many parts of ASEAN. What some people believe as the sixth mass extinction is happening. There is no doubt that habitat loss has caused the extinction of species before they are even documented. We have no time left! We need more taxonomists to identify and document ASEAN's precious biodiversity for their conservation and sustainable use before they disappear."



to maximize technical human resources; improve capacity in light of advances and innovations in technology used in taxonomy; and build a network of taxonomists in the region. A regional network will also help facilitate access to IUCN and other global networks to build taxonomy skills and capacity.

- 4. Strengthen education. taxonomy in Biodiversity and taxonomy can be discussed at all levels of education in subjects such as natural resources, biology, zoology, botany, and many others. There is a need to increase degree and non-degree course offerings in taxonomy. Interest in taxonomy can also be generated by introducing species identification and appreciation in outreach and extra-curricular activities such as tree planting, birdwatching, clean-up activities, and nature walks. Highlighting the importance of field surveys and exploration work may encourage participation. particularly of individuals interested in science, nature, and adventure, and help develop new generations of parataxonomists and taxonomists.
- 5. Scientific work needs to be peer reviewed and published. Results of taxonomic research should be presented in conferences of organizations such as the Society for Conservation Biology (Asia section) and Asia Tropical Biology Network.
- 6. Develop a CEPA plan on taxonomy for ASEAN Member States. Scientific information must be translated into layman's terms for the appreciation of other stakeholders. Champions for taxonomy should also be sought to attract young people into the field.

- 7. Facilitate information and data sharing. Taxonomic information should be made interoperable among databases in AMS by adopting globally accepted interfaces such as the Darwin Core.
- 8. Establish or improve *ex situ* structures such as botanic gardens and natural history museums.
- 9. Strengthen professional organizations on taxonomy in the national, regional, and international levels. This includes reinforcing national organizations, such as the Indonesian Plant Taxonomy Association, and strengthening regional organizations, such as the Asian Fern Society, Flora Malesiana Foundation and PROSEA, to create a greater impact on taxonomy issues at the international level.

There has been increasing support for and cooperation in taxonomy in ASEAN, which bode well for strengthening species information, knowledge, and understanding. Participation in formal taxonomy education remains a challenge in the AMS, but growing awareness from nature enthusiasts, development of field guides, and popularization of biodiversity-friendly activities, such as birdwatching, wildlife photography, nature walks, and plant and tree walks, are spurring an interest in species identification and knowledge and taxonomy.

#### **Box 15. Echoing capacity building in taxonomy** Fulgent P. Coritico

Research Assistant, Center for Biodiversity Research and Extension in Mindanao (CEBREM), Central Mindanao University, Musuan, Bukidnon, Philippines

Mr. Fulgent P. Coritico was a participant in the Advanced Course on the Taxonomy of Bryophytes (mosses) and Pteridophytes (ferns) and Biodiversity Data Organizing on 25 November – 2 December 2014 at the Universitas Dhyana Pura, and the Bali Botanic Garden in Denpasar, Bali, Indonesia. He also attended the Internship Programme on Taxonomic Capacity Building for Bryophytes and Pteridophytes on 20–30 January 2015 in Chiang Mai, Thailand. The training workshop on terrestrial plants (bryophytes and pteridophytes) was conducted to develop and enhance the capabilities of potential ASEAN researchers in understanding nomenclature and applications of taxonomic methods and principles.

Mr. Coritico conducted an echo seminar entitled Taxonomy of Bryophytes and Pteridophytes, Data Organization and Field Guide Preparation at the Central Mindanao University on 24 February 2015, which was attended by 20 participants, including graduate and undergraduate students of the Biology Department and research assistants of CEBREM. He used taxonomic keys and books provided from the training-workshops in Indonesia and Thailand. The echo seminar included presentations on the standard database format for flora and fauna used by ACB; data extraction from online sources and management of field data; basic GIS mapping; and preparation of CEPA materials. Mr. Cortico assisted undergraduate students in biology during the conduct of their theses on the morphology and diversity of pteridophytes in different mountain ecosystems in Mindanao. He guided students in the proper identification of the specimens and data analysis.

Mr. Coritico highlights the importance of participant selection in training-workshops as participants can immediately apply or share what they learn in their own institutions.



# Access and **Benefit-Sharing**

Ensuring the fair and equitable sharing of benefits from the utilization of genetic resources

ABS refers to the agreement between user and provider in the access of genetic resources and how benefits are shared between them.



## Prior and Informed Consent (PIC)

seeks permission from appropriate representatives and shares information on the purpose for accessing genetic resources and traditional knowledge.



## Mutually Agreed Terms (MAT)

states monetary and non-monetary benefits in exchange for access as agreed between user and provider.



### Traditional Knowledge

refers to knowledge of indigenous peoples and local communities that are rich sources of information for bio-product development.



## Compliance

is observance of obligations to ensure sharing of benefits when genetic resources leave a provider.

### **Potential Income** Generation: Creation of products worth billions

**USD 323B** 

worth of global market products

# 6 of 10

**ASEAN Member States** are Parties to the Nagoya Protocol

#### **Development of ABS Frameworks:** More ASEAN Member States are acceding to the Nagoya Protocol and/or developing national ABS policies.

**Opportunities** 

**Research and Development:** 

Advances in biotechnology

# **Ways Forward**

Protect genetic resources from misappropriation

and misuse



#### Raise public awareness and increase stakeholders' participation

### Promote regional cooperation and capacity building

Implement legislation and administrative or policy measures on ABS



Formulate national regulatory and institutional frameworks on ABS

## Accessiand Benefit-Sharing: Ensuring the fair and equitable sharing of benefits from the utilization of genetic resources

Genetic resources have become increasingly valuable over time as the discovery of new medicinal plants and the development of drugs and health supplements from these sources have rapidly progressed. Biotechnology, as an industry that maximizes the potential of these products, boasts of an annual growth of 3.7 percent from 2011 to 2016 with a reported revenue amounting to USD 323 billion (IBISWorld, 2016).

With ASEAN identified as a biodiversity-rich region, it was inevitable for the biotechnology industry to take a keen interest in the resources that the countries in the region have to offer. The ASEAN Member States (AMS) are realizing the need to seize the opportunity to benefit from the use of their own genetic resources.

For AMS providing genetic resources to industries and other sectors, it is imperative that a regulatory system be set in place to ensure that benefits are shared fairly and equitably from the use of the provided genetic resources. This involves a contracting system between the providers and the users of genetic resources. Benefits generated from such interactions can serve as important resources and opportunities for biodiversity conservation, and even as a means to reduce poverty, targeting those who substantially help sustain biodiversity.

The Convention on Biological Diversity (CBD) explicitly states as its third objective the "fair and equitable sharing of benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources 16

With Aichi Biodiversity Target 16 of the Strategic Plan for Biodiversity 2011-2020, Parties to the Convention on Biological Diversity (CBD) have a clear goal: "By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation." As of April 2017, six ASEAN Member States have acceded or ratified the Nagoya Protocol and are establishing national ABS measures.

and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding." Article 15 of the CBD outlines a framework for the implementation of Access and Benefit Sharing (ABS). To achieve this third objective, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the CBD, or the Nagoya Protocol on ABS (NP–ABS), was adopted in Nagoya, Japan at the Tenth Meeting of the Conference of the Parties (COP 10) to the CBD in October 2010.

The NP–ABS, which entered into force in October 2014 after the ratification of the fiftieth instrument, significantly advances the third objective of the CBD and similarly provides incentives to support the first and second objectives. Parties recognize that the Nagoya Protocol provides a framework for greater legal certainty and transparency for both providers and users of genetic resources. Countries acknowledge the need to seek prior informed consent (PIC), and to agree on sharing of benefits through mutually agreed terms (MAT). ABS is seen as a framework wherein PIC, MAT, traditional knowledge (TK), and compliance to these considerations are key elements that will ensure access to genetic resources and fair and equitable sharing of benefits from their utilization are met.

ABS serves as an incentive to conserve biodiversity and provide sustainable livelihood. As such, it could address biodiversity loss by providing incentives to reduce habitat loss, manage invasive alien species, and prevent overexploitation.

ABS could also address biodiversity loss by giving incentives for promoting and preserving cultural knowledge and practices associated with important or potentially important genetic resources. ABS could enhance local science and technology capabilities by adding value to endemic genetic resources including their derivatives through product development and commercialization.

Other ABS-related instruments and processes (Greiber, 2012) include:

- International Treaty on Plant Genetic Resources for Food and Agriculture
- International Convention for the Protection of New Varieties of Plants
- United Nations Convention on the Law of the Sea
- Antarctic Treaty System
- World Trade Organization–Trade-Related Aspects of Intellectual Property Rights

- World Intellectual Property Organization– Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore
- The World Health Organization–Pandemic Influenza Preparedness Framework for the Sharing of Influenza Viruses and Access to Vaccines and other Benefits

## Impact on indigenous peoples and local communities

Biodiversity and indigenous peoples and local communities (IPLCs) in ASEAN are inextricably linked. Just as biodiversity continues to be lost, so are the indigenous culture and knowledge associated with the use of genetic resources. Indigenous peoples living close to biodiversity for generations understand the importance and uses of certain species and ecosystems; thus, much of their knowledge relates to biodiversity, the environment, and their ecological relationships and patterns. Traditional knowledge has been proven to be a valuable source of information on the medicinal and agricultural uses of plants.

Most AMS have diverse cultures and indigenous communities that are governed by their own set of rules or community protocols. These may consist of rituals, customs, practices, and customary laws that relate to the rights of communities over resources and intellectual creations. Community protocols are recognized, for instance, in Sabah, Malaysia and in Bukidnon, southern Philippines. The Sabah Biodiversity Centre, in particular, is implementing the Kinabalu Biocultural Law Project, which aims to support ABS by raising awareness and building the capacity of the





Dusun communities living around Mt. Kinabalu on customary sustainable uses of biodiversity and the protection of traditional knowledge.

#### **Current efforts**

The ASEAN Member States, through the ASEAN Centre for Biodiversity, have been active in enhancing regional awareness on ABS. Key activities conducted include regional workshops with the Secretariat of the Convention on Biological Diversity (SCBD) on ABS prior to COP 10. AMS and Timor Leste were also involved in projects enhancing capabilities on developing policies and national regulatory and institutional frameworks on ABS in collaboration with regional and international partners.

Partners in enhancing capabilities on ABS in ASEAN include the following:

- ASEAN Secretariat
- ASEAN Senior Officials on the Environment
- ASEAN Working Group on Nature Conservation and Biodiversity
- Secretariat of the Convention on Biological Diversity
- United Nations Environment Programme-Global Environment Facility
- United Nations University
- ABS Capacity Development Initiative
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
- Asia-Pacific Network for Global Change Research
- International Union for Conservation of Nature–Asia
- Natural Justice
- Tebtebba
- Third World Network
- National Biodiversity Authority-India
- Japan Bioindustry Association

Capacity development activities are conducted through "learning-by-doing" and "innovating-bylearning" approaches. AMS may need to identify mechanisms to implement ABS principles while developing their legal frameworks on ABS.

#### Ways Forward

The Nagoya Protocol reaffirms that countries have sovereign rights over their natural resources. Measures on ABS need to be established in each of the AMS in the form of domestic legislation, and administrative or policy measures. Similarly, ASEAN needs to have a guiding ABS framework on multilateral benefit-sharing of common and transboundary resources, including associated traditional



knowledge. Consequently, it is important for all AMS to align their regulatory, administrative, or policy measures with the Nagoya Protocol on ABS.

ACB will continue to work with AMS to enhance their capabilities in implementing ABS at the national and regional levels. ACB is also developing a database on traditional knowledge associated with genetic resources found in ASEAN. Developing this database is a way of documenting indigenous cultural knowledge systems to support the rights of IPLCs. Developing measures on access and benefit sharing among the AMS has room for improvement. These improvements should involve public participation, increasing awareness and communication of ABS-related issues, and showing the relevance of ABS in scientific and technological research.

With the adoption of the Nagoya Protocol, national policies related to ABS in AMS would have to be reviewed in harmony with its provisions. Setting a legal framework in place would help facilitate the needed capacities as identified in the ABS regional project baseline study and as

#### Box 16. Fighting for *Euphorbia lactea*

Wichar Thitiprasert

Chairman of National Working Group on Access and Benefit-Sharing, Thailand

In 2002, local farmers and dealers exporting *Euphorbia lactea*, an ornamental plant, informed Thailand's Department of Agriculture (DOA) that a European Union (EU)–based company filed an application for new plant variety protection of six varieties of *Euphorbia lactea*. The company, which is engaged in importing and exporting tropical plants, filed its application with the Community Plant Variety Office, the body responsible for new plant variety protection.

The company tried to claim ownership over these varieties by declaring them as its newly bred varieties. Had the application been approved, the varieties would have been protected in 15 countries in the EU. The company also sent a letter informing Thai farmers and dealers that they will be prosecuted should they continue to export these varieties. These farmers and dealers have been exporting these plants for a long period of time as reported by the Thailand Trading Report. The DOA then coordinated with the Office of Agricultural Affairs, Royal Thai Embassy in Brussels to process the objection against the company over issues of distinctness, uniformity, and stability claims.

The company claimed that *Euphorbia lactea* was produced when grafted on *E. royleana* rootstock. However, the DOA emphasized that the ornamental *E. lactea* produced and exported from Thailand is actually the combination of two species, which are both vegetatively propagated. The company also argued that the genetic resources for these plants did not come from Thailand, and the company itself bred and selected these varieties. The DOA had to obtain information from the local community in Ang Thong Province to disprove the company's claims. In the end, the company withdrew its application and this case has been widely used as an example for raising awareness to rights to genetic resources in Thailand.

Box 17. A look at resource sharing arrangements Tanit Chanthavorn Expert on Traditional Knowledge and Intellectual Property

ABS covers benefit-sharing under mutually agreed terms between providers and users where negotiations should answer the questions: "What do you really want?" and "Are there other options?" The National Center for Genetic Engineering and Biotechnology (BIOTEC) under the Ministry of Science and Technology of Thailand, the country's leading microorganism collection network, shared some experiences on ABS negotiations:

- 1. In 1996, BIOTEC provided samples of a microorganism to Wyeth-Ayerst to screen active compounds for human medicine or agriculture application. It was agreed that Wyeth-Ayerst would provide a service fee and royalty payment in case of commercialization from any product while technology transfer would be paid by BIOTEC. However, BIOTEC never received any royalty payment from the contract because no commercialization occurred.
- 2. In 1998, BIOTEC's contract with Novozyme had two phases. The first phase was similar to Wyeth-Ayerst but with an additional clause stating: "Each Party shall be a recognized CBD Party." In the second phase, BIOTEC considered each step of research and development and negotiated for benefit-sharing through milestone payments (including technology transfer), service fee, and royalty payment in case of commercialization of any product to BIOTEC by Novozyme. This agreement provided monetary benefits to BIOTEC.
- 3. In another arrangement in 2005, BIOTEC prioritized conditions of technology transfer and equal partnership over monetary benefits.
- 4. BIOTEC and Novartis worked to exchange expertise in the study of microorganisms for potential use, which included a service fee, milestone payment, and royalty payment. BIOTEC also provided microorganism strains to be evaluated in a drug screening program, while Novartis provided internship programs and training in Thailand.
- 5. BIOTEC worked with Shiseido and the National Institute of Technology and Evaluation (NITE) of Japan on a contract similar to NOVARTIS. This contract involved compliance with Plant Variety Protection Act B.E. 2542 as they used general domestic plant varieties. The contract of BIOTEC with NITE aimed to jointly conduct a taxonomy program on acetic acid bacteria, fungi, and yeast found in Thailand. Both parties agreed to develop human resources and share information.

provided for in the Nagoya Protocol's Article 22 on Capacity. Article 22 outlines the key areas, as well as measures, by which capacity building and development may be addressed in support of the implementation of the Protocol.

With the Nagoya Protocol on ABS already in force, effective national legislative and administrative or policy measures on ABS should be formulated, developed, and implemented as soon as possible. Environmental policies, institutional frameworks, and legislation all form a part of an interlinked whole and cannot be meaningful in isolation. With this in mind, regional, national, and local entities and policymaking bodies are called upon to consider the following:

- Formulate and develop ABS measures supported by regulations, guidelines, and manuals for effective implementation and enforcement.
- Recognize linkages among policy, institutional, and regulatory measures. Policy should emphasize the integrated nature of the elements of an ABS regime. Institutional arrangements should be coordinated in implementing the policy and enforcing the law.

- Strengthen environmental legislation with an ABS law in mind. This requires management and technological factors that encourage compliance with ABS legal requirements including, but not limited to, trainings dedicated to compliance, availability of affordable technologies (e.g., laboratory equipment), strong governmental will to enforce the law including capacity building for compliance, monitoring, and public support for biodiversity conservation concerns.
- Encourage public participation, including indigenous peoples and local communities, by involving, informing, and consulting them in planning, management, and other decisionmaking activities. All stakeholders must be made aware of the value of ABS in terms of providing livelihood to IPLCs through benefits (monetary and non-monetary) derived in exchange for right of access.
- Involve relevant ASEAN bodies to further expound on the agreement by the ACB Governing Board to pursue regional cooperation on ABS with capacity building activities on ABS measures, including the Nagoya Protocol, through ACB.

#### Box 18. Knowledge sharing on genetic resources

Viet Nam is blessed with rich plant biodiversity, particularly species used for medicinal purposes. Over 4,000 species of medicinal plants have been identified in Viet Nam, majority of which are recognized based on knowledge and experience of indigenous peoples and or local communities.

The annual demand for medicinal plants is pegged at 50,000 to 60,000 tons, and the government is aware of the importance of managing these resources properly. Since 1988, the National Institute of Medicinal Materials (NIMM) under Viet Nam's Ministry of Science and Technology has acted as the focal point in the conservation of medicinal genetic resources and breeds. NIMM conducts surveys, national inventory, and conservation projects on these medicinal genetic resources. NIMM manages seven conservation gardens and has collected nearly 900 species of medicinal plants. The institute supports conservation practices through various community programs such as trainings, designing a development model of violet cardamom, and the conservation and development of three indigenous medicinal plants including *Cortex acanthopanacis* Radicis, Valeriana jatamansi Jones, and *Fallopia multiflora*.

In the past years, many international cooperation activities have been conducted with foreign universities and countries (such as China, Japan, Korea, Malaysia, and Thailand), and international organizations (such as Botanic Gardens Conservation International, International Union for Conservation and Nature, and Fauna & Flora International) and many other non-government organizations (such as Valhetas Swiss Intercooperation). These collaborations have benefited all parties by sharing knowledge, technology, and best practices; promoting fair trade; and mobilizing financial resources to conserve genetic medicinal resources. Viet Nam has showcased that proper management and inventory of genetic resources will make it easier to regulate access and channel benefit-sharing to the right target and activities necessary for conservation.

Source: Excerpt from presentation during the 4th Regional Workshop on ABS, December 2014, Hanoi, Viet Nam

# Wildlife Conservation Protecting ASEAN's natural heritage



Myanmar HAWKSBILL TURTLE Eretmochelys imbricata Critically Endangered

**Threats:** tortoise shell trade, egg collection, and slaughter for meat, destruction of foraging habitat, hybridization with other species, entanglement of marine debris



Threats: Commercial hunting, illegal collection of eggs and crocodiles, habitat loss and degradation, incidental capture/drowning in fish gear

Singapore FRESHWATER CRAB

Johora singaporensis Critically Endangered

Threats: stream

acidification



Lao PDR **IRRAWADDY DOLPHIN** Orcaella brevirostis Critically Endangered

Threats: direct mortality from fisheries interaction, vessel strikes, and habitat loss and

degradation

### Cambodia INDIAN BLACK VULTURE

Sarcogyps calvus Critically Endangered

Threats: demise of wild ungulates, intensification of agriculture, increased sophistication of waste disposal techniques, direct persecution and disease



exploitation for horticultural

Viet Nam VIETNAMESE PAPHIOPEDILUM Paphiopedilum vietnamense Critically Endangered

Threats: ruthless collection for regional and international trade, purposes, large exports, deforestation, fires and logging

Philippines PHILIPPINE EAGLE Pithecophaga jefferyi Critically Endangered

Threats: forest destruction and fragmentation through commercial timber extraction and shifting cultivation

> Brunei Darussalam MALAYAN SUN BEAR Helarctos malayanus Vulnerable

Threats: habitat loss and commercial hunting

Malaysia RED LAUAN Shorea acuminata **Critically Endangered** 

Threat: habitat loss

Indonesia SUMATRAN RHINOCEROS Dicerorohinus sumatrensis Critically Endangered

Threats: poaching and reduced population viability

# **ASEAN's Response**



**Develop and** implement wildlife conservation laws

> Strengthen cooperation on law enforcement and illegal wildlife trade

Increase area and number and improve effective management of protected areas

Prepare endangered species action plans



transboundary conservation measures

Increase research on species at risk



Improve communication, education, and public awareness campaigns



**Develop breeding** and captive propagation programs

### Allies in Wildlife Conservation







FREELAND



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# Wildlife Conservation: Protecting ASEAN's natural heritage

With increasing global environmental pressures, it is quite evident that the world's species and ecosystems are under serious threat. All forms of wildlife face risks from the degradation of habitats through illegal logging, land conversion, pollution and others; overexploitation and use of illegal and destructive harvesting practices; and poaching and trafficking of wild plants and animals. These and many other threats undermine the population growth, diversity, and breeding and reproductive behavior of wildlife.

Thousands of species are endangered and on the brink of extinction, leading to the possible loss of both endemic and economically important species. The massive loss of wildlife has led to rates of extinction that are considered at least 100 to 1,000 times higher than nature intended. The World Wide Fund for Nature's (WWF) 2014 Living Planet Report found wildlife populations of vertebrate species—mammals, birds, reptiles, amphibians, and fish—have declined by 52 percent over the last 40 years.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which aims to regulate trade in the world's species, provides varying degrees of protection to thousands of species to ensure their survival. CITES protects roughly 5,600 species of animals and 30,000 species of plants against overexploitation through international trade. Vigilance among Parties and enforcement of wildlife law and trade restrictions will hopefully ensure the survival of critically endangered species.

# 12

Wildlife conservation addressed in Aichi Biodiversity Target 12, which states that "By 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained." Target 12 is particularly significant to ASEAN where overexploitation of biological resources is a major driver of biodiversity loss.

Wildlife conservation is particularly significant in ASEAN as the region provides habitats for some of the world's most iconic and increasingly vulnerable species. These species, which are essential to the cultural and natural heritage of the region, include the Asian elephant; Sumatran, Malayan and Indo-Chinese tigers; orangutan; Sumatran and Malayan rhinoceros; and hornbill, among many others. In addition to various environmental pressures, ASEAN is also a global hotspot for the poaching, trafficking, and consumption of illegally traded wildlife parts and products. These include live animals and bush meat; bones, rare plants, scales, and other parts used for traditional medicine; wildlife products such as exotic leather goods and wooden musical instruments; timber; decorations and luxury products; pets and zoo exhibits; and souvenirs and collectors' trophies.

These and various other threats may already mean the loss of many unrecorded and little studied species that may have infinite benefits to humankind. Thus, saving wildlife species and their habitats are priority programs for environment organizations across ASEAN.

### Global efforts in wildlife conservation

Various multilateral environmental agreements (MEAs) address wildlife conservation, such as the Convention on Biological Diversity (CBD), CITES, Convention on Migratory Species (CMS), and Convention on Wetlands of International Importance or Ramsar Convention. CITES is particularly relevant as it aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

Another important endeavor in wildlife conservation is the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species, which has assessed 79,800 species and provides a comprehensive information source on the global conservation status of animal, fungi, and plant species. The Red List also provides information about the range, population size, habitat and ecology, use and/or trade, threats, and conservation actions that will help inform necessary conservation decisions. The IUCN Red List is a powerful tool for biodiversity conservation policy and action and has moved countries to develop their own national Red Lists. The IUCN Red List is managed by the IUCN Global Species Programme, which implements global species conservation initiatives, including Red List biodiversity assessment projects, to assess the status of species for the IUCN Red List and on the ground conservation projects.

At the international level, the United Nations Office on Drugs and Crime (UNODC) is the lead department working on issues related to wildlife and forest crime. UNODC is a global leader in the fight against illegal drugs and international crime, and, increasingly, environmental crime, specifically the illegal wildlife trade. The international nature of environmental crime requires the expertise and support of Interpol, which not only helps address crimes but provides support in information sharing and capacity building.

Establishment and effective management of terrestrial and marine protected areas (PA) continue to be effective measures in the conservation of wildlife species and habitats. Identification of key biodiversity areas (KBAs) and Important Bird Areas (IBAs) allow modification of boundaries or establishment of additional PAs to ensure that species are effectively protected.

### Conserving ASEAN's wildlife

As indicated in Table 1 in the section on Forest, threatened species constitute 16 percent of 14,591 species assessed by the IUCN in ASEAN from 1996 to 2015. More plants are threatened compared to animals. Mammals and birds constitute 84 percent of all threatened wildlife as these groups are the most affected by deforestation. Table 7 lists some of the critically endangered wildlife in ASEAN.



AMS		Flora	Fa	Fauna		
AIVIS	Scientific Name	Common Name	Scientific Name	Common Name		
Brunei Darussalam	Anisoptera reticulata		Batagur borneoensis	Painted Terrapin		
	Dipterocarpus globosus		Dicerorhinus sumatrensis	Sumatran Rhinoceros		
	Hopea latifolia		Manis javanica	Sunda Pangolin		
	Parashorea malaanonan	White Lauan	Rhinoplax vigil	Helmeted Hornbill		
	Shorea laxa	Yellow Meranti	Presbytis chrysomelas	Bornean Banded Langur		
Cambodia	Aquilaria crassna	Eagle Wood	Aaptosyax grypus	Mekong Giant Salmon Carp		
	Shorea hypochra	White Meranti	Crocodylus siamensis	Siamese Crocodile		
	Dipterocarpus turbinatus		Bos sauveli	Grey Ox		
	Hopea helferi		Houbaropsis bengalensis	Bengal Florican		
	Shorea thorelii		Sarcogyps calvus	Indian Black Vulture		
Indonesia	Paphiopedilum intaniae	Intani Paphiopedilum	Ailurops melanotis	Talaud Bear Cuscus		
	Parashorea lucida	White Meranti	Ceyx sangirensis	Sangihe Dwarf Kingfisher		
	Shorea balangeran	Red Balau	Axis kuhlii	Bawean Hog Deer		
	Dryobalanops keithii		Cacatua sulphurea	Yellow-crested Cockatoo		
	Hopea sphaerocarpa		Macaca niara	Black Crested Macaque		
Lao PDR	Diospyros mun	Ebony	Catlocarpio siamensis	Giant Carp		
	Glyptostrobus pensilis	Chinese Swamp Cypress	Cuora bourreti	Bourret's Box Turtle		
	Impatiens angustisepala	chinese swamp cypress	Datnioides pulcher	Siamese Tiger Perch		
	Hopea thorelii			Slender-billed Vulture		
	and many second	Gratix's Paphiopedilum	Gyps tenuirostris	Large-antlered Muntjac		
	Paphiopedilum gratrixianum	Gratix's Paphiopedilum	Muntiacus vuquangensis	Large-antiered Muntjac		
Malaysia	Actinodaphne cuspidata		Calidris pygmaea	Spoonbill Sandpiper		
	Hopea johorensis		Calamaria prakkei	Prakke's Reed Snake		
	Parashorea macrophylla	White Seraya	Liphistius kanthan	Kanthan Cave Trapdoor Spider		
	Shorea acuminata	Red Lauan	Pongo pygmaeus	Bornean Orangutan		
	Hopea subalata		Pristis pristis	Largetooth Sawfish		
Myanmar	Anisoptera scaphula		Ardea insignis	White-bellied Heron		
	Dipterocarpus baudii		Aythya baeri	Baer's Pochard		
	Hopea apiculata		Glyphis siamensis	Irrawaddy River Shark		
	Magnolia gustavii		Geochelone platynota	Burmese Starred Tortoise		
	Sonneratia griffithii		Rhinopithecus strykeri	Burmese Snub-nosed Monkey		
Philippines	Alocasia sinuata	Alocasia Quilted Dreams	Anthracoceros montani	Sulu Hornbill		
	Nepenthes attenboroughii	Attenborough's Pitcher Plant	Crateromys australis	Dinagat Bushy-tailed Cloud Rat		
	Shorea palosapis	Philippine Mahogany	Crocodylus mindorensis	Philippine Crocodile		
	Vatica pachyphylla		Pandaka pygmaea	Dwarf Pygmy Goby		
	Tectona philippinensis	Philippine Teak	Sus cebifrons	Visayan Warty Pig		
Singapore	Anisoptera megistocarpa		Manis javanica	Sunda Pangolin		
	Bruguiera hainesii		Johora singaporensis	Singapore Freshwater Crab		
	Shorea gibbosa	Yellow Meranti	Pandaka pygmaea	Dwarf Pygmy Goby		
	Shorea platycarpa	Light Red Meranti	Parathelphusa reticulata	Swamp Forest Crab		
	Vatica maingayi		Fregata andrewsi	Christmas Frigatebird		
Thailand	Cycas tansachana		Balantiocheilos ambusticauda	Burnt-tailed Barb		
	Impatiens adenioides		Betta simplex	Krabi Mouth Brooding Bett		
	Paphiopedilum thaianum	Thai Paphiopediulum	Eretmochelys imbricata	Hawksbill Turtle		
	Terniopsis ubonensis		Eurochelidon sirintarae	White-eyed River-Martin		
	Paraboea tarutaoensis		Thalasseus bernsteini	Chinese Crested-Tern		
Viet Nam	Amorphophallus interruptus		Cuora picturata	Southern Viet Nam Box Turtle		
	Cycas fugax		Lophura edwardsi	Edwards's Pheasant		
	Paphiopedilum vietnamense	Vietnamese Paphiopedilum	Nomascus nasutus	Eastern Black Crested Gibbon		
	Cycas pachypoda		Oreolalax sterlingae	Sterling's Toothed Toad		
	Typhonium penicillatum		Sewellia breviventralis	Butterfly Loach		

### Table 7. Some of ASEAN's most critically endangered species

Source: IUCN Red List of Threatened Species, retrieved from http://www.iucnredlist.org/ on 18 October 2016.

Various projects have been established to strengthen the populations of the region's most at risk species. These include efforts to determine biodiversity status of wildlife; *in situ* and *ex situ* conservation programs; development of law and policy; strengthened law enforcement; and provision of institutional and community support for wildlife conservation, among others.

### Assessment of biodiversity status

All AMS continue to conduct biodiversity assessments to evaluate the conservation status of species, and list them appropriately, when necessary, in the IUCN Red List or CITES. Other AMS, such as Singapore, Thailand, and Viet Nam, have developed and updated their own national Red List.

### Transboundary conservation

Biodiversity knows no boundaries, and this is particularly evident in ASEAN where various species roam among countries with shared political borders. Migratory species travel between countries as part of their life cycle. While ASEAN has always stressed the importance of a common responsibility over the region's shared natural resources, this is particularly evident in AMS that are land-linked, share specific resources and ecosystems, and provide habitats for migratory species. Addressing common issues requires transboundary cooperation to overcome different policy, legal, and institutional structures; management and governance regimes; and social, cultural and economic contexts and systems. Some of the transboundary programs and protected areas that have been established to overcome complex relations between countries include the following:

Greater Mekong Subregion Core Environment Program and Biodiversity Conservation Corridors Initiative

In 1992, the six countries that form the Greater Mekong Subregion (GMS) – Cambodia, the People's Republic of China, Lao PDR, Myanmar, Thailand, and Viet Nam – entered an economic cooperation program, with the assistance of the Asian Development Bank (ADB), to facilitate the implementation of high-priority projects across various sectors. The Mekong River is a major source of food and livelihood, farmland irrigation and energy; facilitates transport; and provides habitats for vital freshwater species. The GMS also embraces unique flora and fauna, some of which have evolved in isolation on the Cardamom and Annamite mountains across the GMS (ADB, n.d.). ADB, country members, and other partners have been working on emerging environmental concerns that facilitated the formation of the GMS Core Environment Program and Biodiversity Conservation Corridors Initiative (CEP-BCI). The program consolidates environmental initiatives under a single integrated program to achieve a poverty-free and ecologically-rich GMS by mainstreaming sound environmental management across all GMS economic cooperation program sectors to enhance their development impact and sustainability (GMS) Environment Operations Center, 2011).

### International Tropical Timber Organization (ITTO)/CBD Collaborative Initiative for Tropical Forest Biodiversity

The joint ITTO/CBD Collaborative Initiative for Tropical Forest Biodiversity aims to enhance biodiversity conservation in tropical forests with the direct participation of local stakeholders. It addresses the main drivers of biodiversity loss in tropical forests: deforestation and



forest degradation. The initiative supports ITTO producer member countries in reducing biodiversity loss through the implementation of the CBD Programme of Work on Forest Biodiversity, focusing on the common objectives of the Strategic Plan for Biodiversity 2011–2020 and the ITTO Action Plan. Projects in ASEAN include:

- Management of the Emerald Triangle Protected Forests Complex to promote cooperation for transboundary biodiversity conservation between Thailand, Cambodia, and Lao PDR.
- Promoting biodiversity conservation in Betung Kerihun National Park as the transboundary ecosystem between Indonesia and the state of Sarawak in Malaysia.
- Buffer-zone management for the Pulong Tau National Park with the involvement of local communities in Sarawak, Malaysia.
- Promoting the conservation of selected high-value indigenous species of Sumatra, Indonesia.

### Emerald Triangle Protected Forests Complex

The Emerald Triangle Protected Forests Complex is the last refuge for populations of more than 50 wildlife species on the IUCN Red List, including 10 that are listed as critically endangered. The complex covers Pha Taem National Park, Kaeng Tana National Park, Phu Jong-Na Yoi National Park, Yot Dom Wildlife Sanctuary, and Buntrarik-Yot Mon Wildlife Sanctuary (Thailand); Phou Xieng Thong National Biodiversity Conservation Area and Dong Khanthung Protected Forest (Lao PDR); and Preah Vihear Protected Forest The program aims to initiate (Cambodia). a management planning process using the transboundary conservation area (TBCA) framework; enhance protection and monitoring of biodiversity in biological resources of TBCAs with the involvement of local communities and stakeholders; and strengthen the protection of transboundary habitats of endangered wideranging species in the Emerald Triangle (Hwanok et al., 2016).

### **Species conservation**

### In situ

The establishment of effectively managed protected areas is the best strategy for wildlife protection. Such areas need extensive monitoring to ensure that they continue to protect species and habitats. Species and ecosystem

assessments may yield the identification of IBAs and KBAs, some of which may not be part of existing protected area systems. Protected areas that comprise IBAs and KBAs are critical to the protection of species and prevention of extinctions.

Efforts to increase the number of PAs and ensure their effective management continue to be part of measures to address biodiversity loss in ASEAN Member States. Brunei Darussalam, for instance, is increasing gazetted forest reserves from 41 percent to 55 percent of the country's total land area to strengthen biodiversity and ensure environmental stability, maintenance of ecosystem services, and species conservation.

Many PAs are also under threat because they provide habitats for economically important species. In Thailand, smuggling of the Siamese rosewood, which grows in 34 sanctuaries, has reached alarming proportions. Forests are plundered for high-priced orchids, including the Siam orchid, golden bow dendrobium or fried egg orchid (*Dendrobium chrysotoxum*), skyblue Rhynchostylis (*Rhynchostylis coelestis*), and Phoenix orchid, and other plants such as the Indian birthwort (*Aristolochia indica*), popped rice, ball fern, and Bua Pud (*Rafflesia kerrii* Meijer).

### Species Conservation Programs

Various species conservation programs have been implemented to protect remaining populations of critically endangered species in collaboration with regional and international conservation organizations.

In Cambodia, projects were created to protect species such as the Indo-Chinese tiger (Panthera tigris corbetti), elephant (Elephas maximus), Eld's deer (Cervus eldii), wild water buffalo (Bubalus arnee), and hog deer (Axis porcinus). Some success has been noted as populations have increased through collaboration with IUCN, Wildlife Conservation Society (WCS), WWF, Conservation International, Fauna & Flora International (FFI), Wildlife Alliance, and BirdLife International, among others. Other programs include the Mekong Giant Catfish and Dolphin protection programs, Wild Vulture Feeding programs, and Rhino and Elephant Conservation Strategies.

Indonesia has prioritized a number of species for protection. In the marine and fisheries sector, these include sea turtle, dugong (*Dugong dugon*), Napoleon fish (*Cheilinus undulates*), Toli shad fish (*Tenualosa toli*),



banggai (*Pterapogon kauderni*), cardinal fish, ornamental coral, freshwater turtle, shark, sea bamboo, Indonesian shortfin eel (*Anguilla bicolor bicolor*), arwana, sea horse, Lola, Kima, and whale. Programs are also in place for the Javan rhino (*R. sondaicus*), Sumatran tiger (*Panthera tigris sumatrae*), Sumatran elephant (*Elephas maximus sumatranus*), Roussa pig, Anoa, Javan gibbon (*Hylobates moloch*), orangutan, proboscis monkey, komodo dragon (*Varanus komodoensis*), Bali starling or Bali myna (*Leucopsar rothschildi*), Maleo (*Macrocephalon maleo*), Javan hawk-eagle (*Nisaetus bartels*i), and small yellow crested caccatua (*Cacatua sulphurea*).

Lao PDR is home to six different gibbon species, including four species of highly threatened crested gibbons. As the country is the best hope for the conservation of some of these gibbon species, the government works with a number of conservation organizations and prepared a national gibbon conservation action plan in 2011 with the assistance of FFI. A major initiative for the protection of the saola (Pseudoryx nghetinhensisis) is being undertaken by King Mongkut's University of Technology Thonburi (KMUTT) in collaboration with the IUCN Species Survival Commission (SSC) Saola Working Group, with support from a Critical Ecosystem Partnership Fund (CEPF)/IUCN small grant, WCS, WWF, and the MacArthur Foundation. There are other programs for other endangered species in Lao PDR, including the serow (Capricornis milneedwardsii) and sambar deer (Rusa unicolor).

Projects and plans established in Malaysia include the National Tiger Conservation Action Plan 2008–2020; National Elephant Conservation Action Plan; Management and Ecology of Malaysian Elephants Project; Pygmy Elephant Source-Strategic Plan of Action; Orangutan Action Plan 2012–2016; and National Plan of Action for Conservation and Management of Sea Turtles. Projects are also in place for the conservation of totally protected species such as the proboscis monkey.

Myanmar has established conservation programs for sea turtles, sharks, and the Irrawaddy dolphin (*Orcaella brevirostris*), and two endemic species, the Myanmar golden deer (*Cervus eldi thamin*), and Myanmar star tortoise, (*Geochelone platynota*), among others.

In the Philippines, programs have been developed for the protection of the endangered Philippine eagle (*Pithecophaga jefferyi*), which is undertaken by the Philippine Eagle Foundation Inc. and Philippines Raptors Conservation Program; and tamaraw (*Bubalus mindorensis*) by the Tamaraw Conservation Program. Projects for the conservation of the Philippine cockatoo (*Cacatua haematuropygia*), Philippine tarsier (*Tarsius syrichta*), Philippine crocodile (*Crocodylus mindorensis*), and marine turtles, among others, are ongoing.

Singapore has been implementing programs to restore or recreate degraded habitats and conserve and recover native species, including birds, dragonflies, and plants. The government's conservation work with Oriental pied hornbills (*Anthracoceros albirostris*) has received national and international attention, and such work is being extended to other species.

Thailand aims to conserve and restore 20 animal species and 10 plant species, which includes conservation action for tiger (*Panthera tigris*), Asian elephant (*Elephas maximus*), Malayan tapir (*Tapirus indicus*), Irrawaddy dolphin (*Orcaella brevirostris*), dugong (*Dugong*  dugon), sarus crane (*Grus antigone*), Eld's deer (*Panolia eldii*), hornbill, Gurney's pitta (*Hydronis gurneyi*), black-necked stork (*Ephippiorhynchus asiaticus*), Siamese fireback pheasant (*Lophura diardi*), giant soft shell turtle (*Chitra chitra*), giant clam (*Tridacna gigas*), giant mountain crab (*Indochinamon bhumibol*), regal crab (*Thaiphusa sirikit*), Himalayan newt (*Tylototriton verrucosus*), Chaophraya giant carp (*Catlocarpio siamensis*), golden birdwing (*Troides spp.*), and water lily (*Crinum thaianum*).

In 2011, Thailand's Department of National Parks, Wildlife and Plant Conservation established a project for the return of wild orchids to the forest, where some rare and endangered wild orchid species were selected and propagated with the tissue culture technique. Facilitated by the Royal Development Project, the initiative returned the following species into the wild: silver dendrobium (Dendrobium formosum), blue foxtail (*Rhynchostylis coelestis*), Chang Kra (Rhynchostylis gigantea), vanda (Vanda denisoniana Bens. Rchb.f.), and aerides (Aerides *falcata*). Through other agencies, the following species have also been returned to Thai forests: lesser blue vanda (Vanda coerulescens), Mrs. Godfroy's lady slipper (Paphiopedilum godefroyae), and yellow Chantabun dendrobium (Dendrobium friedericksianum).

In 2015, Thailand, supported by the Global Environment Facility (GEF), created the Project of Conserving Habitats for Globally Important Flora and Fauna in Production Landscapes to return the sarus crane to the wild, decrease habitat loss of water lilies, and conserve the habitats of the spoon-billed sandpiper, one of the world's critically endangered migratory birds.

### Wildlife corridors and flyways

Wildlife corridors are crucial pathways between protected areas and critical habitats, particularly in areas where habitats are fragmented and species may need to migrate through pockets of areas in their life cycle. Wildlife corridors ensure that natural pathways allow the movement of species to hunt for food, breeding, and reproduction.

The Southern Cardamom Biodiversity Corridor serves as a critical wildlife corridor to close gaps between protected areas in the Cardamom Range to protect 250 Asian elephants still found in Cambodia. Around 30 Indochinese tigers are also estimated to survive in the habitat (Rainforest Trust, n.d.).

The Kenyir Wildlife Corridor in northeastMalaysia connects Taman Negara National108 ASEAN Biodiversity Outlook 2

Park, Malaysia's largest national park and an ASEAN Heritage Park, to other forests in Terengganu. It provides habitats to 40 mammal species, including 15 threatened with extinction such as elephants, gibbons, tigers, tapirs, and even black panthers (melanistic leopards). The forest is also home to nearly 290 species of birds, including nine of 10 of Malaysia's hornbill species (Hance, 2012).

Malaysia also balances agriculture and biodiversity through the Stability of Altered Forest Ecosystems (SAFE) project. With funding from Sime Darby Foundation and managed by the South East Asia Rainforest Research Partnership (SEARRP), the SAFE project aims to maintain and study tropical wildlife corridors along rivers as the land is converted. The idea is that these corridors can connect local populations of wildlife, including orangutans that have become isolated by their fragmented habitat. SAFE's long-term studies could prove invaluable for determining the ideal design of wildlife corridors in agribusiness landscapes throughout ASEAN (Cudmore, 2016).

Wildlife corridors also facilitate movement between wild spaces in urban settings. In Singapore, the Eco-Link@BKE is an ecological bridge that spans the Bukit Timah Expressway, connecting Bukit Timah Nature Reserve with the Central Catchment Nature Reserve. The first of its kind in ASEAN, the Eco-Link@BKE aims to restore the ecological connection between two nature reserves, allowing wildlife to expand their habitat and exchange genetic material. (NParks, n.d.).

Collaboration in ASEAN and with international partners ensures that migratory species are protected in the entirety of their range. In relation to bird species, all AMS are members of the East Asian-Australasian Flyway Partnership, which aims to ensure that migratory waterbirds and their habitats in the EAAF are recognized and conserved through the development of flyway networks; enhanced communication, education and public awareness activities; research and monitoring; capacity building; and development of flyway wide approaches to conservation (East Asian-Australasian Flyway Partnership, n.d.)

### Ex Situ

All AMS have *ex situ* programs to conserve and protect species and genetic resources, including wildlife rescue centers, training and rehabilitation centers, zoos, natural history museums, arboreta, gene banks, and others. Development and number of such programs, however, are uneven among AMS.

### Illegal wildlife trade

The illegal trade of animals and plants is classified as a wildlife crime. The region's rich biodiversity and increasing demand from outside the region for wildlife products make illegal wildlife trade a lucrative business. Illegal wildlife trade in the ASEAN region, including in the Asia Pacific, is estimated at USD 20 billion per year. The amount is equivalent to about one-fourth of the total value of transnational organized crime in the region (UNODC, 2013).

The UN Office on Drugs and Crime ranks illegal trade of timber-based products from and within the region as the second biggest criminal activity, next to the illegal trade of counterfeit goods. The most illegally traded wildlife in the ASEAN region range from mammals to fish, orchids to exotic birds, and corals to reptiles (Table 8).

Wildlife crime has a negative impact on a country's biodiversity, economy, and national security. Illegal wildlife trade, when linked to organized crime, violence, corruption and armed conflict, may destabilize governments and threaten regional security (Zimmerman, 2003).

Part of the problem lies in inadequate law enforcement and coordination among government agencies, and low public awareness on the importance of reducing the incidence of illegal wildlife trade. Law enforcement agencies need to form an organized front to effectively combat illegal wildlife trade, whether they are individual efforts or part of an organized crime.

Leading efforts against illegal wildlife trade is the ASEAN Wildlife Enforcement Network (ASEAN-WEN), which is a mechanism for countries to share information and learn best practices. It has links with the CITES offices, Interpol, U.S. Fish and Wildlife Service, U.S. Department of Justice, and other wildlife law enforcement groups. ASEAN-WEN assists AMS in adopting effective and enforceable legislation for CITES implementation; promotes networking among relevant law enforcement authorities to curb illegal trade in wild fauna and flora; promotes research, monitoring, and information exchange on CITES-related issues; encourages industry associations/traders, groups, trade and local communities to comply with legal and sustainability requirements of CITES and national regulations on trade in wild fauna and flora; supports research and capacity building on sustainable management of trade in wild fauna and flora; encourages greater regional cooperation on specific issues; and seeks sufficient technical and financial assistance through collaborative initiatives. Each AMS is expected to establish a national inter-agency task force and cooperation models among police, customs, and environmental officers, These groups are the enforcing mechanisms of ASEAN-WEN tasked to halt national and transnational illegal wildlife trade.

Species	Common Name	Country	Traded Through	Red List Status	Individuals	Year
Dendrobium hybrid		Thailand	Exported orchids		10,000,000	2012
Phalaenopsis hybrid		Thailand	Exported orchids		3,000,000	2012
Aquilaria crassna	Agar Wood; Eagle Wood	Thailand	Exported noncacti/nonorchid	CR	600,000	2012
Aquilaria crassna	Agar Wood; Eagle Wood	Viet Nam	Exported noncacti/nonorchid	CR	450,000	2012
Vanda hybrid		Thailand	Exported orchids		900,000	2012
Scleropages formosus	Asian Arowana; Asian Bonytongue; Golden Arowana; Golden Dragon Fish; Kelesa	Indonesia	Exported fish	EN	70,000	2012
Hippocampus kuda	Yellow Seahorse; Estuary Seahorse; Oceanic Seahorse; Spotted Seahorse	Viet Nam	Exported fish	VU	40,000	2012
Crocodylus siamensis	Siamese Crocodile	Cambodia	Exported reptiles	CR	38,000	2009
Acienser schrenckii	Amur Sturgeon	Malaysia	Imported fish	CR	20,000	2012
Crocodylus siamensis	Siamese Crocodile	Viet Nam	Exported reptiles	CR	13,000	2012

Table 8. Some of the most illegally traded wildlife in ASEAN

Source: UNODC, 2013

Important resolutions and decisions by ASEAN leaders have contributed to strengthening policy against illegal wildlife trade. These include:

- The 33rd ASEAN Inter-Parliamentary Assembly (AIPA) Meeting in 2012 in Lombok, Indonesia approved a resolution calling for stronger law enforcement and regional cooperation to combat wildlife crime. The resolution called upon AIPA Member Parliaments to place wildlife crime in the permanent agenda of the ASEAN Senior Officials Meeting on Transnational Crimes (SOMTC) and ASEAN Chiefs of Police (ASEANAPOL) AIPA Resolution on "Strengthening Law Enforcement and Regional Cooperation to Combat Wildlife Crime".
- The East Asia Summit (EAS) in August 2013 endorsed wildlife crime as a new threat under the non-traditional security and non-proliferation purview in the region.
- Officials at the 22nd Asia-Pacific Economic Cooperation (APEC) Leaders' Meeting in 2014 in China made a commitment to treat wildlife trafficking crimes seriously and continue efforts to combat wildlife trafficking through international cooperation to reduce the supply of and demand for illegally traded wildlife.
- Delegates at the 9th East Asian Summit in November 2014 in Nay Pyi Taw, Myanmar adopted the East Asia Summit Declaration on Combating Wildlife Trafficking.

Other organizations that support actions against illegal wildlife trade in ASEAN are the ASEAN Wildlife Forensics Network, World Customs Organization, CITES Secretariat, Wild Aid, UNODC, TRAFFIC Southeast Asia, TRACE Forensics Network, US Agency for International Development, Freeland Foundation, and the ASEAN Centre for Biodiversity.

### Law and Policy

ASEAN Member States have made significant progress in the development of wildlife legislation (Table 9).

In 2010, the Philippine Supreme Court introduced the Writ of Kalikasan, a legal remedy that was designed to protect the constitutional right of Filipino citizens to "a balanced and healthful ecology." In 2013, environmental and religious groups filed a petition for a Writ of Kalikasan in connection with the grounding of

the USS Guardian, a US Navy minesweeper, at the Tubbataha Reefs Natural Park, a renowned marine protected area with distinctions as a UNESCO World Heritage Site, Wetland of International Importance under the Ramsar Convention, and ASEAN Heritage Park. The ship was dismantled and removed from the reef in March 2013. Petitioners reiterated their call for the issuance of the Writ and a Temporary Environmental Protection Order (TEPO) in 2014, underscoring the extent of the damage to the corals (DENR, 2014).

### Institutional and community support

### Community participation

Public participation, particularly of indigenous peoples and local communities (IPLCs) and other groups residing within or in the vicinity of protected areas, is vital to successful biodiversity conservation measures. Local volunteer groups are crucial to monitoring and law enforcement activities because of their familiarity with the territory, other local communities, and the biodiversity found within the park. At the Mount Kitanglad Range Natural Park, the Kitanglad Guard Volunteers (KGV), composed of members of IPLCs, contribute to patrolling and law enforcement activities with funding from local government units.

### Biodiversity Information Management

Information sharing and management are important to making science-based decisions in conservation management. Biodiversity assessments provide critical information on the status of species, highlighting the importance of data in the development of databases, Clearing-House Mechanisms (CHMs), and the development of knowledge products such as IUCN and National Red Lists of endangered species.

### Training and capacity building

Extensive training and capacity building protected strengthen area management in various aspects of wildlife conservation. These require collaboration with various organizations with expertise in areas such as taxonomy; ecological studies and assessment; environmental law and policy; patrolling and monitoring on land and sea; arrest and apprehension; paralegal training; biodiversity information and management; community development; and communication, education, and public awareness.

### Table 9. Significant wildlife legislation in ASEAN

AMS	Law/Policy
Brunei Darussalam	Wildlife Protection Act of 1978 (revised 1984) Wild Fauna and Flora Order of 2007 Fisheries Order 2009
Cambodia	Forestry Law of 2002 Ministerial Declaration (Prakas) on Classifications and List of Wildlife Species in Cambodia in 2007
Indonesia	Law No. 5/1990 on Conservation of Biological Resources and Ecosystems regulating ecosystems conservation and species especially in protected areas
Lao PDR	Aquatic and Wildlife Law 2007 Fisheries Law 2009 Forestry Law (updated 2008) Environmental Protection Law
Malaysia	Wildlife Conservation Act of 2010 National Tiger Conservation Action Plan The National Elephant Conservation Action Plan for Peninsular Malaysia Orangutan Action Plan 2012–2016 Elephant Action Plan for Sabah 2012–2016 International Trade in Endangered Species Act of 2008 Wildlife Protection Ordinance of 1998 Wildlife Conservation Enactment of 1997
Myanmar	Forest Law of 1992 Protection of Wildlife and Protected Areas Law of 1994 National Wildlife Law Enforcement Taskforce
Philippines	The Wildlife Management Fund established pursuant to Section 29 of Republic Act 9147 Writ of Kalikasan of 2010 The Department of Environment and Natural Resources adopted the Wildlife Law Enforcement Manual of Operations in 2010
Singapore	Parks and Trees Act (2005) Wild Animals and Birds Act (2000) Fisheries Act (2002) Endangered Species (Import and Export) Act (2008)
Thailand	Wildlife Conservation and Protection Act, B.E. 2535 (1992)
Viet Nam	<ul> <li>National Action Plan to Combat Illegal Wildlife Trafficking</li> <li>Decree No. 32/2006/NĐ-CP of 30 March 2006 on the Management of Endangered, Precious and Rare Species of Wild Plants and Animals</li> <li>Decree No. 82/2006/NĐ-CP of 10 August 2006 on Managing Activities on Export, Import, Re-export, Introduction from the Sea, Transit, Breeding, Rearing and Artificial Propagation of Endangered, Precious and Rare Species of Wild Plants and Animals</li> <li>Circular No. 47/2012/TT-BNNPTNT of 25 September 2012 of the Ministry of Agriculture and Rural Development on Management of the Exploitation and Breeding of Common Wildlife Species</li> <li>Decree No. 160/2013/NĐ-CP of 12 November 2013 on Criteria for Identification and Management of Endangered, Rare and Precious Species Prioritized for Protection</li> </ul>

### Technology

Advances in technology have contributed immensely to improved patrolling and monitoring in PAs. Communication has been enhanced by higher radio frequencies, use of mobile phones, and other advanced telecommunications equipment. Advanced information and computer technology facilitated better mapping of PAs and generated software to enhance data sharing capabilities. Digital cameras record evidence and apprehensions, and camera traps help monitor endangered species.



More AMS are adopting the Spatial Monitoring and Reporting Tool (SMART), a new and improved tool for measuring, evaluating, and improving the effectiveness of wildlife law enforcement patrols and site-based conservation activities. It is both a ranger-based data collection tool and a suite of best practices to help protected area and wildlife managers monitor, evaluate, and adaptively manage patrolling activities. SMART is inexpensive, more adaptive and intuitive to use, and has more advanced analysis and reporting functions. While the initial focus has been on law enforcement, SMART aims to expand collaboration to a diverse community of users to develop a suite of software tools that can be used to capture, manage, and analyze various kinds of spatial data critical for the effective management and monitoring of conservation areas (What is SMART, n.d.).

## Communication, education, and public awareness

Given the complex context of wildlife conservation issues, CEPA strategies have to be targeted given the varying roles of stakeholders in the issue. On illegal wildlife trade, for instance, messages have to be designed for actors along the supply chain, from the poachers to the buyers. For buyers, it is important to debunk myths that certain species may have medicinal values. The population of various species have been decimated to near extinction as animal parts are believed to have healing properties. Using appropriate media is equally important. While the use of biodiversity champions, television advertisements, documentaries, and social media have been used to great effect among the general public, traditional faceto-face community discussions may be more effective particularly in more remote areas and where poaching is likely to occur.

### ACB and wildlife conservation

The ASEAN Centre for Biodiversity has supported wildlife conservation through initiatives that provided training to park rangers and PA staff on the identification of threatened species, international wildlife protection policies, and patrolling and monitoring techniques in collaboration with ASEAN-WEN and Freeland Foundation.

ACB's flagship program on ASEAN Heritage Parks helps ensure protection of the region's most representative wildlife through training programs in taxonomy, monitoring, enhanced database management, ranger and patrolling activities, equipment support, and development of CEPA strategies, among others. ACB uses various media platforms and knowledge products to promote the conservation of ASEAN's endangered species and its heritage parks.

ACB also works with partners such as the Asia Pacific Biodiversity Observation Network (AP-BON) and Global Biodiversity Information Facility (GBIF) in developing the ASEAN Clearing-House Mechanism and the enhancement of the national CHMs of the AMS.

### Ways Forward

As host to mega-diverse countries and a region that is close to a growing market for wildlife use, the ASEAN region bears the burden of intense wildlife depletion and heavy wildlife traffic. Addressing issues in wildlife conservation requires comprehensive international and ASEAN collaboration, particularly due to increasing demands for ASEAN wildlife outside the region, and the region's status as both a source and hub for illegal wildlife trade.

To further strengthen wildlife conservation in ASEAN, ABO 2 recommends the following actions:

• Ensure that PAs are effectively managed with trained staff or partnerships in the areas of biodiversity identification, monitoring and assessment; data sharing and management; patrolling and monitoring; enforcement of laws and policies on wildlife conservation, arrest, and apprehension; community development; and CEPA, among others.

- Increase efforts to strengthen populations of critically endangered species through captive breeding centers and speciesspecific conservation programs to prevent extinctions.
- Strengthen ASEAN-WEN through institutionalized funding from the ASEAN Member States, including a strong secondment program involving national law enforcement and judicial officials. ASEAN-WEN, ACB, and other institutions may also collaborate on wildlife conservation measures.
- Develop a follow-up to the ASEAN Regional Action Plan on Trade in CITES Wild Fauna and Flora (2011–2015). The proposed action plan may be renamed the ASEAN Strategy and Action Plan on Wildlife Law Enforcement and Reduction of Illegal Wildlife Trade, which may be extended up to 2020 in line with the Aichi Biodiversity Targets and the UN Sustainable Development Goals 2030. The regional strategy and action plan should serve as a cooperation framework that will clearly identify and delineate the tasks of various international, regional, and national agencies and organizations to avoid duplication of efforts and promote the leveraging of resources. The proposed strategy and action plan should be able to implement a financing mechanism for effective law enforcement; promote the

sharing of good practices; and implement a CEPA program that will generate public support for wildlife law enforcement.

- Engage various stakeholders, including scientists, policy makers, law enforcement, IPLCs, business, media, academe, and the youth, in wildlife conservation through innovative social media solutions.
- Promote environment-friendly businesses that help reduce pressures on the environment such as ecotourism and the development of biodiversity-based products.
- Intensify CEPA campaigns for wildlife conservation using messages tailored to target audiences. Document and share good practices in wildlife conservation. Develop a regional recognition program.
- Call for stronger law enforcement of conservation laws, and establish and improve national wildlife enforcement networks.
- Optimize the use of technology to support wildlife law enforcement.

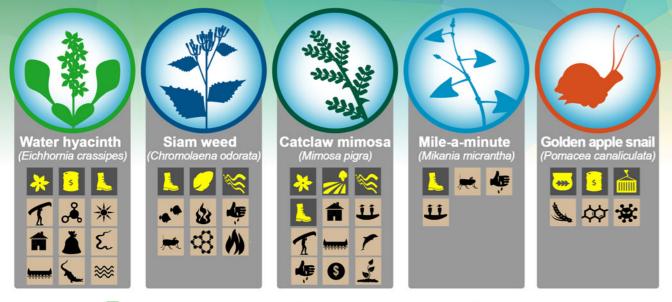
ACB may also provide support by creating a CHM on wildlife conservation. This may be a hub of wildlife conservation programs and efforts; database of wildlife conservation laws and status of endangered species; repository of best practices that may be replicated across ASEAN; and a venue for interaction and sharing of expertise among experts in various aspects of wildlife conservation.

Box 19. Conservation of the Burmese star tortoise (Geochelone platynota)

The Burmese star tortoise is a critically endangered species endemic to the dry zone of central Myanmar. It is now believed to be extinct in the wild due to subsistence harvesting and over-collection for the pet trade. Captive breeding efforts in Myanmar have been proven extremely successful. Over 3,000 star tortoises are held in facilities in Myanmar. Efforts to reintroduce the population into the wild included a draft reintroduction protocol developed for the Minzontaung Wildlife Sanctuary (MWS) in 2011; conservation workshops; an education and community outreach program in the villages surrounding the sanctuary to enlist local support; and establishment of a network of community conservation volunteers to provide information on poaching, fuel wood collecting, and timber harvesting within the sanctuary.

A group of 150 captive-reared tortoises were selected for release. Health assessments were completed and prerelease pens were built in the sanctuary. A "donation ceremony" involving the local Buddhist clergy and a shaman was also conducted. The first group of 50 captive-bred tortoises was released in April 2014, followed by a second group in November 2014, and the third group in April 2015. Given the potential value of star tortoises in the illegal wildlife trade, security remains a serious concern for the reintroduction program. Security at the assurance colony and holding pens is provided by MWS Rangers 24 hours a day, seven days a week. Once tortoises are released into the wild, active patrols are conducted by forest department rangers. The local police were informed about the project and remain alert for any illegal activity.

# **Invasive Alien Species: Keeping intruders out**



### Top **5** Invasive Alien Species in the ASEAN Region



Magnify costs of clean-up activities

Provide cover for crocodiles

### **Common Pathways of IAS**



### Impacts of IAS

Intensify species reduction Limit the availability of sunlight Frovide refuge for snakes Block river traffic Clog waterways

Cause bushfires Cause fatalities due to leaf toxicity

Displace indigenous forage/grass species 1/ Increase cost of farm management Harbor agricultural

pests

Cause forest fires Affect agricultural lands and fisheries îî Hinder growth of native plants r Disturb aquatic life Require more funds for prevention, control, and elimination 6 Magnify ecosystem pollution due to use of chemical posticities chemical pesticides Cause massive losses in rice production

Pose danger and realth bazards to .

Capacity Building on Taxonomy Effective control and management measures can only be implemented when exotic species are correctly and properly identified.

# Information Sharing through the ASEAN CHM ASEAN Member States should make

all IAS-related information available in information sharing platforms such as the Clearing-House Mechanism.

СНМ

### National Invasive

**Species Strategy and Action Plan (NISSAP)** To prevent the spread of IAS in natural habitats, all ASEAN Member States should have their own NISSAPs. To date, only Cambodia, Indonesia, and the Philippines have drafted their NISSAPs.

Awareness Raising Understanding the impacts and implications of IAS can help intensify efforts on IAS prevention, control, and eradication.

Research In-depth research, survey, and analysis of priority IAS in the ASEAN region, including its pathways of introduction, should be conducted.

# **Ways Forward**

or anothersity Target 9 species and their pathways are identified, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

# Invasive Alien Species: Keeping intruders out

The proliferation of invasive alien species (IAS) disrupts the ecological balance of the area being invaded. Indigenous species lose their natural habitat and food, which can lead to their extinction. Controlling and reducing the number of these IAS require financial resources that may lead to major economic problems to the areas or countries being invaded.

In the ASEAN region, the member states are employing varying strategies to address the IAS challenge.

Data of more than 9,000 IAS are recorded and compiled by two IAS global data sources: the Global Invasive Species Database of the International Union for Conservation of Nature's Invasive Species Specialist Group (IUCN-ISSG) and the Invasive Species Compendium of the Centre for Agriculture and Biosciences International (CABI).

More than 200 species that are native to almost all parts of the world were introduced to the ASEAN region. Additionally, 304 species that are native to ASEAN have become invasive in other parts of the world. Out of this figure, 41 are included in the IUCN's 100 of the World's Worst Invasive Alien Species List.

In recent years, some of the world's worst invasive alien species have caused significant ecological and economic damage in many ASEAN Member States. Costing an estimated USD 28–45 million in damages to farmers' crops in the Philippines in 1990, the golden apple snail (*Pomacea canaliculata*) is one of the Under Aichi Biodiversity Target 9 of the CBD's Strategic Plan for Biodiversity 2011–2020, Parties are working to ensure that "by 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated and measures are in place to manage pathways to prevent their introduction and establishment."

region's worst IAS. The snail also devastated Viet Nam's rice fields in the late 1980s. After being introduced for culturing in backyard ponds as an alternative high-protein food for duck and fish, some snails escaped and spread to ponds, trenches, and rice fields; thereby, becoming pests.

In the lower Mekong region, *Mimosa pigra* spread rapidly in long distances in floodwaters, affecting grasslands, floodplains, and pastures, converting them into unproductive shrub lands. It also damaged rice fields in nearby areas.

AMS have identified and listed 112 key invasive alien species affecting forests, agriculture, and aquatic ecosystems. However, pathways of introduction have yet to be comprehensively documented. While there is no available information on the extent of eradication, all AMS reported that priority IAS are being managed and controlled, either manually or through the use of appropriate chemicals. The Integrated Pest Management (IPM) approach is also being applied particularly for IAS affecting the agriculture sector (e.g., the golden apple snail).

In the Regional Workshop on Classical Biological Control of Invasive Alien Species jointly organized by CABI and the ASEAN Centre for Biodiversity (ACB) in September 2014, four priority forest IAS were identified as requiring interventions based on the consensus of nine AMS represented during the workshop (the exception being Thailand). These are Siam weed (*Chromolaena odorata*), catclaw mimosa (*Mimosa pigra*), water hyacinth (*Eichhorrnia crassipes*), and mile-a-minute vine (*Mikania micrantha*) – all high-impacting and fastspreading invasive species (Table 10). The AMS also identified the golden apple snail (*Pomacea canaliculata*) as a priority IAS because of its significant impact in the agricultural sector.

Thailand and Viet Nam have published their IAS lists, the former having a database shared through its Clearing-House Mechanism.

### **Current and potential impacts of IAS**

AMS recognize the negative impacts of invasive alien species introduced as pets, aquarium and terrarium species, and as live bait and live food. Many IAS have caused a wide variety of problems for the economy, on human health, and biodiversity. The impact of climate change on biodiversity and its contribution to the proliferation of IAS is also increasingly recognized in ASEAN.

### Socio-economic impacts

The damage caused by IAS, as well as the programs designed to eradicate them, translates to significant economic and monetary losses. According to a 2013 study (Nghiem et al., 2013) that used cost-benefit analysis and other models, the total annual loss equivalent to the economic and environmental impacts of harmful non-indigenous species in the region was estimated at USD 33.5 billion. This was further broken down into losses and costs to the agricultural sector (USD 23.4–33.9 billion), human health (USD 1.4–2.5 billion), and the environment (USD 0.9–3.3 billion). Though the magnitude of the damage caused by these invasive species

in the region may not be completely quantified, there is clearly a negative impact. The growing trend of urbanization and modernization causes anthropogenic changes to the environment, which are suitable conditions for IAS to thrive and adapt.

### Impacts on biological diversity

Invasive alien species have common characteristics: they can thrive under adverse conditions, reproduce and grow rapidly, have high dispersal ability and adaptability to new conditions, and survive on various food types and in a wide range of environmental conditions (CBD, 2017). As these invasive species prevail in their new environment, indigenous species are unable to compete for space and food or are prey for the IAS, and eventually become extinct. Vital ecosystem functions, such as pollination, soil regeneration, and nutrient and water cycling functions, among others, eventually deteriorate. For example, a common myna can drive away native birds by occupying their nesting areas. Mimosa pigra, a thorny shrub with buoyant seeds that grow abundantly in mudflats, can drive away migratory birds feeding and nesting in these areas (Burgiel et al., 2010).

### IAS and climate change

Climate change, which brings about extreme climatic events such as storms, floods and drought, can hasten the movement of invasive alien species across the region. Storms, for instance, increase the probability of spreading non-native species propagules over long distances. Such extreme weather disturbances could either cause abrupt and widespread death of native species or limit their ability to grow and reproduce, thus providing an opportunity for non-native species to establish and grow with more resources such as nutrients, water, and space (Diez et al., 2012).

 
 Table 10. Priority IAS identified by ASEAN Member States based on impact and fast spread in the region

IAS	BRN	КНМ	IDN	LAO	MYS	MMR	PHL	SGP	THA	VNM
Chromolaena odorata		~		~	~	~	~		1	~
Eichhornia crassipes		✓	~	~		~	~	~	~	
Mikania micrantha		√	~			~	~			
Mimosa pigra		$\checkmark$	$\checkmark$	1					1	~
Pomacea canaliculata		~		~	~	~	$\checkmark$		~	~

Source: Country reports submitted to the Regional Workshop on Classical Biological Control of Invasive Alien Species, Kuala Lumpur, Malaysia, 23–26 September 2014.

### Strategies addressing IAS in ASEAN

Various strategies and activities are being implemented to address IAS. Several AMS, such as Cambodia, Indonesia, and the Philippines, have already drafted their National Invasive Species Strategy and Action Plans (NISSAPs). Malaysia operationalized its National Action Plan for Prevention, Eradication, Containment, and Control of IAS in 2008. Thailand has established a list of IAS and developed national IAS control measures. In Viet Nam, a strong legal regulation system on import and export of biological materials is in place.

At the regional level, strategies include collaborative engagements that are being organized to manage IAS. These include joint workshops and conferences that tackle the IAS agenda and allow the exchange of experiences on the management and control practices of AMS. The Southeast Asian Ministers of Education Organization Regional Centre Biology (SEAMEO-BIOTROP) Tropical for regularly conducts a regional training course on IAS management to boost the knowledge and capacity of researchers, scientists, and technical personnel. In 2014, SEAMEO-BIOTROP and the United Nations Food and Agriculture Organization (UN-FAO) co-organized a Regional Seminar-Workshop on Harmonizing Approaches to Risk Assessment and Management of Forest Invasive Alien Plant Species in Southeast Asia, effectively focusing on assessing and managing the risks of forest invasive alien plant species. The participants of the seminar-workshop called for a more harmonized and effective risk analysis of forest invasive alien plant species, including the development of a region-wide long-term and short-term capacity building program; development of programs addressing gaps in risk analysis of forest invasive alien plant species; and mainstreaming invasive alien species information in school curricula.

Regional programs and projects, including research initiatives focusing on specific IAS,

their management and control measures, have also been conducted. There have been previous attempts to establish a regional IAS program, such as the Regional Programme on Marine and Coastal Invasive Species, which was endorsed by the Intergovernmental Meeting of the Coordinating Body on the Seas of East Asia (COBSEA). The proposed program would have focused on building capacities in COBSEA countries to "address the emerging transboundary threats of marine and coastal invasive species." The Project Identification Form was developed by the COBSEA Secretariat for endorsement of the countries to be included in the Global Environment Facility (GEF) V priority list. By June 2011, however, no endorsement was received and the proposed project was then shelved. Similarly, ACB also drafted a regional proposal to address IAS for possible GEF support, but this was also not pursued.

The United Nations Environment Programme-Environment Facility - Centre for Global Agriculture and Biosciences International (UNEP - GEF-CABI) Regional Project on Removing Barriers to Invasive Species Management in Production and Protection Forests in SEA (FORIS) is a program being implemented in Cambodia, Indonesia, Philippines, and Viet Nam, together with other stakeholders in the region. including ACB. The project has the overall goal of conserving important forests, species, and genetic diversity. It aims to sustainably manage ASEAN's forests and biodiversity by reducing negative environmental, economic, and human health consequences of IAS (especially plants) in production systems and forest ecosystems by strengthening existing national frameworks (GEF Forest Invasives SEA, retrieved from http://www.gefforestinvasivessea.org/). Table 11 presents the impacts and management of the top five priority IAS identified by ASEAN Member States. These were presented in one of the regional consultation workshops organized under the FORIS project.



IAS	Impacts (common among AMS)	Management
Catclaw mimosa ( <i>Mimosa pigra</i> )	<ul> <li>Affects agricultural land, fisheries production, and economy (reduces crop yields, lesser income for farmers).</li> <li>Results in loss of feeding and resting habitats of migratory fish, birds, and other mammals.</li> <li>Hinders growth of a few native plants in heavily infested areas.</li> <li>Aquatic weeds decreases water supply by degrading water catchment areas and freshwater ecosystems.</li> <li>Makes infested areas inaccessible to animal and people, interfering with stock watering, irrigation and recreational waterways.</li> <li>At Tonle Sap Lake, several white fish species have disappeared, fish catch has declined, some local plant species were displaced, fish/wild fish/bird habitats have degraded, aquatic life disturbed, and sediment trapped.</li> <li>Prevention, control, and elimination is expensive.</li> </ul>	<ul> <li>Mechanical / manual management – stem cutting, tree chopping, burning, put up the saplings.</li> <li>Chemical control – spraying with herbicide before plants bloom until seedling; Glyphosate, Metsulfuron Methyl, Oxadiazon, and Alachlor.</li> <li>Planting of native weed to cover the land and compete with <i>Mimosa pigra</i>.</li> <li>Biocontrol methods – using bioagents, which include <i>Acanthoscelides quadridentatus</i>, <i>A. puniceus, Carmenta mimosa</i>, and <i>Phlocospora mimosae-pigrae</i>.</li> </ul>
Mile-a-minute (Mikania micrantha)	<ul> <li>Smothers ground, annual and perennial crops including agroforest plantations.</li> <li>Smothers trees and affects natural regeneration of native vegetation.</li> <li>Competes for light, water, nutrients, and space with crops.</li> <li>Harbors pests.</li> <li>Increases cost of farm management in terms of labor and use of herbicides.</li> </ul>	Chemical control – herbicides.
Golden apple snail (Pomacea canaliculata)	<ul> <li>Heavy use of chemicals to control golden apple snail (<i>Pomacea canaliculata</i>) has led to ecosystem pollution, threats to other aquatic organisms, and negative health effects on people working in paddy fields.</li> <li>Snails spread more rapidly into the delta region of the Mekong River and invaded rice plantations, feeding voraciously on rice seedlings, resulting in massive production losses.</li> <li>Reduces seedling density and increases frequency of reseeding each year.</li> <li>Snail shells can cause severe injuries to people working in the field.</li> <li>Causes yield losses in Malaysia estimated at RM 250 million per year; yield reduction in the Philippines by 40 percent in 2014.</li> <li>In 2006, caused infestations in 2,426.63 sq km of land in Viet Nam.</li> </ul>	<ul> <li>Mechanical/manual management – transplant with old seedlings; reduce water level in the rice field; soak snails in salt solution, handpicking; duck pasturing; screen tapping in canals for easy collection; staking and removing egg mass; and dry land preparation.</li> <li>Chemical control – chemical pesticides/ Molluscides (niclosamide, metaldehyde, izazophos, and copper hydrosulfate), and tea seed powder. Biological control – ducks before and after sowing</li> <li>were also effective in controlling the snail population; leaves of some plants found toxic to snails such as gugo (<i>Entada</i> sp.), sambong (<i>Blumea</i> sp.), calamansi (Citrus) and makabuhay (<i>Tinospora</i> sp.), gabihan (<i>Monochoria</i> sp.) are placed in small canals along sides of paddies; red ants and long-horned grasshopper feed on snail eggs; and birds feed on eggs and young snails.</li> </ul>

### Table 11. Specific impacts and management of top 5 IAS as reported by ASEAN Member States

Continued next page

## Table 11. Specific impacts and management of top 5 IAS as reported by ASEAN Member States(continuation)

IAS	Impacts (common among AMS)	Management
Water hyacinth (Eichhornia crassipes)	<ul> <li>Reduces abundance of native floating plants and other aquatic organisms by limiting the availability of sunlight and competing for nutrients.</li> <li>Blocks river traffic, slowing water currents in reservoirs and thus reducing power generation ability and irrigation potential; obstructs fishing activities and water transport; clogs waterways which contributes to flooding; and leads to increasing maintenance costs.</li> <li>Lowers dissolved oxygen levels of water due to dense monospecific mats and reduces phytoplankton growth and food for fish.</li> <li>Colonizes and fills up great expanse of shallow wetlands, speeding up habitat loss, and compromising functions of wetlands as water catchment resulting in increased flooding in adjoining lands.</li> <li>Magnifies the costs of clean-up activities by local governments.</li> <li>Provides refuge and cover for snakes (and in the Philippines, even crocodiles) and could pose risk to humans where they are in close proximity with residential areas.</li> </ul>	<ul> <li>Collected from water surface.</li> <li>Used as duck and pig feed and fertilizer.</li> <li>Mechanical/manual management – pulling by hand.</li> <li>The Philippines' Department of Science and Technology embarked on a PHP 1.5-million project for the adoption of a water hyacinth harvester, which would operate at PHP 6,000 (gas) for a 20-day operation.</li> </ul>
Siam weed (Chromolaena odorata)	<ul> <li>Forms dense stands preventing establishment of other species, due to aggressive competition.</li> <li>May promote wild bushfires.</li> <li>Toxic leaves containing high levels of nitrate may cause fatalities if consumed by grazing animals.</li> <li>Displaces indigenous forage/grass species for livestock.</li> <li>Makes invaded lands too costly to prepare for cultivation.</li> <li>Grows rapidly under plantations, thus increases cost of farm management in terms of labor and use of herbicides.</li> <li>Harbors agricultural pests.</li> <li>In forests, it may occupy gaps and retards natural regeneration by competing with space and nutrients.</li> </ul>	<ul> <li>Mechanical/manual management - manual slashing using bush cutter, burning.</li> <li>Chemical control using herbicides.</li> <li>For IAS primarily affecting agriculture, Integrated Pest Management Programs (IPM) have been developed for some pests for adoption by farmers.</li> </ul>

Source: Country reports submitted to the Regional Workshop on Classical Biological Control of Invasive Alien Species, Kuala Lumpur, Malaysia, 23–26 September 2014.

### **Ways Forward**

Invasive species continue to demonstrate impacts both on land and water habitats, imposing heavy costs in control and management. They continue to spread with the influence of the changing climate. Though the NISSAP and IAS management plans of the ASEAN Member States are already underway in varying degrees, the issue and concern about IAS linger and would need to be

continuously addressed. Further actions and recommendations in addition to what is already being done should be prioritized, and this has to be directed towards achieving Aichi Biodiversity Target 9. Recommended actions include the following:

1. Establish a regional program to address invasive alien species in the ASEAN region. This is necessary to consolidate all ongoing efforts in IAS management, in



view of arising issues over its impacts on biodiversity, as well as regional cooperation and trade concerns. The regional program should be able to enhance and highlight models of IAS management that are most effective in AMS, focusing primarily on the key/priority IAS that have been identified. Capacity development of agencies and personnel in charge of such species should also be key components of the regional program.

2. Conduct in-depth research on priority IAS. Although AMS have identified IAS and prioritized actions for their management, an in-depth research, survey, identification, and analysis of the priority IAS in the region, including their pathways of introduction and early detection, should be conducted. Cost-effective eradication and restoration programs, including research on and testing of new control technologies, should be implemented. Comprehensive research on introduction pathways will contribute to management efforts, which should then be mainstreamed in government and private policies and action.

Another recommendation from the SEAMEO-BIOTROP and UN-FAO Regional Seminar-Workshop on Harmonizing Approaches to Risk Assessment and Management of Forest Invasive Alien Plant Species in Southeast Asia is to "develop program/project research proposals with other relevant institutions at both national and regional levels towards addressing gaps in risk analysis of forest invasive

alien plant species, which are aligned with NISSAPs and NBSAPs."

- 3. Analyze other regional IAS regulations, policies, and protocols. The implications of other regional policies on IAS, such as EU Regulation 1143/2014 on invasive alien species, which entered into force on 1 January 2015, should be analyzed as these will mainly affect ongoing efforts to manage IAS, and may have implications on ASEAN trade relations. A regional IAS strategy that includes protocols to abate the spread of their establishment is necessary. This translates to implementation of stricter quarantine border control measures.
- 4. Conduct IAS taxonomic work through network of experts and continuous exchange of information. Taxonomic information is essential for agencies and border authorities to detect, manage, control invasive alien species. and Networking and sharing of experiences, information, and expertise facilitate early detection and identification of IAS, and the development of less expensive and more effective prevention, control, and management measures. When eradication is needed, taxonomists, as experts in proper identification, classification, and characterization of species, can provide technical assistance in developing the most effective yet economic and environmentally benign eradication measures.
- 5. Raise awareness and expand public education campaigns and information

sharing platforms on IAS. Awareness of invasive species is on the rise as a result of public education campaigns and legislative measures for IAS prevention, control, and eradication. However, there is still a need to increase understanding of impacts and implications of IAS. Capacity building activities should also be augmented and prioritized particularly for government agencies that are tasked to manage IAS.

IAS occurrences, their impacts, and implications should be published in print and digital formats. AMS should endeavor to make all IAS-related information available in information-sharing platforms such as the Clearing-House Mechanism. Publishing such information could strengthen the information base and address data distribution gaps so they can serve as a basis for developing national management, prevention, and control strategies and frameworks.

The SEAMEO-BIOTROP and UN-FAO Regional Seminar-Workshop also recommended a review of existing regional and global IAS networks and databases to enhance knowledge sharing and understanding of international and regional trends for application at the national level.

### **Box 20. Expanding stakeholder engagement with IAS: The active role of academia in Indonesia** Titiek Setyawati

National Project Coordinator, FORIS Project Indonesia

Component 3 of the Removing Barriers to Invasive Species Management in Production and Protection Forests in Southeast Asia (FORIS) project focused on national capacity building and institutional support as these contribute significantly to the sustainability of all interventions of the project. The project involved multiple stakeholders including representatives from government and non-government organizations from relevant sectors (agriculture, fisheries, academic, and research organizations), managers and staff of national parks, staff in forest extension activities, students (high school and university), and forest concession managers.



### **Good practices**

A number of activities were conducted to increase awareness of IAS among students. Student competitions were held to identify IAS in the field. In collaboration with university lecturers, students were invited to carry out research on IAS relevant to the FORIS project objectives. Materials on IAS, which covered scientific evidence of negative impacts of some IAS in Indonesia and around the world, as well as basic biological and ecological information on IAS, were distributed. One competition was held among 100 high school students from four districts in East Java during the anniversary of Baluran National Park. Information on IAS was provided to the students at the beginning of the program. The students were able to absorb the information quickly and were able to identify some invasive alien plant species within the national park. Winners were given attractive prizes.

Lectures on IAS were also conducted at eight state universities with the participation of a total of 1,200 students.

### **Results and impact**

There was increased awareness and understanding of the negative impacts of IAS among high school and university students. The project has received a number of requests from universities for lectures on IAS. More universities also plan to integrate IAS into the curricula. There has also been an increase in the number of undergraduate and post graduate students who carry out research on IAS after the lectures and seminars on IAS were conducted. High school students who participated in the awareness campaign on IAS were quick to share information with fellow students. These impacts highlight the importance of the youth in spreading knowledge on IAS.

### **Lessons learned**

Realizing the lack of awareness of IAS, the government should strengthen communication, education and public awareness campaigns in IAS. This includes selecting an appropriate communication strategy and identifying target audiences. Campaigns should also target the youth by integrating IAS knowledge and information in the curricula at the high school and university levels.

### **Box 21. The FORIS Project**

Removing Barriers to Invasive Species Management in Production and Protection Forests in Southeast Asia (FORIS) focused on the sustainable management of forests and biodiversity by reducing negative environmental, economic, and human health consequences of IAS (especially plants) in forest production systems and natural parks in Cambodia, Indonesia, Philippines, and Viet Nam by strengthening existing policy frameworks, national capacities and awareness, management interventions, and regional linkages. The project was funded by the United Nations Environment Programme–Global Environment Facility.

The project resulted in the gradual removal of various technical, social, environmental, and economic barriers to IAS management. This is best exemplified in the target pilot sites with the use of target-specific biological, chemical, and physical/mechanical control measures. In pilot site trials, social (e.g., indigeneous peoples and local communities such as those in Baluran National Park and the Allah Valley Watershed Forest Reserve) and environmental safeguards were considered based on Ecosystem Management Plans (EMP) complemented by the assessment criteria used for the selection of target IAS and pilot sites. Due diligence was followed in the usage of herbicides, both in terms of selection (i.e., registered in the country) and application (safety considerations to applicators), at the pilot site trials. Even with the proposed introduction of biological control agents, proper protocols were followed, including the use of risk analysis. The regional component is now working with Indonesia and Viet Nam and project partners (e.g., SEAMEO BIOTROP, Indonesia, and BioSecurity Queensland, Australia) to exercise due diligence for the importation of potential agents (*Chiasmia assimilis* for *Acacia nilotica* and *Heteropsylla spinulosa* for *Mimosa diplotricha*).

Key developments in the project included the 1) formulation of the National Invasive Species Strategy and Action Plan; 2) conduct of regional trainings and workshops; 3) establishment of communication and awareness on IAS at regional and national levels; and 4) improvement of competencies in implementing pilot scale management programs against target IAS such as *Acacia nilotica* and *Merremia peltata* (Indonesia), *Mimosa pigra* (Cambodia), *Piper aduncum* (Philippines), and *Mimosa diplotricha* (Viet Nam) in the pilot sites.

Source: Sivapragasam, A., Arne, W., Titiek, S., & Chan, H. T. (n.d.). Removing Barriers to Invasive Species Management in Production and Protection Forests in SE Asia - the FORIS Project. International Conference of Indonesia Forestry Researchers III - 21-22 October 2015.

### Box 22. Habitat restoration vs. *Mimosa pigra* in Cambodia Seng Rathea

National Project Coordinator, FORIS Project Cambodia

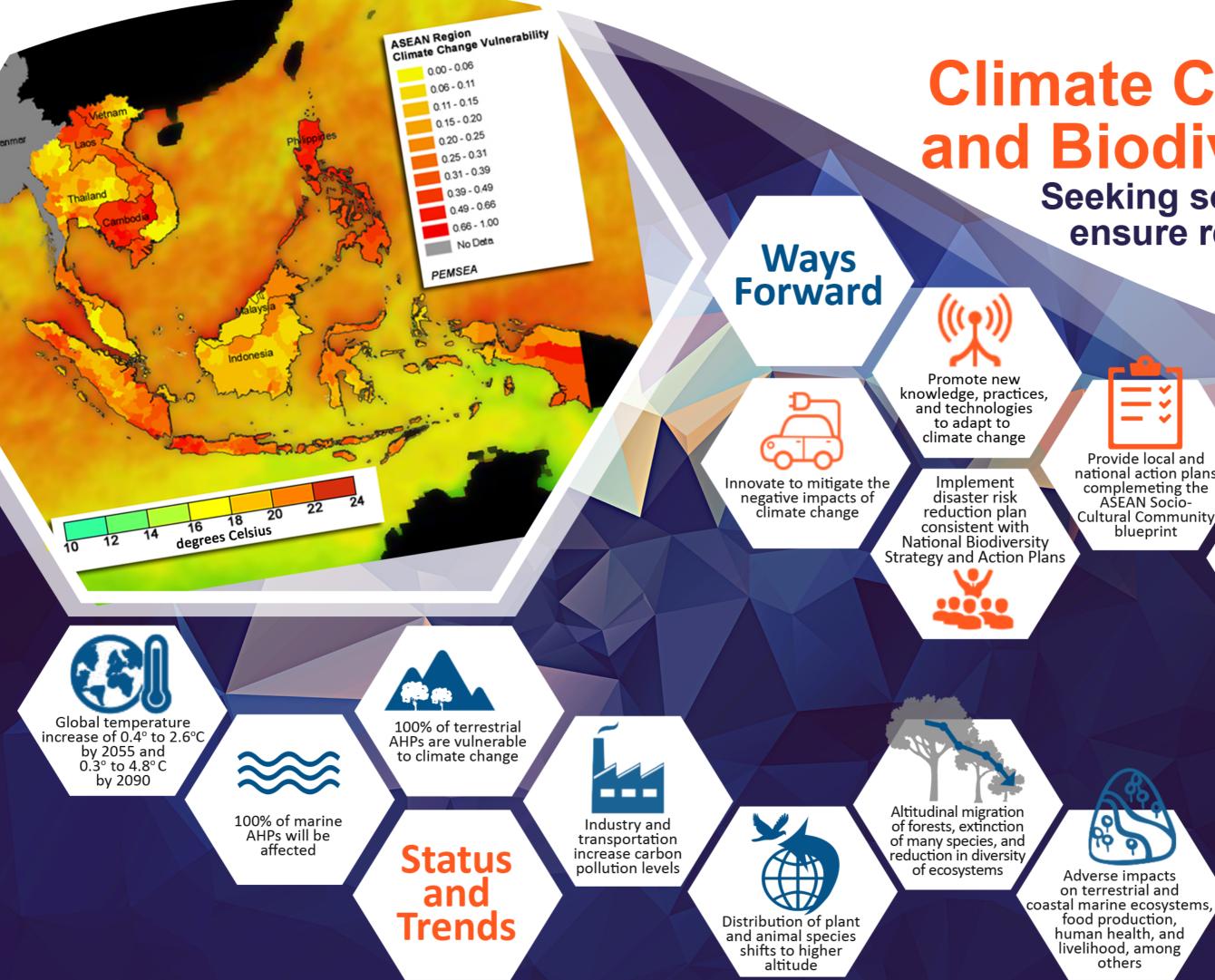
The Stung Sen Core Area (SSCA) is a buffer zone within the Tonle Sap Biosphere Reserve (TSBR), which supports more than 300 species of invertebrates, more than 200 species of birds, 20 species of mammals, and 5 species of amphibians. SSCA is an important inland wetland in ASEAN for biodiversity and the livelihoods it supports.

The key invasive alien species in SSCA is *Mimosa pigra*, which poses significant threats to forest habitats, biodiversity, and ecosystem functions, invading fallow fields, cleared and burned swamp forest, and shrubland areas. Prior to intervention, there was a low awareness level on IAS, particularly on *M. pigra*. There was also no habitat restoration activity after removing *M. pigra* as this required extensive funds; thus,



resulting in new invasions. *M. pigra* grows fast, forms dense and impenetrable thickets, and can grow in any type of land with high adaptability. If left uncontrolled, it can create serious impacts on aquatic resources, livelihood, and agriculture.

Through the FORIS Project, a training workshop on forest restoration was conducted using selected native tree species to stop or minimize invasion of *M. pigra*. The habitat restoration activity began with 1,300 seedlings of *Barringtonia acutangula* planted in .04 sq km of flooded and degraded forestland inside the SSCA. A total of 129 stakeholders, including senior government officials, were engaged in the activity and the awareness level on *M. pigra* has consequently increased. The tree canopy and floating plants can also limit invasion of *M. pigra* in the flooded forest area.



# **Climate Change** and **Biodiversity** Seeking solutions to ensure resiliency

Provide local and national action plans complemeting the ASEAN Socio-Cultural Community

Enhance projects and policies on Reducing Emissions from Deforestation and Forest Degradation and biodiversity conservation

# Climate Change and Biodiversity: Seeking solutions to ensure resiliency

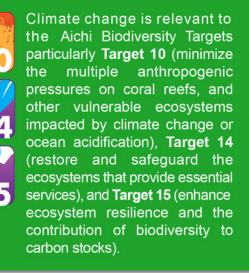
The past decade has witnessed a growing recognition of the inextricable link between climate change and biodiversity. The Global Biodiversity Outlook 4 (GBO 4) (SCBD, 2014), ASEAN Biodiversity Outlook (ABO 1) (ACB, 2010), and Moving Forward: Southeast Asian Perspectives on Climate Change and Biodiversity (Sajise et al., 2010) underscored that while climate change is a major threat to biodiversity, the conservation of biological resources and restoration of ecosystems contribute to climate change mitigation and adaptation.

This connection is underscored by the CBD, which stressed that climate change has an effect on biodiversity and that changes in biodiversity also affect climate change (SCBD, 2009). The functional biodiversity responsible for climate change resilience and sustainability also needs to be identified and used for climate change mitigation and adaptation (Sajise, 2015).

### Impacts of climate change

According to the July 2016 World Meteorological Organization (WMO), global temperatures for the first six months of 2016 were the highest in history (WMO, 2016). Global temperature increases of 0.4 to 2.6°C by 2055 and 0.3 to 4.8°C by 2090 would be accompanied by rising sea levels, changes in precipitation patterns, substantial loss of summer Arctic sea ice, and increasing ocean acidification (SCBD, 2014).

The GEO-6 Regional Assessment for Asia and the Pacific stated that a rising trend in carbon dioxide is a critical off-track indicator among the



Millenium Development Goals (MDGs), both regionally and globally. The upward emissions trend indicates the need for strong policy and appropriate action plans at national, regional, and international levels.

Most global and regional climate projections indicate highly differentiated climate change impacts across the region by 2050. In ASEAN, temperature has been increasing at a rate of 0.14–0.20°C per decade since the 1960s, with a rising number of hot days and warm nights and a decline in cooler weather. Climate models project regional temperature increases of around 0.5–2°C by 2030. The region is also projected to experience an increase in sea levels of approximately 3–16 centimeters, and the potential for more intense tropical cyclones and changes in important modes of climate variability such as the El Niño-Southern Oscillation (ENSO) (UNEP, 2016).

ENSO is a major sea temperature and air pressure shift between the Asian and east Pacific regions. Temperatures during El Niño years are warmer than average in the east Pacific and cooler than average over the Indonesian region. The temperatures during La Niña years are reversed (NCCARF, 2013). The ENSO effect leads to an increase in the likelihood of droughts and destructive fires (Subramanian et al., 2011). The frequency and intensity of extreme climate events (excessive rains and prolonged droughts) associated with ENSO are observed to have increased in ASEAN (IPCC, 2007).

Annual total wet-day rainfall has increased by 22 millimeters per decade. Climate variability and trends, however, differ vastly across the region and between seasons (Working Group 1 Assessment Report 5 [WG1 AR5] Sections 14.4.12, 14.8.12). Between 1955 and 2005, the ratio of rainfall in the wet to the dry seasons increased. While an increasing frequency of extreme events has been reported in the northern parts of ASEAN, decreasing trends in such events were reported in Myanmar (IPCC, 2014a).

Increased rainfall, extreme weather events, and projected sea-level rise are increasing risks of flooding to people living along the coasts in ASEAN. Water scarcity is expected to be a challenge because of increasing water demand from population growth and consumption per capita with higher standards of living (IPCC, 2014a).

### Impacts on biodiversity

GBO 4 states that climate change is projected to become a major driver of biodiversity loss and ecosystem change by 2050. According to the CBD, climate change has already adversely affected biodiversity at the species and ecosystem levels. Some species and ecosystems are demonstrating capacity to adapt naturally. However, others show negative impacts under current levels of climate change (an increase of 0.75°C in global mean surface temperature relative to pre-industrial levels), in comparison to future projected changes (2.0– 7.5°C by 2100 without aggressive mitigation actions) (SCBD, 2009).

Based on the GEO-6, biodiversity-rich forests are likely to be less vulnerable to climate risks and impacts than degraded and/or fragmented forests and plantations dominated by a single or a few species (UNEP, 2016). The assessment states that the geographical distribution of species and vegetation types is projected to shift radically due to climate change. The current regulating services of forests as carbon sinks may be lost entirely and turn land ecosystems into a net source of carbon dioxide later in the century.

### Box 23. The future global climate

The IPCC Fifth Assessment Report uses Representative Concentration Pathways (RCPs), which are four greenhouse gas emissions and atmospheric concentration trajectories used to make projections. The four RCPs include a stringent mitigation scenario (RCP2.6), two intermediate scenarios (RCP4.5 and RCP6.0), and one scenario with very high greenhouse gas emissions (RCP8.5). These are named after a possible range of radiative forcing values (the rate of energy change per unit area of the globe as measured at the top of the atmosphere) in the year 2100 relative to pre-industrial values.

The future climate is partly determined by the magnitude of future emissions of greenhouse gases, aerosols, and other natural and man-made factors. The IPCC states the continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system including the increasing likelihood of severe, pervasive, and irreversible impacts for people and ecosystems. The surface temperature is projected to rise over the 21st century under all assessed emission scenarios. It is very likely that heat waves will occur more often and last longer, and that extreme precipitation events will become more intense and frequent in many regions. The ocean will continue to warm and acidify, and global mean sea-level will continue to rise (IPCC, 2014b).

Climate change projection shows that a 1 or 2°C increase may occur compared to pre-industrial levels. Global climate change threats are high to very high with a global mean temperature increase of 4°C or more above pre-industrial levels. Other threats include severe widespread impacts on unique and threatened ecosystems, substantial species extinction, large risks to global and regional food security, and the combination of high temperature and humidity compromising normal human activities, including growing food or working outdoors in some areas for parts of the year (IPCC, 2014c).

In marine and coastal ecosystems, warmer temperatures lead to increased rates of coral bleaching or a decline in coral health (ADB, 2010). Other impacts include large tidal variations, tropical cyclones, and a potential increase in regional rainfall (Pilgrim, 2007). There is also a possible decline in seagrass meadows and seaweed beds due to storms and warmer waters (UNEP, 2016).

About 20 percent of wetlands globally could be lost due to sea-level rise. The impacts of sea-level rise on coastal ecosystems will vary regionally and depend on erosion processes from the sea and deposition processes from land. It further affects global and regional climate through changes in the uptake and release of greenhouse gases and changes in albedo and evapotranspiration. The change in the structure of biological communities in the upper ocean could alter the uptake of carbon dioxide by the ocean or the release of a substance for the formation of cloud droplets could cause either positive or negative feedback on climate change (IPCC, 2002).

The Fifth Assessment Report of the IPCC states that climate change is expected to modify vegetation distribution across the region, but responses will be slowed by limitations on seed dispersal, competition from established plants, rates of soil development, and habitat fragmentation.

The impact of climate change on freshwater ecosystems will change habitat characteristics and alter the distribution and abundance of species found in these environments (Marambe and Silva, n.d.). In terms of species, climate change impacts include: 1) alterations of species densities (including altered community composition and structure); 2) range shifts, either poleward or upward in elevation; 3) behavioral changes, such as the phenology (seasonal timing of life cycle events) of migration, breeding, and flowering; 4) changes in morphology (body size); and 5) reduction in genetic diversity that leads to inbreeding depression (Sodhi et al., 2009).

ASEAN's projected climate and vegetation changes are expected to cause widespread declines in bat species richness, northward range shifts for many species, and large reductions in the distributions of most species.

A study by BirdLife International and National Audobon Society (2015) shows that climate change clearly impacts species and was identified as an important driver of bird population trends. Birds are a great indicator of how climate change affects nature and people worldwide. Climate change is expected to result in climatic zones moving poleward and an associated shift in the geographic ranges of bird species. Rising temperatures and other changes in climate have caused declines in a much larger number of species, and distribution shifts to higher latitudes or altitudes. Montane species are shifting their ranges upslope to track suitable climate, but there is considerable variation in responses. Some species show no change yet while others have due to changes in rainfall patterns (BirdLife International and National Audubon Society, 2015).





The continued warming is likely to result in elevation range contractions, and eventual species extinctions, particularly at mountaintops. This would also eradicate most suitable habitats for wetlands birds such as the sarus crane (Grus antigone), giant ibis (Thaumatibis gigantea), and lesser adjutant stork (Leptoptilos javanicus) in the Emerald Triangle forest complex along the borders of Cambodia, Lao PDR, and Thailand. In marine and coastal ecosystems, climate change will cause the migration of tropical pelagic fish and other marine species to previously cooler waters; loss of diversity in coral fish and coraldependent organisms; and risks to the marine food chain from ocean acidification, potentially affecting fisheries (UNEP, 2016).

### Impacts on agriculture and food security

A study by the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) states that changes in climatic patterns consequently alter the spatial distribution of agro-ecological zones, habitats, distribution patterns of plant diseases and pests, fish populations, and ocean circulation patterns that can significantly affect agriculture and food production. The manifestation of identified climate change-induced hazards and risks on agriculture will vary due to differences in geographical and socio-economic conditions across the region (IGES and SEARCA, 2013). Agrobiodiversity remains the main raw material for agroecosystems to cope with climate change as it contains the reservoir of traits for plant and animal breeders and farmers to select resilient, climate-ready germplasm, and produce new breeds (Marambe and Silva, n.d.).

### Impacts on protected areas

According to the World Wide Fund for Nature (WWF), protected areas offer a limited defense against climate change and they should be improved to withstand climate change impacts. Climate change is likely to result in biodiversity loss, forest degradation and reduction, migration, and extinction of species. Climate change also adds to pressures of already vulnerable biodiversity hotspots (WWF, 2015).

If there is a significant rise in sea level, all wetland and marine and coastal ASEAN Heritage Parks (AHPs) will be affected. Species existing in about 60 percent of AHPs are vulnerable to climate change due to decreasing niche space considering these AHPs are 1,000 meters above sea level (Bickford et al., 2010).

AHPs in Cambodia, Philippines, and Viet Nam are shown to be affected by past cyclone events. Endangered plants and animals are the most common components in almost all AHPs that are sensitive to climate change. However, very limited attention has been given to address climate change issues in most of AHPs. Nonetheless, Mardiastuti et al. (2013) stated that components in most of the AHP management plans do not specifically address climate change but contribute to the reduction of sensitivity and vulnerability to climate change impacts (Simorangkir and Pollisco, 2012). While not expressly reflected in the management plans, these are indicative of indirect mitigation action plans to address climate change.

## Current initiatives on mitigation and adaptation

As a region that is highly vulnerable to climate change, it is imperative for ASEAN to seek solutions to adapt to climate change and ensure resiliency. AMS have expressed their commitment to addressing climate change issues by playing an active role in the global community.

The ASEAN Working Group on Climate Change (AWGCC) was established in 2009 to oversee the implementation of relevant action lines in the ASEAN Socio-Cultural Community (ASCC) Blueprint and the ASEAN Climate Change Initiative (ACCI) (ASEAN Cooperation on Climate Change, n.d.). The ACCI is a consultative platform to promote coordination and collaboration among ASEAN sectoral bodies impacted by climate change such as energy, forestry, agriculture, disaster management, and others to ensure a wellcoordinated and integrated approach to climate change (ASEAN Secretariat, n.d.).

In 2012, the ASEAN Action Plan on Joint Response to Climate Change (AAP-JRCC) was developed to implement the ASEAN Leaders' Statement on Joint Response to Climate Change, which is a living document guided by the Roadmap for an ASEAN Community 2009–2015 and the ACCI. The program of action includes adaptation, mitigation, finance and investment, technology transfer, and other matters of regional cooperation (ASEAN Secretariat, n.d.).

The region reaffirmed its commitments on climate change in the twenty-first session of the UNFCCC (COP 21) in 2015. In the 2015 ASEAN Leaders' Statement, AMS declared, among others, to look forward to positive outcomes from the intensive negotiations under the Durban Platform for Enhanced Action towards increasing the level of implementation of existing mitigation and financial commitments under the Convention during the pre-2020 period. AMS urged Parties to adopt a COP decision on the pre-2020 ambition that effectively and adequately enhances goals on adaptation, mitigation, finance, technology development and transfer, capacity building, and transparency of actions and support; in particular through the ratification of the Doha Amendment to the Kyoto Protocol in the second commitment period by all Parties, and the outcome of the Bali Action Plan. AMS urged developed countries to provide assistance to AMS to enhance protection and sustainable use of biodiversity and systematic rehabilitation of forest ecosystems including mangrove and peatland forests, in recognition of their critically important roles in mitigation and adaptation, particularly their provision of ecosystem services, including disaster risk reduction.

The ASCC Blueprint (2016–2025) reflects climate change as an area for regional collaboration and cooperation. With the post–2015 blueprint, the region will continue and build upon the gains of the Millennium Development Goals and rally broad-based support in addressing challenges to sustainable development such as climate change, among many other issues.

### Box 24. Strategic measures of ASCC Blueprint 2025

- Increase competencies and resilience of relevant stakeholders with advanced technological and managerial skills to improve institutional capacity.
- Promote sustainable financing mechanisms for financial risk protection through strategic partnerships with relevant stakeholders.
- Strengthen human and institutional capacity in implementing climate change adaptation and mitigation especially among vulnerable and marginalized communities.
- Develop comprehensive and coherent responses to climate change challenges such as, but not limited to multi-stakeholder and multi-sectoral approaches.
- Leverage the private sector and community to have access to new and innovative financing mechanisms to address climate change.
- Mainstream climate change risk management and greenhouse gas (GHG) emission reduction sectoral planning.
- Strengthen global partnerships and support the implementation of relevant international agreements and frameworks.
- Promote policy coherence and interlinkages, and synergize initiatives in disaster risk reduction, climate change adaptation and mitigation, humanitarian actions, and sustainable development.
- Expand regional cross-sectoral platforms and establish shared strategies against climate change.
- Promote sound science and evidence-based policies.
- Consider indigenous and traditional knowledge and practices in responding to the impacts of climate change.
- Explore the potential of financial and insurance mechanisms and strategies for disaster risk reduction and climate change adaptation.

ASEAN 2025: Forging Ahead Together was adopted in November 2015, which constitutes the ASEAN Community Vision 2025, ASEAN Political-Security Community (APSC) Blueprint 2025, ASEAN Economic Community (AEC) Blueprint 2025, and ASEAN Socio-Cultural Community Blueprint 2025 (ASEAN Secretariat, 2015). At the twenty-sixth ASEAN Summit in Kuala Lumpur, Malaysia on 27 April 2015, the ASEAN leaders, through the Declaration on Institutionalizing the Resilience of ASEAN and its Communities and Peoples to Disasters and Climate Change, committed "to forge a more resilient future by reducing existing disaster and climate-related risks, preventing the generation of new risks and adapting to a changing climate through the implementation of economic, social, cultural, physical, and environmental measures, which address exposure and vulnerability, and thus strengthen resilience." In recognition of ASEAN 2025, ASCC Blueprint 2025, and the ASEAN Strategic Plan on Environment (ASPEN) 2016–2025, the AAP–JRCC will be replaced by the AWGCC Action Plan that will serve as the blueprint to address climate change problems in the region.

ASEAN and the United Nations (UN) agreed in 2015 to develop a joint work plan on environment and climate change for 2016–2020, which takes into account the key elements of the ASEAN 2025 Vision, ASPEN, and the 2030 Agenda for Sustainable Development. The primary objective of the action plan is to support ASPEN. The medium- to long-term goal of the partnership is to ensure appropriate capacity and cooperation between ASEAN and the UN to address the region's environmental challenges and support national and regional leadership. On the ASEAN Cooperation on Climate Change with Dialogue/Development Partners and other Sectoral Bodies, the ASEAN Centre for Biodiversity (ACB), in collaboration with the Federal Republic of Germany through Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), implemented the Biodiversity and Climate Change Project (BCCP) from 2010–2015. The BCCP supported the AHP Programme in addressing biodiversity and climate change through the assessment and sharing of knowledge and experiences on best practices, capacity building outputs, and development of a database of knowledge, experts, and institutions on biodiversity and climate change. Other related projects being implemented by GIZ and its partners included the ASEAN-German Programme on Response to Climate Change (GAP CC).

Other key regional activities on climate change under the environment sector include the following: 1) Rehabilitation and Sustainable Use of Peatland Forests in Southeast Asia (2009– 2013); 2) ASEAN-India Project on Enhancing Local Level Climate Change Adaptation in Southeast Asia (Phase I); 3) ASEAN-India Project on Climate Change Projections and Assessment of Impacts; and 4) Modeling and Capacity Building Programme.

Many climate-relevant activities are also being undertaken in the framework of ASEAN cooperation, which include both mitigation and adaptation actions under general environmental protections, disaster risk reduction, and natural resources management agreements and initiatives (Asia-Europe Environment Forum, 2014).

Theme	Agreement/Initiative
Air pollution	ASEAN Agreement on Transboundary Haze Pollution
Carbon trading	Joint Crediting Mechanism (JCM)/Bilateral Offset Credit Mechanism (BOCM) between Japan and Cambodia, Indonesia, Lao PDR, Viet Nam
Disaster risk management	ASEAN Agreement on Disaster Management and Emergency Response 2010-2015
Water resource management	ASEAN Strategic Plan of Action on Water Resources Management (ASPA-WRM) ASEAN Marine Water Quality Management Guidelines and Monitoring Manual
Natural resource use and agriculture	ASEAN Multi-Sectoral Framework on Climate Change: Agriculture, Fisheries and Forestry Towards Food Security (AFCC Framework) The Rehabilitation and Sustainable Use of Peatland Forests in Southeast Asia Project
Nature conservation	ASEAN Heritage Parks Programme Heart of Borneo Initiative (HoB) Coral Triangle Initiative (CTI)

At the national level, AMS reflected their action plans on climate change through Nationally Determined Contributions (NDCs) indicated in the 2015 Paris Agreement, National Biodiversity Strategy and Action Plans (NBSAP), and Fifth National Reports (5NR) to the CBD (Table 13). NDCs outline post-2020 climate actions that countries intend to undertake under the Paris Agreement, which will largely determine whether the world achieves an ambitious goal and is put on a path towards a low-carbon, climate-resilient future.

The Paris Agreement came into force on 4 November 2016 and has been ratified by 151 countries as of 3 July 2017. All AMS are signatories to the Paris Agreement and, as of publication, only Myanmar has yet to submit its instrument of ratification.

ASEAN Member State	Nationally Determined Contribution (NDC)	National Biodiversity Strategy and Action Plan (NBSAP)	Fifth National Report to the Convention on Biological Diversity (CBD)
Brunei Darussalam (Ratified Paris Agreement on 21 September 2016)	Reduce total energy consumption by 63% by 2035 compared to business- as-usual (BAU) scenario. Reduce morning peak hour CO, emissions from vehicles by 40% by 2035 compared to BAU. Increase total area gazetted as Forest Reserves to 55% of total land area, compared to the current level of 41%. Priority sectors for further climate change adaptation actions: • Biodiversity • Forestry • Coastal and flood protection • Health • Agriculture • Fisheries Reduce emissions by 27% by 2030 with international support.	Target 10: Raise awareness on the importance of marine and coastal resources, particularly coral reefs. Implement an environmental impact assessment (EIA) system to mitigate adverse effects on coastal and marine ecosystems. Target 15: Timber harvesting and related utilization of forest resources inside the country's peat swamp forests are not allowed. Target 10: Identification of size	The Cambodia Climate Change Strategic Plan (2014–2023) directs climate-smart
(Ratified Paris Agreement on 6 February 2017)	<ul> <li>with international support.</li> <li>Increase forest cover to 60% of national land area by 2030.</li> <li>Climate change measures: <ul> <li>Promote capacity through community-based adaptation actions and restore ecosystems to respond to climate change.</li> <li>Implement management measures for protected areas to adapt to climate change.</li> <li>Develop and rehabilitate flood dykes for agricultural and urban development.</li> <li>Develop climate-proof agriculture systems to address changes in water variability and enhance crop yields.</li> <li>Promote climate-resilient agriculture in coastal areas by building sea dykes and upscaling climate-smart farming systems.</li> <li>Develop crop varieties suitable to agro-ecological zones (AEZ) and resilient to climate change.</li> <li>Strengthen technical and institutional capacity to conduct climate change impact assessments and projections, and mainstream climate change into sector and sub-sector development plans.</li> </ul> </li> </ul>	Identification of size and distribution of habitats for threatened species. Target 15: Plans are being developed for reporting of coral reef status, locations, and protection.	<ul> <li>Plan (2014–2023) directs climate-smart development with the following objectives:</li> <li>Promote climate resilience through food, water, and energy security.</li> <li>Reduce vulnerability of sectors, regions, gender, and health to climate change impacts.</li> <li>Ensure climate resilience of critical ecosystems, biodiversity, protected areas, and cultural heritage sites.</li> <li>Promote low-carbon planning and technologies to support sustainable development.</li> <li>Improve awareness and capacities for climate change responses.</li> <li>Promote adaptive social protection and participatory approaches in reducing loss and damage.</li> <li>Strengthen institutions and coordination for national climate change responses.</li> <li>Strengthen collaboration and participation in regional and global climate change processes.</li> <li>Green growth and policies on climate change and energy efficiency in the industrial sector have been developed. The National Policy, Strategy and Action Plan on Energy efficiency in the industrial sector by 28%; strengthen capacity building in energy efficiency; and raise awareness of industry stakeholders on energy efficiency issues.</li> </ul>

ASEAN Member State	Nationally Determined Contribution (NDC)	National Biodiversity Strategy and Action Plan (NBSAP)	Fifth National Report to the Convention on Biological Diversity (CBD)
Indonesia (Ratified Paris Agreement on 31 October 2016)	<ul> <li>The unconditional reduction target is 29% from BAU scenario by 2030. Conditional reduction is subject to international support and cooperation where Indonesia is committed to a further 12% up to 41% reduction in emissions by 2030.</li> <li>Climate change measures: <ul> <li>Employ a landscape approach.</li> <li>Improve management of natural resources and enhance climate resilience by protecting key terrestrial, coastal, and marine ecosystems.</li> <li>Build resilience into food, water, and energy systems through: <ul> <li>Sustainable agriculture and plantations</li> <li>Integrated watershed management</li> <li>Reduction of deforestation and forest degradation</li> <li>Land conservation</li> <li>Utilization of degraded land for renewable energy</li> <li>Improved energy efficiency and consumption patterns</li> </ul> </li> <li>Support ecosystem and landscape resilience through: <ul> <li>Social forestry</li> <li>Coastal zone protection</li> <li>Integrated watershed management</li> </ul> </li> </ul></li></ul>	The national targets for biodiversity management for 2015-2020 are: Target 4: Establishment of increased availability and implementation of policies supporting sustainable production and consumption (SCP) in the utilization of biodiversity resources. Target 8: Reduction of pollution that damages biodiversity and ecosystems. Target 10: Reduced level of anthropogenic pressure on coral reefs and other vulnerable ecosystems affected by climate change. Target 11: Sustainable maintenance and improvement of conservation areas. Target 14: Improved functionality of integrated ecosystems to ensure the improvement of essential services (water, health, livelihoods, and tourism, among others). Target 15: Conservation of degraded ecosystems in the region.	The government plans to increase understanding of climate change; coordinate research to diminish coral reef degradation; ensure water quality and water continuity in watersheds for climate change adaptation; improve livelihoods especially for people living within forests; and reduce GHG emissions from deforestation, and forest and peatland degradation (REDD).
Lao PDR (Ratified Paris Agreement on 7 September 2016)	<ul> <li>Increase renewable energy to 30% of energy consumption by 2025.</li> <li>Climate change measures: <ul> <li>Increase forest cover to 70% of land area by 2020. Once the target is achieved, emission reductions will carry on beyond 2020.</li> <li>Implement REDD+ Programme, which has been a framework for the forestry sector since 2007. A number of REDD+ pilot projects were established in 2009; and in 2010, Lao PDR became one of the first pilot countries under the Forest Investment Program (FIP), which is a multilateral program under the Climate Investment Fund (CIF).</li> <li>Promote climate resilience in farming systems, agriculture infrastructure, and forest production and ecosystems.</li> <li>Promote technical capacity in managing forest for climate change adaptation.</li> <li>Strengthen water resources information systems.</li> </ul> </li> </ul>	Target 2: A national strategy on environmental and climate change education and awareness 2016–2030 has been revised. Target 3: REDD+ has been introduced and institutions have been established at the national and sub-national level. Target 15: Efforts have been made to restore 4.44 sq km of forests.	The government has developed the National Strategy on Environmental and Climate Change Education and Awareness 2016–2030.

ASEAN Member State	Nationally Determined Contribution (NDC)	National Biodiversity Strategy and Action Plan (NBSAP)	Fifth National Report to the Convention on Biological Diversity (CBD)
Malaysia (Ratified Paris Agreement on 16 November 2016)	Reduce GHG emissions intensity by 45% by 2030 relative to emissions intensity in 2005. Unconditional reduction target is 35% and a further 10% is conditional upon receipt of climate finance, technology transfer, and capacity building programs from developed countries for 2021–2030.	Action 7.1.b. Undertake nationwide mapping of all vulnerable ecosystems taking cognizance of land use changes and other emerging threats, including climate change. Action 7.2. Improve management and rehabilitation of vulnerable ecosystems by designing a targeted approach to rehabilitate degraded ecosystems and habitats, and formulating national action plans for the conservation of coral reefs, seagrass beds, and limestone hills. Action 16.3. Improve knowledge on the link between climate change and biodiversity. Malaysia needs to understand and expand the evidence base on the effects of climate change on biodiversity, and assess the vulnerability of species and habitats to climate change adaptation and mitigation efforts.	<ul> <li>The National Policy on Climate Change has the following thrusts: <ul> <li>Institute measures for climate- resilient development through a low-carbon economy to enhance global competitiveness and attain environmentally-sustainable socio- economic growth.</li> <li>Support climate-resilient development and investment including industrial development.</li> <li>Balance adaptation and mitigation measures to strengthen environmental conservation and sustainability of natural resources.</li> <li>Enhance management practices that support renewable energy and energy efficiency.</li> </ul> </li> <li>The Coral Reef Bleaching Response Plan monitors information that serves as early warning of climate conditions that favor bleaching.</li> <li>The National Green Technology and Climate Change Council and the Malaysia Green Technology Corporation supports implementation of climate change policies.</li> <li>The National Action Plan for Peatland Management in Malaysia evaluates climate change impacts and develops adaptation measures.</li> <li>The Central Forest Spine Master Plan ensures services such as climate regulation, soil protection, and carbon storage and sequestration.</li> <li>The Malaysia National Plan of Action for the Coral Triangle Initiative develops climate change adaptation measures for the Coral Triangle.</li> </ul>
Myanmar	<ul> <li>Realize 20% electricity saving potential by 2030 of the total forecast electricity consumption.</li> <li>Climate change measures: <ul> <li>Implement actions in the forestry sector such as forest assessments, reduction of deforestation, rehabilitation of degraded forest lands, reforestation, and implementation of REDD+ projects.</li> <li>Rehabilitate degraded forests and restore ecosystems affected by extreme weather events.</li> </ul> </li> </ul>	Target 10: Protect and check environmental damage to coastal areas; establish a coastal and marine research center in a university of marine science; and promote protection of fisheries in sustainable development. Target 15: Monitor prescriptions in forest working plans for sustainable forest management; restore forest cover in critical watersheds; increase knowledge of desert and mountain ecosystems; and identify high-risk areas from floods, soil erosion, and others.	The Myanmar Biodiversity Conservation Investment Vision integrated relevant results of research on climate change adaptation and mitigation into the analyses of biological priorities and strategies for conservation action.

ASEAN Member State	Nationally Determined Contribution (NDC)	National Biodiversity Strategy and Action Plan (NBSAP)	Fifth National Report to the Convention on Biological Diversity (CBD)
Philippines (Ratified Paris Agreement on 23 March 2017)	Reduce carbon emissions by 70% by 2030 relative to its BAU scenario of 2000–2030. Reduce emissions from energy, transport, waste, forestry, and industry sectors.	Target 1: Develop a comprehensive communication, education, and public awareness (CEPA) strategy addressing stakeholders' low awareness of the interconnection among biodiversity, climate change, and land dogradation	The Philippine Development Plan (2011–2016) ensures sustainable and climate-resilient agriculture and fisheries, forestry, and associated industry and services sectors that provide livelihood and employment; enhances natural systems resiliency and improves adaptive capacities of vulnerable communities; and prepares protected area management plans incorporating vulnerability and adaptability of sectors to disaster risk reduction and climate change.
		degradation. Target 6: The Sustainable Coral Reef Ecosystem Management Program (2012–2020) will help sustain the	The National Framework Strategy on Climate Change 2010–2022 builds the adaptive capacity of communities; increases the resilience of natural ecosystems to climate change; and optimizes mitigation opportunities towards sustainable development.
		integrity of the environment; adapt to and mitigate climate change; reduce poverty and empower vulnerable communities;	The National Climate Change Action Plan 2011–2028 aims to achieve climate-smart industries and services; implement climate change mitigation and adaptation strategies for key ecosystems; and establish local Climate Change Action Plans.
		and implement a regional and national plan of action that strengthens climate change adaptation and resilience.	The National Wetlands Action Plan (2011–2016) implements strategies for the conservation and wise use of wetlands, incorporating urgent concerns such as biodiversity conservation and climate change mitigation and adaptation.
		Target 15: The National Climate Change Action Plan will enhance the adaptive capacity of communities and the resilience of	The National Action Plan to Combat Desertification, Land Degradation and Drought (2010–2020) details policies and programs to prevent desertification and land degradation, and mitigate impacts of drought.
		natural ecosystems to climate change through eco-towns where communities enjoy increased income through climate-resilient livelihood projects and financing	The National Action Plan for the Sustainable Use and Protection of Philippines Peatlands promotes the sustainable management and wise use of peatlands through awareness raising, capacity building, and enhanced inter-agency cooperation for the benefit of local communities.
		schemes, and are supported by climate-smart infrastructure.	Eco-towns, which are planning units of individual or groups of municipalities located around boundaries of critical key biodiversity areas, will be established to increase climate change adaptation.
Singapore (Ratified Paris Agreement on 21 September 2016)	Reduce emissions intensity by 36% from 2005 levels by 2030, and stabilize emissions with the aim of peaking around 2030. All sectors are covered in Singapore's NDC.	Action 3.1. Encourage and facilitate research, particularly on ecosystem and species-specific biodiversity conservation, the interactions between the biological components and their physical environment, biodiversity valuation	Singapore has been very actively greening the urban infrastructure as part of the City in a Garden vision, which greatly increases the capacity of urbanized areas to contribute to climate change mitigation.
		studies, and the impacts of climate change on biodiversity.	

ASEAN Member State	Nationally Determined Contribution (NDC)	National Biodiversity Strategy and Action Plan (NBSAP)	Fifth National Report to the Convention on Biological Diversity (CBD)
Thailand (Ratified Paris Agreement on 21 September 2016)	<ul> <li>Reduce GHG emissions by 20% by 2030 compared to the BAU scenario; and the level of contribution could increase up to 25%.</li> <li>Climate change measures: <ul> <li>Increase national forest cover to 40% through local community participation to enhance adaptive capacities of related ecosystems.</li> <li>Safeguard biodiversity and restore ecological integrity in protected areas and important landscapes emphasizing vulnerable ecosystems and red list species.</li> <li>Develop a participatory and integrated marine conservation and coastal rehabilitation plan to strengthen coastal protection against erosion.</li> <li>Promote nature-based and sustainable tourism while enhancing better understanding of risk and vulnerability of the tourism sector, especially in hotspot areas.</li> <li>Strengthen disaster risk reduction and reduce vulnerability to climate change impacts through enhanced awareness, coordination, and adaptive capacity of local communities, especially in disaster risk-prone areas.</li> </ul> </li> </ul>	Target 10: The Department of Marine and Coastal Resources plans to monitor climate change impacts, particularly rise of sea temperature, ocean acidification, disease, and endurance of corals to future changes in marine environment. Target 15: The Master Plan on Water Resources Management (2013– 2017) prioritizes the restoration and conservation of watershed forests and promotion of economic forests and community forests.	<ul> <li>The Strategy on Climate Change 2008–2012:</li> <li>Assessed impacts on issues related to climate change, such as drought, higher temperature, coastal erosion, changes of forest ecosystem, and spread of disease and vectors.</li> <li>Implemented capacity building activities to adapt to climate change impacts.</li> <li>Developed guidelines to mitigate impacts on biodiversity.</li> </ul> The Climate Change Master Plan 2015–2050 directs climate change adaptation and mitigation measures. The Plan to Mitigate Global Warming (2008–2010) developed work plans on plants, soil, water, livestock and fishery, and climate change and agriculture. The Energy Conservation Plan (2008–2010) promoted alternative energy including biogas production from tapioca factory and agricultural solid waste/unused materials. The National Research Strategy Development of Biological Diversity Value (2013–2016) studied climate change adaptation on water, flood, and drought management; agriculture and food security; and natural resources management, among others. The National Economic and Social Development Plan No. 11 (2012–2016) promoted research and development of Climate-resilient species. The Chiang Rai Municipality Developmental Strategic Plan (2013–2017) aims to increase breathing spaces in the city, raise public awareness on conservation and biodiversity, become a low-carbon city, and prepare for climate-resilient species.
Viet Nam (Ratified Paris Agreement on 3 November 2016)	<ul> <li>Reduce GHG emissions by 8% by 2030 compared to BAU. Conditional contribution could be increased to 25% with international support.</li> <li>Increase forest coverage to 45% by 2030; increase area of protection forest in coastal areas to 3,800 sq km including 200–500 sq km of additional mangroves.</li> <li>Climate change measures: <ul> <li>Promote sustainable forest management and biodiversity conservation, prioritizing regions with large forests that are important for forestry production and local livelihoods.</li> <li>Attract private sector investment for sustainable forest management, biodiversity conservation, and livelihood development</li> <li>Effectively use domestic and international resources for REDD+ and payment for forest environmental services projects.</li> <li>Expand international cooperation for investment, technical assistance and capacity building, information and experience sharing on sustainable forest management and development, biodiversity conservation, and livelihood development.</li> </ul> </li> </ul>	Target 5: Identify climate change impacts to actively respond to climate change; develop biodiversity corridors to increase connectivity between forest ecosystems and critical biodiversity areas; and implement forest regeneration programs using appropriate approaches to biodiversity, carbon storage, and climate change adaptation and mitigation.	Study and evaluate the role of biodiversity in response to climate change and propose appropriate solutions. The National Strategy on Climate Change promotes sustainable management of forests, reduction of greenhouse gases, and biodiversity conservation. Decision No. 45/QD-TTg dated 8 January 2014 of the Prime Minister approving the masterplan on nation-wide biodiversity conservation by 2020, with a vision to 2030, ensures that important natural ecosystems; endangered, rare, and precious species; and genetic resources are conserved and sustainably developed; and ecosystem services are maintained to promote sustainable development.

Sources: 1. NDCs as communicated by Parties. (n.d.). Retrieved from http://www4.unfccc.int/submissions/INDC/Submission Pages/ submissions.aspx 2. AMS' Fifth National Reports



Commitments by ASEAN Member States to reduce emissions demonstrate that the urgent need to ensure resilience against climate change is recognized in the region. Similar to the global assessment made by GBO 4, results in ASEAN show that while AMS are on track to restore 15 percent of degraded ecosystems that contribute to climate change mitigation and adaptation, it is uncertain whether the region will meet the target by 2020.

### Ways Forward

Climate change is a global and regional issue. In many cases, different national agencies work on climate change and biodiversity separately, and a convergence among relevant stakeholders on both issues is necessary to comply with commitments to both the UNFCCC and the CBD. Regionally, there is recognition of the vulnerability of ASEAN to the impacts of climate change, but an understanding of biodiversity conservation as an effective mitigating measure against climate change impacts needs to be emphasized. Increased collaboration, sharing of expertise, and public awareness of the interrelationship between climate change and biodiversity are crucial to addressing these twin issues.

As agreed upon during the ASEAN Ministerial Meeting on Environment in 2015, the ASCC Blueprint provides strategic guidance to address issues on the environment. AMS need to provide national and local strategic action plans to complement the ASCC Blueprint that pertains to the 12 points relevant to climate change.

AMS need to implement plans identified in NBSAPs specific to climate change adaptation and mitigation. Local indicators that will contribute to the national status of Aichi Biodiversity

Targets 10 and 15 may be developed. Indicators to Target 10 could be related to the change in the population of migratory bird species and monitoring of impacts of climate change and ocean acidification to vulnerable local species and habitats across ecosystems. For Target 15, an indicator relevant to the local situation could be related to population trends of forest-dependent flora and fauna, such as some species of rattan, bryophytes, pteridophytes, raptors, amphibians, and butterflies, among others.

AMS have to continue developing means to adapt and mitigate climate change impacts at the local, national, and regional levels. These include the following:

- Identify species and ecosystems naturally adaptive to climate change (Targets 10, 12, 14, and 15).
- Provide support to species and ecosystems threatened by climate change (Targets 10, 12, 14, and 15).
- Enhance climate change mitigating measures vis-à-vis biodiversity conservation, e.g., implementing the principles for ecosystem-based disaster risk reduction (Eco-DRR) in protected areas including the incorporation of DRR into protected area management (Targets 11 and 15).

The ASEAN Centre for Biodiversity can contribute in the promotion of new knowledge, practices, and technologies for the region to adapt and mitigate climate change impacts by facilitating sharing of and through:

- Localized climate scenario models
- Localized monitoring and evaluation
- Regional conferences on biodiversity and climate change

# Cities and Biodiversity: Nature in tight spaces

# Challenges

Many cities in the ASEAN region were established near biodiversity - rich habitats. Unregulated use of natural resources have depleted these habitats, and, thus, are now categorized as critical biodiversity habitats.

Rapid urban growth could lead to more land conversion.

Poor understanding of the benefits of having rich biodiversity in the city.

**Environmental considerations**, including biodiversity, are accorded a low priority compared to economic and industrial progress.

- ✓ Conserving small areas of forests, floodplains, estuaries, and coastlines protects species and strengthens ecosystems services.
- ✓ Maintaining biodiversity keeps cities cool.
- $\checkmark$  Nature areas provide habitats for species.
- ✓ Greening idle areas with urban farming helps supply food and employment, and promote appreciation of biodiversity.
- ✓ Green areas, such as parks, clean the air and calms the body and mind.

**ASEAN Initiative on Environmentally Sustainable Cities** 



**ASEAN Environmentally** Sustainable City Award

> **Singapore Index on Cities' Biodiversity**

# **Cities and Biodiversity:** Nature in tight spaces

Urban biodiversity encompasses the variety of living organisms that have adapted and are surviving in densely human-populated built up environments. An urban ecosystem is a human-dominated environment (Ernstson et al., 2010) with mostly artificial habitats and features. This ecosystem draws ecosystem services from nearby habitats but at the same time continues to expand outwards, upwards, or both. Such movement encroaches on adjacent farmlands, forests, and grasslands, and in some cases, reclaims parts of the marine and coastal ecosystem to accommodate further developments.

In this human-dominated ecosystem, other organisms may have adapted, lived and thrived among humans, and collectively formed the biodiversity in the city (Hunter, 2007). Biodiversity is not merely the number of different species present in a given ecosystem, such as a city, but rather the intricate web of biological dependencies where species, including humans, depend on others for their survival and well-being (SCBD, 2000).

Maintaining biodiversity in cities must be understood as a harmonious co-existence between humans and different plant and animal species that are mutually dependent on each other for wellness and survival in a built up and largely artificial environment. However, while appreciation and understanding of biodiversity has grown, many cities in the region have already lost much of their natural areas and wildlife.



Expansion of cities affects a number of Aichi Biodiversity Targets, such as the development and application of positive incentives for the conservation and sustainable use of biodiversity (Target 3), implementation of plans for sustainable production and consumption (Target 4). reduction of the rate of loss of natural habitats (Target 5), reduction of pollution levels (Target 8), and protection of ecosystems and ecosystem services (Target 14).

This chapter aims to examine urbanization in the region, its impacts on biodiversity, and how cities conserve biodiversity by making it an integral component of urban planning and design.

### Urbanization in ASEAN and biodiversity

Urbanization in ASEAN is guite rapid that ruralurban change can happen in the duration of a single generation. This rapid development is influenced by the availability of technologies, modern tools, equipment, and machinery that are readily on hand to build modern infrastructure (Biswas et al., 2015). Communication is faster and reaches a wider audience, thereby enhancing information sharing and exchange. Industries, trading, and infrastructure continue to develop as countries push their economies to globally competitive levels. This rapid urban development has caused significant impacts on biodiversity as the region is home to three of the world's mega-diverse countries (UNEP-WCMC, 2014).

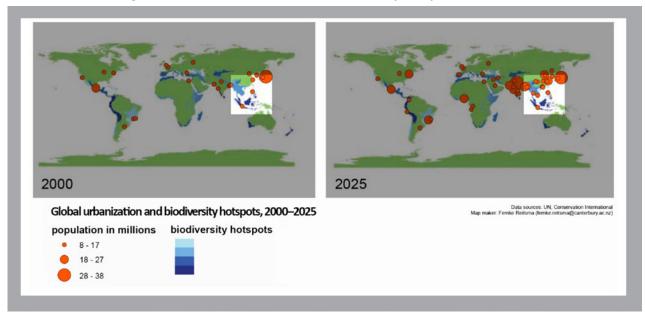


Figure 7. Global urbanization and biodiversity hotspots, 2000–2025

Many cities in ASEAN are located in biodiversityrich areas such as floodplains, estuaries, and coastlines and these cities are expanding rapidly (SCBD, 2012). Rapid increase in human population usually occurs in close proximity to areas with rich natural resources and high biodiversity (Figure 7). While some species migrate to more suitable habitats, some go locally extinct, and other resilient species have adapted and learned to thrive in the new urban environment.

Human behavior towards the environment is different in ASEAN compared to other regions. ASEAN culture has a very strong link to spiritual traditions and care for the environment is encouraged in many religions. Most cities in the region maintain associations with their respective culture and traditions where unique values of nature remain intact (Narayanan, 2016). It can be observed that many parks, gardens, and

open areas are dedicated to deities and it is in these parks that temples are often found.

Spiritual motivation in valuing biodiversity and educating people about biodiversity at the level of scientific understanding should be parallel efforts in the region because attachment to traditions and culture can erode through time particularly in a highly modern world where science and technology have become more dominant (Mazzocchi, 2006).

### **Challenges**

Development of cities in the region is among the fastest in the world and occur mostly in coastal areas—where about 80 percent of the population live within 100 kilometers of the coast. Such a situation leads to the overconcentration of economic activity and livelihoods in coastal mega cities (Weiss, 2009). Many of these



coastal cities expand by reclaiming parts of the sea or clearing out mangroves, further destroying remaining critical habitats of coastal and marine species.

Most AMS cities develop in important habitats such as floodplains, estuaries, and coastlines where people have traditionally taken advantage of the flat terrain, accessibility to food and other resources, mobility, and trade. Despite being home to a variety of organisms, these important habitats are eventually destroyed to make way for urban development. The initial impacts of habitat loss and degradation are compounded by the rapid growth and expansion of cities as populations increase and economies progress correspondingly. Such circumstances put remaining natural areas under threat of further land use changes (Elmqvist, n.d.). In addition to increasing levels of toxicity on rivers and air, city temperatures are becoming warmer (Oke, 1997). While some species can tolerate such artificial changes and learn to adapt and even take advantage of these changes, the factors contributing to the general wellness of all its inhabitants are being taken for granted. If urban development is left unchecked and environmental considerations are not prioritized against economic and industrial progress, cities might eventually become unlivable (Pathirana and Meurs, 2015).

Every person in the city making up the millions of people in a highly populated urban environment needs food, water, and clean air to survive. These resources are directly and indirectly sourced from different ecosystems. Cities must learn to value these ecosystem services and ensure their sustainability by lessening impacts and maintaining the surrounding ecosystems.

Another challenge is the introduction of nonnative species to the environment from various channels such as resource production (cultivation of non-native but commercially valuable crops and tree species), species migration due to natural habitat loss/survival response, and other

vectors such as exotic species and pet trade, and irresponsible pet care (releasing pets into the environment if caring becomes too difficult or expensive). Related to this challenge is the proliferation of feral animals such as stray dogs and cats and other pet species that were abandoned or have escaped from domestication and have turned wild as they compete with other urban wildlife species for food (Shochat et al., 2010).

The main challenge, however, is people's lack of understanding of the values of and advantages of maintaining biodiversity. People generally understand nature; some can identify certain trees and flowers; many know fish comes from rivers and oceans, meat comes from chickens, cattle, and other livestock; but most do not understand how nature and humans interact to have better quality of life in cities (Gezgin, 2010).

Existing highly urbanized cities need to have biodiversity integrated into its urban development plan to restore natural areas and species diversity. Developing cities must be designed to work with biodiversity and not against it by incorporating and even expanding existing natural areas as integral components of landscape planning. A city with rich tree cover, nature parks, clean rivers, and green spaces have cleaner air, cooler climate, and more aesthetic features.

# **Opportunities**

Cities play a key role in global efforts to protect and manage vulnerable ecosystems and biodiversity. Just as the ecological footprint of a city can have a negative impact far beyond the boundaries of the city, certain urban actions can also have far reaching positive impacts (UNEP and UN-HABITAT, 2005).

Cities have a higher educational capacity to spread awareness on the values and benefits of biodiversity, sustainable use, and management (SCBD, 2012). As most national universities



and colleges are located in cities, these institutions have knowledge and understanding about integrating environmental sciences and socio-cultural education that promote and advocate environmental care. Such information is also quickly and widely disseminated with the availability of various forms of media (i.e., television, movies, radio, and internet).

Cities can form partnerships nationally, regionally, and globally to tackle the challenges of rapid urbanization and biodiversity loss by sharing experiences and lessons learned and developing strategies and policies to avert further loss and conserve remaining biodiversity. Cities have financial resources, expertise, and tools to implement policies in protecting, preserving, and enhancing biodiversity. One of the ways in which cities are implementing biodiversity friendly policies is in the area of climate change impact mitigation. Recent studies conducted by the Economy and Environment Program for Southeast Asia (EEPSEA) found that major cities form the most high risk areas in the region. Coastal floodplains, deltas, estuaries, and basins, where many high density cities are located, are at high risk of inundation due to sea-level rise, and areas on eastern seaboards are at high exposure to climatic hazards such as typhoons, storm surges, and landslides.

Realizing that biodiversity is a key element in developing resilience to climate change, a growing number of biodiversity-related programs are being established and promoted to help buffer the effects of climate change such as mangrove rehabilitation (i.e., Mangrove and Beach Forest Rehabilitation Project in lloilo City, Philippines, one of the hardest hit areas of typhoon Haiyan), and reforestation on landslide and flood-prone areas (Kuchelmeister, 2000). Under the umbrella of sustainable urban development, cities and local governments

are forming global partnerships committed to becoming sustainable, low-carbon, resilient, eco-mobile, biodiverse, resource-efficient, and productive urban communities (ICLEI, n.d.).

Cities with rich biodiversity are more livable and, therefore, have a higher land value that can attract more business investments (Chua, 2015). A well-planned urban landscape would integrate biodiversity to optimize its benefits to city habitants, both humans and wildlife.

### Responses

There has been a growing awareness among local authorities and city administrators on the importance of biodiversity. During the Tenth Conference of Parties to the Convention on Biological Diversity (CBD COP 10) in Nagoya, Japan held in 2010, Parties adopted Decision X/22 on the Plan for Action on Subnational Governments. Cities and Other Local Authorities for Biodiversity in recognition of the contribution of cities and local authorities to the biodiversity agenda. The Plan of Action supports the implementation of the Strategic Plan for Biodiversity 2011–2020 at the national and local levels by providing recommendations to national governments on how they can engage local authorities and translate national strategies to the local context. It also encourages the use of the City Biodiversity Index (CBI) as a monitoring tool to assist the local authorities to evaluate their progress in urban biodiversity conservation, which can be further included in countries' National Reports to the CBD.

In recognition of Singapore's leadership and contributions in the development of the Index, the CBI was renamed the Singapore Index on Cities' Biodiversity, or Singapore Index.



The Singapore Index serves as a selfassessment tool for cities to benchmark and monitor the progress of biodiversity conservation efforts against their own individual baselines. It comprises two parts: first, the "Profile of the City" provides background information on the city; and second, 23 indicators that measure native biodiversity in the city, ecosystem services provided by biodiversity, and governance and management of biodiversity. Each indicator is assigned a scoring range between zero and four points, with a total maximum score of 92 points. Cities will have to conduct baseline scoring in the first application of the Singapore Index. It is recommended that subsequent applications of the Singapore Index take place every three years to allow sufficient time for changes to take effect or the results of biodiversity conservation efforts to materialize.

Singapore Index indicators:

# Native Biodiversity in the City:

- 1. Proportion of Natural Areas in the City
- 2. Connectivity Measures
- Native Biodiversity in Built Up Areas (Bird Species)
- 4. Change in the Number of Vascular Plant Species
- 5. Change in the Number of Bird Species
- 6. Change in the Number of Butterfly Species
- 7. Change in the Number of Species (any other taxonomic group)
- 8. Change in the Number of Species (any other taxonomic group)
- 9. Proportions of Protected Natural Areas
- 10. Proportion of Invasive Alien Species

# Ecosystem services provided by biodiversity:

- 11. Regulation of Quantity of Water
- 12. Climate Regulation: Carbon Storage and Cooling Effect of Vegetation

- 13. Recreation and Vegetation: Area of Parks with Natural Areas
- Recreation and Education: Number of Formal Education Visits per Child Below 16 Years to Parks with Natural Areas per Year

# Governance and management of biodiversity:

- 15. Budget Allocated to Biodiversity
- 16. Number of Biodiversity Projects Implemented by the City Annually
- 17. Existence of Local Biodiversity Strategy and Action Plan
- 18. Institutional Capacity: Number of Biodiversity Related Functions
- Institutional Capacity: Number of City or Local Government Agencies involved in Inter-agency Cooperation Pertaining to Biodiversity Matters
- 20. Participation and Partnership: Existence of Formal or Informal Public Consultation Process
- 21. Participation and Partnership: Number of Agencies/Private Companies/NGOs/ Academic Institutions/International Organizations with which the City is Partnering in Biodiversity Activities, Projects and Programs
- 22. Education and Awareness: Is Biodiversity or Nature Awareness Included in the School Curriculum
- 23. Education and Awareness: Number of Outreach or Public Awareness Events Held in the City per Year

# Monitoring tool to guide cities towards the accomplishment of the Aichi Biodiversity Targets

In 2012, through Decision XI/8 adopted at COP 11 held in Hyderabad, India, Parties to the CBD welcomed the report on the implementation of the Plan of Action and further encouraged the Biodiversity Indicators Partnership to use the

arget	Description	Relevant Singapore Index Indicator
1	Public Awareness	21, 22, 23
2	Mainstreaming Biodiversity Values	17, 18, 19, 20, 21, 22
3	Elimination of Incentives Harmful to Biodiversity	15
4	Sustainable Production and Consumption	21
5	Habitat Loss	1, 2, 17
6	Fishery Resources	17, 19, 20, 21
7	Agro-Biodiversity	17, 19, 20, 21
8	Pollution	17, 19, 20, 21
9	Invasive Alien Species	10
10	Climate Change and Marine Ecosystems	17, 19, 20, 21
11	Protected Areas	1, 2, 9, 17, 21
12	Species Extinction	1, 2, 3, 4, 5, 6, 7, 8
13	Genetic Erosion	1, 2, 3, 4, 5, 6, 7, 8, 9, 17
14	Ecosystem Services	11, 12, 13, 14, 17
15	Ecosystem Restoration and Carbon Stocks	1, 2, 4, 5, 6, 7, 8, 9, 12
16	Access and Benefit Sharing	17
17	National Biodiversity Strategies and Action Plans	17
18	Traditional Knowledge	Not Applicable
19	Science-Based Knowledge	18, 19, 21
20	Resource Mobilization	15

### Table 14. Aichi Biodiversity Targets and potential relevant indicators in the Singapore Index

Singapore Index to monitor the progress of urban settlements in achieving the Aichi Biodiversity Targets. The potential links between individual Aichi Biodiversity Targets and the relevant Singapore Index indicators are highlighted in Table 14.

### Ways Forward

The best way forward for cities in the region is to protect whatever is left of natural areas and foster programs that will increase green spaces and biodiversity. Using best practices shared by other cities in ASEAN, local authorities and city administrators can design functional parks that offer a safe haven for different urban plant and animal species and, at the same time, offer a relaxing place for urban citizens to unwind, enjoy, and de-stress. This is a good opportunity to preserve and highlight endemic species found in natural urban habitats, such as Thailand's *Crinum thaianum*, an emergent plant species endemic to the coastal plains of the Ranong and Phang Nga provinces of southern Thailand.

Idle lands and vacant areas can be used as urban farms, or orchards that not only increase green spaces, but also support public awareness on the importance of biodiversity for food and sustenance.

Financially capable cities can adopt important ecosystems outside their boundaries that

directly provide important services such as major watersheds or catchment areas that supply water and provide flood control (Landbank, 2014) to ensure proper protection and regulation of resources. This is just one of the things that can be done to protect, conserve, and promote biodiversity within and beyond the borders or urban areas.

Restoration of coastal ecosystems, such as mangrove forests, seagrasses and coral reefs, should be an integral part of coastal city planning to generate urban development that is more resilient to the increasing number of storm surges and coastal flooding and to ensure sustainability of coastal and marine resources. These ecosystems protect the cities' coastal areas, sustain vital marine and fishery resources, and provide alternative recreational areas.

Most importantly, natural areas within the city can provide opportunities to educate future generations with the right scientific knowledge and understanding of how biodiversity works and sustains life and human well-being. Urban biodiversity is an opportunity to see biodiversity in action by enabling natural processes such as pollination by bees, butterflies, and birds for fruit and crop production. Urban green spaces should be provided to encourage activities that create greater interest in nature and biodiversity, such as bird watching, nature and wildlife photography, plant walks, and picnics, among others.

### Box 25. Sustaining the Save La Mesa Watershed Project, Philippines

A watershed is the land area that drains to a stream, lake, or river. It affects water quality in the water body that it surrounds. Healthy watersheds not only help protect water quality, but also provide greater benefits to the people and wildlife that live there. Watershed conditions are important to everyone and everything that uses and needs water (US Environmental Protection Agency, n.d.). Watersheds are important for biodiversity as they provide a clean source of water and habitats for species, prevent soil erosion, and help regulate climate, among many other henefits

A relevant approach being pursued in efforts to protect and conserve urban biodiversity is resource management on the watershed scale. The watershed perspective is integral to the environmental protection and conservation agenda because of the scope of its biogeographic area and the value of the interconnected ecological services that such areas provide.

One such watershed, which serves as the main water supply for a densely populated city, is the La Mesa watershed in Metro Manila, Philippines. The La Mesa Watershed is a 27-square kilometer protected area and the only major watershed in Metro Manila. It is a major carbon dioxide sink and provides potable drinking water to nearly 12 million city residents. Previously threatened by illegal settlers, poaching, and logging, the watershed was rehabilitated and protected through the Save La Mesa Watershed Project, which was organized by Bantay Kalikasan and the Metropolitan Waterworks and Sewerage System in 1999. The watershed was reopened in 2004 with all revenues going to its conservation.

The watershed features the La Mesa Ecopark. It has picnic grounds, swimming pools, boating and fishing lagoons, bike trails, an eco-museum, butterfly trail and hatchery, pavilions, camping zone, zip line, and facilities for paintball, wall climbing, and rappelling. It has become a popular destination for outdoor recreation, photography, and family and educational trips. It has been nominated for the Best Tourism Practices Awards of the Department of Tourism, and the Pacific Asia Travel Association Awards for the Environment Category.

Source: Bantay Kalikasan - Green Initiative. Retrieved from http://www.greeninitiative.com.ph/tag/bantay-kalikasan/.

### Box 26. Urban agriculture in Bangkok, Thailand

In the context of ecosystem services, cities primarily get food supply from agricultural ecosystems usually located outside city boundaries. Rapid population rates put severe strain on food security. The challenge to cope with increasing demand encourages farmers to use farming techniques that are harmful for the environment, such as increasing fertilizer and pesticide use to improve yield. One way to manage the demand of farm products is the introduction of urban farming within city limits. With careful planning and implementation, urban farms may augment the cities', and even national food supply, and encourage the greening of vacant land areas in the city. This also gives an opportunity for urban residents to experience and appreciate the production of vegetables and fruits and learn the importance of species, such as insects that act as pollinators that are important for sustaining vields.

Realizing the importance of food security in a rapidly growing urban environment, Thailand encouraged projects to develop urban agriculture in Bangkok.

### Using GIS to map agricultural activity

Launched in April 2012 by Kasetsart University, German University of Freiburg, and GIZ, the Vegetable-GIS (V-GIS) Project uses a geographical information system to map agricultural productivity and analyze the contribution of urban and peri-urban agriculture (UPA) food security to Bangkok's growing population of more than 14 million residents. The project aims to inform decision makers on the potential of UPA, which is estimated to produce about a fifth of the world's food. All aspects of urban agriculture, including potential sites, soil quality, and risks, are included in the analysis.

### **Promoting food sustainability**

The Urban Farm Urban Barn of the Isavaret Tamonut, TTH Trading Co., Ltd. creates green spaces in Bangkok by integrating urban structures into agricultural production. In 2012, the project transformed a former textile factory and abandoned farmland into an eco-supermarket. It has an urban marketplace with semi-outdoor "produce pavilions." Crops and other agricultural products were carefully balanced to maximize harvest without exploiting resources. The project aimed to reconnect food production and consumption by reintroducing self-sufficiency in metropolitan areas, where there is an ongoing spatial separation of food production and consumption. The project won the Holcim Awards Silver 2011 Asia Pacific.

### Sources:

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www.bangkokpost.com/print/355332/.

### Box 27. Singapore: The city in a garden

Singapore has been a model for establishing connections between built-up urban environments and nature. The country's combined Nature Reserves, Nature Areas, parks, and streetscapes in developed areas put half of the total land area under some sort of green cover. The government believes that maintaining biodiversity is not only a key part of Singapore's natural and national heritage, but also makes the city more livable and attractive to global firms.

In 2014, a slender woody tree known as *Alangium ridleyi*, which was believed to have been lost to development, was discovered hiding in plain sight in the middle of Singapore's heavily visited Botanic Gardens (a dry spell triggered the blooming of small and delicate yellow flowers). In May 2015, researchers found a species of shrub brand-new to science called *Hanguana neglecta*, a shin-high spray of blade-like leaves that was spotted right beside a footpath in a nature reserve. Singapore's last remaining patch of swamp forest, where mineral-rich, teabrown water flows through small streams, was found to harbor a strangler fig thought to be locally extinct as well as a mud-snake species that had no previous record in Singapore.

Efforts to restore nature in Singapore began in 1963, when then-Prime Minister Lee Kuan Yew initiated a massive greening campaign to cultivate a garden city image to make the city more livable. In 2011, construction began on the Eco-Link@BKE, an hourglass-shaped overhead ecological corridor 50 meters wide at its narrowest point, to reestablish an ecological linkage between two adjacent nature reserves separated by an expressway. There have also been efforts to cultivate "nature ways" — strips of native vegetation along roadsides that enable the movement of birds and butterflies. Recent surveys of these plantings found that forest-edge species, such as the Horsfield's baron butterfly and the common gliding lizard, were present where they were not commonly seen before.

As part of efforts to restore ecological connections, Singapore is also using geographic information systems, genetics, and other technologies to map the best thoroughfares for specific species, from birds to coral larvae. Singapore's first marine park was built at Sisters' Islands as research models suggest that this site is a major source of coral larvae for the surrounding islands. Singapore is also looking to integrate nature into its skyline. NParks promotes the installation of green roofs and walls to temper air quality and insulate high-rise buildings from harsh tropical heat, showing that Singapore is in a good position to do research on these types of solutions and show other cities what works.

### Sources:

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# Valuing Biodiversity: Mainstreaming biodiversity in economy and business

Lack of information of the economic value of biodiversity

# **Challenges**

Insufficient awareness of the ecological and economic values of biodiversity in the business community

Lack of ASEAN-wide network of businesses with common biodiversity goals

Inadequate prioritization of business and biodiversity in national communication, education, and public awareness programs

Limited involvement of the business sector in biodiversity conservation

....

Educate consumers on the value of biodiversity.



Facilitate dialogues among relevant stakeholders on the benefits from biodiversity.

# **Biodiversity valuation tools**

The Economics of Ecosystems and Biodiversity (TEEB)

National Capital Accounting (NCA)

Payment for Ecosystem Services (PES)

# Ways Forward

Emphasize that biodiversity is everybody's business.

V

Ensure that decision makers have access to scientifically credible information that accounts for the total value of ecosystem benefits.

Mainstream biodiversity and sustainable development at all levels of governance.

NEWS

# Valuing Biodiversity: Mainstreaming biodiversity in economy and business

The ASEAN region is endowed with rich biodiversity that sustain essential life support systems both for the region and the world. The natural resources of the region provide the foundation for economies of the ASEAN Member States, and are vital to the survival and well-being of millions, both within and beyond the region.

Threatening this source of raw materials are natural and human-induced disasters such as climate change, habitat destruction, deforestation, pollution, illegal wildlife trade, invasive alien species, poverty and population growth, ineffective law enforcement, and lack of effective conservation measures, among others. Extractive industries, such as mining, logging, fishing, and agriculture, are particularly responsible for the state of natural resources. Such industries harvest resources beyond their limits and often employ irresponsible business practices, such as excessive use of pesticides and fertilizers in agriculture or use of destructive fishing practices, to increase yield and profits, and satisfy growing demands for products.

The World Wide Fund for Nature's Living Planet Report 2014 determined that there was a 52 percent loss of the world's biodiversity between 1979 and 2010. More than 60 percent of the world's ecosystems have been so degraded that they can no longer provide goods and services. It has been calculated that this degradation is currently costing the world between USD 5 trillion to USD 10 trillion annually. While the value for overall ecosystem degradation is difficult to









of biodiversity values in sustainable development plans and goals makes it relevant to all Aichi Biodiversity Targets. Issues of economy and business, are related to: Target 2, which focuses on removal of subsidies that drive negative impacts and provision of incentives to spur the sustainable use of biodiversity; Target 4, where business and other stakeholders should have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits; Target 6, where fisheries and marine resources are harvested sustainably with recovery measures in place to prevent adverse impacts on threatened species, vulnerable ecosystems and fisheries stocks; and Target 20 on mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020.

Giving due recognition to the

assess in ASEAN, a region-wide scoping study in 2012 on the economics of ecosystems and biodiversity conducted by the ASEAN Centre for Biodiversity stated that under a business-asusual (BAU) scenario, the projected loss in the value of ecosystem services from a decrease in mangrove areas is estimated at USD 2.16 billion annually (in 2007 prices). In the case of coastal and marine ecosystems, an annual loss of USD 5.64 billion per year (in 2007 prices) for the period of 2000–2050 is projected if current rates of over fishing and the use of destructive fishing practices continue. There has been increasing recognition of the importance of biodiversity and ecosystem services to the development of a strong and resilient economy. More governments are strengthening measures to determine biodiversity values and incorporate these into the national economy. Decisions made at the Meetings of the Conference of the Parties (COP) to the Convention on Biological Diversity (CBD) have generated global attention to the direct links between business and biodiversity, leading to global initiatives to strengthen biodiversity in business philosophies and operations.

# Biodiversity valuation for economic policy and development

Evidence of the link between nature and the economy have to be provided to convince policy makers, businesses, and other stakeholders that in addition to products derived from nature, ecosystem services also have value and have to be considered in economies and business practices. Various methods have been developed to monetize intangible benefits from biodiversity to highlight the importance of conserving biodiversity and ecosystem services.

### The Economics of Business and Biodiversity

In 2007, the Government of Germany and the European Commission launched The Economics of Ecosystems and Biodiversity (TEEB), a global initiative and study that aims to evaluate the costs of biodiversity loss and ecosystems degradation, and compare the economic benefits of biodiversity conservation and the costs of failure to take protective measures. It is focused on "making nature's values visible" and outlines the costs of policy inaction. The study presents a compelling rationale for promoting its application in the daily decisions of governance and management.

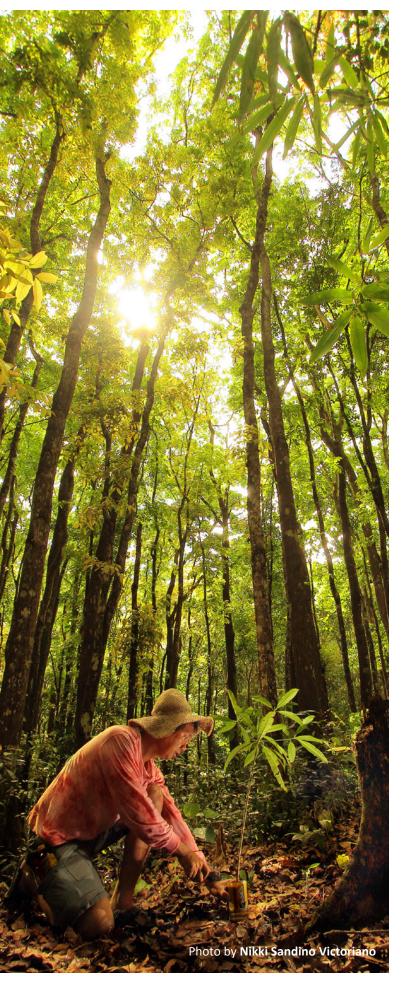
The TEEB approach promotes three steps: 1) identifying and assessing the full range of ecosystem services and people affected; 2) estimating and demonstrating the value of ecosystem services; and 3) capturing the value of ecosystem services and seeking solutions to identified issues. TEEB is both a tool and methodology that can be used to influence and inform decision makers about the costs and benefits of biodiversity, economic opportunities in tapping natural resources as sources of highvalue services, and policy incentives, which can be created to support the sustainable use of biodiversity.

## Valuation of biodiversity in the ASEAN region

TEEB has clearly drawn international attention as a number of international fora have been initiated by government and non-government organizations to promote the results of the study. After the launch of the TEEB Synthesis Report at the CBD COP 10, the AMS, through ACB, recognized the need to support the global TEEB initiative in ASEAN.

In 2012, ACB implemented the ASEAN TEEB Scoping Study, which gathered and reviewed existing evidence on the value of ecosystem services in ASEAN. The study covered information derived from 182 materials published mostly within the last 15 years from across the region. To complement the scoping exercise, four valuation case studies were developed. The four cases feature the valuation of services provided by mangrove, coral reef, forest, and marine protected area ecosystems at regional and local scales. They illustrate how information on the economic value of natural capital can draw attention to the need for conservation, the trade-offs involved, and the design of policy instruments to aid and finance conservation.

The case study on mangroves provided estimates of the value of the change in ecosystem services provision due to the estimated and projected loss of mangrove areas in ASEAN over the period 2000–2050 with the assumption that present circumstances and practices remain constant in the years to come. The case study on coral reefs employed the value transfer approach to provide an estimate of the loss in value of coral reef ecosystem services resulting from a decline in coral reefs under a business-as-usual scenario over the period 2000–2050. The forest ecosystem case study described the value of a broad set of ecosystem services provided by the Leuser forest ecosystem in Sumatra, Indonesia. It highlighted the distribution of ecosystem service benefits across different stakeholders and the trade-off between short term gains for some versus larger long term losses for others. The analysis shows that the net benefits of conservation outweigh the net benefits of deforestation in the long run. In marine protected areas, the case study focused on the Hon Mun Marine Protected Area in Nha Trang Bay, Khanh Hoa Province, Viet Nam. The case study illustrated the potential impact of information on the economic values of ecosystem services to improve decision making regarding nature conservation and finance.



A 2010 study facilitated by the World Wide Fund for Nature (WWF) attempted to derive the monetary value of ecosystem service flows, and the costs and benefits of conservation investments in the Lower Mekong region in relation to local, national, and regional economies. A scenario analysis showed that there are considerable gains to the region if investments for ecosystem conservation will be made in contrast to the continuation of BAU development activities. Through the implementation of green economic growth policies, the estimated additional monetary value that can be gained cumulatively by Cambodia, Lao PDR, Thailand, and Viet Nam by 2035 is estimated at USD 55 billion.

The WWF Heart of Borneo Global Initiative has compared BAU and Green Economy (GE) scenarios with respect to the possible impacts of economic activities to biodiversity and ecosystems. In this study, higher carbon stocks can be expected by 2030 under a GE scenario. Assuming a carbon price in the range of USD 2 per ton to USD 15 per ton, the total value of carbon stock will be between USD 2.4 billion and USD 18 billion. The scenario analysis supports the premise that, indeed, a green economy significantly contributes to environmental, social, and economic development in a sustainable manner.

# Payment for Ecosystem Services and TEEB

Prior to the launch of the TEEB study, the concept of ecosystem services was recognized by the 2015 Millennium Ecosystem Assessment. Attaching economic values to ecosystem services underscores the fact that economies derive benefits from biodiversity. The mechanism of seeking payments for the use of ecosystem services has already been proven to work despite variations in its interpretation and corresponding implementation. Payments for Ecosystem Services (PES) is an incentive mechanism that contributes to the application and dissemination of the TEEB approach.

A PES scheme is a voluntary transaction where a defined ecosystem service is paid for by at least one buyer from at least one provider of an ecosystem service if the provider can ensure a sustainable supply. The establishment of a PES mechanism follows the three steps of the TEEB approach: 1) recognizing the value of the ecosystem service by identifying the available ecosystem services that are generated by an ecosystem; 2) demonstrating the value of the ecosystem service by applying economic

### Box 28. Contribution of national initiatives to TEEB implementation

The TEEB Office hosted by the United Nations Environment Programme (UNEP) initiated the project Reflecting the Value of Ecosystems and Biodiversity in Policy Making. Financed by the European Commission, the project supports national and local capacity to produce assessments of ecosystem services and guidance on how to include the recommendations in policy making. Among the AMS, the Philippines was identified as one of five pilot countries that will implement a country study from 2012 to 2017.

A TEEB Country Study identifies the ecosystem services that are vital to meeting the country's policy priorities and recommends how these services can be integrated into policies. These recommendations can include policies for poverty alleviation, subsidy reform, land use management, protected area management, securing livelihoods, investment in natural infrastructure restoration, and national accounting to include natural capital (TEEB, n.d.-b).

The TEEB Country Study for the Philippines intends to inform land reclamation and coastal development plans for Manila Bay, where there is a planned reclamation covering 6.85 sq km. One of the areas that could be affected by this reclamation project is the Las Piñas-Paranaque Critical Habitat and Ecotourism Area (LPPCHEA), a 1.75-square kilometer area that was declared a "critical habitat" in April 2007 and Ramsar Site in 2013. The area provides habitats for migratory birds and indigenous and endemic species of waterbirds, including some that have been classified as threatened by the IUCN. It is the only sanctuary for wildlife in the heart of Metro Manila. An environmental compliance certificate has been issued for the reclamation project in Manila Bay. TEEB can contribute to the compliance process by providing the Department of Environment and National Resources (DENR) of the Philippines with information about the impacts of land reclamation on LPPCHEA (TEEB, n.d.-a).

valuation methodologies; and 3) capturing the value of the ecosystem service by translating the results of the valuation exercises into policies and concrete actions.

In the ASEAN region, only Viet Nam has adopted a national policy on PES. Decree No. 99 of 2010 promulgated the Payments for Forest Ecosystem Services (PFES) and sets out guidelines and regulations on the application of such a scheme for the provision of water resources. The Government of Viet Nam is currently reviewing the possibility of expanding the scope of the PFES policy to cover other feasible ecosystem services.

The design and signing of the PFES decree in Viet Nam was guided by the results of the pilot program for PFES implemented by Winrock International's Asia Regional Biodiversity Conservation Program (ARBCP) with support from the United States Agency for International Development-Regional Development Mission for Asia (USAID-RDMA). From 2009-2010, the pilot program improved livelihoods of over 40,000 rural poor while promoting biodiversity conservation in Lam Dong Province and across Viet Nam. It generated the scientific basis and justification for and valuation of forest environmental services in Lam Dong Province; facilitated capacity building and public awareness on the importance of biodiversity ecosystem services; and enhanced and monitoring and evaluation of conservation. By December 2010, PFES payments totaling VND 87,067,200,000 (USD 4.46 million) were made to 22 Forest Management Boards (FMBs)

and forestry businesses, as well as to 9,870 households, including 6,858 ethnic minorities. PFES activities resulted in enhanced protection of 2,097.05 sq km of threatened forest land. In 2010, the average annual payment per household was VND 10.5–12 million (USD 540–615), representing an almost 400 percent increase over previous forest protection payments by the Government of Viet Nam. Based on information in logbooks maintained by patrol teams, forest protection patrols supported by PFES payments have resulted in a 50 percent decrease in the number of reported cases of illegal logging and wildlife poaching in the Da Nhim watershed area (Winrock International, 2011).

# Natural Capital Accounting as an institutional policy tool

Gross Domestic Product (GDP) only delves into one part of economic performance (income); but it does not identify assets that contribute to the aggregation of such declared figures. These are identified as invisible assets and are not measured, e.g., water supply, fish stocks, carbon sequestration, and other ecosystem services. Thus, the term and concept "wealth accounting," which includes natural capital accounting (NCA), has been introduced to measure GDP more accurately by considering the contributions of invisible assets. In light of deteriorating ecosystems and biodiversity across the globe, the adoption of NCA by developing countries can be considered of critical importance as natural capital in these nations makes up about 36 percent of the world's total wealth.



The NCA concept has been around for more than three decades. The adoption by the UN Statistical Commission of the System for Environmental Economic Accounting (SEEA) in 2012 represents a major milestone that provides an internationally-agreed methodology to account for natural material resources such as minerals, timber, and fisheries. The SEEA is now recognized as a significant tool that is able to support policy formulation and the analysis of the relationship between the environment, and economic and human activities. Its key feature is its capacity to integrate information on the environment into standard measures of economic activity. Therefore, mainstreaming such environmental information in economic planning can be achieved.

In 2013, the United Nations Statistical Commission endorsed the SEEA Experimental Ecosystem Accounting (EEA) and encouraged its use by international and regional agencies, and countries. The World Bank Group contributes to this initiative by leading a partnership to advance NCA internationally. The Wealth Accounting and the Valuation of Ecosystem Services (WAVES) partnership aims to promote sustainable development by ensuring that natural resources are mainstreamed into development planning and national economic accounts. The United Nations Statistical Division (UNSD), United Nations Environment Programme (UNEP) TEEB Office, and the Secretariat of the Convention on Biological Diversity have also embarked on a project to advance the SEEA-EEA. In the ASEAN region, testing of the SEEA-EEA is being done in Indonesia, Philippines, and Viet Nam.

Philippines WAVES (Phil-WAVES) will support institutionalization of selected SEEA modules by

providing training for newcomers and previously trained staff; introducing Key Performance Indicators (KPIs) in the medium- and longterm development plans and Organizational Performance Indicator Framework (OPIF); and synchronizing project activities with the long-term planning processes of the National Economic Development Authority (NEDA), Department of Budget and Management (DBM), Department of Finance (DOF), and relevant statistical and sector agencies. Agriculture, Natural Resource, and Environment staff (ANRES) of the NEDA is the lead agency for Phil-WAVES. The Philippine Statistics Authority (PSA) is responsible for implementing SEEA by constructing both the macroeconomic indicators and natural capital accounts, and leading the learning among the statistical and source agencies. Pilot sites for Phil-WAVES in the Philippines are Laguna de Bay, which provides tremendous ecosystem benefits to thousands but are highly threatened by ongoing human activities (Phil-WAVES, 2016).

# Promoting the link between business and biodiversity

Biodiversity valuation is also used to build the case for biodiversity conservation as a smart business practice. In the past, biodiversity was a topic alien to the business sector. Over the years, scientific evidence has demonstrated the direct link between biodiversity and the economy.

Businesses depend on biodiversity as the source of raw materials and natural capital in industries, such as agriculture and agribusiness, mining, pharmaceuticals, and construction, among others. Today, many industry players are aware that aside from inflation and competition, biodiversity loss could reduce the supply of raw materials and adversely affect businesses.

An increasing number of companies are assessing how biodiversity loss may impact their bottom lines. Some companies are studying how their operations impact biodiversity and the steps necessary to minimize such impacts. Many businesses have also decided to take action against biodiversity loss. Some are financing protection-related environmental activities through corporate social responsibility (CSR) projects, while others have started the process of mainstreaming biodiversity conservation into policies, operations, products, and services. Conservation has become a huge business opportunity. Consumers are also becoming more aware of environmental issues and are increasingly looking for "green" products and services.

# Global actions vs. biodiversity loss to ensure business sustainability

In 2008, business engagement in biodiversity conservation took center stage at the ninth meeting of the Conference of the Parties to the CBD (COP 9) in Bonn, Germany where a pre-COP 10 meeting on business and biodiversity was organized. Known as the Business and Biodiversity Initiative (BBI), the action formally established the link between business and biodiversity. Thirty-four international companies joined the BBI and signed the Leadership Declaration, which signifies the commitment of the business sector to the three objectives of the CBD.

At COP 10 in Nagoya, Japan, Parties to the CBD adopted the Strategic Plan for Biodiversity 2011–2020, and the Aichi Biodiversity Targets, which highlighted the engagement of business in conservation. Aichi Biodiversity Target 4 focuses on sustainable production and consumption, stating that "By 2020, at the latest, governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits."

At COP 11 in 2012 in Hyderabad, India, Parties to the CBD agreed on the "Declaration of Support for the CBD Global Partnership on Business and Biodiversity: Creating a Business Biodiversity Network." The Declaration encourages businesses to consider biodiversity and ecosystem services in their corporate strategies,

policies, and operations. The development of the Global Partnership for Business and Biodiversity is a concrete signal by the global community of its increasing understanding that business needs to play a critical role in addressing the serious environmental problems facing the world, including the loss of biodiversity. The partnership allows members to share information and best practices. It is involved in COP-mandated projects including reporting of and making the business case for the Aichi Biodiversity Targets.

Another development underscores that the significance of the business sector in biodiversity conservation is the business engagement decision during COP 12 held in the Republic of Korea. During COP 12, the CBD Executive Secretary was requested "to compile information, and analyze best practices, and research on biodiversity standards, and ecosystem functions and services, and the valuation of those services, to facilitate assessments of the contributions by business to achieving the objectives of the Convention and the Aichi Biodiversity Targets, and to assist in the dissemination of this information to various relevant forums" (Decision XII/103f).

# Good practices in business and biodiversity

Fujitsu Limited, which operates in the information, communication, and technology (ICT) field, acknowledges that corporate activities are sustained by natural resources, energy, and other ecosystem services. The company believes that it is necessary to protect the biodiversity that provides these ecosystem services and reduce the burden on the environment to ensure a stable foundation for society and continue corporate activities. Fujitsu's Green Policy 2020 – which aims to benefit customers and society, pursue internal reforms, and preserve biodiversity – provides direction for the creation of technologies and solutions, and transformation to a low-carbon company. In September 2010, Fujitsu became the first ICT company to be certified under Japan's Ministry of the Environment's Eco-First Program, where industry-leading companies pledge to fulfill environmental commitments in areas such as climate change and biodiversity conservation (Fujitsu, n.d.-a).

In 1998, Fujitsu started rainforest protection and regeneration projects in Thailand, Viet Nam, and Malaysia. It established the Fujitsu Group Malaysia Eco-Forest Park in 2002 in Sabah, Malaysia with support from the Sabah Forestry Development Authority. The project is a biodiversity educational environment for employees and their families, and other visitors, where guests learn about forest regeneration and threats to biodiversity, and observe oil palm fields and primary forest and orangutan protection efforts. The project also helped plant 37,500 indigenous dipterocarpaceae trees in 1.5 sq km of the park (Fujitsu, n.d.-b).

Mars, Incorporated is one of the world's largest food companies, generating billions of dollars annually with food and drinks as its major products. For Mars, biodiversity is a business imperative because ingredients such as cocoa can only thrive long-term in a biologically diverse environment. Mars has responded to the loss of biodiversity and habitats by supporting initiatives that focus on the environmental, economic, and social aspects of cocoa cultivation to secure responsible cocoa production and the future supply of the crop. Cocoa production also provides a living for over 6.5 million smallholder families and their communities and a significant source of revenue for a small number of tropical countries. Mars addressed issues by developing agroforestry approaches, high-yielding and disease-resistant varieties, production techniques, and post-harvest practices that raise yields and quality, significantly improve the welfare of rural families, and limit the negative impacts on the biodiversity of adjacent lands.

In 2003, Mars Cocoa Development Centres in Indonesia taught cocoa farmers improved agricultural practices that more than doubled yields and incomes. The project was replicated in Côte d'Ivoire, the world's largest cocoa producer, in collaboration with the World Agroforestry Centre. In 2010, Mars, IBM, and the US Department of Agriculture completed a two-year effort to sequence the cocoa genome. The results of the research will lead to more accurate breeding and allow farmers to plant better-quality trees that produce more cocoa and are more resistant to pests and disease (Mars, n.d.).

There are a number of efforts to promote business and biodiversity in ASEAN, including the establishment of the ASEAN CSR Network (ACN) in 2011 with support from the ASEAN Foundation and the Japan-ASEAN Solidarity Fund. It is a regional organization that provides a mechanism for networking in the ASEAN region, supports capacity building activities, facilitates collective action on key issues, and establishes links with regional and international organizations that can support the advancement of CSR in ASEAN. The ACN can play an important role in promoting biodiversity in regional CSR initiatives.

# Encouraging businesses to invest in biodiversity in ASEAN

In the ASEAN region, an increasing number of companies are beginning to recognize the role of biodiversity in the sustainability of their businesses. Still, the challenge to balance profitability and sustainability remains. An equally important challenge is mainstreaming biodiversity in business policies, operations, products, and services beyond traditional shortterm CSR activities.

In October 2010, business and biodiversity experts from ASEAN and Japan gathered at the Business Opportunities in Biodiversity International Conference and Exhibition in Manila to raise the business sector's awareness of the values of biodiversity and encourage corporations to support conservation initiatives. Organized by the ASEAN Centre for Biodiversity (ACB) in cooperation with the Philippines' Department of Environment and Natural Resources, the European Union, and the ASEAN Secretariat, the conference discussed the impact of biodiversity on business sustainability. The conference was held back-to-back with the third ASEAN-Plus-Three Leadership Programme on Sustainable Production and Consumption, which served as a crucial step towards equipping business and industry leaders with the knowhow and tools needed to contribute their share in ensuring sustainable development in their own backyards.

Another major business and biodiversity effort in the ASEAN region was the Asia Regional Forum on Biodiversity initiated by the private sector in 2011. Spearheaded by the Sirindhorn Foundation headed by Royal Princess Maha Chakri Sirindhorn and supported by ACB and the Royal Government of Thailand, the workshop resulted in the Cha-am Declaration on Biodiversity (See Box 29).

A business and biodiversity forum was organized as one of the parallel special thematic sessions at the 2016 ASEAN Conference on Biodiversity (ACB2016) held in February 2016 in Bangkok, Thailand. The forum allowed the sharing and exchange of insights into global and regional efforts in expanding dialogues and forging partnerships on business and biodiversity. A number of businesses stated that they benefitted from higher investment returns and lessened their environmental footprint by integrating biodiversity initiatives into regular operations.

Another regional effort on business and biodiversity is the ASEAN Champions of

### Box 29. Cha-am Declaration on Biodiversity

We, the participants of the Asia Regional Forum on Biodiversity, recognize that nature is the foundation of life and that protecting nature is the joint task of business, government, academe, and other multi-stakeholders in society. Thus, we have committed ourselves to advocate for the protection and sustainable use of biodiversity in partnership with all sectors of society.

To this end, we declare our commitment to:

- Contribute to the preservation of the Earth's natural heritage by protecting species, ecosystems, and genetic diversity through mainstreaming of biodiversity conservation, sustainable management, and advocacy in organizational plans and programmes, as well as corporate social responsibility initiatives;
- Produce goods and services in forms and manners that will contribute to the protection and conservation of biodiversity;
- Promote sound investments that will pave the way for environmentally sound technologies, products, and services;
- Use expertise, experience, and resources to convince co-employees and customers, as well as the general
  public, to implement ecologically sustainable practices of living and consumption;
- Support global, regional, and national efforts to halt the loss of biodiversity, including objectives and initiatives by the Convention on Biological Diversity, the Sirindhorn International Environmental Park Foundation under the Patronage of HRH Princess Maha Chakri Sirindhorn, the United Nations University Institute of Advanced Studies through the Regional Centres of Expertise on Education for Sustainable Development, the ASEAN Centre for Biodiversity and other relevant international/regional agreements and institutions;
- Share the benefits of the economic utilization of natural resources fairly with those who grant access to them openly and cooperatively;
- Explore the potential for cooperation with scientific institutions, non-governmental organizations and governmental institutions with the aim of deepening involvement in biodiversity conservation;
- Ensure, in cooperation and networking with all stakeholders including business sector and communities, the long-term viability of agriculture and fisheries for food production and income generation through fair, ecosystem-based, community-centered, science & technology-oriented R&D approaches, while providing solutions to problems of pollution, disease, land degradation, desertification, and climate change that are affecting sustainable agricultural and fishery practices;
- Promote biodiversity conservation actions at all levels of government, communities, businesses, and universities through education;
- Explore channels of support for biodiversity conservation actions and wildlife and forest law implementation as well as enforcement such as social sanction, capacity building, and public awareness;
- Encourage national governments to recognize the role of business in biodiversity conservation actions;
- Engage in transformative education on biodiversity conservation for sustainable development that can change behavior of all stakeholders;
- Encourage youth involvement in biodiversity and environmental conservation action to promote sustainable development through education, training, and social activities;
- Explore appropriate channels by regular interactive meetings for mass media of different status (government, business, etc.) through media resource centers to create awareness on various issues relating to biodiversity conservation; and
- Meet the basic needs for the present and future generation using scientific innovation for research and development for appropriate utilization of local and indigenous knowledge with equity and equality while maintaining balance between environmental, social, and economic sustainability.

With this declaration, we will work together to inspire other organizations by communicating examples of environment-friendly best practice; encouraging multi-stakeholder partnerships; promoting wide leadership and public awareness of the values of biodiversity and the need for cooperation from all sectors; and recognizing outstanding contributions to biodiversity conservation and advocacy.

This Cha-am Declaration is adopted on the 4 November 2011 at the Asia Regional Forum on Biodiversity held in Cha-am, Phetchaburi Province, Thailand.



Biodiversity Awards organized by the ASEAN Centre for Biodiversity to recognize outstanding efforts in biodiversity conservation in the business, media, and youth sectors. In 2010, ASEAN Champions of Biodiversity in the business category were HSBC Brunei, PTT Public Company Ltd. of Thailand, and Chevron Philippines, Inc. HSBC Brunei was recognized as the first corporation to support the Heart of Borneo Initiative and for advancing climate change research in the forests of Brunei Darussalam. PTT Public Company Ltd. of Thailand was recognized for establishing the Sirinath Rajini Mangrove Ecosystem Learning Center, which serves as a hands-on facility for stakeholders on the process and benefits of rehabilitating degraded coastal areas. The winning company from Thailand contributes to the government's One Million Rai Reforestation Project and engages local communities on the importance of forest protection, biodiversity conservation, and livelihood development. Chevron Philippines, Inc. collaborated with the Project Seahorse Foundation on the conservation of the Danajon Double Barrier Coral Reef, creation of the Minantaw Marine Park and Sanctuary, and the reduction of illegal fishing activities in project sites.

# Business and biodiversity cases from ACB2016

The ASEAN Conference on Biodiversity 2016 highlighted the link between business and biodiversity with plenary presentations and parallel sessions on a variety of concerns, including agriculture, forestry, fisheries, ecotourism, landscape/water catchment level planning and management, biodiversity-based products, and integrating biodiversity with operations in sensitive environments, and the extractives industry, among others.

Ajinomoto Co. Inc. has a Skipjack Tuna Tagging Research project, which investigates the migration of skipjack tuna to the coastal area of southwestern Japan. Skipjack is the original biological resource for the main raw material *Katsuobushi* (dried bonito) of Ajinomoto's flagship seasoning product Hon-Dashi. The company provides funds and materials, and engages its employees in research and dissemination activities. Its government partner designs research plans and conducts analysis, research, and dissemination activities. Ajinomoto helps conserve skipjack stock simply because its business depends on it.

The Asia Pacific Resources International Ltd. (APRIL) has initiatives that integrate forest and ecosystem protection in an important peatland landscape in Riau, Indonesia. APRIL is protecting and restoring an area that was acquired and then converted its logging license into a restoration concession license. The aim is to conserve the area as part of the community and climate change mitigation measures. The project also helps diversify the local employment market, provide alternatives to agriculture, combat deforestation, and strengthen ecosystem services.

The Biodiversity-Based Products-GIZ Project focuses on biodiversity-based products as an economic source for the improvement of livelihood and biodiversity protection. Biodiversity-Based Products (BBP) is a four-year ACB-GIZ project implemented in Cambodia, Lao PDR, and Viet Nam that aims to give strategic support to BBP value chains, create a central information platform of biodiversity information management, highlight a selection of the BBP value chain to improve livelihoods and protect biodiversity, and gain competence in the development of BBP value chains in the private sector in ASEAN Member States. The project focuses on the following products in four pilot sites: medicinal plants/ herbs for pharmaceutical and phyto-medicinal products; plants, herbs, resins, and essential oils for cosmetics and personal care products (bio/organic cosmetics containing natural ingredients); organic processed food products or local traditional foods (e.g., honey, bamboo, wild fruit, vegetables, wild tea, and mushrooms); and handicrafts (e.g., rattan and bamboo products) in Phnom Kulen National Park (Cambodia), Nam Ha National Protected Area (Lao PDR), Ba Be National Park (Viet Nam), and Hoang Lien Sa Pa National Park (Viet Nam).

# Ecotourism as a source of sustainable financing for biodiversity conservation and protected areas

Ecotourism best embodies the link between economics, business, and biodiversity in biodiversity conservation and protected area management. The numbers attest to increasing interest in ecotourism as more travelers seek responsible tourism that provides multiple benefits to stakeholders and generates funds for biodiversity conservation and management. According to the UN World Tourism Organization (UNWTO), international tourism arrival is forecast to reach 1.8 billion in 2030, with 25 percent of travels going to ecotourism (Center for Responsible Travel, 2013). In ASEAN, the

regional arrival figure is projected to reach 136 million by 2020 (UNWTO, 2013). The numbers for ecotourism are expected to grow as global tourism continues to increase along with heightened interest in ecotourism destinations and programs in the ASEAN Member States.

Ecotourism destinations are highlighted by attractions derived from environmental, cultural, and historical features. When properly packaged and managed, ecotourism can provide much needed revenues for the protection of national parks and other natural areas to complement limited traditional funding sources. Additionally, ecotourism can provide a viable economic development alternative for local communities with few income-generating options. As a labor-intensive industry, ecotourism provides jobs to local communities through craft production, guiding services, vehicle rentals, accommodations, and food and recreation services. These types of businesses not only benefit the local communities, but also play a crucial role in the success of the ecotourism destination (Bagadion et. al., 2014). Moreover, ecotourism can increase the level of education and activism among travelers, making them more enthusiastic and effective agents of conservation.

The ASEAN Member States have a number of ecotourism laws, policies, and programs in place that provide direction in national ecotourism development. The ASEAN Centre for Biodiversity, through the ASEAN Heritage Parks (AHP) Programme, has facilitated trainings, seminars, workshops, field visits, and AHP conferences that have highlighted the benefits of ecotourism to biodiversity conservation and protected area management in the region.

### Box 30. The story of Lubang

Chen Reyes-Mencias, Blue Water Consultancy

Lubang island in Occidental Mindoro, Philippines is known as the home of Lt. Hiroo Onoda, a Japanese straggler who lived in the jungles for 30 years because he refused to believe that World War II was over. He was perceived as a sniper and a dangerous man, but his presence in the mountains of Lubang for three decades prevented the people from exploiting its resources. In 2011, the local government decided to initiate a tourism master planning process to create a road map for the sustainable development of local tourism. An assessment by planning consultants showed that the Onoda story was one of the most compelling interpretations of the island. Hence, the Onoda Trail was developed and local trek guides were trained. Visitors can now experience guided hikes on either of two routes – half-day loop or whole-day loop that ends at Vigo River where Onoda used to bathe and catch shrimp.

Other attractions are being developed as indicated in the master plan. The trail to Hulagaan Falls was improved and has become a major destination for visitors. The local government became the recipient of a grant that will be used to rehabilitate the centuries-old Spanish Lighthouse in Cabra island. To ensure the sustainability of the tourism industry in Lubang, the local government unit and the municipal tourism council plan to introduce the wealth generation concept to open the door for passive and active income streams for many marginalized members of the community. Today, tourism is providing an economic incentive for the people to conserve the island's natural capital. **Box 31. Mt. Kinabalu National Park: A case study on ecotourism in ASEAN** Maipol Spait, Senior Protected Area Manager, Mt. Kinabalu National Park

Established in 1964, Mt. Kinabalu National Park, an ASEAN Heritage Park and UNESCO World Heritage Site, used to have difficulty sustaining funding for operations. One strategy that enhanced its ecotourism potential and generated funds for the park is private-public partnership. On 8 November 1995, the Sabah State Cabinet decided to privatize the park's visitor facilities (accommodations and restaurants). This resulted in an increase in foreign visitations, from 15,931 in 2000 to 23,136 in 2012, which generated revenues of RM 8 million (USD 1.8 million), whereas the expenses of the park was only a little over RM 7 million (USD 1.59 million). The profits were spent to improve park management.

Chalets, souvenir shops, and restaurants are rented out to private operators with an operational duration of 30 years. The fees are revised every five years. The chosen operators are required to have a development plan, which is submitted to the Park Board for approval. Plans that do not comply with the park's policy on development are rejected.

The build-operate-transfer scheme is implemented where the private operator builds the facilities and operates it for 30 years, after which the facilities are turned over to Sabah park authorities. Freed from responsibilities on ecotourism and visitor management, the park can focus on biodiversity conservation and park management.

The partnership resulted in the following:

- Revenues exceeded expenses. Some of the profits were channeled to the operations and management of the park, and the government subsidy went to salaries and incidental expenses.
- Privatization increased visitation through increased promotional and marketing efforts.
- Increased participation of the local community in ecotourism.
- Increased benefit sharing from revenues and activities among Sabah park authorities, private operators, and local communities.

Lessons learned from the experience include:

- Public-Private Partnership (PPP) can be a powerful tool for ecotourism product development and enhancement, marketing, and promotion.
- Strategic partnerships can help develop a sustainable tourism program, facilitate tourist access, and improve the destination experience.
- Creating and maintaining trust between protected area managers and their partners, particularly those in the business community in and around the protected area, and other relevant stakeholders, is the key to PPP success.

# Gaps and challenges

### Need to increase efforts to value biodiversity

While AMS recognize the link between nature and economy, more biodiversity valuation cases have to be built to increase the awareness of the significance of biodiversity and ecosystem services among policy makers and business owners. This will facilitate the incorporation of biodiversity values into national economic and development plans, facilitate investments in biodiversity, and develop more biodiversityfriendly business enterprises.

### Inadequate prioritization of business and biodiversity in national communication, education, and public awareness (CEPA) programs

The CEPA-The Economics of Ecosystems and Biodiversity survey conducted by ACB in 2012 showed that promoting business and biodiversity were not prioritized by the respondents from the ASEAN Member States in designing and planning CEPA programs. Survey respondents included communications and information department heads, information officers, and other high-ranking officials of the AMS' Ministries of Natural Resources and Environment and other environmental groups and organizations. According to the survey, biodiversity issues that should be given most priority in drafting communication campaigns were biodiversity loss, deforestation, habitat loss, and land conversion.

# Limited involvement of the business sector in biodiversity conservation

There are notable contributions to biodiversity conservation that are being initiated by some businesses or privately owned commercial establishments. However, most of these efforts are just part of compliance with CSR programs. While complying with these CSR programs are beneficial to the environment, the sustainability of these projects should also be considered. The TEEB survey results showed that 61 percent of the respondents gave the business sector a poor to average rating with regard to mainstreaming biodiversity in regular business operations. There is a lack of information on current biodiversity-related projects being conducted by the business sector in the ASEAN region.

# Lack of an ASEAN-wide network of businesses and of information on business-led biodiversity projects

As a significant decision made during CBD COP 10, the Global Partnership for Business and Biodiversity was established to facilitate exchange of experiences, knowledge, and best practices on biodiversity and environmental conservation efforts among business institutions and organizations around the world. An interim executive committee was established in 2013 during the third global partnership meeting in Montreal to promote the partnership all over the world. Progress has been slow in organizing a regional partnership or national partnerships for business and biodiversity in the ASEAN region. However, some companies in the Philippines and Thailand have signified their interest to join such partnership.

# Ways Forward

Discussions on mainstreaming biodiversity values in the economy, and the link between business and biodiversity at ACB2016 have generated a number of recommendations:

- 1. Mainstream biodiversity and sustainable development at all levels of governance.
- 2. Ensure that economics accounts for biodiversity and ecosystem services.
- 3. Generate and integrate trade and economic data on biodiversity in trade planning.
- 4. Ensure that decision makers have access to scientifically credible and independent information that accounts for the total value of ecosystem benefits, recognizing the complex relationships between biodiversity, ecosystem services, and people.
- 5. Provide decision makers with the scientific information necessary to make informed decisions about the management of critical natural resources.
- 6. Create opportunities for dialogue between the scientific community, governments, private sector, and local resource users on

the benefits from biodiversity and ecosystem services.

- 7. Emphasize that biodiversity is everybody's business and everybody has a stake and role in biodiversity conservation.
- 8. Educate consumers on the value of biodiversity as consumer demands play a major role in business operations and practices. Change consumer demand and behavior to create an impact on business operations.



he Strategic Plan for Biodiversity 2011–2020 and the Aichi Biodiversity Targets provide a general framework and guidance to all Parties to the Convention on Biological Diversity. ASEAN is home to key ecosystems that 632 million lives depend on. However, despite a significant number of success stories, impacts of the combined threats to biodiversity and their habitats have been devastating.

ABO 2 highlights efforts, challenges, and opportunities for improvement of ASEAN Member States in the progress towards achieving Aichi Biodiversity Targets. ASEAN will enhance the implementation of priority programs and initiatives by effectively managing protected areas, bridging the communication gap on biodiversity, and sharing biodiversity data to promote sustainable practices and prevent the loss of biodiversity. ASEAN will also strengthen cooperation with other regional transboundary initiatives and undertake actions to mainstream biodiversity considerations into relevant national, sectoral and cross-sectoral plans, programs and policies.

The ASEAN region will enhance actions to address the challenges of biodiversity conservation and the impacts of climate change and reduce the threats to biodiversity. Through the ASEAN Centre for Biodiversity, the region continues to strengthen the implementation of the ASEAN Heritage Parks (AHP) Programme, which serves as a platform for AMS to demonstrate their contribution to conserve the full range of the region's biodiversity, from terrestrial to marine ecosystems. The AHP Programme is not only a means to conserve habitats critical to the persistence of other species and ecosystems that best represent the natural and cultural heritage of ASEAN, most of which are at great risk from various drivers of biodiversity loss.

Developing and sustaining a biodiversity information management and sharing platform helps guide AMS at all levels of governance and in the preparation of policies related to conservation. ACB continues to assist AMS by providing training on data management and operation of common data systems; assisting in the development and maintenance of Clearing-House Mechanisms; and extending support on a number of other data management concerns in the region, including compliance to commitments to various multilateral environmental agreements.

# CHAPTER 3 Enhancing Implementation:

ASEAN's Priority Actions to Achieve the Aichi Biodiversity Targets and Other Priority Areas of Cooperation

Photo by Chan Wai Meng

An effective communication, education, and public awareness campaign, with specific targets and using appropriate messages and media, would provide tremendous ongoing efforts; increase support to awareness of the values of biodiversity; and expand participation in conservation. The development of a regional communication strategy could help build awareness of the importance of ASEAN's shared biodiversity, increase pride in nature beyond national borders, and help mobilize funding and technical expertise in the achievement of common conservation goals.

ASEAN is committed to accelerating efforts to contribute to the achievement of the Aichi Biodiversity Targets. ASEAN will build on existing programs and projects of ACB in support of AMS to address cross-cutting areas of actions that will further enhance policy coherence across sectors, improve technical and scientific cooperation, and increase funding for biodiversity for accelerated implementation of priority actions to achieve the targets. These will be achieved through the following programs and projects supported by various partners and donors with a total regional portfolio of around USD 50 million.



Photo by Eisen Bernard V. Bernardo

### Table 15. ASEAN Biodiversity Programs and Projects (2010–2021)

### ASEAN-Germany (2010–2022)

**Biodiversity and Climate Change Project** 

Institutional Strengthening of Biodiversity Sector in ASEAN (ISB)

Biodiversity-based Products as an Economic Source for the Improvement of Livelihoods and Biodiversity Protection (BBP)

Small Grants Programme for Biodiversity Conservation (SGP I & II)

### ASEAN-India

Project on Cooperation Between ACB and the National Biodiversity Authority (NBA) of India (2017–2019)

### ASEAN-Japan

Taxonomic Capacity Building and Governance for the Conservation and Sustainable Use of Biodiversity (2011–2012)

Expanded Taxonomic Capacity Building and Governance for the Conservation and Sustainable Use of Biodiversity (2012–2013)

Extended Taxonomic Capacity Building and Governance for the Conservation and Sustainable Use of Biodiversity: Bryophytes, Pteridophytes, and Economically Important Species of Predators and Parasitoids (2014–2015)

ASEAN Heritage Parks Development through Capacity Enhancement and Information Management (2015–2016)

Development of the GTI Regional Action Plan for Southeast Asia 2017–2020 and Capacity Development on the Taxonomy of High Elevation Vascular Plants (2017–2018)

British Foreign and Commonwealth Office British High Commission in Singapore

Disseminating the Values of Ecosystems and Biodiversity to Enhance Climate Change and Biodiversity Strategies in Southeast Asia (2011–2012)

### ASEAN-China

China-ASEAN Cooperation Plan on Biodiversity and Ecological Conservation (Phase I, II, & III) (2012-2018)

### **UNEP-China**

Strengthening the Capacity of Southeast Asian countries for the Implementation of the Biodiversity Strategic Plan 2011–2020 and Aichi Biodiversity Targets (2014–2015)

Building Capacities of Countries in Support of the Development and Implementation of National ABS Frameworks (UNEP-China Trust Fund) - Follow-up to the Regional Project on ABS Capacity Building supported by the Global Environment Facility (2015–2017)

### ASEAN-EU

Biodiversity Conservation and Management of Protected Areas in ASEAN (2017-2022)



# Ways Forward

**Raise public awareness** 

Mobilize additional financial resources

Implement alternative livelihood opportunities

Seek active participation from indigenous peoples and local communities





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# ASEAN Heritage Parks and Protected Areas: Enhancing effective management

Protected areas (PA) provide a wide range of social, environmental, and economic benefits to people and communities worldwide. Establishment of protected areas is a tried-andtested approach, which has been particularly applied by indigenous peoples and local communities for centuries, to conserve nature and associated cultural resources.

More than instruments for conserving nature, protected areas are vital for responding to some of the world's most pressing challenges, including food and water security, human health and well-being, disaster risk reduction, and climate change.

Despite the ecological, cultural, and economic importance of services provided by protected areas, ecosystems and the biodiversity that underpins them are still being degraded and lost at an unprecedented scale. The total economic value of ecosystem services is estimated at tens of trillions of dollars every year, far larger than the global gross domestic product. However, the Millennium Ecosystem Assessment estimates that 60 percent of these services are being degraded or used unsustainably with up to 70 percent of global ecosystems' regulating services (affecting floods, climate, water quality, and others) and cultural services (including recreational, aesthetic, and spiritual benefits) currently in decline.

Knowledge on how protected areas directly and indirectly contribute to biodiversity conservation is relatively new to many. There are approximately 200,000 protected areas in



The ASEAN Heritage Parks (AHP) Programme contributes to the achievement of Target 11 as it encourages the establishment of new protected areas and calls for additional nominations for AHP inscription. PA management initiatives contribute to abating habitat loss, fragmentation, and degradation (Target 5); promote sustainable exploitation of marine resources (Target 6); relieve pressures on coral reefs and other vulnerable ecosystems 10); (Target prevent the extinction of known threatened species (Target and 12); contribute to safeguarding and restoring ecosystem services (Target 14).

the world. However, these protected areas do not adequately cover all ecosystems, habitats, and species important for conservation. While 14.6 percent of the Earth's land surface are declared protected areas, only less than one percent of the world's marine ecosystems are protected. Other biomes, including major freshwater ecosystems and grasslands, are poorly represented since these ecosystem types are usually accounted as part of terrestrial protected areas. This highlights the urgent need to improve coverage and representativeness of protected areas nationally, regionally, and globally.

# Protected areas in the ASEAN Region

According to the World Database on Protected Areas (2015), the ASEAN region has 2,587 protected areas covering 803,955 sq km. This figure encompasses 13 percent of the land area Indonesia has the greatest number of protected and 2 percent of the marine area of ASEAN.

areas among the ASEAN Member States.

AMS	Land Area in sq km	Land Area Protected in sq km (WDPA)	Marine Area in sq km	Marine Area Protected in sq km (WDPA)	Total Area Protected (sq km)	% of Land Area Protected in sq km	% of Marine Area Protected in sq km	% of Total Area Protected in sq km	Total Number of Protected Area
Brunei Darussalam	5,765	2,794	41,188	52	2,846	48%	0%	48%	56
Cambodia	181,035	47,503	47,967	89	47,592	26%	0%	26%	45
Indonesia	2,010,000	226,249	5,800,000	171,453	397,702	11%	3%	15%	646
Lao PDR	236,800	38,582	0	0	38,582	16%	0%	16%	33
Malaysia	332,700	63,474	453,186	6,358	69,832	19%	1%	20%	739
Myanmar	676,577	48,278	514,147	269	48,547	7%	0%	7%	58
Philippines	300,000	45,762	1,835,028	21,269	67,031	15%	1%	16%	559
Singapore	718	34	763	0	34	5%	0%	5%	4
Thailand	513,104	97,391	316,118	5,774	103,165	19%	2%	21%	238
Viet Nam	329,315	24,994	647,232	3,630	28,624	8%	1%	9%	209
Total	4,586,015	595,061	9,655,629	208,894	803,955	13%	2%	15%	2,587

### **Table 16. Protected Areas in ASEAN**

Source: World Database on Protected Areas, retrieved from https://www.protectedplanet.net/ on 12 December 2015.



### Models for effective protected area management: The ASEAN Heritage Parks Programme

The AHP Programme manages a regional network of representative protected areas created to generate greater collaboration between AMS in preserving their shared natural heritage. The history of the AHP Programme dates back to 1984 when the ministers of the founding countries of ASEAN signed the declaration of 11 protected areas as ASEAN Heritage Parks. The 2003 ASEAN Declaration on Heritage Parks states that AHPs shall be managed to maintain ecological processes and life support systems; preserve genetic diversity; ensure sustainable utilization of species and ecosystems; and maintain wilderness that have scenic, cultural, recreational, and tourism values.

ASEAN Heritage Parks are defined as protected areas of high conservation importance, preserving a complete spectrum of representative ecosystems of the ASEAN region. There are currently 38 protected areas under the AHP Programme, 33 of which are terrestrial protected areas covering a total area of 84,067 sq km.

Country	AHP	Area (sq km)	Year Declared as AHP
Brunei Darussalam	Tasek Merimbun Heritage Park	78	1984
Cambodia	Preah Monivong (Bokor) National Park	1,400	2003
	Virachey National Park	3,325	2003
Indonesia	Gunung Leuser National Park	10,927	1984
	Kerinci Seblat National Park	14,000	1984
	Lorentz National Park	25,056	1984
	Way Kambas National Park	1,256	2015
Lao PDR	Nam Ha National Protected Area	2,224	2003
Malaysia	Gunung Mulu National Park	529	1984
	Kinabalu National Park	754	1984
	Taman Negara National Park	4,344	1984
Myanmar	Alaungdaw Kathapa National Park	1,598	2003
	Indawgyi Lake Wildlife Sanctuary	775	2003
	Inlay Lake Wildlife Sanctuary	642	2003
	Hkakaborazi National Park	3,812	2003
	Lampi Marine National Park	205	2003
	Meinmahla Kyun Wildlife Sanctuary	137	2003
	Nat Ma Taung National Park	723	2012
Philippines	Mt. Apo Natural Park	551	1984
	Mt. Hamiguitan Range Wildlife Sanctuary	71	2014
	Mts. Iglit-Baco National Park	754	1984
	Mt. Kitanglad Range Natural Park	473	2009
	Mt. Malindang Range Natural Park	530	2011
	Mt. Makiling Forest Reserve	42	2013
	Mts. Timpoong Hibok-Hibok Natural Monument	37	2015
	Tubbataha Reefs Natural Park	970	2014
Singapore	Bukit Timah Nature Reserve	1.63	2011
	Sungei Buloh Wetland Reserve	1.31	2003
Thailand	Ao Phang-Nga — Mu Ko Surin — Mu Ko Similan National Park	681	2003
	Kaeng Krachan Forest Complex	4,373	2003
	Khao Yai National Park	2,168	1984
	Tarutao National Park	1,490	1984
Viet Nam	Ba Be National Park	100	2003
	Bai Tu Long National Park	158	2016
	Chu Mom Ray National Park	566	2003
	Hoang Lien Sa Pa National Park	298	2003
	Kon Ka Kinh National Park	419	2003
	U Minh Thuong National Park	218	2012

# Table 17. ASEAN Heritage Parks

Among these AHPs, there are six UNESCO World Heritage Sites—Lorentz National Park (Indonesia), Gunung Mulu National Park and Kinabalu National Park (Malaysia), Mt. Hamiguitan Range Wildlife Sanctuary and Tubbataha Reefs Natural Park (Philippines), and Khao Yai National Park (Thailand). Six AHPs are also Ramsar sites – Indawgyi Lake Wildlife Sanctuary and Meinmahla Kyun Wildlife Sanctuary (Myanmar), Tubbataha Reefs Natural Park (Philippines), Ao Phang-Nga National Park (Thailand), and Ba Be National Park and U Minh Thuong National Park (Viet Nam).

The ASEAN Centre for Biodiversity serves as the secretariat of the AHP Programme. The AHP Committee is comprised of members representing each of the AMS. In the implementation of the AHP Programme, the ASEAN Working Group on Nature Conservation and Biodiversity (AWGNCB) provides technical guidance by reviewing and endorsing AHP nominations, ACB work plans, and project proposals for AHPs.

The AHPs provide a window to the world showcasing a wealth of biodiversity that is uniquely



ASEAN. These protected areas represent the most intact tracts of land and sea that provide vital ecosystem services such as food and clean water, and protection against floods, erosion, and pollution. The AHPs also form the lifeblood of many of the region's enigmatic indigenous cultures. Indigenous and traditional knowledge practices are intimately linked to nature, and the loss of forests, lands, and connections to the sea also means the eradication of traditional and sustainable methods of natural resource Biodiversity loss also erases management. traditional knowledge of other resources that may have significant pharmaceutical benefits. Conservation of AHPs, therefore, assists in the sustainable management of ASEAN's natural resources and the protection of the region's life and culture.

# Framework for the implementation of the AHP Programme

During the second AHP Conference in Malaysia in April 2007, the first Regional Action Plan (RAP) for AHPs was developed. ACB and the AHPs used this first RAP as a basis for common efforts towards the implementation of priority activities in AHPs.

The adoption of the Convention on Biological Diversity's (CBD) Strategic Plan for Biodiversity 2011–2020 and the Aichi Biodiversity Targets in 2010 encouraged a more focused framework in support of biodiversity conservation. ACB initiated the updating of the RAP and developed the AHP RAP 2016–2020 in various discussions with AHP managers. With seven goals, the AHP RAP 2016–2020 provides the guiding framework for implementing priority biodiversity conservation measures in AHPs. These are as follows:

- Goal 1: Strengthen national and regional systems of AHP management to ensure integration into global network and contribution to globally agreed goals.
- Goal 2: Strengthen national and regional networks and collaboration.
- Goal 3: Enhance capacity of AHP managers and staff, and other stakeholders to ensure effective management of AHPs.
- Goal 4: Ensure that scientific knowledge and technologies are improved, widely shared, transferred, and applied for the effective management of the AHPs.
- Goal 5: Promote equity and benefit-sharing.
- Goal 6: Ensure sufficient financial resources and promote sustainable financing.
- Goal 7: Strengthen communication and promotion strategies.

The AHP Programme is guided by the following priority thematic areas:

- 1. Capacity Development
- 2. Information Sharing Network
- 3. Technical Exchange Program
- 4. Public Awareness and Education
- 5. Promotion of Recreation, Tourism, and Ecotourism
- 6. Participation in Joint Research Program
- 7. Management Improvement Program
- 8. Partnership and Collaboration
- Involvement of Indigenous Peoples and Local Communities and other Stakeholders
- 10. Development, Review, or Updating of Management Plans
- 11. Sustainable Financing

# Strengthening the AHP Programme by establishing and strengthening partnerships

Since 2010, ACB has maintained its partnership with the Government of Germany via technical and financial cooperation projects. Such joint undertakings target AHPs, among other defined areas, as the sites in which implementation of on-the-ground activities shall take place.

Technical cooperation projects are implemented in collaboration with GIZ and include completed, ongoing, and planned projects, such as the Biodiversity and Climate Change Project (BCCP, 2010-2015),Biodiversity-Based Products Project (BBP, 2014–2019), and the Institutional Strengthening of the Biodiversity Sector in ASEAN Project (ISB, 2016–2019). A financial cooperation project, through the German development bank KfW, supports ACB in the implementation of the Small Grants Programme (SGP, 2015–2019). These interventions aim to develop, pilot test, and replicate good practices in protected area management to support the creation of regional and national biodiversity conservation policies. These projects will also provide technical and limited financial support that will help build capacity on issues related to climate change, livelihood development, biodiversity conservation, and AHP management.

The Government of Japan, through the Japan-ASEAN Integration Fund (JAIF), has also granted financial assistance to ACB for capacity building activities at the regional and local levels for improved management of AHPs. Collaboration with the government of Japan has also led to various training activities in taxonomy, some of which have resulted in increased awareness and knowledge of species found in ASEAN Heritage Parks.

# Common issues and gaps in implementing the AHP Programme

The management of AHPs is the responsibility of each AMS and follows national and sub-national policies and regulations. Within the context of the AHP Programme, ACB generates regional scenarios based on identified gaps and issues of every AHP. These scenarios intend to assist the AMS to better understand common issues and recommend appropriate measures that may address these issues collectively as a region.

Challenges include the development of sustainable financing mechanisms for AHP sites, updating of AHP management plans (as some management plans are outdated), promoting further nomination of new AHPs, particularly marine, and achieving a balance in the distribution of declared terrestrial and marine AHPs.

### The AHP Programme, Aichi Biodiversity Targets, and the CBD Programme of Work on Protected Areas: Synergies and Complementation

The AHP Programme contributes to the achievement of Target 11 by encouraging the establishment of new protected areas. Other targets addressed include those that are specific to prevention of habitat degradation, fragmentation and loss (Target 5); sustainable use of marine resources (Target 6); protection of coral reefs and other vulnerable ecosystems (Target 10); prevention of the extinction of threatened species (Target 12); and safeguarding and restoring ecosystem services (Target 14).

Projects conducted through the AHP Programme have also contributed to the achievement of other Aichi Biodiversity Targets. The BCCP raised awareness of climate change, helped develop products to reduce dependence on forest resources, and contributed to the development of a climate change strategy for marine protected areas, specifically in Viet Nam (Target 10). Capacity building activities in taxonomy undertaken with JAIF have resulted in enhanced taxonomic skills and published guidebooks on various species that have increased the base of scientific knowledge and awareness of the biodiversity values of specific AHPs (Target 19). Traditional knowledge, customs, and practices of indigenous peoples and local communities are also well documented in a number of AHPs (Target 18). Projects and activities are continuously being developed to benefit AHP management and with reference to the AHP RAP 2016–2020, Aichi Biodiversity Targets, and the CBD Programme of Work on Protected Areas (PoWPA).

Element 4 of the CBD PoWPA, "Standards, Monitoring," Assessment and prescribes the development and adoption of minimum standards and best practices, evaluation and improvement of effectiveness of protected area management, assessment and monitoring of protected area status and trends, and ensuring that scientific knowledge contributes to protected area establishment and effectiveness. The AHP Programme supports the implementation of the CBD PoWPA by conducting capacity building activities and AHP conferences and committee meetings; reviewing and updating AHP criteria and requirements; and updating and implementing AHP RAPs.



# Fifth ASEAN Heritage Parks Conference

The Fifth AHP Conference (AHP5) held on 24–27 October 2016 in Nay Pyi Taw, Myanmar reiterated the importance of protected areas in biodiversity conservation and sustainable development. Support for the ASEAN Heritage Parks Programme will continue through collaboration with various partners. ACB will capitalize on existing support from AMS and other partner organizations and projects, including the German Cooperation projects and the European Union, for the AHP Programme and the implementation of the AHP RAP.

Highlights of AHP5 include the following:

1. Biodiversity information management and communication and public awareness - AHP5 highlighted the importance of organizing biodiversity data into information relevant to the monitoring and management of protected areas (e.g., mobilization and publication of geo-referenced speciesrelated information to know distributions and places of species aggregation). Participants explored further collaboration on biodiversity information management capacity building activities, such as the production of biodiversity field guides, to synergize information management with communication, education, and public awareness efforts.

The conference highlighted the need for collaboration with the right agencies at the appropriate level of governance to communicate the significance of sustainable management practices. Partnerships must be built among PA management, township leaders, local authorities, NGOs and other stakeholders. AHP5 also stressed the importance of addressing gaps in communication capacity, policy support, and enforcement of wildlife policies in PAs.  Collaborative management, partnerships, livelihood development, and gender

 Multi-stakeholder and multi-sectoral collaboration is an effective mechanism in protected area management and governance, which is called for under global and regional frameworks and mandates. Collaboration can be managed through partnership agreements, learning from available models in PA management set-up and governance.

The United Nations Development (UNDP) Small Programme Grants Programme (SGP) is emerging as a viable tool for improving biodiversity conservation and livelihood of communities. The SGP could facilitate collaborative management at the local level by supporting local authorities and organizations, and women to engage in AHP co-management. The ASEAN SGP, through ACB and KfW, could also take into account landscape level SGP. learning from the experience of UNDP. The SGP is paving the way for piloting models of collaborative protected area management in ASEAN Heritage Parks in Myanmar and Indonesia, and soon in Viet Nam.

3. Ecosystem restoration and invasive alien species - PA management plans must consider climate change adaptation, such as the conservation and rehabilitation of habitats susceptible to extreme weather conditions. This entails integrated management of water and fire regime to maintain habitats and biodiversity. The community participatory approach has also been successfully applied in developing livelihood activities towards the sustainable use of water resources in buffer zones.

On the issue of invasive alien species (IAS), AHP5 has, among others, identified capacity building for researchers and

relevant government officials to undertake basic research, prepare risk analyses, and prevent and control IAS. Global and regional partnerships are important to the integrated control of IAS and to prevent their spread across borders.

- 4. Governance and management planning – Legislation and policy support are significant to protected area management because they provide the guidelines and framework for processes and contents, and encourage participation of key stakeholders of protected areas. It is important to recognize internationallyaccepted standards for protected area management and capitalize on good practices that have already been tested. These can be modified and enhanced to conform to specific site conditions.
- 5. Indigenous peoples and local communities, health and well-being, and traditional knowledge - AHP5 recognized the need to generate active participation of local communities in biodiversity conservation and protected area management and to build their capacity to sustainably manage these areas. Some experts relate that ASEAN needs a paradigm shift by rediscovering and celebrating its ancient wisdom, traditional ecological knowledge, and philosophy in developing contemporary approaches in protected area management. Development of community protocols could support good understanding and awareness of the community on customary sustainable uses of biodiversity, protection of traditional knowledge, and related legal frameworks such as access and benefitsharing.
- Transboundary protected areas and wildlife law enforcement – Transboundary protected area (TBPA) management provides a framework and opportunity

to conserve threatened biodiversity and ecosystems borders, thereby maximizing benefits to people. TBPA is particularly important in wildlife law enforcement to:

- Enhance cooperation in forest conservation and protection between two countries at the local level.
- Generate collaboration among countries for financial support with donors and partners on TBPA management.
- Raise awareness on the crucial role of wildlife in sustainable development.
- Undertake research on wildlife for management planning.
- Develop policies and legal frameworks to address wildlife trafficking.
- Promote collaboration and participation of international organizations for a more robust wildlife law enforcement network.

# Capacity building for AHP managers and stakeholders

The ASEAN Centre for Biodiversity will support continuing capacity building for PA managers and stakeholders, and engage all sectors, including women, indigenous peoples and local communities, local authorities and the private sector. Capacity building activities will be based on identified needs and capacity gaps on management planning, law enforcement, and standard setting. ACB will capitalize on various partnerships and develop collaborations with other stakeholders, specifically the business community, to generate more support for AHP and PA management activities. Outcomes of AHP5 will be integrated into the 2017–2018 Work Plan under the AHP RAP.

# Ways Forward

AHPs are not only measures to conserve protected areas, but also a means to achieve harmony between humans and nature. They advocate conservation within a protected area





while helping uplift the economic conditions of communities living within and adjacent to protected areas. Internalizing experiences and lessons learned help generate a broader and more strategic perspective on how the ASEAN region can push the agenda of biodiversity conservation vis-à-vis protected area management to new heights. The succeeding views articulate possible measures to achieve this goal.

### Initiatives to improve the AHP Programme

The strengthening of the AHP Programme to support effective management of unique and ecologically representative protected areas in ASEAN would need further recognition by the ASEAN public at large. As such, ACB will undertake the following initiatives and learn from experiences of the World Heritage Site Programme of UNESCO: 1) increase recognition of the AHP Programme through promotional events and participation in international fora, 2) continue to monitor and provide assistance to AHPs as part of a collective effort to develop AHPs as models of effective protected area management in the region, 3) review the evaluation system for new AHP nominations, 4) intensify lobbying for more nominations for marine AHPs, 5) adjust AHP management approaches based on changing natural and socio-economic conditions, and 6) strengthen collaboration with stakeholders across levels and sectors to enable engagement of partners and leveraging of resources for AHPs.

# Strengthening ACB as AHP Secretariat

The AHP Programme is expanding as evidenced by the AMS response to more nominations of protected areas for declaration as ASEAN Heritage Parks. This necessitates a subsequent increase in technical capacity in ACB to adjust to the growth in the AHP network. Therefore, building the capacity of ACB in carrying out processes required for the implementation of the various components of the AHP Programme is being done and shall continue to improve delivery of services. Improving the monitoring and evaluation systems of the AHP Programme shall be designed to facilitate the provision of technical assistance. Exposure of ACB to good practices and lessons learned from significant PAs outside ASEAN can improve knowledge and broaden understanding of PA issues.

# Effective implementation of the AHP RAP

With the implementation of the RAP, ACB shall continue to promote the application of AHP RAP activities through the updating and revision of AHP management plans. ACB shall also continue to provide complementary support for the implementation of AHP management plans through ACB programs and projects. Lastly, ACB will establish and strengthen a regional monitoring and evaluation system that is aligned with national and site level systems.

# Establishing and strengthening networks, linkages, and partnerships

Partnerships and linkages with like-minded organizations and networks are also instrumental in levelling up the technical and financial capacities of ACB and the AHPs. Hence, ACB shall maintain existing partnerships and establish new ties with global and regional organizations that are mandated to support protected area management. Tapping business organizations and encouraging investments in AHPs shall also be done to secure additional support for AHPs. ACB will link with international organizations involved in protected area management and landscape conservation (such as the UNESCO World Heritage Centre and Ramsar Convention Secretariat) to gather insights and initiate technology transfer to benefit AHPs.

# **Biodiversity** Information Management: Cultivating a culture of information sharing

**Challenges** 

Limited

technical

capacity

and financial

resources

Language

barriers

Limited sharing

of species and

PA-related data

Species and protected

area data do not

use common

format

# **Clearing-House Mechanism (CHM)**

A biodiversity information platform that facilitates information sharing to support the conservation and management of biological resources

1

RSERN CHR **Encourage AMS** to support the ASEAN CHM

Promote a culture of biodiversity information sharing

# Ways Forward

Work with natural history museums

Continue to enhance capacities on CHM management and data organization

Maintain global partnerships

Continue developing biodiversity information management tools

Engage academic institutions as part of network of data partners



Contribute data and policies in global scientific discussions

Pursue CHM content enhancement activities





# Biodiversity Information Management: Cultivating a culture of information sharing

Information on biodiversity can come in many forms, one of which is the observation of species—their habitats, genetic makeup and distribution, and the means by which these information have been collected or photographed. Biodiversity managers and decision makers who promote conservation of biodiversity resources need information on the state of such species, threats to their existence, the state of their preferred environments, and how these can be best conserved.

The use of biodiversity information as scientific basis for conservation planning and management is underscored in Target 19 of the Convention on Biological Diversity's (CBD) Strategic Plan for Biodiversity 2011–2020. Thus, its collection and generation should be improved, widely shared and transferred, and appropriately used to achieve desired goals.

In the ASEAN region, Biodiversity Information Management (BIM) is the means by which ASEAN Member States (AMS) could systematically integrate biodiversity concerns in conservation planning, management, policy development, and decision-making processes. Specifically, BIM is having data contributed by a community of partners who are equipped with the necessary skills that enable the use of a common structure (interoperable data) and collaboratively develop knowledge products on responsible biodiversity conservation.

The results of efficient biodiversity information management can be demonstrated in 1)

Biodiversity information management is relevant to the implementation of Target 19. Access to information is important to identify and monitor threats to biodiversity and determine priorities and appropriate measures for conservation and sustainable use. The CBD encourages the establishment and maintenance of national Clearing-House Mechanisms among Parties to improve access to and sharing of biodiversity information, generate knowledge products, and promote scientific and technical cooperation.

accurate regional analyses; 2) informed policy development; 3) adequate and robust data for research support; and 4) having available information for science-based governance and local area management support.

# Challenges in biodiversity information management

Biodiversity information in ASEAN are held by various institutions and recorded in different structures and in local dialects, making these data difficult to integrate, analyze, share, and use for conservation efforts. The variability of formats constrains long-term observations of biodiversity components such as taxonomic data, species occurrences, and socio-economic information. Project-based initiatives often limit information and its use within the scope of their design and objectives. Further, biodiversity information sharing in the region, particularly on species location, is largely compromised due to the species' vulnerability to poaching and other illegal wildlife trading activities. In the global setting, there are about 2.5 to 3 billion specimens that document more than 300 years of biological exploration of the Earth. It is estimated that only around 10 percent of the specimens are digitized, with some 4 to 5 percent discoverable through global online platforms such as the Global Biodiversity Information Facility (GBIF) (Holmes et al., 2016). The vast majority of accessible records are shared by natural history collections in the developed world, especially in Europe and North America, including some 3 million specimen records "repatriated" through digital access to the AMS from which they were collected. A great wealth of data remains untapped in the institutions of megadiverse regions including ASEAN; and initiatives such as the Biodiversity Information Fund for Asia (BIFA) are attempting to bring more of this information into the public domain and accessible for research and policy through promotion of data standards, capacity building, and publication in open data discovery platforms (GBIF, 2016).

## The ASEAN Clearing-House Mechanism and CHM capacity building activities

Cognizant of the need for infrastructure to organize biodiversity information in the region, theASEAN Clearing-House Mechanism (ASEAN CHM) was established, through the ASEAN Centre for Biodiversity (ACB), as the gateway to all available biodiversity-related information in ASEAN. The ASEAN CHM provides a cohesive and integrated perspective of the region's biological resources. It is a single entry point to the national CHMs of AMS and offers a range of services, such as providing biodiversity-related information and capacity building guides and tools, to aid conservation planning, monitoring, and decision making.

The website features an Aichi Biodiversity Targets web service to monitor AMS' progress in achieving the Aichi Biodiversity Targets. It also highlights the regional status of species and protected areas and other regional analyses that can be used as bases for species and protected areas prioritization and conservation, and where data are adequate, advice on efficient fund sourcing and management. The website's species, protected areas, and e-library databases hold over 69,000 species records, 2,600 protected area records, and over 11,300 biodiversity-related journals, respectively.

To keep abreast with the latest developments in data organization and management and to facilitate access on species data in ASEAN, ACB also partnered with global data holders and organizations, including the Asia Biodiversity Conservation and Database Network (ABCDNet), Asia Pacific Biodiversity Observation Network (AP-BON), BirdLife International, GBIF, and GEO BON, among other groups. However, the maintenance of the ASEAN CHM as a regional platform for biodiversity information is highly dependent on the availability of locally and nationally collected information by AMS. Currently, biodiversity information at the national level is not interoperable; thus, data are difficult to share and integrate with other systems. In response, training modules and tools that facilitate the encoding of biodiversity data in common formats that are globally acceptable have been developed. Since 2012, Brunei Darussalam, Myanmar, Philippines, and Thailand have collaborated with ACB to organize data and CHM business plans, train national focal points and stakeholder data contributors, and develop and update national CHMs.

#### Updates on national Clearing-House Mechanisms

As part of commitments to the CBD, the ASEAN Member States continue to establish and maintain national CHMs as facilities to promote technical and scientific cooperation in the region. To date, Indonesia, Malaysia, Philippines, Singapore, and Thailand have operational national CHM websites. Of these five countries, Malaysia has the most frequently updated database maintained through an interactive biodiversity database web service. The Malaysian CHM has also been rebranded from the Malaysian Biological Clearing-House Mechanism to Malaysia Biodiversity Information System (MyBIS). Launched and uploaded in June 2016, the website is fully operational and located at www.mybis.gov.my. The MyBIS system is a one-stop repository for Malaysian biodiversity information, collating data from different sources, providing easy access and making biodiversity information in Malaysia available to the public.

In the Philippines, species data are being encoded into the Darwin Core format and CHM operations have been mainstreamed into regular activities of the Philippine Department of Environment and Natural Resources' Biodiversity Management Bureau (DENR-BMB). The Philippines and Indonesia have tied up with GBIF to organize species data in common formats. Indonesia also published an Indonesian Biodiversity Stocktaking Study in 2014 and launched the Indonesia Biodiversity



Information Facility (InaBIF) in 2016.

Brunei Darussalam, Cambodia, Lao PDR, and Myanmar have commenced CHM development, with their national CHM websites undergoing beta testing. While Viet Nam has yet to establish its national CHM, it has worked with the Japan International Cooperation Agency (JICA) and GBIF through BIFA in the establishment of the country's national biodiversity database.

In 2010, some AMS received funds amounting to USD 5,000 as initial support for national CHM establishment and management under ACB's technical assistance program. Capacity building courses and tools have also been developed to enhance the ASEAN Member States' capacities to organize and manage their CHM websites, as well as organize and manage their biodiversity information. Nearly 500 individuals from the AMS have been trained on CHM and data organization and management through ACB.

Despite these efforts, uptake of biodiversity tools in the region has been slow due to a number of factors. Data are still in local dialects and need to be translated. The lack of financial and human resources for encoding is also hampering uptake. In some cases, internal policies also limit the sharing of sensitive information, particularly on species locations. Further, CHM operations are not mainstreamed into the regular operations of some ASEAN Member States because of the lack of regular staff to maintain the national CHM network and website, thereby stagnating national CHM developments.

#### **Lessons learned**

Although National CHM establishment in the region is largely challenged by the lack of financial and human resources and limited technical capacities, some countries have

successfully employed strategies to surmount these obstacles. For instance, Singapore and Malaysia transformed their existing government portals into national CHM websites, thereby ensuring sufficient funds and manpower from their respective regular government budgets are allotted for CHM maintenance. Singapore uses the National Parks Board's (NParks) website as its CHM website, while Malaysia uses the Forest Resource Institute of Malaysia's (FRIM) website. In the Philippines, the DENR-BMB mainstreamed CHM-related activities under its regular budget with the creation of regular staff positions, such as web programmer and GIS officer, to undertake CHM operations.

The Philippines, Malaysia, and Thailand are also working with the UNDP Biodiversity Finance Initiative (BIOFIN) project in updating their National Biodiversity Strategies and Action Plans (NBSAPs), where CHM-oriented activities are included, so that funds can be appropriated for such activities within their respective government systems. Indonesia published the updated Indonesian Biodiversity Strategy and Action Plan (IBSAP) in 2015.

Indonesia and the Philippines have tied up with GBIF to facilitate the transformation of their species data into interoperable formats.

#### **Ways Forward**

It has become necessary to support the coordination of biodiversity observation efforts at the national and regional levels to facilitate sound decision making and policy development for the conservation and management of the region's biological resources. The recommendation by the CBD to develop national CHMs as national repositories of biodiversity data and national coordination platforms should be considered. Adhering to the principles of interoperability among data holders. contributors and stakeholders of the ASEAN region will ensure coherent information integration processes. Such harmonization will result in better understanding of the state of biodiversity and the dynamics at which its components interact. This will enable countries to use such information in decision making and policy development and/or reform. The availability of information will allow managers of parks, protected areas, and other biodiversity conservation initiatives to adhere to scientific basis in all aspects of strategic planning, as well as in day-to-day operations.

The following actions are recommended to facilitate generation of shareable biodiversity information in the region as bases for scientific and informed decision making:

- Promote a culture of data sharing harmonized information (species on and PA data that conform to common terminologies, metrics, and format) to increase access to accurate and scientific biodiversity data for decision making, policy development, and monitoring purposes. This should be achieved by following the voluntary guidance recommended by the Nineteenth Meeting of the Subsidiary Body for Technical and Technological Advice to the CBD (SBSTTA 19) in the annex to Recommendation XIX/2 (CBD, 2016).
- AMS must support the ASEAN CHM website by contributing species and protected area data that will facilitate science-based biodiversity monitoring, decision making, and policy development in the region.
- On CHM development and maintenance:
  - AMS are encouraged to establish and maintain their national CHM.
  - Continue to promote the mobilization of species and protected area data into common and shareable formats with the use of ACB's offline species and protected area encoding tools and other online data management applications recommended by global and regional data partners.
  - AMS are encouraged to develop their national CHM business plans that will guide the operations and management of the national CHM including its objectives, goals, and directions; meet resource requirements (human, financial, equipment, and others); and

establish information-sharing protocols with the CHM network members (as data contributors and users).

- Promote mainstreaming of CHM business plans in government processes to sustain CHM operations.
- Maintain regional and global partnerships to promote biodiversity information sharing at all planning levels. Involvement of ASEAN Member States in global initiatives (e.g., UNDP BIOFIN, GBIF, AP-BON, GEO BON, and ABCDNet, among others) must be encouraged by ACB through more information campaigns regarding these initiatives.
- Continue enhancing capacities of AMS to manage national CHMs, as well as organize and maintain biodiversity information.
   A module on the CHM business plan preparation should also be included in future CHM-oriented training programs.
- Continue developing biodiversity information management tools that could facilitate establishment of biodiversity databases and promotion of knowledge products.
- Tap academic institutions engaged in biodiversity data collection as data partners and provide capacity support to share data in common formats.
- Engage natural history museums as sources of biodiversity information and support encoding of specimens and spirit collections as well as natural history data.
- Secure funding for updating and implementation of National Biodiversity Strategy and Action Plans (NBSAP) and CHM maintenance. This could be done by tapping the BIOFIN project to generate and explore potential funding sources for NBSAPs and CHMs.
- As interoperable biodiversity information becomes available in the region, AMS should be encouraged to contribute biodiversity data and policies in regional and global scientific discussions as they will be in a better position to contribute scientific biodiversity information that conforms to globally accepted formats.

# CEPA: Bridging the communication gap in biodiversity conservation

ASEAN

Regional Strategy

Partne

Limited

funds

Abundance

of competing

messages

**Biodiversity experts** Conservation organizations Scientific community

Lack of biodiversity information in education curricula at Lack of all levels Unrealistic political communication Limited goals human resources

will

Language

barriers



## **General Public**

## **CEPA:** Bridging the communication gap in biodiversity conservation

Communication, education, and public awareness is crucial to achieving **Target 1**, and is an integral aspect of strategic development plans on biodiversity and sustainable development.

Biodiversity loss is one of the greatest threats to the 632 million residents of ASEAN. One of the drivers of biodiversity loss is the lack of awareness on the values of biodiversity and apathy towards environmental issues caused by overexploitation of natural resources and other destructive human activities. Promoting the values of biodiversity is one of the most crucial steps in combatting the continuous depletion of the region's biological resources.

By 2020, the Convention on Biological Diversity (CBD) expects people from all over the world to be aware of the values of biodiversity and the steps necessary for its conservation and sustainable use. This goal is hinged upon the belief that understanding and appreciation of the importance of biodiversity will make people more willing to take proactive actions to conserve biological resources.

## Awareness rising, but there's a long way to go

Recent surveys show that in the final stretch of the 10-year time frame of the Aichi Biodiversity Targets, there is still a long way to go in terms of making the general public understand the economic, environmental, and social impacts of biodiversity.

The 2015 edition of the annual Biodiversity Barometer conducted by the Union for Ethical BioTrade (UEBT) shows that between 2009 and 2015, biodiversity awareness increased from 56 to 64 percent in France, Germany, the UK, and the US. In India, awareness grew from 19 to 40 percent. In Brazil, the awareness level dropped marginally since 2010.

In the 2015 survey, which involved 9,000 persons from Brazil, Ecuador, France, Germany, India, Mexico, Netherlands, the UK, and the US, an average of 69 percent of respondents said they have heard of biodiversity. However, despite increasing awareness especially among the millennials, greater outreach efforts are needed to meet the global target on awareness.

In the ASEAN region, a biodiversity awareness survey conducted by the ASEAN Centre for Biodiversity among media practitioners shows that while reporters and editors have heard of biodiversity, they see a need to understand it better so they can report on the topic. They confirmed that there is limited reportage on biodiversity and attribute this to the fact that it is not seen as a priority topic. "Certainly not. There are always other priorities like political and economic news and biodiversity is seen as a secondary news item," an editor from Malaysia said. According to another editor, "Media organizations are businesses like any other; while we do have a duty to readers, that duty is often constrained by the bottom line. Media organizations must be shown how environmental issues can affect everyone's bottom line."

Complicating the situation is the lack of understanding of the topic. "There is a lot of jargon that are too heavy and difficult for a layperson to understand," a Malaysian editor said of information materials she read on biodiversity. According to the executive director of a Philippine media organization, "Some terms need to be popularized so that it is easier to relay the data and information to the public." A reporter from the Philippines said there is a need to "bring the conversation down a bit."

Most of the respondents believe that media helps in getting the message across, but there is a need for further education on biodiversity issues.

## ASEAN Member States' commitment to achieve Aichi Biodiversity Target 1

As Parties to the CBD, ASEAN Member States (AMS) are committed to strengthening biodiversity conservation efforts by promoting understanding of the importance of biodiversity through public awareness and education programs. Commitment to raising biodiversity awareness is operationalized through Communication, Education and Public Awareness (CEPA) programs under National Biodiversity Strategies and Action Plans (NBSAPs).

The ASEAN Ministerial Statement to the Twelfth Meeting of the Conference of the Parties (COP 12) to the CBD demonstrated AMS' commitment to enhance national CEPA strategies in support of the Aichi Biodiversity Targets, in particular Target 1. They also committed to focusing efforts on key groups such as business, media, women, local governments, and youth.

## ACB: Promoting cooperation among the AMS in communicating biodiversity

In the ASEAN CEPA Workshop: Streamlining National CEPA Strategies in Support of Aichi Target No. 1 conducted by ACB and the ACB-GIZ Biodiversity and Climate Change Project (BCCP) in November 2014, participants presented outlines of their National CEPA Strategies. Most of these strategies have undergone extensive processes such as consultations with national stakeholders. Some of the delegates said they will submit recommendations for revision to their respective organizations based on inputs from the workshop.

Workshop participants identified a number of gaps that hinder the effective implementation of their respective national CEPA strategies. They listed unrealistic goals as one of the key challenges. They highlighted the need to set more realistic and attainable goals in communicating biodiversity. Another challenge

identified was the lack of political will among decision makers. To address this problem, they recommended conducting briefing sessions with target decision makers and providing them with biodiversity information specific to their needs. Encouraging politicians and decision makers to champion the conservation cause was also suggested.

AMS representatives to the workshop also mentioned the lack of human resources in implementing CEPA programs. One solution seen was to streamline CEPA activities among relevant agencies to make implementation more efficient. It was also recommended that capacity building activities be conducted for staff involved in CEPA work.

In mainstreaming biodiversity, a key challenge identified was the lack of an updated education curricula that highlights the importance of biodiversity conservation. The participants recommended that information must be made more accessible to the education sector to ensure that biodiversity will be included in course curricula.

Other recommendations included using appropriate channels of communication and key messages in communicating biodiversity, encouraging and nurturing new nature conservation interest groups, and looking for more funds to support CEPA programs.

#### Ways Forward

## Developing an ASEAN Regional CEPA Strategy

To guide the AMS in prioritizing activities aimed at increasing awareness of and engagement in biodiversity conservation, initial discussions were made about developing a regional CEPA strategy. At the ACB-GIZ workshop, participants crafted an outline of the regional strategy with the key message, "Biodiversity is Life: Conserve Today for Tomorrow." The following target groups were also identified: 1) Ministries/policymakers, 2) media, 3) youth and academe, and the 4) business sector. The participants also enumerated specific strategies to engage target groups, such as conducting capacity development programs for AMS in CEPA, staging a biodiversity reporting awards program, strengthening biodiversity and environmental education for all sectors, and creating partnerships with businesses, among others.



Once the draft strategy is prepared, it will undergo a series of consultations prior to approval and implementation. The Regional CEPA Strategy is expected to be implemented by the AMS after another leg of the CEPA Workshop in 2017.

#### **Biodiversity CEPA Network**

An existing regional initiative is the CEPA and Media Network for Biodiversity (CEPA-Net), a knowledge network composed of more than a hundred media practitioners, government and NGO information officers, and communication experts who are committed to help promote the importance of biodiversity conservation in the region.

The group was organized during the Sub-Regional Capacity Development Workshop for ASEAN Countries on Communication, Education and Public Awareness (CEPA) and Media Relations conducted by SCBD and ACB in November 2009 and relaunched at the ACB-GIZ CEPA workshop in 2015. The relaunch was made to officially come up with a more organized group with regular activities that will take the lead in advocating for biodiversity conservation in ASEAN. Ms. Zamzurina Zulkifli, Assistant Secretary, Biodiversity and Forestry Management Division, Ministry of Natural Resources and Environment, Malaysia, was elected as the Chair of CEPA-Net.

CEPA-Net seeks to facilitate knowledge exchange and learning among civil servants responsible for CEPA activities on biodiversity and media practitioners who report on biodiversity; increase the government and NGO information officers' awareness of the media and improve their skills in dealing with the media; sensitize media practitioners to issues on biodiversity conservation and encourage them to become partners in conservation advocacy; promote a better understanding of the role of CEPA in strategic communication and change management; and enhance the CEPA strategies of AMS.

To further increase the members of the CEPA-Net, ACB conducted Biodiversity Reporting 101, a series of workshops involving mainstream media practitioners in the Philippines. This workshop series was conducted in cooperation with the US Embassy Manila, through its Young Southeast Asian Leaders Initiative (YSEALI) program. The series was conducted in three legs: Luzon, Visayas, and Mindanao. Biodiversity Reporting 101 is an attempt to increase media interest on biological diversity. The project recognizes the crucial role of mass media in making biodiversity a part of everyone's everyday life. More than a hundred participants of the workshop series were automatically added to the CEPA-Net.

#### ASEAN Champions of Biodiversity

ACB and its partners are recognizing efforts to conserve biodiversity through the ASEAN Champions of Biodiversity. Launched in 2009, the ASEAN Champions of Biodiversity is a recognition program for outstanding initiatives on biodiversity conservation and advocacy in the ASEAN region. The award is aimed at

	Youth Sector	Media Sector	Business Sector
2011	Green Community, Indonesia (Champion)	Born to be Wild, Philippines (Champion)	HSBC Brunei, Brunei Darussalam (Champion)
	Sahabat Alam, Indonesia (2 <sup>nd</sup> place)	The Brunei Times, Brunei Darussalam (2 <sup>nd</sup> place)	PTT Public Company Limited, Thailand (2 <sup>nd</sup> place)
	Architectural Students' Association of the Philippines – University of the Philippines, Philippines (ASAPHIL-UP) (3 <sup>rd</sup> place)	BusinessMirror, Philippines (3 <sup>rd</sup> place)	Chevron Philippines, Inc., Philippines (3 <sup>rd</sup> place)
2014	Sahabat Alam, Indonesia Bekantan Twins Project, Indonesia	BusinessMirror, Philippines	

#### Table 18. ASEAN Champions of Biodiversity, 2011 and 2014

generating greater leadership, public, and media awareness of the problems facing the region's rich but highly threatened biodiversity and the need for a concerted effort in biodiversity conservation and advocacy. The award has three categories: Business Sector, Media Sector, and Youth Sector.

The first staging of the awards was conducted between 2010 and 2011 and supported by the ASEAN Foundation (AF), Asian Institute of Journalism and Communication (AIJC), EU, GIZ, SCBD, and the United Nations Educational, Scientific and Cultural Organization (UNESCO). ACB and GIZ staged the second ASEAN Champions of Biodiversity from August 2013 to August 2014 under the Biodiversity and Climate Change Project (BCCP). The winners were announced in November 2014. Table 18 shows the winners of the 2011 and 2014 Champions of

Biodiversity in the Youth, Media, and Business categories.

Three youth leaders from Indonesia and a business newspaper from the Philippines were honored as the 2014 ASEAN Champions of Biodiversity for their outstanding work in biodiversity conservation and advocacy. The awarding ceremony was held in the Philippines. The winners in the Youth Category were Indonesia's Adeline Suwana of the Sahabat Alam youth organization, and twins Giovanna and Gabriella Thohir of The Bekantan Twins Project. The Philippines' BusinessMirror was recognized as the Media Champion of Biodiversity.

In 2017, the ACB, together with the ASEAN Secretariat, the Philippines' Department of Foreign Affairs, Hyundai Asia Resources Inc., and the European Union, will spearhead another

#### Box 32. The 2014 ASEAN Champions of Biodiversity

- Adeline Suwana founded Sahabat Alam, an internationally known youth environmental organization with thousands of members all over Indonesia. Adeline and Sahabat Alam generate awareness of biodiversity conservation through school seminars, events, talk shows, films, and various activities to encourage young people to do something for the environment. In a span of five years, Adeline has grown from a 12-year-old girl who organized a small mangrove planting trip with her classmates to a 17-year-old advocate who is recognized as a credible voice of the youth in Indonesia's environmental movement.
- Twin sisters Gabriella and Giovanna Thohir and The Bekantan Twins Project are championing biodiversity by inspiring fellow youth and the public in Indonesia to conserve the endangered bekantans (proboscis monkeys). Gabriella and Giovanna have taken a crucial step in keeping the bekantans alive. With overflowing support from partners, colleagues, friends, communities, and the media, their supporters say that their dream will soon become a reality.
- BusinessMirror, one of the leading newspapers in the Philippines, prioritizes biodiversity by devoting a full section to biodiversity-related stories each week. Living up to its commitment of providing a 'broader look at today's business,' the BusinessMirror is promoting biodiversity conservation through its day-to-day reportage and special reports, as well as its evaluation and presentation of stories across all sections. The newspaper continues to promote biodiversity as no less than the business of living.



recognition scheme for outstanding men and women of the ASEAN region with exemplary efforts in the protection and conservation of biodiversity through the ASEAN Biodiversity Heroes project. Representing each AMS, 10 Biodiversity Heroes will be recognized in a ceremony on ASEAN Day in August 2017 in the Philippines.

#### Good CEPA practices by the AMS

Greater awareness of the values of biodiversity and participation in conservation efforts in their own spheres of influence will enable people to contribute to efforts to address biodiversity loss. In the ASEAN region, government institutions, organizations, media practitioners, and individuals are working to mainstream biodiversity.

#### **Box 33. Festival of Biodiversity (Singapore)**

Inaugurated in 2012 by Singapore's President Tony Tan Keng Yam, the Festival of Biodiversity is an annual signature community outreach event organized by the National Parks Board (NParks) in collaboration with the Biodiversity Roundtable (a group comprising local non-governmental organizations involved in biodiversity issues) for the conservation of Singapore's natural heritage. It is a national effort to communicate the importance of biodiversity and its conservation to Singaporeans and residents of Singapore.

The annual two-day educational event typically involves up to 100 volunteers and 40 partners comprising nature groups, biodiversity experts, schools, corporate organizations, and government agencies, each contributing to the Festival's program and exhibits.

Through the Festival, the biodiversity community, public agencies, corporate and school groups, and individuals are galvanized to contribute to a common goal: the conservation of Singapore's natural heritage. All the partners involved bring to the Festival their knowledge, expertise, and resources to create greater awareness of and interest in Singapore's natural heritage and instill a sense of national pride to sustain the country's rich biodiversity for future generations.

The first Festival held in Singapore Botanic Gardens attracted some 3,000 visitors. The number of visitors increased significantly at the second (10,000), third (15,000), and fourth festival (27,000), which were held at a shopping mall. Bringing biodiversity into the heart of a popular shopping mall allows the organizers to proactively reach out to the 'unconverted' and shoppers, touching hearts and minds through the passionate volunteers, showcasing a plethora of plant and animal specimens, and sharing interesting nuggets of information on biodiversity.

In addition to exhibits that highlight the biodiversity that exists locally, various activities are organized throughout the day that appeal to different audiences. For example, storytelling and children's activities, such as animal-themed face painting or clay workshops, are conducted for the younger visitors. More serious biodiversity talks are held for the other age groups. The Biodiversity Passport, which involves participants going on a treasure hunt for information on various native species, is an activity that might appeal to slightly older children. The biodiversity community also takes the opportunity to launch new biodiversity mobile applications, exhibitions, and books to the public during the Festival.

Each year at the Festival, NParks puts together and launches an informative and interactive exhibition based on the current year's theme for CBD's International Day for Biological Diversity to enhance local understanding of biodiversity issues. This educational exhibition is subsequently showcased at various heartland areas in Singapore to further reach out and spread the message to people who might not be familiar with local biodiversity.

Based on a poll done during the event, 96 percent of visitors cited that they gained a deeper understanding and appreciation of Singapore's rich biodiversity, its benefits, and relevance to Singaporeans. More than 90 percent of the visitors said they would tell their families and friends about the Festival and would participate in the event the following year. An overwhelming number of visitors also stated that they were not aware of the rich biodiversity that Singapore has, and that the Festival of Biodiversity has given them an opportunity to learn about the city-state's natural heritage and the need to conserve it.

This event runs predominantly on sponsorship and represents the community giving back to the society. Corporate sponsors were courted to contribute in kind and in cash year after year with success. Most of the partners have supported and participated in the Festival since its inception in 2012.

Holistic biodiversity conservation cannot be achieved with the efforts of a single organization or government agency. It is essential for effective biodiversity conservation programs to have broad-based support from individuals, the community, and government agencies. This event marks a major milestone for biodiversity conservation where the biodiversity community, public agencies, corporate and school groups, and individuals are galvanized to contribute to a common goal: the conservation of Singapore's natural heritage.

#### Box 34. Transforming biodiversity data into CEPA materials (Thailand)

Thailand's Royal Forest Department is responsible for the preservation and protection of the country's preserved forests. There are 1,221 preserved forests, the details of which were not previously incorporated in a biodiversity database. Some parts of the preserved forests were converted into community forests to allow people who live around the areas to take vegetables, fruits, medicinal plants, bamboo, and mushrooms or fungi from the forest for their livelihood. The department assigned Dr. Surang Thienhirun, the director of the Forest Biodiversity Division, to construct a database of preserved forests under the biodiversity conservation and development project.

The project entails collecting biodiversity data on plants, animals, insects, mushrooms, and lichens, as well as locals' wisdom and traditional knowledge related to biodiversity. From the data collected, the Forest Biodiversity Division constructed the database and made it available online (http://biodiversity.forest.go.th).

To date, the project has collected data from approximately 32 forests from the northern, southern, central, eastern and northeastern parts of Thailand. It has published 45 books and produced fifteen videos to generate awareness of biodiversity.

The project also conducts biodiversity exploration training for staff and people who live around the forest to provide them skills on how to collect biodiversity data. The project enables villagers to gain a greater understanding of ecology and biodiversity. Through the project, the Forest Biodiversity Division is able to determine which plants, animals, insects, mushrooms, and lichens are extinct and which ones are at great risk of extinction. The community is also made aware of the impact of extinction, encouraging them to think of ways to conserve forest biodiversity for future generations. Today, the community helps conserve rare plant species by growing young plants and replanting them in the forest.

Under the project, the Forest Biodiversity Division constructs biodiversity classrooms with the goal of giving knowledge back to communities through the younger generation. The biodiversity classrooms are built in schools located near forests so that students and local communities are made aware of the importance and the value of biodiversity in the forest.

By working with local people and staff, the Forest Biodiversity Division of Thailand's Royal Forest Department not only gathered information for its biodiversity database, but also formed a good relationship with the local people. Both parties gained knowledge on biodiversity together. In the end, the people not only understood more about biodiversity, environment, and culture; they realized the important role that they play in forest conservation.

his sur chapter provides а summary of key actions and recommendations to accelerate efforts in the ASEAN region to achieve biodiversity targets by 2020 and beyond. These build on thematic and ecosystems-based analyses elaborated in the first three chapters and recognize national innovations consistent with the ASEAN Vision 2025.



CHAPTER 4 The ASEAN Biodiversity Outlook: 2020 and Beyond

Photo by Erwin James Agumba

Consistent with the global agenda on biodiversity. the ABO 2 highlights ASEAN's priority actions and strategies beyond 2015. In support of the environmental agenda at the regional level, these actions will be anchored on the ASEAN Socio-Cultural Community Blueprint 2025 on building a sustainable community that promotes social development, environmental protection, and a resilient community under the ASEAN Community Vision 2025. The collective actions of ASEAN Member States (AMS) at the national level will remain the driving force in achieving desired results. The ASEAN Community Vision 2025 has recognized that the global agenda provides a useful enabling framework for the achievement of the Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets in mainstreaming biodiversity into national and regional decision-making.

The first edition of the ASEAN Biodiversity Outlook (ABO 1) identified and comprehensively discussed the drivers of biodiversity loss in the ASEAN region that include habitat change, climate change, invasive alien species, overexploitation, pollution, and poverty.

The ASEAN community has experienced remarkable economic development in the past 25 years that have imposed corresponding pressures on biodiversity. The Fifth National Reports of the AMS and reports from organizations that monitor changes in the state of biodiversity indicate that drivers of biodiversity loss identified in 2010 persist in forests, fisheries, and related ecosystems in ASEAN. The same reports show that issues related to the drivers of biodiversity loss have grown in complexity, brought about by general increases in population, regional economy, land conversion for agriculture and other uses, pollution, and changes in consumption patterns. However, common to these drivers of biodiversity loss is that they all result in habitat change, the root cause being poor governance (Figure 8).

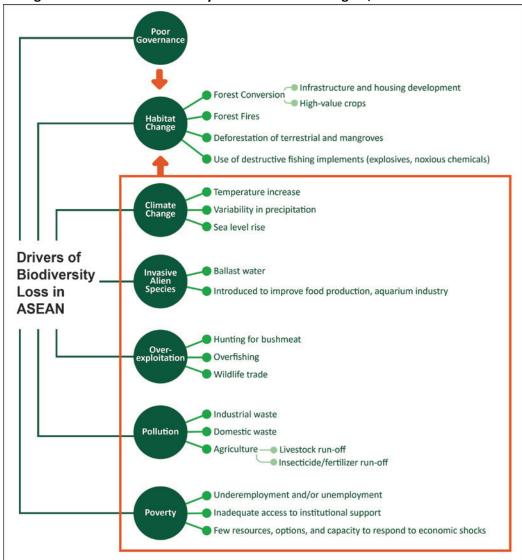


Figure 8. Drivers of biodiversity loss in the ASEAN Region, redrawn from ABO 1

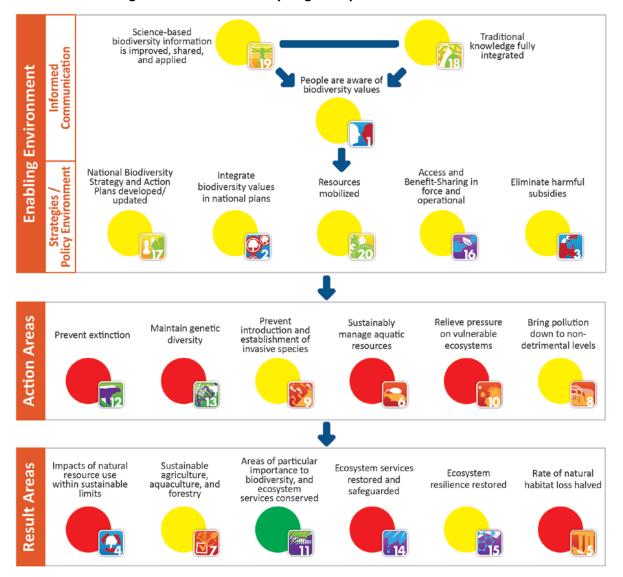
## Aichi Biodiversity Targets implementation framework

The diagram (Figure 9) recommends a revised sequence by which the Aichi Biodiversity Targets may be implemented in the ASEAN region, achieving the five goals through a logical and prudent use of resources. It visualizes synergies among specific Aichi Biodiversity Targets and suggests a framework by which these synergies may be applied such that: 1) the basis of an enabling environment is established when all sources of information are considered in making people aware of the relevance and values of biodiversity and the national biodiversity strategies, and appropriate policies are in place. This includes scientific evidence and traditional knowledge (Targets 1,18, and19); 2) such an enabling environment will facilitate the implementation of conservation actions as appropriate, in the jurisdiction of AMS such as the conservation of species and ecosystems

(Targets 6, 8, 9, 10,12, and 13); and 3) having items 1 and 2 in place will facilitate the delivery of result areas, such as sustainability in naturebased industries, agriculture, aquaculture, and fisheries (Targets 4 and 7), deliverables related to protected areas (Target 11), ecosystem conservation and restoration (Targets 14 and 15), and the need to increase ecosystem resilience (Target 5).

## Moving innovative actions at the national level

The AMS have undertaken innovative and significant actions at the national level in implementing the Strategic Plan for Biodiversity 2011–2020 and the Aichi Biodiversity Targets. Awareness campaigns involving the private sector, expansion of conservation areas (including marine protected areas), enhanced management plans, and engagement of indigenous peoples and local communities in



#### Figure 9. Aichi Biodiversity Targets Implementation Framework



natural resources planning and management are key developments made by AMS to address the challenges of biodiversity loss.

On mainstreaming biodiversity, some AMS have established legislative and regulatory frameworks to implement an ecosystem approach in sustainable agriculture, fisheries, and forest management, particularly in stopping timber harvesting. A number of AMS have also incorporated biodiversity conservation and environmental protection into national development plans.

Based on the analyses in Chapter II, the impetus for achieving the Aichi Biodiversity Targets are defined by the elements of Goal A where a larger conservation constituency must be organized from both local stakeholders and non-traditional partners such as the health, construction, tourism and recreation, mining and other extractive industries, music and the arts sectors. While these actions indicate ASEAN's progress to achieve the Aichi Biodiversity Targets, more actions and accelerated implementation of agreed initiatives are urgently needed.

## ASEAN regional platforms and mechanisms to support actions at the national level

ASEAN recognizes the myriad challenges being faced by the region in achieving the biodiversity targets. These challenges encompass governance, limited technical and scientific capacity, and a limited biodiversity information base. The ASEAN 2025 vision laid down the foundation to further engage the region's people and provide benefits to all through the principles of good governance. To this end, the strategic measures agreed on by the AMS to conserve and sustainably manage biodiversity and natural resources will pave the way towards a more rigorous and strategic plan on the environment. All AMS are Parties to the Convention on Biological Diversity (CBD), and the Strategic Plan for Biodiversity 2011–2020 and Aichi Biodiversity Targets provide a general framework and guidance to all Parties to the CBD to halt the loss of biodiversity and provide benefits to all.

ASEAN has recognized that one of the key challenges to halting biodiversity loss is the greater involvement of a broader stakeholder base beyond environment and conservation practitioners. CEPA campaigns must target key groups such as business, media, women, local governments, and youth. As a region, ASEAN is committed to promoting the integration of policies on biodiversity conservation and climate change adaptation to improve ecosystem resilience.

ASEAN will continue to promote programs on protected areas in the region. The strengthening of one of ASEAN's flagship initiatives in biodiversity - the ASEAN Heritage Parks Programme will continue to be a key platform and network on protected areas in the implementation of the Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets. These have been reiterated in the Joint Statement to CBD COP 12 by the ASEAN Environment Ministers. The AHP platform will continue to demonstrate ASEAN's contribution to conserve the full range of the region's biodiversity covering terrestrial, coastal and marine, and inland water ecosystems, including wetlands and peatlands. The effective management of AHPs shall serve as the means to conserve species critical to the persistence of other species and ecosystem

functions. Through the ASEAN Heritage Parks Conference (held every three years), ACB, as Secretariat of the AHP Programme, will continue to build capacity and engage park management and stakeholders in conserving and effectively managing habitats and species.

ASEAN will continue to develop and maintain a biodiversity information management and sharing platform to inform and provide advice on conservation at all levels of governance in AMS towards the development and enhancement of biodiversity related policies.

ASEAN will promote the engagement of a wider audience, including the business sector, in line with the CBD's Global Partnership on Business and Biodiversity. Business and industries rely on biodiversity and ecosystem services for their raw materials. A healthy business environment contributes to economic development, which is a very important component of human and societal development.

The ASEAN Biodiversity Outlook series, which is produced every five years, will continue to be the main publication to assess the status and progress of biodiversity in the region. The ASEAN Conference on Biodiversity is another series platform conducted every six years. The ASEAN Conference on Biodiversity serves as a platform for consultation, reporting, engagement, and discourse on issues and challenges on biodiversity.

The ASEAN Conference on Biodiversity 2016 (ACB2016) held on 15-19 February 2016 in Bangkok, Thailand was convened with the theme, Biodiversity for Sustainable Development. Over 800 delegates from the AMS, government, academic, science and research community, business sector, media, and international organizations participated in the conference. ACB2016 provided an opportunity for biodiversity stakeholders to enhance partnerships and form new alliances; discuss ways and means to financially sustain biodiversity conservation in ASEAN; and engage more sectors in biodiversity conservation and advocacy. ACB2016 highlighted the connection between biodiversity and sustainable development for the elimination of poverty. It also stressed the need to mainstream biodiversity into various sectors such as fisheries, agriculture, and forestry.

#### Box 35. Key messages and recommendations of ACB2016

ACB2016 recognized that countries in the region are making progress towards attaining a majority of the Aichi Biodiversity Targets. However, the achievements so far are insufficient to attain most of the targets by 2020. Despite considerable progress in a wide range of actions to improve the status of biodiversity and ecosystems, most indicators show a continued decline in biodiversity, partly due to persistent increases in pressures. ACB2016 called for scalingup commitments to conservation action in the region, more active partnerships, and redoubling of national and regional efforts that will lead to substantial progress to achieve biodiversity targets. Key recommendations include the following:

- Communicate the essential role of biodiversity and healthy ecosystems for all life on Earth, including humans, and the crucial role that biodiversity plays in development.
- Mainstream the conservation and sustainable use of biodiversity into relevant sectoral or cross-sectoral plans, programs, and policies in areas such as forestry, agriculture, fisheries, and tourism. In support of further actions to achieve the Aichi Biodiversity Targets in the region and to mainstream biodiversity in ASEAN, ACB2016 called for heightened efforts and priority actions particularly in species conservation, wildlife management, and agrobiodiversity conservation for food security.
- Use best available data and scientific evidence to develop and implement stronger national and regional measures applied in law enforcement, consumer behavior, border patrols, and the criminal justice system to better address species conservation and wildlife management, particularly those that are transboundary in nature.
- Increase collaboration to link biodiversity and human health and implement integrated biodiversity and health strategies. Human health ultimately depends on ecosystems services that are made possible by biodiversity and its products.
- Explore innovative forms of sustainable financing for biodiversity including advocacy for pro-people privatepublic partnerships. The private sector must ensure that biodiversity assets are protected to sustain delivery of products and services. Business practices must improve to lessen impacts on biodiversity and the environment.
- Scale up successes in ASEAN that promote biodiversity conservation at the local and national levels to strengthen commitment to conservation actions in the region. Lessons learned from the ASEAN Heritage Parks Programme must be taken into consideration in the scaling-up process.
- Support biodiversity conservation but recognize that more efforts need to be made. This is embodied in the ASEAN Vision 2025, which aims to create an ASEAN community that is inclusive, sustainable, resilient, and dynamic.

Source: ACB. (2016). Summary Report of the ASEAN Conference on Biodiversity 2016.

## Accelerating actions to halt biodiversity loss in ASEAN

The CBD Strategic Plan for Biodiversity 2011–2020 has five defined strategic goals: mainstream biodiversity across government and society; reduce direct pressures on biodiversity and promote sustainable use; improve biodiversity by safeguarding ecosystems, species, and genetic diversity; enhance benefits

to all from biodiversity and ecosystems services; and enhance implementation of conservation initiatives through participatory planning, knowledge management, and capacity building.

Some of the key actions needed to accelerate progress in ASEAN to achieve biodiversity targets by 2020 for these five goals are summarized below:

GOAL A	<ul> <li>Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society</li> <li>Heighten awareness of biodiversity and institutionalize communication, education, and public awareness strategies through multi-sectoral approaches; engage more stakeholders and build their capacity, including mobilizing champions on biodiversity; and streamline CEPA activities among various sectoral agencies.</li> <li>Expedite the development of national and local policies and strategies that integrate biodiversity and poverty reduction.</li> <li>Review subsidies and policies harmful to biodiversity (such as in industrial forests, mining, and agriculture).</li> </ul>
GOAL B	<ul> <li>Reduce direct pressures on biodiversity and promote its sustainable use</li> <li>Significantly improve enforcement capacities and establish monitoring and reporting systems.</li> <li>Develop an ASEAN Forestry Master Plan, foster Green Economy, and establish ecological corridors.</li> <li>Develop an ASEAN-wide strategy on sustainable fishing practices and enhance national fisheries policies on gear and seasonal catch controls, conservation partnerships, and integrated land and sea use plans.</li> <li>Secure sustainability of small-scale fisheries to alleviate poverty and food security.</li> <li>Promote agro-ecological farming practices to increase food production and conserve agrobiodiversity.</li> <li>Accelerate CEPA campaigns for key stakeholders and the public to develop and adopt waste management practices (reduce, reuse, and recycle).</li> <li>Identify pathways of introduction, prevention, and eradication of invasive alien species.</li> <li>Develop appropriate policies, incentives, and penalty systems to decrease pressures on coral reefs, mangroves, and inland waters.</li> </ul>
GOAL C	<ul> <li>To improve the status of biodiversity by safeguarding ecosystems, species, and genetic diversity</li> <li>Expand protected area networks, in particular on coastal and marine areas, and ensure effective protected area management.</li> <li>Enhance protected area management planning by updating and effectively implementing management plans, enhancing collaborative management, and incorporating climate actions.</li> <li>Accelerate updating of management plans towards the effective management of all AHP sites.</li> <li>Enhance protection of ecologically-representative and well-connected systems of protected areas, including transboundary management of protected areas.</li> <li>Implement a comprehensive and collaborative species conservation program that addresses wildlife trafficking at national, regional, and global scales.</li> </ul>
GOAL D	<ul> <li>Enhance benefits from biodiversity and ecosystems services for all</li> <li>Undertake ecosystems restoration activities, including assessments and mappings, of areas with greater carbon sequestration value, especially mangroves.</li> <li>Enhance protection and restoration of ecosystems services.</li> <li>Enhance capacity building activities to assist AMS to enhance or develop and implement national legislative, policy, or administrative measures and institutional structures on access and benefit sharing.</li> <li>Foster regional dialogues to enhance the interface among biodiversity, health, and human well-being.</li> </ul>
GOAL E	<ul> <li>Enhance implementation through participatory planning, knowledge management, and capacity building</li> <li>Strengthen partnerships at the regional level to support the implementation of Strategic Plan for Biodiversity 2011–2020 and the Aichi Biodiversity Targets.</li> <li>Continue to recognize and document traditional knowledge and practices of indigenous and local communities for the conservation and sustainable use of biodiversity.</li> <li>Forge partnerships that promote biodiversity information management, provide training to increase capacity, and optimize the use of national Clearing-House Mechanisms as knowledge platforms.</li> <li>Strengthen resource mobilization efforts, and explore and implement innovative financing schemes to sustainably finance biodiversity initiatives.</li> </ul>

Clearly, there is an urgent need to work together at the national, regional, and global levels for Parties to the CBD to save biodiversity and enhance benefits to people by 2020.



## Towards a strategic approach to ensuring environmental sustainability in ASEAN

Beyond ASEAN's commitment to implement the CBD Strategic Plan for Biodiversity 2011–2020, a renewed focus brought about by the ASEAN 2025 Vision has identified key characteristics that would underline ASEAN's approach towards an inclusive, resilient, dynamic, and sustainable community. The ASEAN Socio-Cultural Blueprint 2025 encompasses key result areas to conserve and sustainably manage biodiversity and natural resources and promote environmentally sustainable cities, sustainable climate, and sustainable consumption and production. As embodied in the ASCC Blueprint 2025, the following strategic measures have been agreed upon by AMS to ensure that biodiversity and natural resources in ASEAN are conserved and sustainably managed. Among these strategic measures, ASEAN has committed to support the full implementation of the Strategic Plan for Biodiversity 2011–2020 and the Aichi Biodiversity Targets.

#### Box 36. Biodiversity conservation measures in the ASCC Blueprint 2025

- Strengthen regional cooperation to protect, restore, and promote sustainable use of terrestrial ecosystems resources; combat desertification; halt biodiversity loss; and halt and reverse land degradation.
- Strengthen regional cooperation on sustainable forest management in the context of forest fire prevention and control, including the implementation of the ASEAN Agreement on Transboundary Haze Pollution, to effectively address transboundary haze pollution.
- Adopt good management practices and strengthen policies to address the impact of development projects on coastal and marine environment; coastal and international waters; and transboundary environmental issues, including pollution, and illegal movement and disposal of hazardous substances and waste; and, in doing so, utilize existing regional and international institutions and agreements.
- Enhance policy and capacity development and best practices to conserve, develop, and sustainably manage marine, wetlands, peatlands, biodiversity, and land and water resources.
- Promote capacity building in a continuous effort to generate sustainable management of ecosystems and natural resources.
- Promote cooperation on environmental management towards sustainable use of ecosystems and natural resources through environmental education, community engagement, and public outreach.
- Strengthen global and regional partnerships and support the implementation of relevant international agreements and frameworks.
- Promote the role of the ASEAN Centre for Biodiversity as a center of excellence in the conservation and sustainable use of biodiversity.
- Support the full implementation of the Strategic Plan for Biodiversity 2011–2020 and the Aichi Biodiversity Targets.

The ASEAN Socio-Cultural Community is developing the ASEAN Strategic Plan on Environment (ASPEN) to achieve a sustainable ASEAN Community that promotes social development and environmental protection and complements the UN 2030 Agenda for sustainable development.

The ASPEN is being developed in line with the ASEAN Vision 2025. It will cover seven strategic priorities on environment and sustainable development: 1) nature conservation and biodiversity, 2) coastal and marine environment, 3) water resources management, 4) sustainable cities, 5) climate change, 6) chemicals and wastes, and 7) environmental education. ASPEN will also cover sustainable consumption and production as a priority theme. The implementation of these strategic priorities identified by ASEAN will contribute to achieving the Aichi Biodiversity Targets.

The emerging ASPEN will also define the institutional coordination and partnerships among ASEAN bodies and entities to deliver the desired objectives beyond the Aichi Biodiversity Targets and until 2025. The ASEAN Centre for Biodiversity will continue to support the ASEAN Working Group on Nature Conservation and Biodiversity (AWGNCB) as the focal body of ASEAN in delivering the strategic priority on nature conservation and biodiversity in line with the objective of achieving an ASEAN where biodiversity is valued, conserved, restored, wisely used, and delivers benefits essential for its people by 2025.

To this end, the ASEAN will implement programs to conserve and effectively manage key biodiversity areas, including protected areas and transboundary protected areas for both terrestrial and coastal and marine areas.

Other priority thematic areas will also be covered under ASPEN from 2016 to 2025, such as ecosystem services, ecotourism, species conservation, wildlife management, taxonomic capacity, and invasive species management.

Mainstreaming biodiversity into sectoral policies, plans, and programs will remain a priority in ASEAN to ensure that it is integrated into the production sector and landscapes (fisheries, agriculture, and forestry) management. Regional actions to support national initiatives on agrobiodiversity, business and biodiversity, and health and biodiversity, will be implemented to address issues on food security, sustainable livelihood, and human well-being.

ACB's Strategic Plan (2016–2025) will be updated in line with the emerging ASPEN and the gaps and priorities assessed in ABO 2. ACB will continue to strengthen and forge new partnerships with various international, regional, and national organizations in support of AMS to implement strategic measures against biodiversity loss and achieve sustainable development in the region.

ASEAN recognizes that the region has to work in a coordinated and integrated approach involving all sectors and levels of governance and society. Beyond the Aichi Biodiversity Targets and as embodied in its ASCC Blueprint 2025, ASEAN will work towards engaging and providing benefits to its people through good governance. ASEAN will promote and ensure balanced social development and a sustainable environment that meets the needs of its people.



## Glossary

- Access and benefit-sharing the sharing of benefits arising from the utilization of genetic resources in a fair and equitable way.
- Agrobiodiversity or agricultural biodiversity is a broad term that includes all components of biodiversity of relevance to food and agriculture, and all components of biodiversity that constitute agroecosystems: the variety and variability of animals, plants, and microorganisms, at the genetic, species, and ecosystem levels, which are necessary to sustain key functions of the agro-ecosystem, its structure, and processes.
- ASEAN Heritage Parks protected areas of high conservation importance, preserving in total a complete spectrum of representative ecosystems of the ASEAN region. Protected areas are established as AHPs to generate greater awareness, pride, appreciation, enjoyment, and conservation of ASEAN's rich natural heritage, through a regional network of representative protected areas, and to generate greater collaboration between ASEAN Member States in preserving their shared natural heritage.
- **Biodiversity** variability among living organisms from all sources including terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems.
- **Climate change** change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forces, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.
- **Conservation** management of human use of nature so that it may yield the greatest sustainable benefit to current generations while maintaining its potential to meet the needs and aspirations of future generations.

- **Ecosystem**–self-regulating community of plants and animals interacting with each other and with their non-living environment—forests, wetlands, mountains, lakes, rivers, deserts, and agricultural landscapes. Ecosystems are vulnerable to interference as pressure on one component can upset the whole balance.
- **Ecosystem services** processes by which the environment produces benefits useful to people, akin to economic services. These include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious, and other non-material benefits.
- **Ecotourism** travel undertaken to witness sites or regions of unique natural or ecologic quality, or the provision of services to facilitate such travel. Travel that has the least impact on biological diversity and the natural environment.
- **Endemic species** species that are native and restricted to a specific geographic area.
- *Ex situ* conservation a conservation method that entails the removal of germplasm resources (seed, pollen, sperm, and individual organisms) from their original habitat or natural environment. Keeping components of biodiversity alive outside of their original habitat or natural environment.
- **Extinction** evolutionary termination of a species caused by the failure to reproduce and the death of all remaining members of the species; the natural failure to adapt to environmental change.
- **Flyway** the geographical area covered by a migratory bird over the course of its annual cycle, encompassing breeding and non-breeding grounds and the connecting migration route.

- **Forest** a land area of more than 0.005 square kilometers, with a tree canopy cover of more than 10 percent, which is not primarily under agricultural or other specific nonforest land use. In the case of young forests or regions where tree growth is climatically suppressed, the trees should be capable of reaching a height of 5 meters *in situ*, and of meeting the canopy cover requirement (CBD).
- **Green economy** an economy that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.
- **Greenhouse gas** atmospheric gas that traps the heat and is responsible for warming the Earth and climate change. The major greenhouse gases are carbon dioxide  $(CO_2)$ , methane  $(CH_4)$ , and nitrous oxide  $(N_2O)$ . Less prevalent – but very powerful – greenhouse gases are hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF<sub>6</sub>).
- Indigenous people/s Usually considered to include cultural groups and their descendants who have a historical continuity or association with a given region, or parts of a region, and who currently inhabit or have formerly inhabited the region either before its subsequent colonization or annexation, or alongside other cultural groups during the formation of a nation-state, or independently or largely isolated from the influence of the claimed governance by a nation-state.
- Inland waters aquatic-influenced environments located within land boundaries, coastal areas, and adjacent to marine environments. Inland water systems can be fresh, saline or a mix of the two (brackish water). Inland waters include rivers, lakes, floodplains, reservoirs, wetlands, and inland saline systems.
- *In situ* conservation a conservation method that attempts to preserve the genetic integrity of gene resources by conserving them within the evolutionary dynamic ecosystems of the original habitat or natural environment.

- **Invasive alien species** animals, plants, fungi, and microorganisms whose introduction or spread outside of their natural habitats causes economic or environmental problems.
- Marine protected area An area of sea (or coast) especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.
- **Migratory species** any species or lower taxon of wild animals in which a significant proportion of the members of the entire population or any geographically separate part of the population cyclically and predictably crosses one or more national jurisdictional boundaries.
- Mutually agreed terms refers to the concept that access to genetic resources and the sharing of resulting benefits among the parties (the contracting country, as represented by its competent authority, and the party using the genetic resources) must be regulated by a contractual agreement.
- National Biodiversity Strategy and Action Plan – The Convention on Biological Diversity calls on each of its Parties to prepare a National Biodiversity Strategy and Action Plan (Article 6a) that establishes specific activities and targets for achieving the objectives of the Convention. These plans mostly are implemented by a partnership of conservation organizations.
- Natural capital natural assets in their role of providing natural resource inputs and environmental services for economic production. Natural capital includes land, minerals and fossil fuels, solar energy, water, living organisms, and the services provided by the interactions of all these elements in ecological systems.
- Payment for Ecosystem Services a voluntary transaction in which a well-defined ecosystem service (ES), or a form of land use likely to secure that service, is bought by at least one ES buyer from a minimum of one ES provider, if and only if the provider continues to supply that service.
- **Peatlands** areas with or without vegetation and have a peat layer, naturally amassed on its surface.

- **Peat swamp forests** forests are forests grown on thick accumulated peat or organic soil layer formed in waterlogged conditions over thousands of years.
- Prior and informed consent the principle that a community has the right to give or withhold its consent to proposed projects that may affect the lands that the community residents customarily own, occupy, or otherwise use.
- Protected area clearly defined geographical space recognized, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.
- Red List The IUCN Red List of Threatened Species provides taxonomic, conservation status, and distribution information on taxa that have been globally evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those taxa that are facing a higher risk of global extinction (those listed as Critically Endangered. Endangered, and Vulnerable). The IUCN Red List also includes information on taxa that are categorized as Extinct or Extinct in the Wild; on taxa that cannot be evaluated because of insufficient information (Data Deficient); and on taxa that are either close to meeting the threatened thresholds or that would be threatened were it not for an ongoing taxon-specific conservation program (Near Threatened).
- **Species** a group of organisms capable of interbreeding freely with each other but not with members of other species.
- **Sustainable development** development that meets the needs and aspirations of the current generation without compromising the ability to meet those of future generations.
- Sustainable Development Goals a set of goals that will build upon the Millennium Development Goals and converge with the post-2015 development agenda. These goals are among the main outcomes of the Rio +20 Conference aimed to be achieved by 2030.

- Sustainable use the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.
- **Taxonomy** the classification of animals and plants based upon natural relationships.
- **Traditional knowledge** the knowledge, innovations, and practices of indigenous people and local communities.
- **Wildlife** living and non-domesticated plants and animals.
- Wildlife crime the taking, trading (supplying, selling, or trafficking), importing, exporting, processing, possessing, obtaining, and consuming wild fauna and flora, including timber and other forest products, in contravention of national or international law.

## Annexes

#### Annex 1. Production and export of forest products in ASEAN

		Produ	uction		Export Quantity				Export Value				
Major Crops	Ave. Qty./Yr. (million mt)		Ave. Growth Rate/Year (%)		Ave. Qty./Yr. (million mt)		Ave. Growth Rate/Year (%)		Ave. Qty./Yr. (million mt)		Ave. Growth Rate/Year (%)		
	2000- 2010	2011- 2013	2000- 2010	2011- 2013	2000- 2010	2011- 2013	2000- 2010	2011- 2013	2000- 2010	2011- 2013	2000- 2010	2011- 2013	
Oil Palm	29.50	46.20	8.31	6.13	22.62	34.73	10.28	5.33	12.59	32.52	24.37	5.16	
Coconut	35.56	37.32	1.55	0.26	2.18	2.39	2.68	0.02	1.37	2.66	13.86	1.15	
Rubber	6.80	8.75	4.34	5.29	6.08	7.47	3.58	4.89	9.23	24.64	27.19	4.68	
Coffee	1.82	2.34	2.40	6.60	1.39	1.91	4.11	5.75	1.66	4.24	14.72	15.53	
All major crops	73.68	94.62	4.33	3.62	32.27	46.50	7.66	4.85	24.85	64.06	14.72	15.53	

## Annex 1A. Production and export of select plantation crops in ASEAN between 2000–2010 and 2011–2013.

Source of base statistics: FAO Statistics, 2000-2013, retrieved from www.faostat3.fao.org on 9 June 2016.

## Annex 1B. Production and export of timber and fuel products in ASEAN from 2000–2010 and 2011–2013

		Produ	iction		Export Quantity				Export Value				
Products	Ave. Qty./Yr. ('000 cu m)		Ave. Growth Rate/Year (%)		Ave. Qty./Yr. ('000 cu m)		Ave. Growth Rate/Year (%)		Ave. Val./Yr. (USD million)		Ave. Growth Rate/Year (%)		
	2000- 2010	2011- 2013	2000- 2010	2011- 2013	2000- 2010	2011- 2013	2000- 2010	2011- 2013	2000- 2010	2011- 2013	2000- 2010	2011- 2013	
Wood Fuel	185,247	161,433	(1.9)	(1.7)	12	35	120	123	2	5	64	20	
Industrial Roundwood	108,401	127,402	2.6	1.6	4,882	20,685	23	9	280	1,403	26	10	
Sawnwood	17,408	20,288	2.2	1.9	6,825	6,458	5	3	1,939	2,558	7	13	
All products	311,055	309,123	(0.2)	(0.1)	11,719	27,178	13	7	2,221	3,966	10	12	

Source of base statistics: FAO Statistics, 2000-2013, retrieved from www.faostat3.fao.org on 9 June 2016.

		Produ	uction		Export Quantity				Export Value				
Products				Frowth Tear (%)	Ave. Qty./Yr. (million MT)		Ave. Growth Rate/Year (%)		Ave. Val./Yr. (USD billion)		Ave. Growth Rate/Year (%)		
	2000- 2010	2011- 2013	2000- 2010	2011- 2013	2000- 2010	2011- 2013	2000- 2010	2011- 2013	2000- 2010	2011- 2013	2000- 2010	2011- 2013	
Wood Charcoal	2.52	3.09	2.45	2.80	0.34	0.55	7.27	13.73	0.08	0.22	9.16	20.71	
Woodbased Panel	36.97	41.33	1.95	2.63	25.02	24.48	1.23	4.45	8.29	10.96	2.88	2.27	
All products	39.49	44.42	1.97	2.64	25.37	25.02	1.29	4.67	8.37	11.18	2.93	2.62	

## Annex 1C. Production and export of timber and fuel products in ASEAN Region from 2000–2010 and 2011–2013

Source of base statistics: FAO Statistics, 2000-2013, retrieved from www.faostat3.fao.org on 9 June 2016.

## Annex 1D. Production and export of pulp and paper and paper products in ASEAN, 2000– 2010 and 2011–2014

	Production				Export Quantity				Export Value			
Products	Ave. Qty./Yr. (million MT)		Ave. Growth Rate/Year (%)		Ave. Qty./Yr. (million MT)		Ave. Growth Rate/Year (%)		Ave. Val./Yr. (USD billion)		Ave. Growth Rate/Year (%)	
	2000- 2010	2011- 2014	2000- 2010	2011- 2014	2000- 2010	2011- 2014	2000- 2010	2011- 2014	2000- 2010	2011- 2014	2000- 2010	2011- 2014
Wood Pulp	18.13	25.04	4.87	0.45	5.61	8.27	6.08	9.31	2.25	4.09	10.16	8.38
Paper and Paper Products	24.04	30.87	4.77	0.68	5.83	7.10	3.48	5.57	4.27	6.75	9.98	2.60
All Products	42.17	55.91	4.66	0.57	11.45	15.37	4.31	7.41	6.52	10.83	9.07	4.09

Source of base statistics: FAO Statistics, 2000-2013, retrieved from www.faostat3.fao.org on 9 June 2016.

#### Annex 2. Role of partner organizations in coastal and marine conservation

Organization / Website	Role/s
BirdLife International http://www.birdlife.org; http://www. birdlife.org/asia/partnership	BirdLife International is one of the world's largest nature conservation partnerships. BirdLife believes that connecting local people and working for nature through national and international partnerships are key to conserving biodiversity. Rigorous science informed by practical feedback from projects on the ground in important sites and habitats enables BirdLife International to implement successful conservation programmes for birds and all nature. BirdLife International provides both practical and sustainable solutions significantly benefiting nature and people.
	The BirdLife Partnership works with governments, regional fisheries management organizations, international conventions and fishing fleets around the world to reduce seabird mortality through fishing "bycatch", which has made seabirds the most threatened of all groups of birds. BirdLife Partners have also been engaged in mapping the most important marine areas (including coastal waters and the high seas) for seabirds. More than 3,000 marine Important Bird and Biodiversity Areas have so far been recognized, the largest network of sites of importance for marine biodiversity.
Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) http://www.pemsea.org/about-pemsea	PEMSEA is an intergovernmental organization operating in East Asia to foster and sustain healthy and resilient oceans, coasts, communities and economies across the region. PEMSEA serves as the regional coordinating institution for the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA) adopted by 14 countries (Brunei Darussalam, Cambodia, China, DPR Korea, Indonesia, Japan, Lao PDR, Malaysia, Philippines, RO Korea, Singapore, Thailand, Timor Leste and Viet Nam). For over 20 years, PEMSEA has made significant contributions and tangible benefits for coastal and ocean ecosystems and coastal communities in East Asia through partnerships and integrated solutions.
	Building on practical experience gained in the application of integrated coastal management (ICM), PEMSEA has developed an ICM system that addresses complex coastal management concerns covering governance and various sustainable development aspects including habitat protection, restoration and management. Recognizing the changing and emerging issues in ocean governance, countries of the region have adopted the SDS-SEA 2015 to contribute in meeting new global commitments on sustainable development. One of these is the Aichi Biodiversity Targets. In 2015, the CBD released a publication highlighting the benefits of ICM processes in addressing biodiversity conservation and its sustainable use, and provided guidance on how ICM application helps achieve the Strategic Plan for Biodiversity 2011–2020 and its Aichi Biodiversity Targets. To date, PEMSEA continues to scale up ICM implementation in the region. Notably, about 17 percent of the region's coastline is covered by ICM programs, creating important impact to more than 31,000 km of coastline and over 146 million people living in coastal and watershed areas. A set of PEMSEA services (advisory, project, knowledge, certification and secretariat services) have also been developed to support the unique needs of governments, companies, communities and other organizations operating in the coastal and marine environment.
Southeast Asian Fisheries Development Center (SEAFDEC) http://www.seafdec.org/about/	SEAFDEC is a regional treaty organization that promotes fisheries development in ASEAN. Member Countries comprise the ASEAN Member States and Japan. Its mandate is "to develop and manage the fisheries potential of the region by rational utilization of resources for providing food security and safety to the people and alleviating poverty through transfer of new technologies, research and information dissemination activities".
	SEAFDEC operates through the Secretariat located in Thailand and has five departments that focus on different aspects of fisheries development: Training Department in Thailand; Marine Fisheries Research Department in Singapore; Aquaculture Department in the Philippines; Marine Fishery Resources Development Management Department in Malaysia; and Inland Fishery Resources Development and Management Department in Indonesia. SEAFDEC conducts research and development activities in AMS under interdisciplinary approaches covering responsible fisheries and aquaculture technologies and practices, post-harvest technology and practices, fisheries management concepts and approaches, and policy and advisory services. These contribute to designing strategies for sustainable resource use.

Organization / Website	Role/s
The East Asian-Australasian Flyway Partnership (EAAFP) http://www.eaaflyway.net/	The EAAFP is an informal and voluntary initiative, launched on 6 November 2006, that protects migratory waterbirds, their habitat and the livelihoods of people dependent upon them. The 35 Partners include 17 national governments, as well as intergovernmental agencies, international non-government organizations and international business organizations.
ASEAN Mangrove Network www.amnetsec.org	The ASEAN Mangrove Network was established to improve the livelihood and environment of people living along the coastal areas of the ASEAN region. The network aims to share good practices, lessons learned, collaboratively develop conservation practices and empower stakeholders on sustainable mangrove ecosystem management.
Conservation International (CI) www.conservation.org	CI's mission is to build upon a strong foundation of science, partnership and field demonstration and empower societies to responsibly and sustainably care for nature and global biodiversity, for the well-being of humanity. CI's ultimate goal is to improve human well-being, particularly in ways that are most dependent on the essential services that nature provides: fresh water, food, health, livelihoods, and climate resilience. It undertakes conservation work involving local governments and other partners to promote the protection of terrestrial and coastal ecosystems through science, policy, and partnerships with countries, communities and companies.
International Union for Conservation of Nature (IUCN) http://www.iucn.org/backup_iucn/iucn. org/what/index.html	IUCN is a membership union uniquely composed of both government and civil society organizations. It provides public, private and non-governmental organizations with the knowledge and tools that enable human progress, economic development and nature conservation to take place together. As the world's largest and most diverse environmental network, IUCN harnesses the experience, resources and reach of its 1,300 member organizations and the input of some 15,000 experts. The ability to convene diverse stakeholders and provide the latest science, objective recommendations and on-the-ground expertise drives IUCN's mission of informing and empowering conservation efforts worldwide.
	IUCN's work is focused on three priority areas: 1) valuing and conserving nature implemented through biodiversity conservation, emphasizing both tangible and intangible values of nature; 2) effective and equitable governance of nature's use consolidates IUCN's work on people-nature relations, rights and responsibilities, and the political economy of nature; and 3) deploying nature-based solutions to global challenges in climate, food and development, tackling problems of sustainable development, particularly in climate change, food security and social and economic development. In Asia, IUCN's flagship coastal conservation initiative Mangroves for the Future is currently in its 10th year of operation. With a presence in 11 countries, the programme promotes an integrated ocean-wide approach to coastal management and to building the resilience of ecosystem-dependent coastal communities.
The Nature Conservancy (TNC) http://www.nature.org/ourinitiatives/ regions/asiaandthepacific/coraltriangle/ overview/index.htm	TNC works with partners to create lasting conservation results that benefit marine life, local communities and economies. TNC is supporting the Coral Triangle Initiative, specifically supporting species conservation through community programs, engaging locals in making their lands and waters more resilient to the effects of climate change and establishing MPAs and MPA networks.
World Wide Fund for Nature (WWF) http://www.worldwildlife.org/	WWF's mission is to conserve nature and reduce the most pressing threats to the diversity of life on Earth. WWF's oceans work focuses on healthy and resilient marine ecosystems that support abundant biodiversity, sustainable livelihoods, and thriving economies. In the ASEAN Region, WWF is most active in the Sulu-Sulawesi Marine Ecoregion and participates in the trinational sea turtle initiative, and promotes sustainable fisheries, MPA networks and policy development.

#### Annex 3. Organizations in ASEAN that work on taxonomy

Regional Organizations
Southeast Asian Regional Centre for Tropical Biology (SEAMEO BIOTROP) – conducts activities emphasizing the
empowerment of human resources in ASEAN covering research, training, networking, personnel exchange, and information dissemination on tropical biology.
Flora Malesiana Foundation – has the most extensive work on plant taxonomy in the region. Since 1938, it has described and published more than 6,000 plant species in the Malesian region or almost all AMS. The foundation deals with international working groups on specific groups of plants at all taxonomical levels. It regularly holds an international symposium every three years to evaluate the progress of taxonomic work in the region. One of the main concerns of the foundation is capacity building in collaboration with international experts. The Flora Malesiana publication complements other publications on local flora such as Flora of the Philippines, Flora of Malaya Peninsula, Flora of Indonesia and others.
Plant Resources of South-East Asia (PROSEA) – is an international and interdisciplinary program focused on documenting information on plant resources in agriculture, forestry, horticulture, and botany. PROSEA synthesizes information on around 7,000–8,000 useful plants in ASEAN, which can be freely used for education, extension work, research, and industry purposes. Its main office is at the Research Center for Biology-LIPI, Bogor, Indonesia with representative institutional members in Malaysia, Philippines, Thailand, and Viet Nam.
Government Institutions
Indonesian Institute of Sciences (LIPI) – serves as the scientific authority on biodiversity in Indonesia and is the country's focal point for CITES; collection and conservation center of plants; management authority for botanic gardens; center for national scientific documentation and information; national focal point of international scientific organizations; and houses the National Education Center for Indonesian Researchers; among others. LIPI conducts various studies and programs on themes such as food and health; environment and biodiversity; policy and good governance; population and society; earth science, aquatic systems, and energy; product, commodity and technology; new energy and renewable energy resources; marine life census; post genomic molecular farming; and genetic materials for pharmaceuticals; among others.
Herbarium Bogoriense (BO) – is the old and biggest herbarium in ASEAN with a million sheets of herbarium specimens. It has experts on various plant groups, modern taxonomic facilities, and a living collection. It is ideal for taxonomic work and training courses related to biodiversity.
Forest Research Institute Malaysia (FRIM) – conducts research and training activities that are organized into the following areas: forestry and environment, forestry biotechnology, forest products; forest biodiversity, natural products, and economic and strategic analysis.
Office of the Forest Herbarium, Royal Forest Department, Thailand – undertakes research on plant and fungal taxonomy, forest ecology, ethnobotany, and conservation biology under the auspices of the Department of National Parks, Wildlife and Plant Conservation of Thailand. Its activities include botanical inventories, plant specimen collection, plant taxonomic research, survey and classification of forest types, and collaborative research.
Academic Institutions
Universiti Brunei Darussalam (UBD) – conducted studies under the biodiversity and environmental studies theme including: Multifaceted Study of Invasive Acacia Species in Brunei; Conservation and Phytobiochemical Studies of Plants and Herbs from Brunei, Studies on Scleractinian Corals, Studies on Parasitic Flies in Brunei Darussalam, Chemical Ecology of the Brunei Estuarine System, and Molecular Phylogenetics of Commercially Important Fishes.
National University of Laos - collaborates on taxonomic research and activities with various international universities.
Universiti Sains Malaysia – offers courses and research in taxonomy, particularly on marine organisms such as corals and giant clams.
Jniversiti Malaysia Sabah (UMS) – does extensive work on taxonomy with research units and centers of excellence that aim to increase awareness and manage the natural resources and development needs of Sabah. UMS Centers of Excellence include the Borneo Marine Research Institute; Institute for Tropical Biology and Conservation; and Small Island Research Centre.
Jniversity of the Philippines System – conducts taxonomic research through various units. The Institute of Biology of the University of the Philippines Diliman provides courses and conducts research in taxonomy. The College of Forestry and Natural Resources (CFNR) in the University of the Philippines Los Baños (UPLB) is a center of excellence in forestry education and is at the forefront of teaching, research, and extension in ecology, biodiversity, physiology, and agroforestry in the Philippines, and has its own herbarium. The Institute of Biological Sciences in UPLB manages its own herbarium as well. The UPLB Museum of Natural History is a center for documentation, research, and information with a collection of more than 200,000 preserved Philippine animals and plants, cultures of living microorganisms, and other biota that showcase the country's rich biodiversity.
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Regional Organizations
6. Silliman University – is recognized as a Center of Excellence in Coastal Resource Management (CRM) by t United States Agency for International Development (USAID) for its research on coastal and marine species. T university has helped establish Apo Island, located off the town of Dauin, Negros Oriental, Philippines as a mod marine reserve.
<ol> <li>Central Mindanao University – conducts taxonomic research through the Forest Resources Development Divisi to ensure the sustainable management of the forest resources of the university.</li> </ol>
8. National University of Singapore – conducts various research relevant to taxonomy.
9. Kasetsart University – conducts taxonomic research through the Faculty of Forestry and Fisheries and the Facu of Sciences (Botany).
Botanical Gardens
1. LIPI operates four Botanic Gardens in Indonesia, specifically Bogor Botanic Garden, Cibodas Botanic Garde Purwodadi Botanic Gardens, and Bali Botanic Gardens.
Bogor Botanic Gardens – is known as Kebun Raya Bogor, covers 0.87 sq km and contains 13,983 different kin of plants. The garden is ideal for the cultivation of tropical plants as it rains almost daily in Bogor, even in t dry season. The garden thrived under the leadership of renowned botanists such as Johannes Elias Teijsmar Rudolph Herman Christiaan Carel Scheffer, and Melchior Treub. Established on 18 May 1817, it is the older botanical garden in ASEAN and continues to serve as a major research center for agriculture and horticulture.
Cibodas Botanical Garden – lies between Mt. Gede and Mt. Pangrango-West Java at an altitude of 1,300–1,4 meters above sea level. It has a humidity of 80-90 percent and an average rainfall of 3,000-4,000 millimeter annually. The garden covers 1.25 sq km and contains about 1,600 plant species from the mountains. The gard was established by Johannes Elias Teijsmann in 1852.
Purwodadi Botanic Garden – covers 0.85 sq km with 14,500 living collections of 3,770 plant species from c climate regions. Located at 300 meters above sea level, it was established on 30 January 1941 and is located Purwodadi Village, Purodadi-Pasuruan, East Java, about 65 km south of Surabaya.
Bali Botanic Garden – covers 1.57 sq km and houses 2,000 species of plants, such as orchids, ceremonial plant medicinal plants, cacti, ferns, aquatic plants, and trees, all coming from montane areas of eastern Indonesia su as Bali, Nusa Tenggara, Sulawesi, Maluku, and Papua. Its main functions are exploration, inventory, researc conservation, recreation, and education. The institution offers a number of scientific services and facilitie including a herbarium, seed bank, library, glasshouses, nursery, and plant database, to support plant research a conservation
2. Singapore Botanic Gardens – plays an important role in fostering agricultural development, orchid breeding a hybridization, and development of horticultural and botanical plants. It continues to be a leading tropical botanic institute, and has been inscribed as the first and only tropical botanic garden on the UNESCO World Heritage Li
3. Queen Sirikit Botanic Garden (QSBG) – aims to conduct and promote research in the study and conservati of Thai flora. It has a glasshouse complex, some of which are dedicated to specific types of plants; an orch breeding center; and trails to areas of climber and medicinal plants. The Botanic Gardens Organization, under t Ministry of Natural Resources and Environment, oversees five other botanic gardens throughout Thailand. Th are Romklao Botanic Garden (Phitsanulok province), Rayong Botanic Garden (Rayong province), Koa Ra Botani Garden (Phangnga), Meaung Pon Botanic Garden (Khon Kaen), and Phra Mae Ya Botanic Garden (Sukhothai).
Natural History Museums
1. National Museum of Brunei Darussalam – features an expansive natural history research and collection through t Natural History Gallery to provide understanding of the people and natural environment of Brunei Darussalam.
<ol> <li>National Museum of the Philippines – acquires, documents, preserves, exhibits, and fosters scholarly study a appreciation of specimens and artifacts representing the Philippines' unique natural heritage. It manages nation reference collections in natural history and permanent research programs in biodiversity.</li> </ol>
3. Lee Kong Chian Natural History Museum – is a specimen-based biodiversity research institute under the Nation University of Singapore with a strong emphasis on taxonomy, systematics, and conservation. It aims to nurtu interest in biodiversity and associated environmental issues; maintain and grow a natural heritage knowledge bas and support research in Singapore and with regional and international partner institutions.

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The ASEAN Centre for **Biodiversity** (ACB) is ASEAN's response to the challenge of biodiversity loss. lt is an intergovernmental regional centre of excellence that facilitates cooperation and coordination among the ASEAN Member States and with relevant national governments and regional and international organizations on the conservation and sustainable use of biological diversity, as well as the fair and equitable sharing of benefits arising from the use of such national treasures.

Championing Biodiversity Conservation in the ASEAN Region

For more information, log on to www.aseanbiodiversity.org or chm.aseanbiodiversity.org

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The **ASEAN Biodiversity Outlook** (ABO) is the flagship publication of the ASEAN Centre for Biodiversity (ACB) that showcases developments in biodiversity conservation in the ASEAN region.

The Second Edition of the ASEAN Biodiversity Outlook (ABO 2) is based on the Fifth National Reports of the ASEAN Member States and other relevant sources. This midterm update demonstrates how the ASEAN region has fared in conserving biodiversity in the context of implementing the Strategic Plan for Biodiversity 2011 – 2020 and the Aichi Biodiversity Targets.

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The printing of this publication was made possible with financial assistance from the Biodiversity Conservation and Management of Protected Areas in ASEAN (BCAMP) Project of the European Union. The views expressed herein should not be taken, in any way, to reflect the official opinion of the European Union, and the European Commission is not responsible for any use that may be made of the information it contains.



