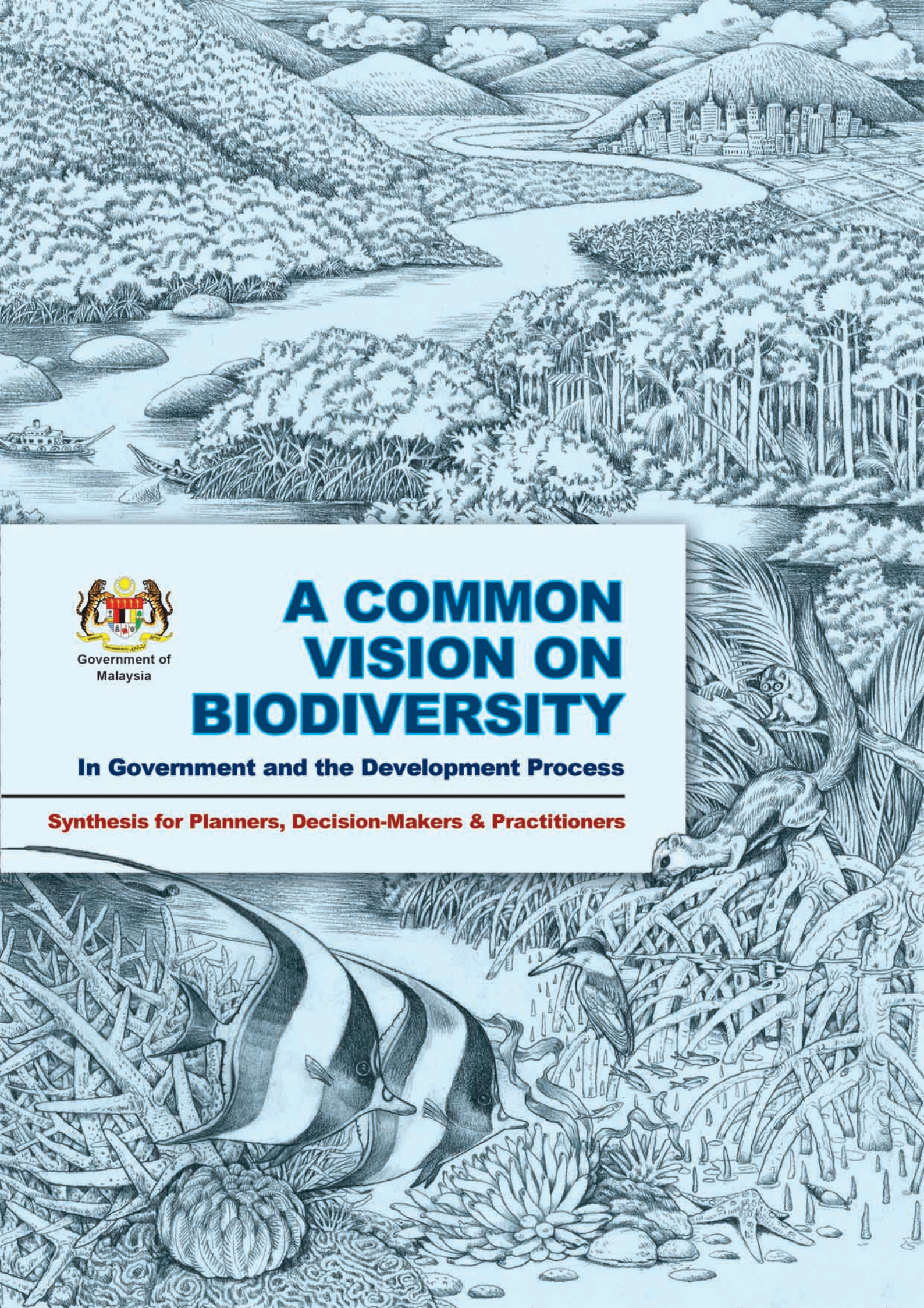

Government of Malaysia

A COMMON VISION ON BIODIVERSITY

In Government and the Development Process

Synthesis for Planners, Decision-Makers & Practitioners

Published by

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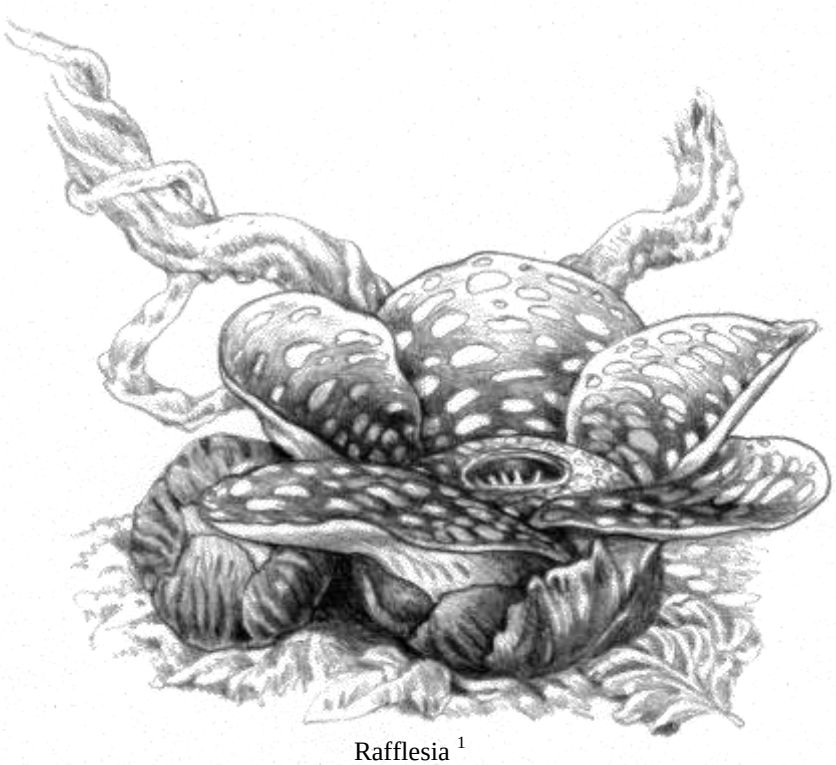

Rafflesia [1]

Foreword

Minister of Natural Resources and Environment

Malaysia is situated at the centre of one the world's richest regions of biological diversity. Our environment provides a setting for prolific plant and animal growth. The benefits of such a fertile environment are evident in today's economy, which in part, depends upon successfully utilising the environment sustainably to fuel our primary production sectors of fisheries, forestry and agriculture and not least as a source of great discoveries of biotechnology resources. As biodiversity represents a significant value to the country it is important that we continuously strive to maintain and preserve this resource.

Malaysia has gone through considerable effort to maintain this rich resource since the establishment of Krau Wildlife Reserve, Pahang, in 1923 as one of Malaysia's first Wildlife Reserves'. Many initiatives and relevant actions have been taken by the Government through its line agencies to manage our biodiversity resources including establishment of additional protected areas and making biodiversity conservation an integrated part of the Forestry Department's management of forestry reserves. The recent establishment of the Department of Marine Park Malaysia further reflect our serious commitment towards conserving both our terrestrial and marine biodiversity.

Malaysians are well aware of our rich natural heritage and its important contributions to our continued development. We recognise the responsibilities that come with this and are conscious and committed to protect the environment while embarking upon rapid national development.

At the international level, Malaysia is Party to the Convention on Biological Diversity and recognises our obligations towards fulfilling the objectives of the Convention in the conservation of biological diversity; in the sustainable use of its components; and the fair and equitable sharing of benefits arising out of the utilization of genetic resources.

At a National level, we must continually reassess the challenges and management options open to us. We must extend our awareness and priorities for conservation beyond the traditional protected areas system and look for additional mechanisms and alternative options to provide for optimum management of our biodiversity resources. An integrated approach to biodiversity and environmental management is thus required and the approach must involve all the relevant stakeholders in government, private entities and civil society across all sectors. Only through joint efforts, can we as a Nation, approach the sustainable management of our biological heritage and safeguard its values for present and future use.

The Ministry of Natural Resources and Environment, with consultation and inputs from all relevant stakeholders, has prepared this publication outlining a vision to manage our biodiversity effectively and sustainably. This Common Vision on Biodiversity in Government and the Development Process is an important step towards ensuring that the principles of environmental sustainability are adhered to as the country propels itself towards developed nation's status by 2020.

DATUK DOUGLAS UGGAH EMBAS
Minister
Ministry of Natural Resources and Environment
Putrajaya, Malaysia
1 July 2008

Foreword

Secretary General of Natural Resources and Environment

Biodiversity is essential for the functioning of ecosystems and that it supports the provisioning of ecosystem services that are essential for our well-being. Through agriculture, forestry and fishery, biodiversity provides products which contribute significantly to national economies and employment. Resources provided by ecosystems range from food and water to timber and fodder to genetic resources. In addition, ecosystems provide essential services such as nutrient cycling; air and water purification; flood, tsunami and drought mitigation; and soil formation.

In economic terms it is interesting and note worthy that estimates of the global monetary value of such ecosystem services are almost twice that of the global Gross National Product. Management of our biodiversity assets and their ecosystems thus becomes even more pertinent as they represent a considerable monetary value to the nation and the society.

Additionally, we are faced with the tremendous responsibility and task of providing stewardship in looking after this asset. However, this responsibility cannot be borne by single agency alone. This publication, *A Common Vision on Biodiversity*, has therefore been prepared by the Ministry to function as rallying point for all stakeholders to come together in the joint management efforts that is necessary.

The *Common Vision on Biodiversity* is relevant for planners, decision-makers and practitioners throughout the government, private sector and civil society. By explaining *what* biodiversity is, *why* it is important and *what* it takes to keep it, the *Common Vision on Biodiversity* provides a suitable platform for concerted inter-agency actions fully in line with existing provisions and priorities in national policies, plans and programmes.

A three-pronged implementation approach has been defined and focused on: (i) Strengthening the Protected Areas System; (ii) Land/Seascape approach in the management of biodiversity; and (iii) Mainstreaming of biodiversity. In doing so, the *Common Vision on Biodiversity* supports the ongoing transformation of environmental planning and management from a largely sector-based to an integrated holistic approach while applying international standards and procedures.

I would like to record my gratitude and appreciation to all agencies and individuals involved in the preparation of this document and for their invaluable contributions and continued support during its implementation.

DATUK SUBOH MOHD. YASSIN
Secretary General
Ministry of Natural Resources and Environment
Putrajaya, Malaysia
1 July 2008

Rainforest patch [1]

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ACRONYMS AND ABBREVIATIONS

BSAP ..... Biodiversity Strategies and Action Plans
CBD ..... Convention on Biological Diversity
CEMD..... Conservation & Environmental Management Division (of NRE)
DID ..... Drainage and Irrigation Department
DOA..... Department of Agriculture
DOE ..... Department of Environment
DOF ..... Department of Fisheries
DMPM ..... Department of Marine Parks Malaysia
EIA..... Environmental Impact Assessment
EPU..... Federal Economic Planning Unit
FD ..... Forestry Department Peninsular Malaysia
FDD ..... Forest Development Division (of NRE)
FRIM..... Forest Research Institute Malaysia
GEF..... Global Environment Facility
GIS ..... Geographic Information System
I&D ..... Irrigation & Drainage Division (of NRE)
IPCC..... Intergovernmental Panel on Climate Change
IUCN..... World Conservation Union
JKR ..... Public Works Department
MA ..... Millennium Ecosystem Assessment
MOSTE..... Ministry of Science, Technology & the Environment (now NRE)
NLD ..... National Landscape Department
NFP ..... National Forestry Policy (1978/1992)
NPBD..... National Policy on Biological Diversity
NPE..... National Policy on the Environment
NPP ..... National Physical Plan (2005)
NRE ..... Ministry of Natural Resources and Environment
PA ..... Protected Area (in plural PAs)
PERHILITAN..... Department of Wildlife & National Parks
PFR ..... Permanent Forest Reserve
PPPs ..... Policies, Plans and Programmes
SEA..... Strategic Environmental Assessment
TCPD ..... Federal Department of Town & Country Planning Malaysia

Squids [1]

1 INTRODUCTION

This document represents a synthesis of the *Common Vision on Biodiversity* developed by the Ministry of Natural Resources & Environment (NRE).

The present summary was prepared for planners and decision-makers at all levels of federal, state and local government.

For more details about the concepts and issues summarised here, see the *Reference Document* (References, p. 31, NRE, 2008).

This paper contains a Glossary where terms under 'single quotation marks' are explained (p. 35).

Endnotes (p. 47) are used to provide additional information.

Dipterocarpus retusus [2]

2 WHAT IS A COMMON VISION ON BIODIVERSITY?

Building understanding about how biodiversity supports ecosystems' services will increase Malaysia's capacity to prevent disturbances to those services and adapt more easily when such disturbances occur

The Common Vision on Biodiversity explains what biodiversity is, why it is important, how to maintain it and what measures are required to ensure a constant provision of ecosystem services that are essential for human livelihood.

Based on the different undertakings of NRE, its line agencies and the latest guidelines and experiences, this Common Vision promotes a three-pronged implementation approach and outreach strategy that consists in:

i) Strengthening the Protected Areas System
ii) Land/Seascape management for biodiversity
iii) 'Mainstreaming' biodiversity.

To a very large extent, the Common Vision on Biodiversity responds to provisions and priorities contained in existing Policies, Plans and Programmes (PPPs), but it focuses on their implementation and the operational aspects of the pursuit of sustainable development.

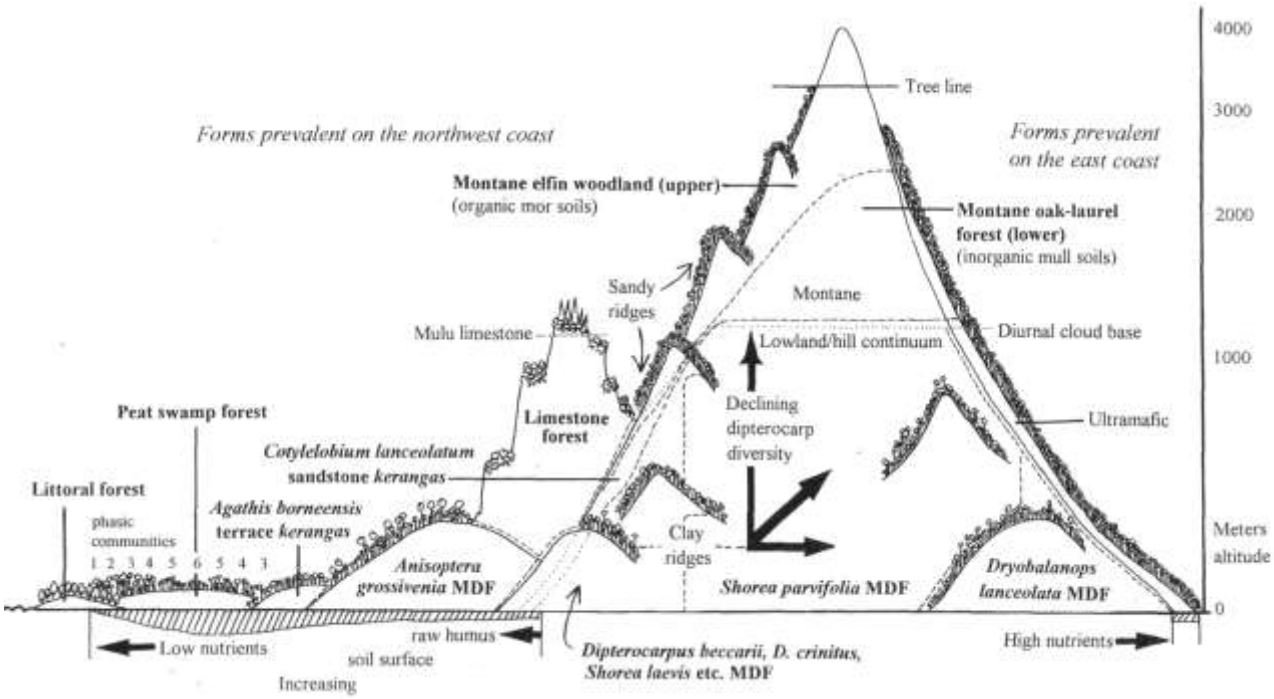
The Common Vision is also important because it can be used to rally support within the government and civil society for a shared perception of issues, priorities and the required inter-agency actions.

NRE has an overarching mandate concerning the environment, natural resources and biodiversity assets; therefore it can play a clear and unique role as an integrating *body for consultation and facilitation of synthesised data about biodiversity issues and priorities* to support federal, state and local planning levels.

The Common Vision on Biodiversity is a suitable framework for such a mainstreaming process and will support the ongoing transformation of environmental planning and management from a largely sector-based to an integrated approach, as recommended by national policy provisions.[3]

In this process, the Common Vision will also facilitate NRE's reporting of (among others):

- The status of biodiversity (for national and international forums)
- The present direction taken concerning planning and management of natural resources and biodiversity assets.
- The extent to which provisions of national policies and plans, as well as international conventions, are adhered to.



Major floristic associations in Bornean forests [4]

3 WHAT IS BIODIVERSITY AND HOW DOES IT LINK TO ECOSYSTEM SERVICES?

"Biological Diversity" means the variability among living organisms from all sources including, *inter alia*, 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.[5]

Ecological experiments, observations, and theoretical developments show that ecosystem properties depend greatly on biodiversity in terms of the functional characteristics of organisms present in the ecosystem and the distribution and abundance of those organisms over space and time. Species effects act in concert with the effects of climate, resource availability, and disturbance regimes in influencing ecosystem properties. Human activities can modify all of the above factors. [6]

Biological diversity, or 'biodiversity', encompasses genes, species, ecosystems and their interactions. It includes all plants, animals, and micro-organisms, the ecosystems to which they belong, as well as the diversity within species, between species, and of ecosystems.

Biodiversity is determined by the interaction of many factors that vary over space and time, and thus no single component of biodiversity (i.e. genes, species or ecosystems) is consistently a good indicator of the overall biodiversity, since these components can vary independently.

Biodiversity is essential for the functioning of ecosystems and supports the provision of 'ecosystem services' (see Glossary) that affect human livelihood. Ecosystem services are the benefits that people obtain from ecosystems and which ultimately affect human well-being (**Figure 3-1**).

Biodiversity: Life on Earth

Provisioning Services	Regulating Services	Cultural Services
Products obtained from ecosystems	*Benefits obtained from regulation of ecosystem processes*	*Non-material benefits obtained from ecosystem*
• Food • Fresh water • Timber • Fuelwood • Fibre • Biochemicals • Genetic resources	• Climate regulation • Pest regulation • Runoff regulation • Water purification • Pollination • Erosion regulation • Tsunami regulation	• Spiritual & religious • Recreation & ecotourism • Aesthetic & inspirational • Educational • Cultural heritage • Existence values

Supporting Services

Services necessary for the production of all other ecosystem services

Soil formation	Nutrient cycling	Primary production	Provision of habitat	Oxygen production

Figure 3-1. Classification of main ecosystem services provided by biodiversity (based on Pereira & Cooper, 2006).

Ecosystem services are typically classified as *provisioning* (e.g. food, water, timber), *regulating* (e.g. climate, erosion, tsunami impact), and *cultural* (e.g. spiritual and religious, ecotourism) services, as well as *supporting services* which are necessary for the three previous categories (e.g. soils).

Human livelihood is the result of numerous factors and many of these are directly or indirectly linked to biodiversity and ecosystem services, as shown in **Figure 3-2**.

and its *web of life*.

For planners and decision-makers it is critical to understand that various aspects of biodiversity underpin the goods and services provided by ecosystems.

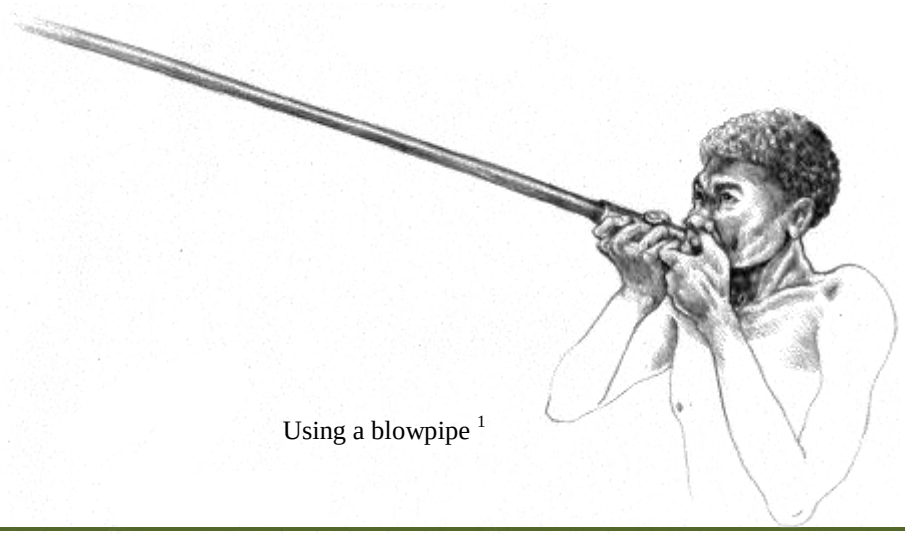
Thus, it is the biodiversity itself, with its numbers; relative abundances; compositions; and interactions which provides stability and ensures that the ecosystem delivers its services at the local, state, national and regional levels.

Moreover, biodiversity is important in managed as well as natural ecosystems.

		Constituents of Well-Being			
		Security	**Basic material for good life**	**Health**	**Good social relations**
		• Personal safety • Secure resource access • Security from disasters	• Adequate livelihoods • Sufficient nutritious food • Shelter • Access to goods	• Strength • Feeling well • Access to clean air and water	• Social cohesion • Mutual respect • Ability to help others
Supporting	***Provisioning***	*Medium*	*Strong*	*Strong*	*Weak*
	Regulating	*Strong*	*Strong*	*Strong*	*Weak*
	Cultural	*Weak*	*Weak*	*Medium*	*Medium*
Ecosystem Services supported by Biodiversity					

Figure 3-2. Intensity of linkages between ecosystem services and human livelihood (derived from MA, 2005).

As we can see, *ecosystem services* sustain essential components required for human existence – in other words, our well-being is intricately linked to the status of biodiversity



Using a blowpipe [1]

4 WHAT IS THE VALUE OF BIODIVERSITY?

Beyond the value biodiversity has in regulating and stabilizing 'ecosystem processes', there are direct economic consequences of losing diversity in certain ecosystems and in the world as a whole. Losing species means losing potential foods, medicines, industrial products, and tourism, all of which have a direct economic effect on people's lives.[7]

The emerging 'ecosystem services paradigm' has enhanced our understanding of how the natural environment matters to human societies.[8] We now think of the natural environment, and the ecosystems that conform it as natural capital—a form of capital that, along with physical, human, social, and intellectual capital, is one of society's important assets.[9]

national economies and employment. Goods provided by ecosystems range from food and water to timber and fodder to genetic resources. In addition, ecosystems provide, free of charge, essential services such as nutrient cycling, air and water purification, flood and drought mitigation and soil formation.

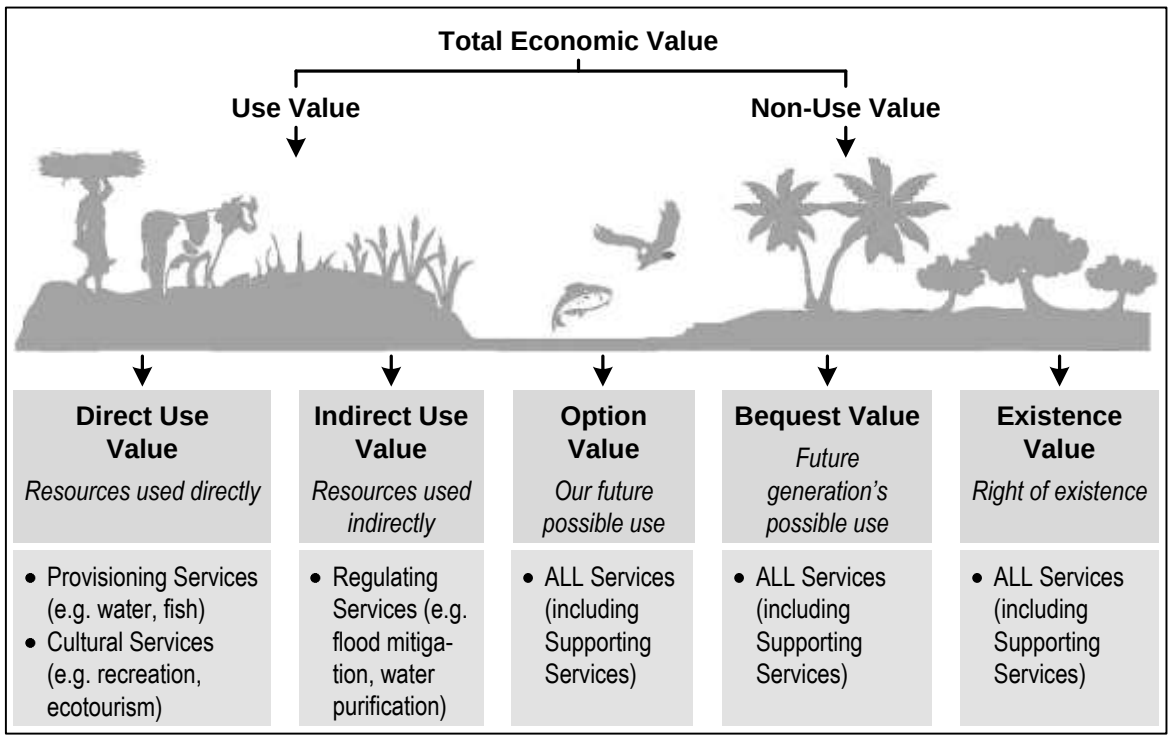


Figure 4-3. The total economic value of ecosystems (redrawn and modified from Smith *et al*., 2006).

Because it provides biological resources and ecosystem services, biodiversity is an essential component of human development and human security. Through agriculture, forestry and fishery, biodiversity provides products which contribute significantly to

There are different ways to value ecosystem services, such as direct use, indirect use, and non-use values (see **Figure 4-3**). The different services and values can be quantified using economic valuation methods, such as direct market pricing, travel cost valuations, or

contingent valuation surveys.

Each method has advantages and disadvantages, and should be selected carefully based on the specific subjects and goals of the study. Apart from the issues raised by individual methods, there are questions concerning the economic theory and the idea of economically valuing ecosystem services in general.

There have been various attempts to measure the economic or monetary value of ecosystem services. In 1997 a controversial paper called "The value of the world's ecosystem services and natural capital" was published.[10] By extrapolating with previous and new data, the study came up with a value of US$33 trillion for 17 different ecosystem services across the globe. This figure compared with a total global GNP of US$18 trillion dollars at the time.

This means that the "value of ecosystem services" was estimated to be 1.8 times the "global Gross National Product" – in other words, the value of ecosystem services was almost double the global GNP.

Though the methods and results of the study were criticized, the paper served its purpose by bringing attention to and provoking discussion about the topic of ecosystem service valuation. Some people believe this approach is meaningful because it helps us place the value of nature within an economic framework, but others consider it meaningless because, ultimately, no value can be placed on the ecosystem services that underpin human existence.

Despite the difficulties, limitations, and issues surrounding ecosystem service valuations, there seems to be a general consensus that the value of ecosystem services often outweighs economic use and that today, protecting ecosystem services is, or should be, one of the most important responsibilities of politicians, resource managers, and society in general.[11]

Other relevant conclusions concerning the value of biodiversity and ecosystem services are:[12]

- Financial markets do not reflect the importance of biodiversity and natural processes as generators of ecosystem services that people depend on.
- If private decision-makers are not given incentives to value the larger social benefits of conservation, their decisions will often result in insufficient conservation actions (e.g. excessive land clearing in one site which may cause heavy sediment load in rivers and siltation of coral reefs offshore).
- Indirect values of biodiversity can be highly significant in comparison to the direct economic values derived from a particular site (e.g. economic studies of changes to biodiversity in specific locations have shown that the costs of ecosystem conversion are often significant and sometimes exceed the benefits of conversion – especially when the indirect values of biodiversity and ecosystem services are internalised).
- Conventional indicators of economic growth or growth in human livelihood do not reflect appropriately the loss of capital asset represented by depletion and degradation of many ecosystem services (e.g. depleting a country's forest or fisheries will show a positive gain in GDP, despite the loss of capital assets).

Text Box 4-1. Mangroves yield significantly higher direct use value for fisheries than for forestry.

Mangroves are often managed by a forestry department which registers modest revenues from harvesting poles and charcoal production. Meanwhile this sophisticated ecosystem nurtures marine life and supports local and offshore users with significant economic values represented by the catch of fish, crabs, shrimps and others.

The mangroves of Johor State were reduced by 30% during the last 25 years of the last century. In 1995, the harvesting of some 27,000 ha of mangrove forest (i.e. poles, charcoal and firewood) yielded a market value of RM 1.2 million. However, this represents only 2.3% of the total market value generated by the mangroves when taking into consideration the mangrove-dependent fisheries, which employ an estimated 39,000 people and yield an estimated RM 54 million annually. To this figure one would have to add important indirect benefits such as coastline stabilization, reduced impacts from tsunamis, etc. (FD/Danced, 1997).

In the Matang Mangrove Forest Reserve in Perak State revenues from forestry were more thanUS$12 million in the late 1990s. By 1994, the prawn industry of the area was estimated at more than US$60 million a year. The total value of forestry and fisheries alone means that Matang mangroves are valued at an impressive US$ 1,800 per hectare per year. Elsewhere 1 km^2 of mangroves is considered capable of producing 38 tonnes of fish and shrimp that each year matures elsewhere outside the mangrove habitat (Giesen *et al.*, 2006).

5 WHO IS RESPONSIBLE FOR MANAGING BIODIVERSITY?

The management of the environment and biological diversity in Malaysia is the joint responsibility of federal, state and local governments.

The Ninth Schedule of the Federal Constitution states that legislative power is shared between the Federal Government and State Governments, and systematically distributes it in a Federal List, a State List and a Concurrent List. However, neither the *environment* nor *biological diversity* appear in the three constitutional lists as a matter for legislation. Instead, these concepts are defined in related subjects under all three lists (e.g. agriculture, forestry, land, soil, water, wildlife protection). State governments control land and natural resources.

The National Policy on Biological Diversity considers the legislative framework insufficient and the National Policy on the Environment states that it should be reviewed and updated. In summary, present legislation is based on sectoral concerns and governed by sector agencies.3

This poses special challenges for managing biodiversity because ecosystems, species and genetics transcend sectors and operate at local, state, national and international scales.

The main provisions dealing with operational planning and management of natural resources and biodiversity assets in existing policies and plans[13] can be summarised as follows:

- Development should be environmentally sustainable [14]
- There is a recognition that human livelihood is dependent on biodiversity [15]
- Planning and management should be integrated and holistic (as opposed to sector-based) [3]
- Critical habitats should be protected (i.e. in terrestrial, freshwater and marine systems) [16]
- Protected Areas should be expanded to include all habitat/ecosystems [17]
- Planning and management should be based on river basins [18]
- Mainstreaming of biodiversity should be incorporated into Policies, Plans and Programmes (PPPs) [19]

Text Box 5-2. Policy and plan provisions.

The **Outline Perspective Plan 3** states that: *the National Policy on Biological Diversity will form the basis for integrating and consolidating biodiversity programmes and projects in the country.*

The **National Policy on Biological Diversity** specifically mentions the need to: *Ensure that all major sectoral planning and development activities incorporate considerations of biological diversity management.*

According to the **9th Malaysian Plan** the plan period will foster closer cooperation between stakeholders in addressing environmental concerns and there will be an increased application of Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA).

The **National Physical Plan** contains certain provisions for natural resources and biodiversity assets in its establishment of Environmentally Sensitive Areas. It also sets out to provide a framework for regional, state and local planning.

Text Box 6-3. Biodiversity in the context of global change.

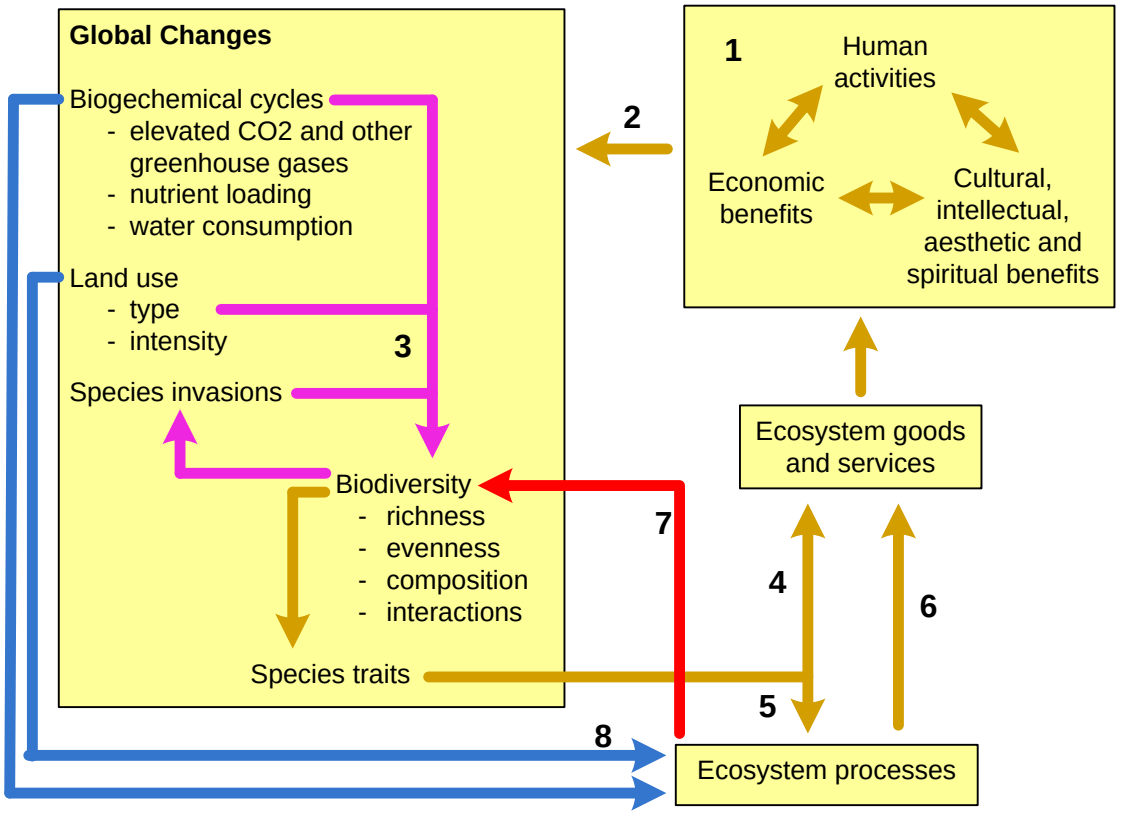


Figure 5-4. The role of biodiversity in global change (redrawn from Chapin *et al.*, 2000).

Human activities that are motivated by economic, cultural, intellectual, aesthetic and spiritual goals (1) are now causing environmental and ecological changes of global significance (2).

By a variety of mechanisms, these global changes contribute to change biodiversity; and changing biodiversity increases susceptibility to species invasions (3, purple arrows).

Changes in biodiversity, by provoking changes in 'species traits', can have direct consequences on ecosystem services and, as a result, on human economic and social activities (4).

In addition, changes in biodiversity can influence ecosystem processes (5). Altered ecosystem processes can thereby influence ecosystem services that benefit humanity (6) and further alter biodiversity (7, red arrow).

Global changes may also directly affect ecosystem processes (8, blue arrows). Depending on the circumstances, the direct effects of global change may be either stronger or weaker than effects mediated by changes in diversity.

The costs of loss of biotic diversity, although traditionally considered to be outside the sphere of human welfare, must be recognized in our accounting of the costs and benefits of human activities (modified from Chapin *et al.*, 2000).

6 ISSUES IN BIODIVERSITY

Human needs have been, and continue to be, satisfied at the expense of altered land use, climate, biogeochemical cycles and species distributions. As a result, biodiversity is declining a thousand times faster now than at rates found in the fossil record, raising concerns about consequences of such loss for ecosystem functioning, the provision of ecosystem services and human well being[20]

On a global scale, human actions have extensively altered the environment, changed the biogeochemical cycles, transformed land use and facilitated the mobility of biota (**Figure 5-4**). Fossil fuel combustion, deforestation and other activities have increased greenhouse gases to the extent that climate change is widely anticipated[21].

Human activities have fundamentally – and to a significant extent irreversibly – changed the diversity of life on Earth, and most of these changes represent a loss of biodiversity.

Substantial alterations have already occurred and include:

- The current rate of biodiversity loss greatly exceeds the rate that nature can compensate for and adapt to[22] (e.g. the projected rates of species extinction in the future are more than ten times higher than the current rate and more than 10,000 times higher than the fossil record12; and this despite the fact that the global extent of Protected Areas has doubled during the last quarter of a century[23]).
- Fifteen of the twenty-four ecosystem services assessed for the last 50 years by the Millennium Ecosystem Assessment[24] (i.e. 63%), were found to be in a state of decline, five remained steady, and only four were improving.

There is growing evidence that critical 'ecosystem processes' are controlled by both the diversity of the plant, animal, and microbial species living within a community and such changes affect the provision of ecosystem services and human livelihood[25] (as shown in **Figure 5-4**).

The primary cause of erosion of biodiversity has been widespread transformation of once highly diverse natural ecosystems into relatively species-poor managed ecosystems.

In Peninsular Malaysia, a Master Plan study for Protected Areas reported more than 10 years ago that 17.6% of mammals and 7.5% of birds were threatened[26]. The reason why so many mammals are threatened in Peninsular Malaysia has to do with their habitat requirements, which for the vast majority (81%) refer to suitable habitats below the 600-metre contour. About half the mammals require appropriate habitats below the 300-metre contour and this is where habitat loss, fragmentation and isolation of remnant vegetation 'patches' is most severe. [27]

In the IUCN Red List 2007, Malaysia has the dubious distinction of being the country with the only species declared extinct. The herb Woolly-stalked Begonia (*Begonia eiromischa*) is only known from collections made in 1886 and 1898 on Pulau Betong, Penang Island. Its habitat was cleared for farmsteads in the 1980s and extensive searches of nearby forests have failed to reveal any surviving specimens.

More recently, Wetlands International published a report which confirms that the coast of Malaysia, particularly of Selangor and Sarawak, is very important for waterfowl.

However, shorebird numbers showed a 22.4% decline in Malaysia between 1983-1986 and 2004-2006. The most significant decline (86%) occurred on the Perak coast of the Malay Peninsula, while the west coast of Johor and the coast of Selangor showed a 40% and 26% decline, respectively. The reclamation/conversion of mangroves and mudflats for aquaculture, agriculture, industry, housing and recreational purposes is the major threat to waterbird habitat[28].

The list below shows the drivers of change that affect biodiversity *most severely* at a global scale, with reference in parenthesis to the main systems affected: [12]

- Change in land use (terrestrial and freshwater systems)
- Fragmentation and isolation (terrestrial and freshwater systems)
- Habitat change (terrestrial, freshwater, and coastal systems)
- Invasive species (islands)
- Over-exploitation (marine system)
- Pollution (freshwater and coastal systems)

A well-managed and secure Protected Areas System *is* fundamental to the long-term survival of biodiversity. Still the fact that biodiversity is eroding in spite of the increase in PAs leads to the important conclusion that we cannot save biological diversity by this measure alone – we have to go further and manage the land / seascape to which the PAs belong.

Biodiversity transcends jurisdictional and administrative boundaries from federal to state and local levels and its successful planning and management requires diverse and complementary interactions from multiple stakeholders (as detailed below). Though each agency conducts important sector activities dealing with natural resource and biodiversity assets, holistic management is today hampered by sector-based legislation and administrative setup. [3]

Integrated and holistic management of biodiversity should also consider that: [12]

- Biodiversity loss is driven by local, state, national, regional, and global factors, and therefore responses are needed at all scales.
- Responses need to acknowledge multiple stakeholders with different needs.
- Given certain conditions, many effective responses are available to address the issues identified.
- Responses designed to address biodiversity loss will not be sustainable or sufficient unless they address relevant direct and indirect drivers of change.
- To attain further progress in reducing biodiversity loss, there is a need for greater coherence and synergy among sector responses and a more systematic consideration of the trade-offs within ecosystem services and biodiversity conservation and other needs of society.

Finally, the costs of biodiversity loss, although traditionally considered to be outside the sphere of human well-being, must be recognized in our accounting of the costs and benefits of (proposed) activities (e.g. change of land use).

Mask at the Orang asli museum in Gombak [1]

7 STRENGTHENING THE PROTECTED AREAS SYSTEM

The Common Vision promotes a three-pronged implementation approach and outreach strategy that consists in:

i) **Strengthening the Protected Areas System**
ii) Land/Seascape management for biodiversity
iii) Mainstreaming biodiversity.

The creation of Protected Areas (PAs) *is* one of the most effective measures available for conserving biodiversity, but PAs are not meant to be islands in a sea of development. Rather, they must be part of our country's strategy for sustainable management and wise use of natural resources, and they must be set within a proper planning context.

In Malaysia there is no single definition of what constitutes a PA or a PA System but both the 'Convention on Biological Diversity' (CBD) and the World Conservation Union (IUCN) have relevant and suitable definitions (Malaysia is party to CBD and a member of IUCN).[29]

PAs need not be limited to federal or state-sponsored reserves but may also include areas managed by indigenous communities, private landowners, industrial holdings and others.

The PAs are further classified into the six 'Management Categories' shown in **Table 7-1** (see Glossary for more details about these). While each of the PA Categories has a different range of management objectives, all should have one feature in common: a properly thought through and conducted 'Management Plan' process to ensure that the optimum outcomes are achieved.

In addition to conserving biological and cultural diversity, it is now widely recognised that many PAs also have important social and economic functions. These include protecting

Table 7-1. Management Categories for Protected Areas (based on IUCN, 1994).

Management Categories	Characteristics
I	Protected Area managed mainly for science or wilderness protection
II	Protected Area managed mainly for ecosystem protection and recreation
III	Protected Area managed mainly for conservation of specific natural features (Natural Monument)
IV	Protected Area managed mainly for conservation through management intervention
V	Protected Area managed mainly for landscape/seascape conservation
VI	Protected Area managed mainly for the sustainable use of natural ecosystems (Managed Resource Protected Area)

watersheds, soil and coastlines, providing natural products to be used on a sustainable basis, and supporting tourism and recreation. Many PAs are also home to communities of people with traditional cultures and knowledge: these assets also need protection.

Though practically all habitats – natural and managed – contribute to the conservation of biodiversity (see **Figure 7-5**) it is important to carefully apply the guidelines for what constitutes a Protected Area.

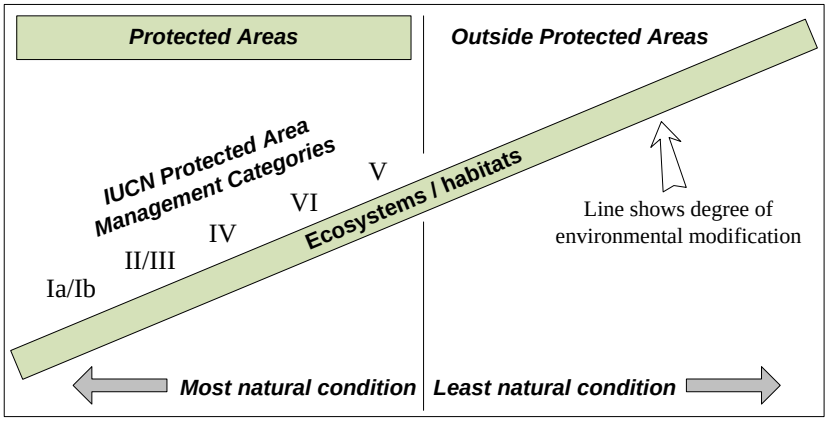


Figure 7-5. Protected Area Management Categories and degree of environmental modification (modified from Bishop *et al.*, 2004).

The maximum biodiversity conservation is offered in the Categories I to IV. The core part of the PA System should consist of areas within these categories.

As highlighted above, despite the significant growth in total extension of PAs, they alone cannot ensure the survival of biodiversity.

In consequence, the challenge faced by most nations today is to ensure that all habitats – including those falling outside Protected Areas – contribute to the maintenance of ecosystem services and national goals of sustainability.

A well-balanced national forest contains many management categories. However, trying to squeeze as many uses as possible under the heading 'Protected Area' will cause confusion, artificially overestimate the achievements in biodiversity conservation targets and devalue the Protected Areas System.

In order to maintain a healthy national forest system, it is essential to determine the proportion of a national Protected Areas network that falls within each of the above-mentioned Categories. When designing a Protected Areas System, a balanced network of Categories will be needed, to meet a range of ecological and social aspects of forest quality. This will, in many cases, include a minimum extent of forest classified within the stricter Protected Area Categories (e.g. 10%).

A 'Protected Areas System' is made of individual PAs and should cover the full range of ecosystems found in a particular country. A PA System Plan should identify the range of purposes of Protected Areas, help to balance different objectives, and ensure adherence to national and international targets and commitments.[30]

By means of inter-agency coordination alone, Malaysia could significantly increase its extent of Protected Areas, incorporating and coordinating sites already set aside for long-term conservation by various entities at the Federal, State and Local levels.

For an estimate of the potential terrestrial size of a Protected Areas System in Malaysia, one could simply consider the already gazetted areas of the Permanent Forest Reserve (PFR) and the existing Protected Areas (PAs). In 2002 the PAs constituted 5.9% of Malaysia (excluding PAs already gazetted with the PFR). Of the PFR, 10.6% was gazetted in various Functional Classes for protection of the habitat they contain.

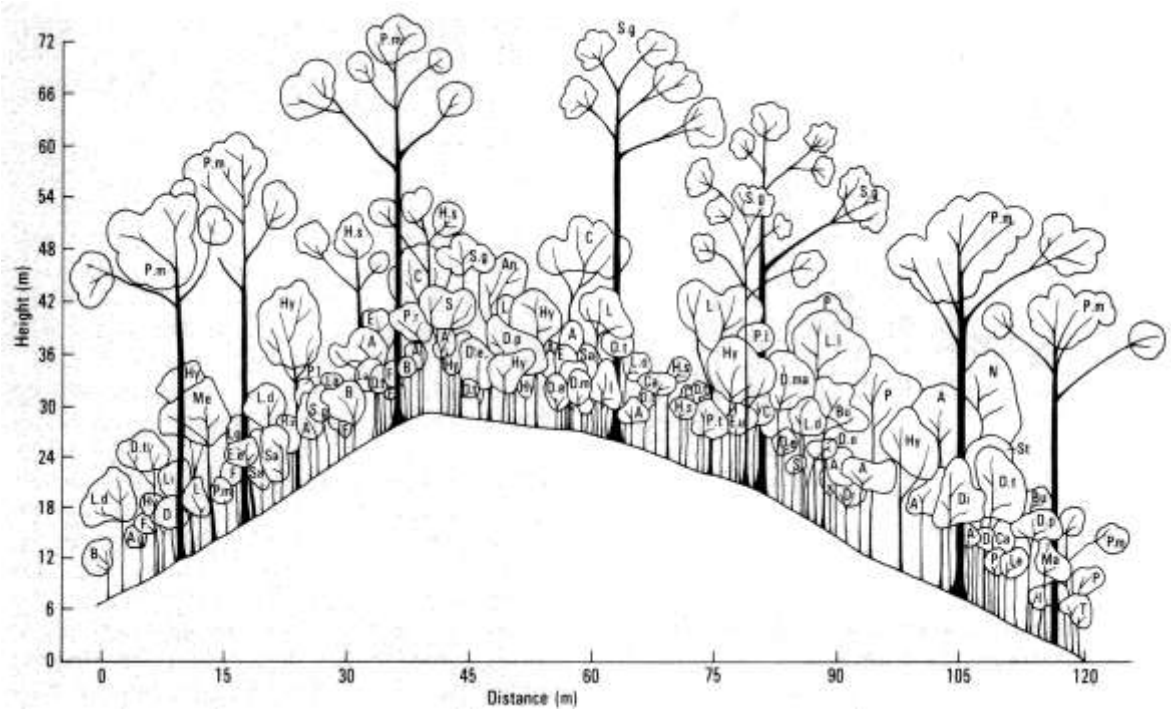
By investing efforts in increased inter-agency collaboration (for Peninsular Malaysia mainly within line agencies of NRE) the Protected Areas System could be increased almost three-fold to an estimated 16.5% of Malaysia – a truly impressive figure at the international level which does not require gazetting new areas.

In addition to the classes of the PFR not destined for production, a considerable extent has been gazetted as *water catchments* to ensure the continuous supply of potable water. These, as well as other state and local areas, which are not automatically Protected Areas, may become such if they comply with recognized standards and principles. [31] In other

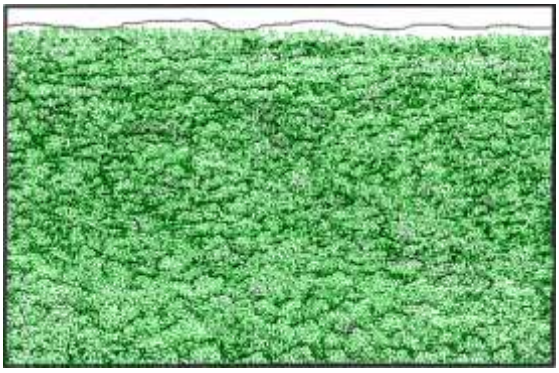
words, the idea is not to transfer jurisdiction, but to establish a framework for integrated planning of Protected Areas supported by various stakeholders.

Indeed, this would be an optimum and efficient way to provide a holistic platform for biodiversity planning and management which extends beyond the Protected Areas to the landscape as a whole, ensuring a constant supply of ecosystem services.

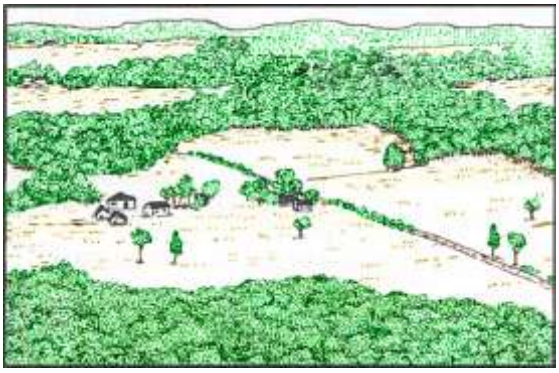
Moreover, such an approach would be in full agreement with the statements and provisions contained in the national policies and plans, though measures still need to be taken to include presently under-represented ecosystems and habitat types in the PA System. [32]



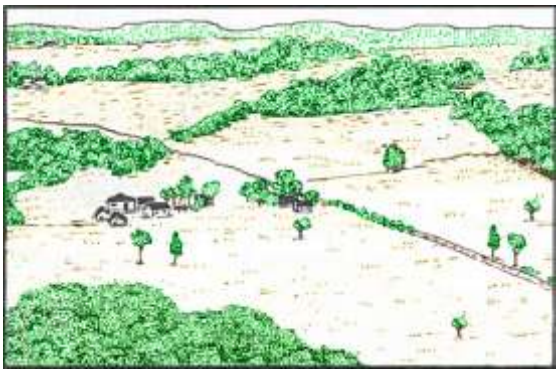
Lowland dipterocarp forest at Silam, Sabah
(*Parashorea malaanonan* (P.m) and *Shorea guiso* (S.g) are the dominant species) [33]



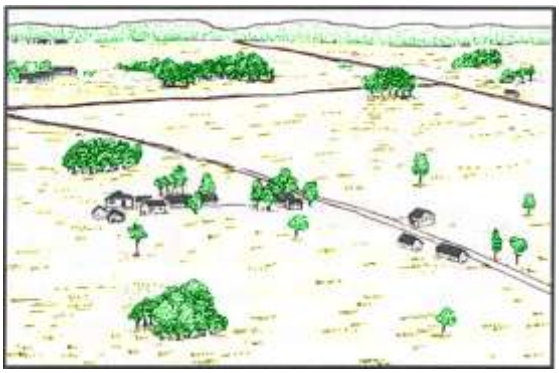
Intact landscape (more than 90% of original habitat



Perforated (60 – 90% of original cover



Fragmented (10 – 60% of original cover)



Relictual (less than 10% of original cover)

Figure 8-6. The process of fragmentation (redrawn from Hunter, 1996).

Text Box 8-4. How does biodiversity support ecosystem services at the landscape level?

The environment returns an estimated US$ 33 trillion a year in ecosystem products and services to human societies all over the planet. In Malaysia, management practices and conditions in the Protected Areas, the Permanent Forest Reserve and the landscape 'matrix' (see Glossary) surrounding these determine the quality, quantity and sustainability of ecosystem services obtained.

A great variety of goods and services are derived from forest habitat. Production of wood fibre is a major income generator and in 2004 Malaysia's export earnings for timber and timber-based products was RM 19.8 billion (US$ 5.2 billion) [34]. Additional services from forests include the regulation of stream flow, soil protection, nutrient retention and cycling, and alleviation of the impact of tsunamis. Forests are also a major carbon sink which is an important ecosystem service to counter climate change.

However, many elements of biodiversity need to be conserved within the landscape matrix to sustain long-term production of wood, potable water and other ecosystem products and services.

Losses of elements of forest biodiversity may impair essential ecosystem functions. Examples include organisms that play key roles in the decomposition of organic matter, pollination, seed dispersal, biological pest control, and the formation of associations between fungi and plants. Changes in biodiversity will also influence the long-term floristic composition and stand structure of forest habitat, which will have negative impacts on the sustained production of commodities.

Landscape matrix management is important for conserving ecosystem processes because it emphasises the importance of biodiversity in the matrix as well as conservation of genes, species, and populations for their own sake. The outcome is a substantial contribution to rebuilding and maintaining the resilience of landscapes which benefits terrestrial, freshwater and marine systems.

High levels of diversity of ecosystems, species and genetics provide higher adaptability to changing conditions caused for instance by climate change. As far as land/seascapes are concerned, the more diverse we keep them the more resilient they become.

8 LAND/SEASCAPE MANAGEMENT FOR BIODIVERSITY

The Common Vision promotes a three-pronged implementation approach and outreach strategy that consists in:

i) Strengthening the Protected Areas System
ii) Land/Seascape management for biodiversity
iii) Mainstreaming biodiversity.

Comprehensive long-term plans for conservation of biodiversity must include both a Protected Areas System and land/seascape-based strategies. The management of the land/seascape will influence the size and viability of populations of many (forest) species and thus biodiversity itself.

The conditions of the land/seascape greatly influence 'connectivity' between habitat fragments and the movement of organisms. In addition, the landscape conditions may act as buffers improving the combined effectiveness of Protected Areas and the Permanent Forest Reserve (i.e. for terrestrial and freshwater systems).

It is essential that the landscape sustains functionally viable populations of organisms that are fundamental to the maintenance of essential ecosystem services such as nutrient cycling, seed dispersal, and plant pollination – processes that underpin the long-term productivity of ecosystems and their ability to produce goods and services that ultimately affect human livelihood (as shown previously in Figure 3-1 and Figure 3-2, above).

The greatest threat to biodiversity is loss of habitat, that is, extreme changes that make habitats unable to support more than a fraction of their original processes and species. This happens with changes in land use, physical modification of rivers and/or indiscriminate withdrawal of their water, loss of coral reefs, and damage to sea floors due to trawling. Loss of habitat can also be caused by climate change, invasive alien species, overexploitation of species, and pollution.

Habitat loss and fragmentation have affected biodiversity in terrestrial, freshwater and marine systems. Nearly 60% of the Earth's ecosystem services are degraded or used unsustainably and actions to increase one ecosystem service often cause the degradation of other services.[12]

At the landscape level, the loss of habitat is often gradual, starting with a fragmentation process which disrupts extensive habitats into increasingly isolated 'patches' of remnant vegetation (**Figure 8-6**, opposite page). Today we are beginning to understand how fragmentation reduces native biodiversity and what sorts of policy and management actions are prudent to apply.

For biodiversity to survive in the landscape there is an increasing need for decision-making and policy actions across multiple geographic scales and multiple ecological dimensions. The very nature of the issue requires it because changes in land use occur in local places, with real-world social and economic benefits, while potentially causing ecological degradation across local, state, national and global scales.[35]

Many of the policies and plans referred to above require the holistic management of natural resources and biodiversity. An inherent challenge is how to promote complementary inter-agency actions in order to build and sustain resilient ecosystems.

The '*ecosystem approach'* (see Glossary) has been conceived to meet this challenge and it is considered one of the most important principles of sustainable environmental management. Parties operating under the Convention on Biological Diversity have developed a significant ongoing experience in implementation of the *ecosystem approach*. The *approach* consists on the application of appropriate scientific methodologies focused on levels of biological organisation, encompassing the essential structure, processes, functions and interactions among organisms and their environment.

A suitable – and probably more tangible – way to implement the *ecosystem approach* is to draw on lessons generated in 'conservation biology'. The availability of ecosystem services across the landscape may be enhanced by management of the landscape structure by way of strategic placement of managed and natural elements.

In order to achieve general biodiversity conservation at the landscape level, the following management principles have been defined:[36]

1. *Maintain connectivity*

   Connectivity is the linkage of habitats, communities and ecological processes at multiple scales. It influences key biodiversity processes such as population persistence and recovery after disturbance, the exchange of individuals and genes in a population, and the occupancy of habitat patches.

2. *Maintain integrity of aquatic systems*

   Aquatic features of forest landscapes (streams, rivers, wetlands, lakes and ponds) are critically important for biodiversity and ecosystem functions. A very large proportion of terrestrial biodiversity is associated with aquatic ecosystems. The integrity of the freshwater systems has a direct bearing on the status of marine biodiversity.[37]

3. *Maintain structural complexity of habitat stand*

   Attributes include: (1) unevenly aged stands; (2) large specimens and snags; (3) large logs on forest floor; (4) vertical heterogeneity (multi-layered canopy); (5) horizontal heterogeneity (e.g. gaps).

4. *Maintain landscape heterogeneity*

   Ecosystems are naturally heterogeneous (i.e. landscapes' gradients include topography, climate, soil type, etc.). Different species inhabit different environmental conditions in landscapes and the diversity, size, and spatial arrangement of habitat patches is important for many 'taxa'.

5. *Manage disturbances*

   Biodiversity conservation is likely to be most successful where management interventions are similar in their effects to natural disturbances.

For each of these principles suitable management interventions have been defined and considered for key stakeholders whose participation is required for a successful implementation (**Table 8-2** overleaf).[38]

Table 8-2. Principles and management interventions for biodiversity conservation at landscape level with reference to key stakeholders (*Principles* and *interventions* from Lindenmayer *et al*, 2006).

How to build and maintain a resilient landscape			***Note 1***
Principles		**Management strategy/interventions**	**Key stakeholders**
1	Maintain connectivity	• Riparian and other corridors • Protection of sensitive habitats within the matrix • Vegetation retention on logged areas throughout the landscape • Careful planning of road infrastructure • Landscape reconstruction	FDs, PAs, DID, DOA, NLD, TCPD, JKR, State Authorities, large estates
2	Maintain integrity of aquatic systems	• Riparian and other corridors • Protection of sensitive habitats within the matrix • Mid-spatial-scale Protected Areas • Spatial planning of cutover sites • Increased rotation lengths • Landscape reconstruction • Careful planning of road infrastructure • Use of natural disturbance regimes as templates	Same as No. 1 plus Departments of: Marine Park Malaysia; Fisheries; and Environment
3	Maintain habitat stand structural complexity	• Retention of structures and organisms during regeneration harvest • Habitat creation (e.g. promotion of cavity-tree formation) • Stand management practices • Increased rotation lengths • Use of natural disturbance regimes as templates	All
4	Maintain landscape heterogeneity	• Riparian corridors • Protection of sensitive aquatic habitats • Careful planning and maintenance of road infrastructure • Midspatial scale Protected Areas within the matrix	All
5	Manage disturbances	• Ensuring that strategies are varied between different stands and landscapes (‘do not do the same thing everywhere’)	All

Note 1: FDs correspond to Forestry Departments Peninsular Malaysia, Sabah and Sarawak; PAs: PERHILITAN, Sabah Parks, Sabah Wildlife Department, Sarawak National Parks & Wildlife Division; TCPD refers to respec-tive Departments in Peninsular Malaysia, Sabah and Sarawak.
In addition to the agencies listed here, research institutions such as FRIM and various universities can contribute tremendously in making operational the management principles for terrestrial, freshwater and marine systems.

From **Table 8-2** it should be clear that successful management of biodiversity at landscape level requires multiple stakeholders to perform diverse management interventions.

However, it is encouraging that many parties share the same objectives and have already engaged in pursuing them.

For instance, the National Landscape Department promotes riparian vegetation for reasons of beautification, but these areas may at the same time fulfil three of the five management principles shown in **Table 8-2**; JKR is now considering habitat linkages such as under-passes for wildlife in their design of new road infrastructure (in collaboration with PERHILITAN several under-passes have been built as part of new road infrastructure in Terengganu). In April 2007 FRIM embarked on a UNDP-GEF-ITTO Conservation of Biodiversity Project which, among other things, will consider how the retention of unlogged areas within production forests will assist biodiversity (see Principle 3 in **Table 8-2**).

To some extent the challenge is to promote a cohesive and concerted approach to achieve a greater impact and reduce the risk of counter-productive measures.

For management of biodiversity at land / sea-scape level the principles shown in **Table 8-2** apply for terrestrial, freshwater and – to a large extent – also marine systems.

Figure 8-7).

Management of natural resources, according to the *ecosystem approach*, calls for increased inter-sectoral communication and cooperation at many levels (i.e. federal, state and local) also involving civil society. This might be promoted for example by creating inter-ministerial bodies within the Government and

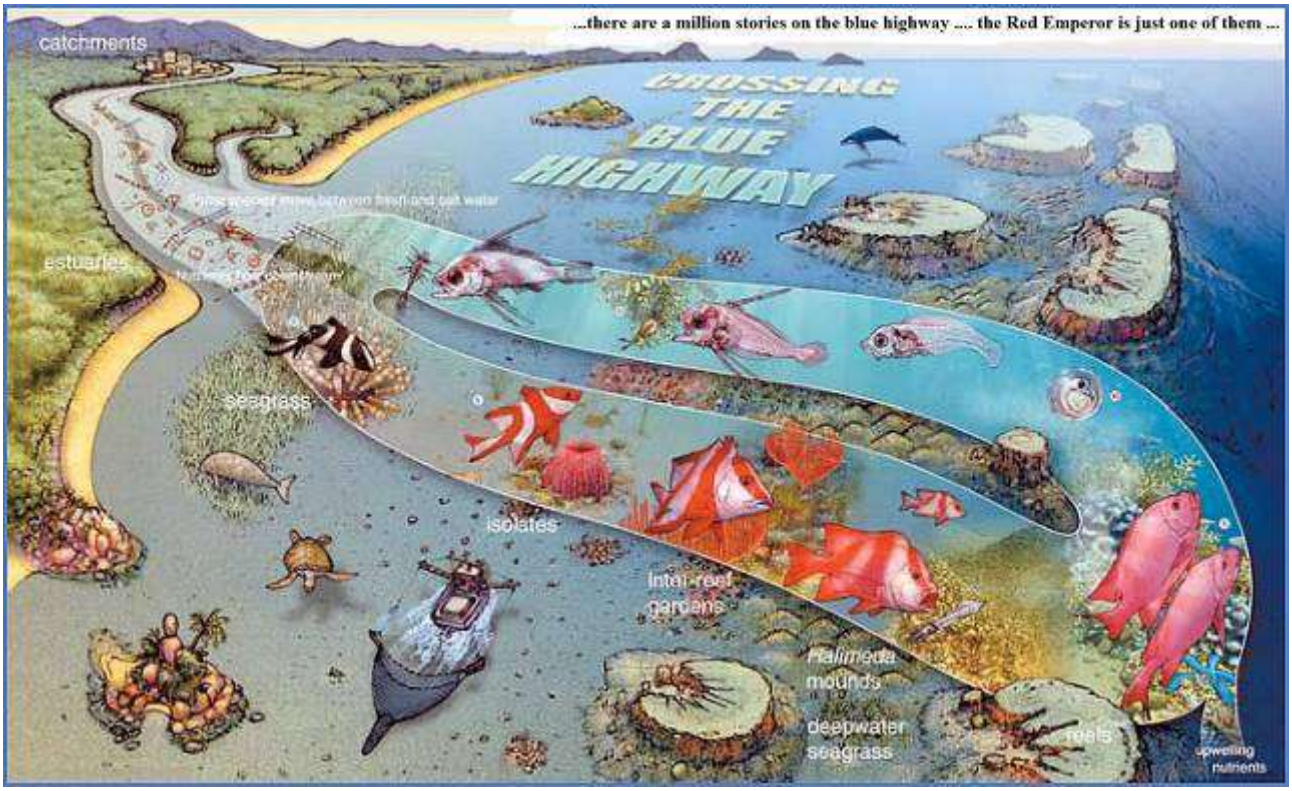


Figure 8-7. The Red Emperor (*Lutjanus sebae*), as much other marine life, depends on different habitats during stages in its life cycle. Adults spawn by coral reefs followed by a 'pelagic' migration towards shore and a return as juveniles from estuaries, mangroves, and seagrass before emerging again as adults at the reef. Throughout their various stages many marine species are heavily influenced by human activities on land and at sea (drawing from Bennett 2004).

The specific management interventions shown in the Table are relevant for terrestrial and freshwater systems in particular, though some apply also to marine systems (e.g. the protection of sensitive habitats such as estuaries, inter-tidal mudflats, seagrass meadows is relevant for three of the five principles; and creating mid-spatial scale Marine Parks of these sensitive habitats will contribute to maintain the integrity of marine systems – see

generating networks where information and experience can be shared.

This Vision suggests the possibility of embarking on 'ecosystem management' by focusing on the more tangible management interventions for biodiversity conservation at landscape level presented above (**Table 8-2**) while promoting and applying the 'operational guidance' to the ecosystem approach (see Glossary).

9 MAINSTREAMING BIODIVERSITY

The Common Vision promotes a three-pronged implementation approach and outreach strategy that consists in:

i) Strengthening the Protected Areas System
ii) Land/Seascape management for biodiversity
iii) Mainstreaming biodiversity.

Why bother?

The previous Chapters outlined that biodiversity is important because it underpins ecosystem functions and the provision of essential ecosystem services. Not only does human livelihood depend on this *web of life* but all human activity, including the global economy, is made possible thanks to the diversity of ecosystem services that nature provides.

In other words, the economic performance of many production sectors, and the well-being of the people depending on those sectors for their livelihoods, is intricately linked to the conservation and sustainable use of biodiversity.

Since ecosystem services represent notable values for Malaysia and a Policy, Plan or Programme (PPP) may result in changes in these values, strengthening the mainstreaming of biodiversity into PPPs will ensure that national priorities for sustainable development are adhered to.

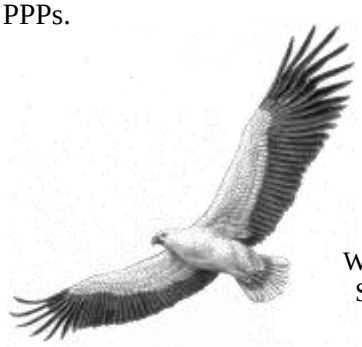
This realisation is evident in national policies and plans[19] (e.g. the National Policy on Biological Diversity dedicates *Strategy 6* to mainstreaming of biodiversity; and the National Policy on the Environment focuses its *Green Strategy 3* on this concept).

What is the objective?

In the short term, the aim is to strengthen NRE's role as *a facilitation and consultation body for mainstreaming biodiversity* which will support other agencies in their efforts to integrate biodiversity into their activities.

Government departments have already embarked on the mainstreaming process and they require synthesised data of biodiversity baseline information, issues and priorities in order to conduct – for instance – Strategic Environmental Assessments (SEA) and Sustainability Assessments (SA). Presently, SEA is carried out by the Sabah State Economic Planning Unit and SA by the Federal Town & Country Planning Department.

In the medium to long term NRE may also deploy such mainstreaming tools in its own PPPs.



White-Bellied Sea-eagle [39]

What is mainstreaming?

The word "mainstreaming" can be used as a synonym of "inclusion". Mainstreaming means integrating or incorporating actions related to conservation and sustainable use of biodiversity into strategies relating to production sectors, such as agriculture, fisheries, forestry, tourism and mining. Mainstreaming may also refer to including biodiversity considerations in poverty reduction plans and national sustainable development plans. By mainstreaming biodiversity into PPPs, we recognize the crucial role that biodiversity plays in human livelihood.

Thus, mainstreaming is about ensuring that the importance of biodiversity is fully realised by the government and taken in consideration within the development process in accordance with existing goals and objectives expressed in policies and plans.

The activities of all economic sectors impact biodiversity in some way and at some level – some effects may be far-reaching in both time and space. Biodiversity conservation is in the process of emerging from a sector-by-sector approach to planning and management of environmental aspects which does not guarantee on its own the desired holistic framework that takes into consideration off-site or long-term implications of today's actions.

As already mentioned (in Chapter 8), managing biodiversity requires diverse management interventions from multiple stakeholders. Mainstreaming is also about mobilising the necessary concerted actions according to stated priorities in PPPs.

Mainstreaming will allow economic sectors, development models, policies and programs to internalize biodiversity concerns. Integrating biodiversity concerns into the way sectors operate can have immediate benefits such as improving environmental quality and productivity, and can also serve as a long-term safeguard for meeting Malaysia's aspirations for sustainable development.

Copper-throated Sunbird [39]

What does it take?

Managing biodiversity depends on a shared perception of issues, priorities and suitable actions which can serve as a framework for diverse and complementary management interventions carried out by several stakeholders (as shown in Table 8-2, p. 19).

Consequently, it requires the ***active and effective participation of stakeholders*** not only at different levels of government, but also in the large number of sectors with potential impacts on the environment.

Basically, mainstreaming requires:

- *An understanding and acceptance of the importance of a healthy environment to well-functioning production sectors*. For specific sectors this entails an appreciation of their relationship to the conservation and sustainable use of biodiversity.
- *Mechanisms, the will and ability to identify win-win situations* that benefit both biodiversity and the sustainability of a specific sector. The mechanisms should bring together representatives of various sectors in order to coordinate activities and address common concerns. This may take the form of a committee, a coordinating body (such as a steering group) or an interagency (working) group, for example.
- *An extensive strategy of communication, education and public awareness.*

More specifically, efforts to mainstream biodiversity into sectoral strategies need to be based on a clear understanding of how that sector:

1. Impacts biodiversity
2. Provides/makes use of ecosystem services
3. Can help reach national policy goals relying on sector-specific tools

Individuals involved in biodiversity planning and policy will therefore need to be familiar with the operating practices of each sector, the actual and potential impacts of that sector on biodiversity, sectoral management practices and their value for conservation and sustainable use of biodiversity. Many sectors have specific biodiversity-relevant knowledge in the form of information (including traditional knowledge) and resource management techniques that can be utilised to achieve national

policy goals and, in particular, the objectives of the National Policy on Biological Diversity and the National Policy on the Environment.

Communication is a key element of sectoral mainstreaming. A strong and clear message about the importance of biodiversity for improved sector production, livelihoods, poverty reduction and national development is needed to promote biodiversity. This message will need to answer the question of "why people should care about biodiversity", and should be communicated across all levels and branches of the government, as well as to the general public (i.e. promote a *Common Vision on Biodiversity* as presented here).

What are the options for mainstreaming?

The options available may be considered in terms of:

A. Using Strategic Environmental Assessments (SEA) in Policies, Plans and Programmes (PPPs)
B. Other mainstreaming options
   1) Long-term planning tools
   2) Medium to short-term planning tools
   3) Using specific strategies/tools

A. Using SEA in PPPs

SEA may be considered a systematic process to analyse the environmental effects of PPPs, and their alternatives. It is now increasingly used to address all three pillars of sustainable development (i.e. environment, social and economic dimensions).

Both the National Policy on Biological Diversity and the National Policy on the Environment state that biodiversity and environmental issues must be incorporated into PPP. The 9th Malaysian Plan establishes that there should be an increased application of EIA, SEA, Cost-Benefit Analysis, market-based instruments, and environmental auditing in evaluating and mitigating environmental impacts of development activities.

There is a high potential for addressing biodiversity concerns in planning and decision-making using SEA, recognised by both the Convention on Biological Diversity and 'Ramsar' as an important tool for identifying, avoiding, minimising and mitigating adverse impacts on biodiversity.

Exactly how biodiversity will be addressed in a given SEA depends on its scope, which may range from a traditional focus on the bio-physical environment to the more recent, broadly sustainability-oriented SEAs which incorporate as well the social and economic spheres. As an example of the latter, the Town & Country Planning Department is using Sustainability Assessment (i.e. part of the family of SEA and associated tools) and more agencies will – according to the 9th Malaysian Plan – follow suit. Already EPU has initiated pilot case studies to assess SEA as a mainstreaming tool.

Whenever an agency embarks on SEA or other mainstreaming processes it will require support from NRE. Indeed, there is (as already stated) a clear and unique role for NRE to act as *a mainstreaming consultation and facilitation body for synthesised data on biodiversity issues and priorities* to support federal, state and local planning levels.

The Common Vision on Biodiversity is a suitable framework for such a mainstreaming process which will support the ongoing migration of environmental planning and management from a largely sector-based to an integrated approach, in line with national policy provisions.

B. Other options

For preparation, review and updating of PPPs mainstreaming of biodiversity is best done using SEA (as highlighted above). However, it may not always be possible or applicable in a given situation.

In those situations several opportunities, at national, state and local levels, may nevertheless significantly complement the overall mainstreaming effort.

B.1 Long-term planning tools

For biodiversity to become a top national priority, its relevance to livelihoods, poverty and national development needs to be highlighted.

Integration of biodiversity into sustainable development policies, plans and programmes is accomplished through participation of

biodiversity specialists and practitioners in PPP development and implementation.

Such participation raises greater awareness of biodiversity issues and priorities. It promotes an understanding of Protected Areas, the need for managing biodiversity at national, state and local levels (i.e. landscape management) and the importance of a concerted multi-stakeholder approach.

This will raise the profile of biodiversity issues at the national level and will assist in incorporating biodiversity and natural resource issues into development agendas at state and local levels.

As already mentioned above, SEA has been applied successfully to long-term policy and plan preparation/review.[40]

Of the long-term development Policies and Plans Vision 2020, National Vision Policy, and Outline Perspective Plan fall into this category.

B.2 Medium to short-term planning tools

Mainstreaming biodiversity into production sectors requires the identification and prioritization of "entry points" that will provide an opportunity to include biodiversity-relevant information and/or activities into sectoral operating processes. The main sectoral entry points consist of the development and updating of various sectoral strategies and tools.

Each sector has its own specific strategies, activities and tools for addressing issues relevant to sustainability. These tools are discussed in more detail in the *Reference Document* (NRE, 2008) and include:

- Sectoral policies, strategies, action plans and programmes
- Industry standards, codes of conduct, guidelines and good practices
- Certification schemes
- Ecosystem approaches specific to a given sector
- Integrating biodiversity into the legal framework

Already, in Malaysia there are several examples of mainstreaming efforts along these lines (e.g. Malaysia Timber Certification Council; and the ongoing Roundtable on Sustainable Palm Oil – RSPO) but a careful examination may identify several additional opportunities for mainstreaming of biodiversity.

B.3 Specific strategies/tools

Other strategies and tools for mainstreaming that are not specific to any given sector include:

- The ecosystem (landscape) approach
- Financial strategies and tools

The ecosystem/landscape approach

The '*ecosystem approach*', with its provisions for societal choice, stakeholder participation, interconnectedness of ecosystems and adaptive management provides an effective guide for mainstreaming efforts (see Glossary).

By its very nature, it also provides for integration between various sectoral interests. Its principles, five-point 'Operational guidance' and associated implementation guide outline a method for managing human activities in a way that promotes sector integration.

Initiating activities with land/seascape management for biodiversity (as was referred to above), may prove more tangible while still maintaining the full scope for mainstreaming of biodiversity.

Other integrated approaches, such as Integrated River Basin Management and Integrated Shoreline Management Planning (both DID), land-use planning and integrated oceans management also promote sector integration in a way that is consistent with the *ecosystem approach*.

Undertaking coastal zone management, for example, will compel all sectors and other stakeholders to get together and resolve conflicts in order to develop a common vision and the associated activities required to realise that vision.

Many of these approaches are already referred to in the Policies and Plans examined (see the *Reference Document*, NRE 2008).

Economic and financial tools

Biodiversity forms a stock of natural capital, which – if managed sustainably – can yield, in perpetuity, a wide range of direct and indirect economic benefits to human populations (as illustrated in Figure 4-3, p. 7).

Economic concerns are of central importance

to biodiversity conservation. Economic forces underlie and explain much biodiversity degradation and loss, and the application of economic instruments is useful to strengthening biodiversity conservation, sustainable use and equitable benefit sharing.

If Biodiversity Strategies and Action Plans (BSAPs) are to be effective they must be justifiable in economic terms. BSAPs also need to make efforts both to overcome the economic causes of biodiversity loss and to ensure that economic incentives to encourage biodiversity conservation are set in place.

Equally, the goals and strategies specified in the national policies – and the National Policy on Biological Diversity in particular – have to be acceptable to other "economic" sectors, decision-makers and planners, if they are to integrate biodiversity concerns into their own (sector) Policies, Plans and Programmes.

Over the last decades a range of economic tools to quantify the total economic value of biodiversity and to express it in monetary terms have been developed or refined. These tools can be useful in distinguishing between short and long-term economic costs and benefits (immediate costs of conservation versus long-term gains), and may assist in answering who should pay the costs of conservation (developers versus local communities).

Economic tools can also be used to create incentives for users to change their behaviour and reduce anthropogenic impacts on the environment, biodiversity and natural resources in general.

Various tools and techniques are available to assist in the mainstreaming efforts and they are further detailed in the *Reference Document* (NRE, 2008).

Orang asli village [1]

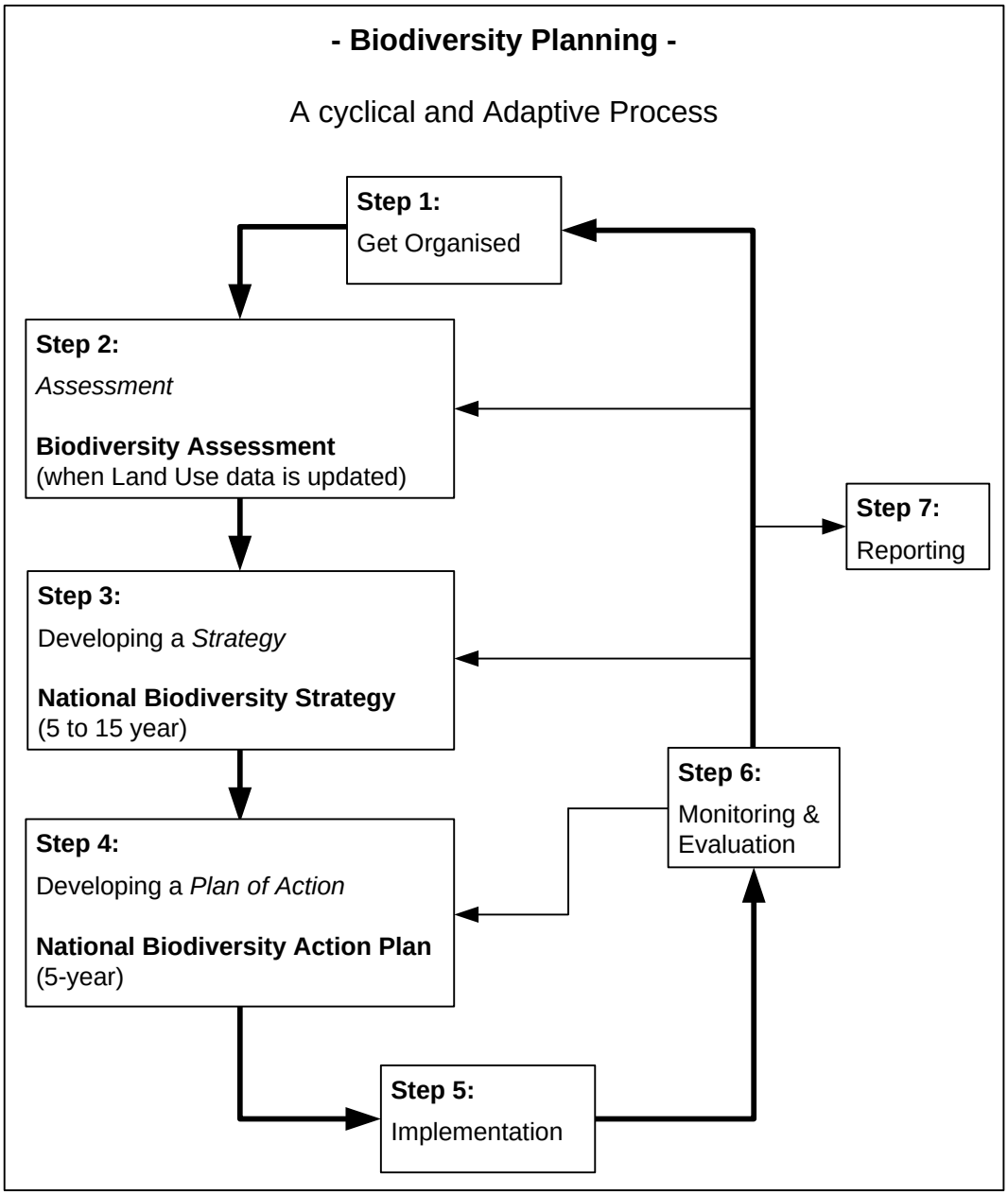


Figure 10-8. National biodiversity planning – basic steps and their relation to key planning tools (figure adapted from Kenton & Lanou, 1995).

10 WHAT IS THE ROLE OF NRE?

Biodiversity planning and management supported by multiple stakeholders requires mainstreaming of synthesised data on biodiversity issues and priorities relevant to planning at federal, regional, state and local levels.

For NRE it is important to promote a *Common Vision on Biodiversity* and the essential complementary contributions that agencies can make towards national goals of environmental sustainability.

This requires NRE to take the lead and act as a *consultation body for synthesised, holistic data on biodiversity issues and priorities*. To a large extent this information may be compiled from line agencies but it is essential that it be complemented with overall land use data produced on a regular basis by the Department of Agriculture (DOA).

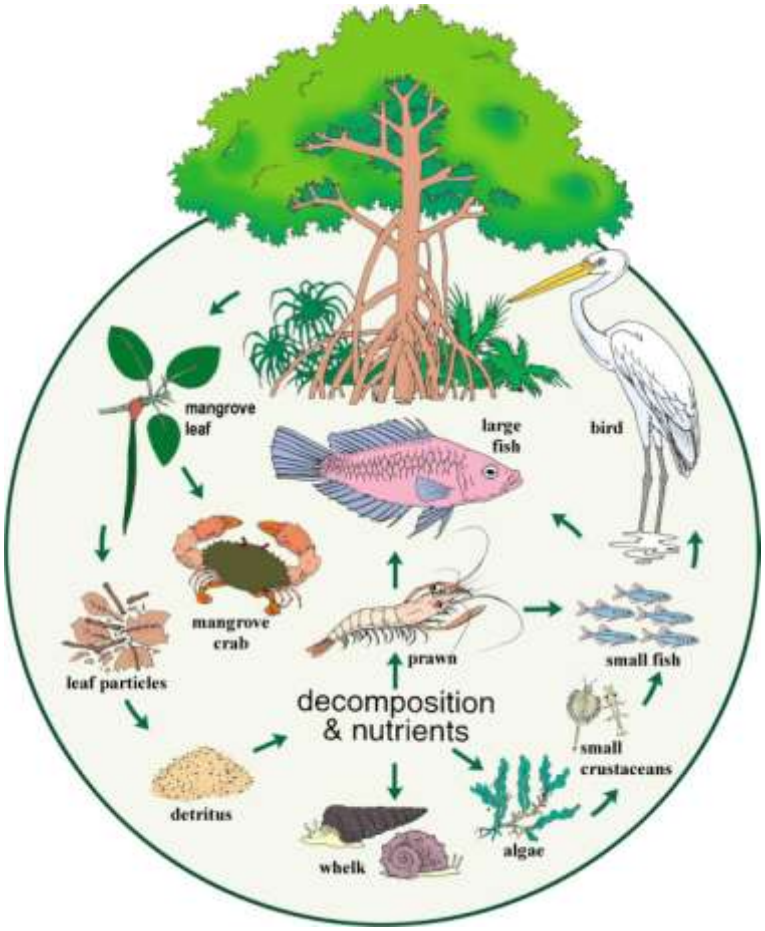
A suitable framework for NRE involves adopting the adaptive approach to biodiversity planning shown in **Figure 10-8** (opposite page).

Indeed, *Step 2* corresponds to the Country Study on Biological Diversity done by MOSTE in 1997 and *Steps 3* and *4* are represented by the National Policy on Biological Diversity (MOSTE, 1998). However, both require updating as part of the cyclical process shown in the Figure.

These basic steps, and the process iterated as indicated, will ensure that NRE is always in a position to report on and respond to inquiry about (among others):

- The status of biodiversity (for national and international reporting)
- The present direction taken with respect to planning and management of natural resources and biodiversity assets.
- The extent to which provisions of national policies and plans, as well as international conventions, are adhered to.

Mobilising support for a broadly shared perception of issues, priorities and required inter-agency actions also calls for an extensive communication and outreach programme.



Simplified food web from of the mangrove ecosystem [41]

11 CONCLUSIONS

Biological diversity, or biodiversity, encompasses genes, species, ecosystems and their interactions. It is essential for the functioning of ecosystems and underpins the provision of 'ecosystem services' that ultimately affect human well being.

For planners and decision-makers it is critical to understand that the provision of goods and services by ecosystems is sustained by various aspects of biodiversity. Biodiversity is also important in both managed and natural ecosystems.

Of the twenty-four ecosystem services assessed for the last 50 years by the Millennium Ecosystem Assessment, fifteen were found to be in a state of decline (i.e. 63%), five remained steady, and only four were improving. Across a range of taxonomic groups, numbers of species are declining. The projected future extinction rates are more than ten times higher than the current rate and 10,000 times higher than the fossil record.

The most severe drivers of change affecting terrestrial and freshwater biodiversity are change in land use followed by fragmentation and increased isolation of remaining habitat. For marine biodiversity change is caused by over-exploitation and pollution, which also affect freshwater systems.

Despite difficulties, limitations, and issues surrounding ecosystem service valuation, there seems to be a general consensus that the value of ecosystem services often outweighs economic use and that protecting ecosystem services is, or should be, one of the most important responsibilities of today's politicians, resource managers, and society in general.

Malaysian Policies and Plans include many important provisions for natural resource and biodiversity assets where planning and management should be integrated, holistic and environmentally sustainable.

Overall, Malaysia needs *a Common Vision on Biodiversity*. Such a Vision comprises the various undertakings by the Ministry and its line agencies, and can be summarized as a three-pronged implementation approach and outreach strategy which involves:

i) Strengthening a Protected Areas System
ii) Managing biodiversity at the land / seascape level
iii) Mainstreaming biodiversity

Protected Areas are fundamental to the long-term survival of biodiversity and thus the continued provision of ecosystem products and services. The Protected Areas System must include suitable areas already gazetted and where the permanence of the site is guaranteed (e.g. water catchments gazetted to ensure long-term production of freshwater). The idea is not to transfer jurisdiction but to achieve coordination of planning and management in accordance with recognised principles and procedures.

Protected Areas alone are not enough to safeguard biodiversity, which must include measures to manage biodiversity in the broader land/seascape.

Managing diversity requires diverse management measures from many stakeholders shaping the landscape today. Management principles and suitable interventions have been identified to (re)build and maintain landscape resilience, which benefits terrestrial, freshwater and marine biodiversity. These principles are an excellent starting point for embarking on an operational 'ecosystem approach', which is in full compliance with policy and plan provisions for integrated, holistic and environmentally sustainable development.

Mainstreaming biodiversity means integrating or incorporating actions related to conservation and sustainable use of biodiversity into Policies, Plans and Programmes. Since biodiversity management is complex and involves many actors it requires *active and effective participation of stakeholders* not only at different levels of government, but also in the large number of sectors potentially impacting the environment at different scales. This document identifies various key stakeholders whose active engagement is essential to achieve concerted actions in favour of national policy goals for environmentally sustainable development.

NRE has an overarching mandate for environment, natural resources and biodiversity assets and there is a clear and unique role for NRE to act as a mainstreaming *consultation and facilitation body for synthesised data on biodiversity issues and priorities* to support federal, state and local planning levels.

The Common Vision on Biodiversity is a suitable framework for such a mainstreaming process which will support the ongoing migration of environmental planning and management from a largely sector-based to an integrated approach in line with national policy provisions.

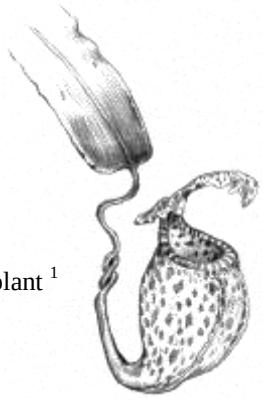
The three-pronged approach supported by an extensive communication programme corresponds to provisions and priorities contained in existing Policies, Plans and Programmes but is characterised by concentrating on implementation aspects.

Promoting the *Common Vision on Biodiversity* will allow NRE and its line agencies to rally support for a shared perception of issues, priorities and required inter-agency actions throughout the government apparatus and civil society.

Following the principles and guidelines referred to here, and taking the necessary steps to review and update the environmental legislative framework, will ensure that national sustainable development goals with respect to natural resources and biodiversity are accepted and integrated by planners and decision-makers in the government, various production sectors and civil society.

It is also important to note that it will facilitate placing NRE in a position where it can always report on and respond to inquiries about (among other things):

- The status of biodiversity (for national and international reporting)
- The present direction taken with respect to planning and management of natural resources and biodiversity assets.
- The extent to which provisions of national policies and plans, as well as international conventions, are adhered to.



Pitcher plant [1]

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White-Handed Gibbon [39]

Iban dance [1]

GLOSSARY

Rubber tapper [1]

5-Point operational guidance: See 'Ecosystem approach – Operational guidance'.

Biodiversity: The CBD defines biodiversity as "the variability among living organisms from all sources including inter alia, 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".

A simpler definition is: The variety of life on the planet. This includes the diversity within species, between species and of ecosystems.

CBD: See *Convention on Biological Diversity.*

Connectivity: Is the linkages between habitats, communities and ecological processes at multiple spatial and temporal scales.

Conservation biology: Is an interdisciplinary, mission-oriented science which aims to alleviate the extinction crisis and foster biological diversity, which is seen as underpinning ecosystem services. Conservation biologists include researchers and managers from fields as varied as 'ecology', genetics, evolution, biogeography, wildlife biology, forestry, captive species breeding, and restoration ecology. Scientists hope that by studying why species become extinct, they can improve the management of natural areas and endangered species in ways that will prevent further extinctions.

Convention on Biological Diversity: The Convention on Biological Diversity (CBD) is an international treaty that was adopted at the Earth Summit in Rio de Janeiro in 1992. The Convention has three main goals:

1. Conservation of biological diversity (or biodiversity);
2. Sustainable use of its components; and
3. Fair and equitable sharing of benefits arising from genetic resources.

It is often seen as the key document regarding sustainable development.

The convention recognized for the first time in international law that the conservation of *biological* diversity is "a common concern of humankind" and is an integral part of the development process. The agreement covers all ecosystems, species, and genetic resources. It links traditional conservation efforts to the economic goal of using biological resources sustainably. It sets principles for the fair and equitable sharing of the benefits arising from the use of genetic resources, notably those destined for commercial use. It also covers the rapidly expanding field of biotechnology through its Cartagena Protocol on Biosafety, addressing technology development and transfer, benefit-sharing and biosafety issues. Importantly, the Convention is legally binding; countries that join it ('Parties') are obliged to implement its provisions.

The *convention* reminds decision-makers that natural resources are not infinite and sets out a philosophy of sustainable use. While past conservation efforts were aimed at protecting particular species and habitats, the Convention recognizes that ecosystems, species and genes must be used for the benefit of humans. However, this should be done in a way and at a rate that does not lead to the long-term decline of biological diversity.

The convention also offers decision-makers guidance based on the precautionary principle that where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat. The Convention acknowledges that substantial investments are required to conserve biological diversity. It argues, however, that conservation will bring us significant environmental, economic and social benefits in return.

It was opened for signature on 5 June 1992 and entered into force on 29 December 1993. Malaysia is party to the Convention.

Driver of change: The Millennium Ecosystem Assessment (MA, 2005) defines a driver as "any natural or human-induced factor that directly or indirectly causes a change in an ecosystem." A *direct driver* unequivocally influences ecosystem processes. An *indirect driver* operates more diffusely, by altering one or more direct drivers. Categories of *indirect drivers* of change are: demographic, economic, socio-political, scientific and technological, and cultural and religious. Important *direct drivers* include: land conversion leading to habitat change, climate change, nutrient pollution, overexploitation, and invasive species and diseases.

Ecology: Is the relationship between organisms and their environment. It may also be expressed as: the scientific study of the distribution and abundance of living organisms and how the distribution and

abundance are affected by interactions between the organisms and their environment.

Ecosystem: Means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit (Article 2 of the CBD).

Ecosystem approach: The ecosystem approach is a strategy for the integrated management of land, water and living resources. It provides a framework for decision-making at various levels, including national policy-making and site-level management.

There has been significant experience in implementation of the ecosystem approach by Parties operating under the Convention on Biological Diversity, as well as considerable experience in the implementation of similar approaches to management under other national and international processes.

Application of the ecosystem approach involves a focus on the functional relationships and processes within ecosystems, attention to the distribution of benefits that flow from ecosystem services, the use of adaptive management practices, the need to carry out management actions at multiple scales, and inter-sectoral cooperation.

A number of other established approaches, such as sustainable forest management (e.g. as carried out by the Forestry Department), integrated river basin management (e.g. DID), and integrated marine and coastal area management (e.g. DID), are consistent with the ecosystem approach and support its application in various sectors and biomes.

The ecosystem approach is well suited to take into account the trade-offs that exist in the management of ecosystems and incorporates the need for both coordination across sectors and management across scales.

The ecosystem approach also provides a framework for designing and implementing the entire range of necessary responses, ranging from those directly addressing the needs for conservation and sustainable use of biodiversity to those necessary to address other indirect and direct drivers that influence ecosystems.

The 12 principles on which the *ecosystem approach* is based are:

1. **The objectives of management of land, water and living resources are a matter of societal choice.**

   Rationale: Different sectors of society view ecosystems in terms of their own economic, cultural and societal needs. Indigenous peoples and other local communities living on the land are important stakeholders and their rights and interests should be recognized. Both cultural and biological diversity are central components of the ecosystem approach, and management should take this into account. Societal choices should be expressed as clearly as possible. Ecosystems should be managed for their intrinsic values and for the tangible or intangible benefits for humans, in a fair and equitable way.

2. **Management should be decentralized to the lowest appropriate level.**

   Rationale: Decentralized systems may lead to greater efficiency, effectiveness and equity. Management should involve all stakeholders and balance local interests with the wider public interest. The closer management is to the ecosystem, the greater the responsibility, ownership, accountability, participation, and use of local knowledge.

3. **Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.**

   Rationale: Management interventions in ecosystems often have unknown or unpredictable effects on other ecosystems; therefore, possible impacts need careful consideration and analysis. This may require new arrangements or ways of organization for institutions involved in decision-making to make, if necessary, appropriate compromises.

4. **Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should:**

   a. **Reduce those market distortions that adversely affect biological diversity;**
   b. **Align incentives to promote biodiversity conservation and sustainable use;**
   c. **Internalize costs and benefits in the given ecosystem to the extent feasible.**

   Rationale: The greatest threat to biological diversity lies in its replacement by alternative systems of land use. This often arises through market distortions, which undervalue natural systems and populations and provide perverse incentives and subsidies to favour the conversion of land to less diverse systems.

Ecosystem approach (continued)

Often those who benefit from conservation do not pay the costs associated with conservation and, similarly, those who generate environmental costs (e.g. pollution) escape responsibility. Alignment of incentives allows those who control the resource to benefit and ensures that those who generate environmental costs will pay.

5. **Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the *ecosystem approach*.**

   Rationale: Ecosystem functioning and resilience depends on a dynamic relationship within species, among species and between species and their abiotic environment, as well as the physical and chemical interactions within the environment. The conservation and, where appropriate, restoration of these interactions and processes is of greater significance for the long-term maintenance of biological diversity than simply protection of species. Ecosystems must be managed within the limits of their functioning.

6. **Ecosystems must be managed within the limits of their functioning.**

   Rationale: In considering the likelihood or ease of attaining the management objectives, attention should be given to the environmental conditions that limit natural productivity, ecosystem structure, functioning and diversity. The limits to ecosystem functioning may be affected to different degrees by temporary, unpredictable or artificially maintained conditions and, accordingly, management should be appropriately cautious.

7. **The *ecosystem approach* should be undertaken at the appropriate spatial and temporal scales.**

   Rationale: The approach should be bounded by spatial and temporal scales that are appropriate to the objectives. Boundaries for management will be defined operationally by users, managers, scientists and indigenous and local peoples. Connectivity between areas should be promoted where necessary. The ecosystem approach is based upon the hierarchical nature of biological diversity characterized by the interaction and integration of genes, species and ecosystems.

8. **Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.**

   Rationale: Ecosystem processes are characterized by varying temporal scales and lag-effects. This inherently conflicts with the tendency of humans to favour short-term gains and immediate benefits over future ones.

9. **Management must recognize that change is inevitable.**

   Rationale: Ecosystems change, including species composition and population abundance. Hence, management should adapt to the changes. Apart from their inherent dynamics of change, ecosystems are beset by a complex of uncertainties and potential "surprises" in the human, biological and environmental realms. Traditional disturbance regimes may be important for ecosystem structure and functioning, and may need to be maintained or restored. The ecosystem approach must utilize adaptive management in order to anticipate and cater for such changes and events and should be cautious in making any decision that may foreclose options, but, at the same time, consider mitigating actions to cope with long-term changes such as climate change

10. **The *ecosystem approach* should seek the appropriate balance between, and integration of, conservation and use of biological diversity.**

    Rationale: Biological diversity is critical both for its intrinsic value and because of the key role it plays in providing the ecosystem and other services upon which we all ultimately depend. There has been a tendency in the past to manage components of biological diversity either as protected or non-protected. There is a need for a shift to more flexible situations, where conservation and use are seen in context and the full range of measures is applied in a continuum from strictly protected to human-made ecosystems.

11. **The *ecosystem approach* should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.**

    Rationale: Information from all sources is critical to arriving at effective ecosystem management strategies. A much better knowledge of ecosystem functions and the impact of human use is desirable. All relevant information from any concerned area should be shared with all stakeholders and actors, taking into account, inter alia, any decision to be taken under Article 8(j) of the Convention on Biological Diversity. Assumptions behind proposed management decisions should be made explicit and checked against available knowledge and views of stakeholders.

Ecosystem approach (continued)

12. **The *ecosystem approach* should involve all relevant sectors of society and scientific disciplines.**

    Rationale: Most problems of biological-diversity management are complex, with many interactions, side-effects and implications, and therefore should involve the necessary expertise and stakeholders at the local, national, regional and international level, as appropriate.

The definition (above), 12 principles and five points of 'operational guidance' (see below), were adopted by the Conference of the Parties at its 5th meeting in 2000.

The 12 principles with rationale and implementation guidelines can be found at:

www.biodiv.org/decisions/default.asp?lg=0&m=cop-07&d=11.

Ecosystem approach – Operational guidance: In applying the 12 principles of the *ecosystem approach*, the following five points are proposed by CBD as operational guidance.

1. **Focus on the relationships and processes within ecosystem**

   The many components of biodiversity control the stores and flows of energy, water and nutrients within ecosystems, and provide resistance to major perturbations. A much better knowledge of ecosystem functions and structure, and the roles of the components of biological diversity in ecosystems, is required, especially to understand: (i) ecosystem resilience and the effects of biodiversity loss (species and genetic levels) and habitat fragmentation; (ii) underlying causes of biodiversity loss; and (iii) determinants of local biological diversity in management decisions. Functional biodiversity in ecosystems provides many goods and services of economic and social importance. While there is a need to accelerate efforts to gain new knowledge about functional biodiversity, ecosystem management has to be carried out even in the absence of such knowledge. The ecosystem approach can facilitate practical management by ecosystem managers (whether local communities or national policy makers).

2. **Enhance benefit-sharing**

   Benefits that flow from the array of functions provided by biological diversity at the ecosystem level provide the basis of human environmental security and sustainability. The ecosystem approach seeks that the benefits derived from these functions are maintained or restored. In particular, these functions should benefit the stakeholders responsible for their production and management. This requires, inter alia: capacity building, especially at the level of local communities managing biological diversity in ecosystems; the proper valuation of ecosystem goods and services; the removal of perverse incentives that devalue ecosystem goods and services; and, consistent with the provisions of the Convention on Biological Diversity, where appropriate, their replacement with local incentives for good management practices.

3. **Use adaptive management practices**

   Ecosystem processes and functions are complex and variable. Their level of uncertainty is increased by the interaction with social constructs, which need to be better understood. Therefore, ecosystem management must involve a learning process, which helps to adapt methodologies and practices to the ways in which these systems are being managed and monitored. Implementation programmes should be designed to adjust to the unexpected, rather than to act on the basis of a belief in certainties. Ecosystem management needs to recognize the diversity of social and cultural factors affecting natural-resource use. Similarly, there is a need for flexibility in policy-making and implementation. Long-term, inflexible decisions are likely to be inadequate or even destructive. Ecosystem management should be envisaged as a long-term experiment that builds on its results as it progresses. This "learning-by-doing" will also serve as an important source of information to gain knowledge of how best to monitor the results of management and evaluate whether established goals are being attained. In this respect, it would be desirable to establish or strengthen capacities of Parties for monitoring.

Ecosystem approach – Operational guidance (continued)

4. **Carry out management actions at the scale appropriate for the issue being addressed, with decentralization to lowest level, as appropriate**

   As noted in the description of the ecosystem approach, an ecosystem is a functioning unit that can operate at any scale, depending upon the problem or issue being addressed. This understanding should define the appropriate level for management decisions and actions. Often, this approach will imply decentralization to the level of local communities. Effective decentralization requires proper empowerment, which implies that the stakeholder both has the opportunity to assume responsibility and the capacity to carry out the appropriate action, and needs to be supported by enabling policy and legislative frameworks. Where common property resources are involved, the most appropriate scale for management decisions and actions would necessarily have to be large enough to encompass the effects of practices by all relevant stakeholders. Appropriate institutions would be required for such decision-making and, where necessary, for conflict resolution. Some problems and issues may require action at still higher levels, through, for example, transboundary cooperation, or even cooperation at global levels.

5. **Ensure inter-sectoral cooperation and information sharing**

   As the primary framework of action to be taken under the Convention, the ecosystem approach should be fully taken into account in developing and reviewing national biodiversity strategies and action plans. There is also a need to integrate the ecosystem approach into agriculture, fisheries, forestry and other production systems that have an effect on biodiversity. Management of natural resources, according to the ecosystem approach, calls for increased inter-sectoral communication and cooperation at a range of levels (government ministries, management agencies, etc.). This might be promoted through, for example, the formation of inter-ministerial bodies within the Government or the creation of networks for sharing information and experience.

(From www.biodiv.org/programmes/cross-cutting/ecosystem/operational.asp)

These may be complemented by the IUCN "Five steps to implementation" of the *ecosystem approach*. www.iucn.org/dbtw-wpd/edocs/CEM-003.pdf

Ecosystem functioning: is a measure of the changes in 'ecosystem processes'.

Ecosystem management: The IUCN's Commission for Ecosystem Management (IUCN-CEM) defines ecosystem management as "a process that integrates ecological, socio-economic, and institutional factors into comprehensive analysis and action in order to sustain and enhance the quality of the ecosystem to meet current and future needs." The core objective of ecosystem management is the sustainable, efficient and equitable use of natural resources.

Ecosystem management recognises that the inter-connectivity of ecological, socio-cultural, economic and institutional systems is fundamental to our understanding of the factors which influence environmental objectives and outcomes. It is a holistic, multi-disciplinary and integrated approach, which requires a substantial shift in the way we perceive and approach the management of both our natural and modified environments.

Ecosystem management involves viewing resources in a broader context - one that crosses bureaucratic and political boundaries to include all stakeholders in the decision process - and basing management actions on the best science available. It is considered synonymous with the '*ecosystem approach'* (see above).

See also www.iucn.org/themes/cem/ourwork/ecapproach/index.html

Ecosystem processes: are quantified by measuring the rates of movement between the biotic (living) and abiotic (non-living) components of an ecosystem. Examples include: decomposition, nutrient leaching, or other measures of material production, transport, or loss. See also 'ecosystem functioning'.

Ecosystem services: The findings of the Millennium Ecosystem Assessment (MA) — the largest-ever international assessment of the consequences of ecosystem change for human wellbeing — were released in March 2005. A cornerstone of the assessment is the concept of 'ecosystem services'

This term has been widely used by the scientific community and in international environmental negotiations, and is defined by the MA as the benefits that people receive from ecosystems. The

term implies that the service is of value to people (in terms of economic, health, cultural or other benefits), and that the degradation or loss of the service represents a harmful impact on human wellbeing. Modern land use practices, while increasing the short-term supplies of material goods, may undermine many ecosystem services in the long run – even on regional and global scales (see Foley, *et al.*, 2005).

Ecosystem services paradigm: Is an emerging paradigm that considers biodiversity as the underpinning of ecosystem services that are ultimate responsible for human well-being. The Millennium Ecosystem Assessment (MA) is a multinational effort to track ecosystem conditions. The MA is a good example of an accountability assessment that has adopted the ecosystem services paradigm to motivate measurement.

Management Categories: See 'Protected Areas Management Categories'.

Management Plan: A Management Plan for a Protected Area (PA) is a product of the planning process, documenting the management approach, the decisions made, the basis for these, and the guidance for future management. The Management Plan should cover the entire PA and how it supports ecosystem processes in the landscape also outside its boundaries. It should contain information on what is to be achieved by management and the rationale behind the management decisions made.

The Management Plan is usually accompanied by a number of other plans or related documents, which are derived from, or support it. Most prominent among these are 'Operational Plans'; Zoning Plans (shows areas to be managed in different ways); and Site Plans (may be produced for sites that require intensive management for instance around major visitor attractions).

Mainstreaming: The word "mainstreaming" can be used synonymously with "inclusion." Mainstreaming biodiversity means to integrate or incorporate actions related to conservation and sustainable use of biological diversity in strategies relating to production sectors, such as agriculture, fisheries, forestry, tourism and mining. Mainstreaming might also refer to including biodiversity considerations in poverty reduction plans and national sustainable development plans. By mainstreaming biodiversity into Policies, Plans and Programmes we recognize the crucial role that biodiversity has for human livelihood.

Matrix: Comprises landscapes that are not designated primarily for conservation of natural ecosystems, ecological processes, and biodiversity regardless of their current condition (i.e. whether natural or developed).

Millennium Ecosystem Assessment: The Millennium Ecosystem Assessment (MA) is the most comprehensive survey ever into the state of the planet. The Assessment was drawn up by 1,300 researchers from 95 nations over four years from 2001 to 2005. The MA is slightly different to all previous environmental reports in that it defines ecosystems in terms of the "services", or benefits, that people get from them. The findings provide a state-of-the-art scientific appraisal of the conditions and trends of the world's ecosystems and the services they provide, as well as the scientific basis for action to conserve and use them sustainably.

It reports that humans have changed most ecosystems beyond recognition in a dramatically short space of time. Approximately 60 percent of the ecosystem services that support life on Earth – such as fresh water, capture fisheries, air and water regulation, and the regulation of regional climate, natural hazards and pests – are being degraded or used unsustainably. Scientists warn that the harmful consequences of this degradation could grow significantly worse in the next 50 years.

The MA observed that ecosystem approaches provide an important framework for assessing biodiversity and ecosystem services, and for evaluating and implementing potential responses.

See www.millenniumassessment.org/en/index.aspx

National Policy on Biological Diversity (NPBD): Malaysia's NPBD was prepared in response to the requirements of the Convention on Biological Diversity (CBD). It was endorsed by the Malaysian Cabinet on 22 October 1997 and it was launched in 1998. The Policy represents a cross-sectoral framework which consists of three parts: the Policy, Strategies and Action Plan of Programmes. The Policy part provides an account of the status of conservation and management of biodiversity and then outlines 15 Strategies for effective management of biological diversity. The final Action Plan of Programmes details a total of 96 activities for implementation by both the public and private sectors and civil society in general. As part of implementation of the NPBD, interagency involvement and collaborations were established – including the Biodiversity and Biotechnology Council, National Committee on Biological Diversity, National Technical Committee on Biological Diversity, Genetic Modification Advisory Committee and Biodiversity Clearinghouse

Mechanism based in the Forest Research Institute of Malaysia (FRIM).

National Policy on the Environment (NPE): The NPE was released by MOSTE in 2002 and it identifies eight *Principles* to harmonise economic development with environmental needs. It also spells out Malaysia's *Green Strategies* in seven key areas, including: effective management of natural resources; integrated development planning and implementation; strengthening of administrative and institutional mechanisms; and formulation and implementation of Action Plans.

Operational guidance: See 'Ecosystem approach – Operational guidance'

Patch: Landscapes may be considered as composed of a mosaic of patches which refer to habitat fragments as the basic elements or units that make up a landscape. Patches are dynamic and occur on a variety of spatial and temporal scales. Thus, a landscape does not contain a single patch mosaic.

Protected Area: According to the Convention on Biological Diversity a Protected Area (PA) is a: *Geographically defined area which is designated or regulated and managed to achieve specific conservation objectives* (Article 2).

IUCN states that a PA is: *An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means* (IUCN, 1994).

In practice, however, these definitions are only marginally different and both of them consider PAs:

- To be area-based concepts that might be found anywhere
- To focus on conservation objectives
- To require specific measures (dedication, designation, regulation) for the purposes of biodiversity conservation (i.e. protection and maintenance)
- To require management, delivered through legal or other effective means
- By implication, to require that some kind of management authority is in place to secure conservation.

Important references include: Thomas & Middleton (2003); Kelleher (1999). Other relevant publications are found in IUCN Best Practice Guidelines at

www.iucn.org/themes/wcpa/pubs/guidelines.htm and the CBD Technical Series at www.biodiv.org/programmes/outreach/awareness/ts.shtml.

Protected Areas Management Categories: Refer to the IUCN 1994 *Guidelines for protected area management categories*. They are summarised as:

Category Ia: area managed mainly for science – an area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring

Category Ib: area managed mainly for wilderness protection – large area of unmodified or slightly modified land and/or sea, retaining its natural characteristics and influence, without permanent or significant habitation, which is protected and managed to preserve its natural condition

Category II: area managed mainly for ecosystem protection and recreation – natural area of land and/or sea designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area, and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible

Category III: area managed mainly for conservation of specific natural features – area containing specific natural or natural/cultural feature(s) of outstanding or unique value because of their inherent rarity, representativeness or aesthetic qualities or cultural significance

Category IV: area managed mainly for conservation through management intervention – area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats to meet the requirements of specific species

Category V: area managed mainly for landscape/seascape conservation or recreation – area of land, with coast or sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value,

and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area

Category VI: area managed mainly for the sustainable use of natural resources – area containing predominantly unmodified natural systems, managed to ensure long-term protection and maintenance of biological diversity, while also providing a sustainable flow of natural products and services to meet community needs

A number of important principles in the Guidelines further explain the categorisation system. These include that:

- The basis of categorisation is by primary management objective
- Assignment to a category is not a commentary on effectiveness of management
- The categories system is international
- National names for protected areas may vary
- All categories are important (i.e. the system is not intended as a hierarchy), ***but***
- A gradation of human intervention is implied.

The main guidelines for the Protected Areas Management Categories are IUCN (1994); Dudley & Phillips (2006); and Phillips (2002). For PA planning and management other issues in the IUCN *Best Practice Protected Areas Guidelines Series* are also very useful (see www.iucn.org/themes/wcpa/pubs/guidelines.htm). Other relevant publications are found in the CBD Technical Series at www.biodiv.org/programmes/outreach/awareness/ts.shtml.

Protected Areas System: is constituted by individual Protected Areas (PAs) and should cover the full range of ecosystems and communities found in a particular country. A PA System Plan should identify the range of purposes of Protected Areas, help to balance different objectives, and ensure that national and international targets and commitments are adhered to.

Important references include: Davey (1998); Dudley *et al.* (2005); and Dudley & Parish (2006). Other relevant publications are found in IUCN Best Practice Guidelines at: www.iucn.org/themes/wcpa/pubs/guidelines.htm and the CBD Technical Series at: www.biodiv.org/programmes/outreach/awareness/ts.shtml.

Ramsar Convention: The Ramsar Convention is an international treaty for the conservation and sustainable utilization of wetlands, i.e. to stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value. The convention was developed and adopted by participating nations at a meeting in Ramsar, Iran on February 2, 1971 and came into force on December 21, 1975.

Red List: The IUCN Red List of Threatened Species (also known as the IUCN Red List or Red Data List), created in 1963, is the world's most comprehensive inventory of the global conservation status of plant and animal species. The International Union for the Conservation of Nature and Natural Resources (IUCN) is the world's main authority on the conservation status of species.

The IUCN Red List is set upon precise criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. The aim is to convey the urgency of conservation issues to the public and policy makers, as well as help the international community to try to reduce species extinction.

Major species assessors include BirdLife International, the World Conservation Monitoring Centre, and many Specialist Groups within the IUCN's Species Survival Commission (SSC). Collectively, assessments by these organizations and groups account for nearly half the species on the Red List.

IUCN Red List is widely considered to be the most objective and authoritative system for classifying species in terms of the risk of extinction

The IUCN aims to have the category of every species re-evaluated every five years if possible, or at least every ten years. This is done in a peer-reviewed manner through IUCN Species Survival Commission (SSC) Specialist Groups, which are Red List Authorities responsible for a species, group of species or specific geographic area, or in the case of BirdLife International, an entire class (Aves). There are over 7000 extant species in the 2006 Red List which have not had their category evaluated since 1996. (http://en.wikipedia.org/wiki/IUCN_Red_List accessed 8 Sep 2007).

In the 2007 Red List corals and seaweeds have been assessed and added for the very first time.

The IUCN Categories and Criteria for evaluating extinction risk, originally intended for use at the global level, are increasingly being used at the national level as countries worldwide become increasingly interested in conserving biodiversity. To facilitate this process, the IUCN recently published guidelines for the application of the criteria at sub-global levels (see www.iucn.org/themes/ssc/redlists/regionalguidelines.htm, accessed 14 Sep 2007).

SEA: see 'Strategic Environmental Assessment'

Species trait: Species possess biological traits that reflect how they are born, how they live (including growth, feeding, movement, dispersion, and reproduction), and how they die. These traits have evolved as a consequence of selective pressures exerted by the organism's environment. Certain suites of traits allow species to be successful in a given environment. Species that do not have the required traits do not survive, and disappear from the community. Species traits provide a means of examining the links between biological characteristics and how ecosystems operate.

Strategic Environmental Assessment - SEA: May be considered *an umbrella term for the assessment of the environmental (and increasingly also the social and economic) impacts/dimensions of policies, plans and programmes*.

Various definitions of SEA have been proposed as practitioners and academics have staked claims in this new territory. Amongst them, several are widely quoted in the literature or deserve attention because of their institutional weight (Dalal-Clayton and Sadler, 2004):

SEA is a systematic process for evaluating the environmental consequences of proposed policy, plan or programme initiatives in order to ensure they are fully included *and appropriately addressed at the earliest appropriate stage of decision-making on par with economic and social considerations* (Sadler & Verheem, 1996)

SEA is a process directed at providing the authority responsible for policy development (the 'proponent') (during policy formulation) and the decision-maker (at the point of policy approval) with a holistic understanding of the environmental and social implications of the policy proposal, expanding the focus well beyond the issues that were the original driving force for new policy (Brown and Therivel, 2000).

More recently (although not strictly a definition), after reviewing international experience and its own practice in SEA, the World Bank assigns the following purpose to SEA:

A participatory approach for upstreaming environmental and social issues to influence development planning, decision-making and implementation processes at the strategic *level* (Mercier, 2004).

These definitions also illustrate how interpretation of the concept of SEA is evolving. Early definitions saw SEA as a tool extending its process and procedure upstream from the project to the strategic level, and focusing on the environmental impacts of policies, plans and programmes that are already proposed.

More recent definitions – and the international trend - take a broader, more complex and varied perspective. They see SEA as including the social (and sometimes the economic) dimension. They also promote SEA not just as a means to 'upstream' impact assessment, but as a diagnostic tool to help integrate environmental and social (and even economic) considerations during the formulation of policies and development plans and programmes. In other words, SEA is seen as a key tool for sustainable development.

Taxa: A *taxon* (plural *taxa*), or *taxonomic unit*, is a name designating for an organism or group of organisms. A taxon is assigned a taxonomic rank and can be placed at a particular level in a systematic hierarchy reflecting evolutionary relationships (e.g. family, genus and species). http://en.wikipedia.org/wiki/Taxon

Threatened species: For the past forty years, the World Conservation Union – IUCN – has been maintaining the *IUCN Red List of Threatened Species*. According to their 2004 report (*2004 IUCN Red List of Threatened Species. A Global Species Assessment*), around 844 species have been confirmed extinct since 1500, with 27 of these extinctions recorded within the last twenty years.

In 2007 there are 41,415 threatened species. 12% of birds, 23% of mammals, and 32% of amphibians are threatened with extinction. However, there is also an important gap in threatened species calculations. While 40% of vertebrates have been evaluated, there is still not enough data regarding freshwater system and ocean dwelling species, invertebrates, plants and fungi. In total, scientists have only been able to evaluate about 3% of a total estimated 1.9 million species. Given that, we can assume that the true amount of threatened species is very much higher.

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The 2007 data for South and South-East Asia are presented below with data for Malaysia highlighted (from www.iucnredlist.org/info/tables/table5, accessed 14 Sep 2007):

South & Southeast Asia	Mammals	Birds	Reptiles	Amphi-bians	Fishes	Molluscs	Other Inverts	Plants	Total
Bangladesh	29	26	21	1	12	0	0	12	101
Bhutan	22	16	1	1	0	0	1	7	48
British Indian Ocean Territory	0	0	2	0	7	0	0	1	10
Brunei Darussalam	15	21	4	3	7	0	0	99	149
Cambodia	27	24	11	3	17	0	0	31	113
Disputed Territory	0	0	0	0	1	0	0	0	1
India	89	75	25	63	39	2	20	247	560
Indonesia	146	116	27	33	111	3	28	386	850
Lao People's Democratic Republic	34	22	11	4	6	0	0	21	98
Malaysia	50	40	21	46	47	19	2	686	911
Maldives	1	0	2	0	11	0	0	0	14
Myanmar	39	39	22	0	16	1	1	38	156
Nepal	32	31	6	3	0	0	0	7	79
Philippines	51	67	9	48	58	3	17	213	466
Singapore	4	13	4	0	22	0	1	54	98
Sri Lanka	21	13	8	52	31	0	52	280	457
Thailand	38	43	22	3	50	1	0	86	243
Timor-Leste	1	5	1	0	4	0	0	0	11
Viet Nam	43	38	25	15	31	0	0	146	298

Kelong [1]

ENDNOTES

1 By Yew Kiang Teh.

2 Wikipedia http://en.wikipedia.org/wiki/Dipterocarp

3 Among other considerations the National Policy on Biological Diversity (NPBD) states:

- p. 14: "There is no single comprehensive legislation in Malaysia which relates to biological diversity conservation and management as a whole. Much of the legislation is sector-based."

The National Policy on the Environment states:

- §5.1, p. 29: "All policy-making mechanisms in government for addressing issues related to environment and development will be streamlined and coordinated for effective and efficient implementation, monitoring and feedback".
- §5.2, p. 29: "Environment-related legislation and standards shall be reviewed regularly and revised where necessary to ensure the continued effectiveness and coordination of laws. Particular attention will be paid to effective enforcement.
- §5.3, p. 30: "Ministries and government agencies will be encouraged to establish mechanisms to ensure that environmental considerations are integrated into their development projects and activities".

The 3rd Outline Perspective Plan 2001-2010

- §1.80 "During the OPP3 period, emphasis will be placed on addressing environmental and resource issues in an integrated and holistic manner..."
- §1.81 "…The National Biodiversity Policy will form the basis for integrating and consolidating biodiversity programmes and projects in the country…."

4 From Ashton, 1995.

5 From Article 2 of the Convention on Biological Diversity (CBD): The CBD therefore encompasses all the variability among the building blocks of life (i.e., genetic diversity), different life forms (species diversity) and the interrelationships of life (ecosystem diversity). In other words, the CBD is the legally binding umbrella for all levels and forms of diversity. www.iucn.org/bookstore/HTML-books/EPLP057-expguide-international-treaty/Article1.html

6 Hooper *et al*. 2005.

7 http://en.wikipedia.org/wiki/Ecological_effects_of_biodiversity (accessed 30 Nov 2007).

8 Universities are now developing undergraduate and graduate courses related to collaborative conservation and the emerging ecosystem services paradigm (see for instance International Society for Ecological Economics, Newsletter July 2007, p. 17, at www.ecoeco.org/pdf/Newsletter_2007_July.pdf). Research programmes are also taking on ecosystem services as a prerequisite for resilient forest ecosystems that take into account the knowledge and needs of different users www.mistra.org/download/18.70949694112f07101bc800030958/Mistra+Future+Forest+Call.pdf

9 Only recently have ecologists begun to think in terms of ecosystem services and their determinants, while economists have likewise only very recently begun to incorporate the factors affecting ecosystem services into their valuations of these.

10 Costanza et al. 1997.

11 See for instance: Balmford *et al*., 2002; Costanze *et al*., 1997; Hawkins, 2003; Pimentel *et al.*, 1999; and Salzman *et al*., 2001.

12 Millennium Ecosystem Assessment, 2005.

13 Only policies and plans of direct relevance to NRE and biodiversity planning and management have been consulted at this stage. They correspond to (further details in the *Reference Document*, NRE 2008):

- Vision 2020
- National Vision Policy
- Outline Perspective Plan 3
- National Policy on Biological Diversity
- National Environment Policy
- National Forestry Policy
- 9th Malaysian Plan
- National Physical Plan

14 Vision 2020: "…we must also ensure that our valuable natural resources are not wasted. Our land must

remain productive and fertile, our atmosphere clear and clean, our water unpolluted, our forest resources capable of regeneration, able to yield the needs of our national development.*"*

National Vision Policy (NVP) 2001 – 2010: It has defined seven critical thrusts, of which one is "pursuing environmentally sustainable development to reinforce long-term growth." (OPP3, Chapter 1.14).

OPP3 (2001-2010): informs to be based on NVP (i.e. "pursuing environmentally sustainable development"). The OPP3 is one of few policies clearly referring to other policies in specifically stating that: §181 "The National Biodiversity Policy will form the basis for integrating and consolidating biodiversity programmes and projects in the country.*"*

National Policy on Biological Diversity (1998): has the policy statement: "To conserve Malaysia's biological diversity and to ensure that its components are utilised in a sustainable manner for the continued progress and socio-economic development of the nation." A number of provisions set out how to go about it.

National Policy on the Environment (2002): is based upon eight principles which are all related to environmentally sustainable development.

9th Malaysian Plan (2006-2010): Chapter 22.02, p. 453: "For the Ninth Plan, in line with the ninth principle of *Islam Hadhari* [i.e. "Safeguarding the environment"], environmental stewardship will continue to be promoted to ensure that the balance between development needs and the environment is maintained. Greater focus will be placed on preventive measures to mitigate negative environmental effects at source, intensifying conservation efforts and sustainably managing natural resources."

National Physical Plan (2005): Objective (ii): "To optimise utilisation of land and natural resources for sustainable development".

15 National Policy on Biological Diversity, p. 6, §17- §20; National Policy on the Environment, 2nd Principle, p. 5; 9th Malaysian Plan: §22.02; National Physical Plan: Objective IV, P4.

16 OPP3: §1.80 "… These approaches will, among others, be geared towards addressing the challenges of providing access to clean water, providing adequate food without excessive use of chemicals, using more organic fertilizers, providing energy services without environmental degradation, developing healthy urban environments, and conserving critical natural habitats and resources."

National Policy on Biological Diversity (1998): (§4, p. 10) "Very little of the lowland dipterocarp forests, the largest reservoir of genetic variation of terrestrial flora and fauna, remain and these require total protection, as do the remaining swamp and mangrove forests."

National Policy on the Environment (2002):

"Second Principle – Conservation of Nature's Vitality and Diversity: Conserve natural ecosystems to ensure integrity of biodiversity and life support systems"

"Green Strategy 2 – Effective Management of Natural Resources and the Environment."

§2.1 "A national inventory and audit of environment and natural resources will be maintained and regularly updated, with particular emphasis on depletion and renewability, to serve as a guide to policy formulation and decision-making. Appropriate environmental monitoring systems shall be established to facilitate the evaluation of programmes and projects".

With §2.1 in place it will be fairly straightforward to achieve the following paragraph.

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

9th Malaysian Plan (2006-2010):

§22.20 "…The strategic thrusts for addressing environmental and natural resources issues will focus on [here only referring to two out of six thrusts]:

- Promoting a healthy living environment
- Utilising resources sustainably and conserving critical habitats"

§22.30 "*Biodiversity*. Efforts will be intensified to protect critical habitats. Towards this end, existing management plans will be reviewed to further strengthen the protection of threatened flora and fauna…"

National Physical Plan (2005): Chapter 5.6: "Although these PA already comprise various habitats/ecosystems, the distribution of reserves reveals that some habitats/ecosystems are seriously under-represented, namely wetlands and lowland dipterocarp forests. Moreover, despite these PA being gazetted, there are provisions that allow degazettement for short-term economic uses".

NPP20: "Sensitive coastal ecosystems shall be protected and used in a sustainable manner".

[17] National Policy on Biological Diversity (1998):
Strategy 5, Action 1: "Expand the network of in-situ conservation areas to ensure full representation of ecosystems and all ecological processes therein."
National Policy on the Environment (2002): See comments under Endnote 16 which (paraphrased) state that "conservation and protection" should include "rich habitats and ecosystems".
National Physical Plan (2005): NPP18, IP8: Environmental Sensitive Areas (measures): (v) "The Protected Areas (PA) network shall be enlarged to include a full representation of the diversity of natural ecosystems, particularly the lowland dipterocarp forests and wetlands…."

[18] OPP3: §1.81 "…Steps will be taken to formulate integrated river basin management plans to improve water quality and supply as well as manage water resources. To ensure sustainability of coastal resources, integrated coastal management plans will be introduced in all states."
National Policy on Biological Diversity (1998):
Strategy 10, Action 1: "Identify major sources of biological diversity loss such as forest damage or degradation, overfishing, pollution of marine resources, development that disrupts primary forest or catchment areas, destruction of mangrove areas and coral reefs, and act to minimise these sources."
National Policy on the Environment (2002): §2.7 "For river basin management and related development projects, specific procedures for planning, including beneficial-use classification, coordination, and monitoring measures, shall be incorporated to ensure sustainability."
9th Malaysian Plan (2006-2010):
§22.22 "*Water Quality*. The utilisation of the integrated river basin management (IRBM) approach will be intensified to improve river and groundwater quality…"
National Physical Plan (2005):
NPP30, IP14: Water Resources and Water-Stressed Areas (Measures): (iii) "Integrated Water Resource Management (IWRM) and Integrated River Basin Management (IRBM) are to be adopted as input of land use planning".
Chapter 2.3 Principles, P8 Avoid disrupting ecological stability: "…. Water resource management based on the concept of Integrated River Basin Management (IRBM) should be exercised".

[19] OPP3:
§1.80 "During the OPP3 period, emphasis will be placed on addressing environmental and resource issues in an integrated and holistic manner. …"
§1.81 "…The National Biodiversity Policy will form the basis for integrating and consolidating biodiversity programmes and projects in the country…"
National Policy on Biological Diversity (1998):
§22, p.15. "Having ratified the Convention on Biological Diversity on 24th June 1994, Malaysia must incorporate into the national policy the set of commitments under the treaty. The Convention reaffirms the sovereign rights of States over their biological resources and their responsibility for conserving their biological diversity and utilizing the biological resources in a sustainable manner. To achieve the above, they must develop national strategies, plans or programmes. As far as possible and where appropriate, these must be integrated into sectoral or cross-sectoral plans, programmes and policies."
Strategy 6: Integrate Biological Diversity Considerations Into Sectoral Planning Strategies: "Ensure that all major sectoral planning and development activities incorporate considerations of biological diversity management".
Strategy 2, Action 3: "Ensure the development of sectoral and cross-sectoral policies, plans and programmes which integrate considerations of biological diversity conservation and sustainable use".
Strategy 6, Actions 1 to 7: Include extensive provisions for cross-sectoral integration; analysis of plan/strategy on biodiversity; review of sector PPPs; incorporation of biodiversity into long-term and medium-term plans; efficient dissemination of relevant information; etc.
National Policy on the Environment (2002):
"Green Strategy 3 – Integrated Development Planning and Implementation: Environmental considerations will be integrated into all stages of development, programme planning and implementation and all aspects of policy making."
§3.1 to §3.5: Include extensive provisions for integrated development planning by mainstreaming of biodiversity and environment into plans at all levels. It also states that "a national natural resource accounting system will be devised and implemented to ensure a balanced perspective of the role of environment and natural resources in relation to overall development plans and strategies". Moreover, "environmental considerations will be integrated into policies, programmes, plans and project formulation as well as implementation, through a comprehensive assessment process, taking into account social, ecological and health effects." Finally, it

establishes the also important need to make linkages to different spatial scales to ensure that both economic as well as environmental protection objectives are met.

9th Malaysian Plan (2006-2010): §22.02 "…Emphasis will be given to the fostering of closer cooperation between stakeholders in addressing environmental concerns. Environmental planning tools such as environmental impact assessments (EIA), strategic environmental assessments (SEA), cost-benefit analysis, market-based instruments and environmental auditing will be increasingly applied in evaluating and mitigating environmental impacts of development activities."

National Physical Plan (2005): implicit measure to take for Environmental Sensitive Areas.

20 Balvanera *et al*. 2006.

21 See IPCC, 2007.

22 See for instance: www.greenfacts.org/en/biodiversity/#2 (accessed 29 Nov 2007); www.ecology.info/biodiversity-ecosystems.htm (accessed 29 Nov 2007) and www.iucnredlist.org/info/publications_links (accessed 29 Nov 2007).

23 Bishop *et al*. 2004.

24 The Millennium Ecosystem Assessment (MA) is the most comprehensive assessment on the links between ecosystem health and human well-being ever undertaken. The assessment was designed to meet the needs of decision-makers and the public for scientific information concerning the consequences of ecosystem change for human well-being and options for responding to those changes. The MA was launched by United Nations in 2001 and was completed in 2005. See further at: www.millenniumassessment.org/en/index.aspx (Guide to Assessment Reports, accessed 1 Dec 2006).

25 See for instance: Balvanera *et al*., 2006; Chapin *et al*., 2000; Naeem *et al*., 1999; Hooper *et al*., 2005; McCann, 2000.

26 DWNP/Danced, 1996.

27 In 1968 the Federal Game Department established that 81% of mammals are dependent on intact habitat below 600 metres. A little more than half the mammals do not go to higher altitudes than 300 m and are dependent on intact habitat below that level (Stevens, 1968).

28 Wei & Ounsted. 2007.

29 According to the Convention on Biological Diversity (CBD) a Protected Area (PA) is a: *Geographically defined area which is designated or regulated and managed to achieve specific conservation objectives* (Article 2).
IUCN states that a PA is: *An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means* (IUCN, 1994).
In practice, however, these definitions are only marginally different and Parties to the CBD *obviously* see no conflict between them as evidenced by their support for the IUCN 'Protected Areas Management Categories' during the 7th Conference of Parties in Kuala Lumpur 2004 . Both definitions consider Protected Areas (Bishop *et al*., 2004):

- To be area-based concepts that might be found anywhere
- To focus on conservation objectives
- To require specific measures (dedication, designation, regulation) for the purposes of biodiversity conservation (i.e. protection and maintenance)
- To require management, delivered through legal or other effective means
- By implication, to require that some kind of management authority is in place to secure conservation.

30 For further details see: Davey, A G. 1998.

31 A fundamental principle for Protected Areas and a Protected Areas System is the permanence of the site. State government may today excise parts of the Permanent Forest Reserve (PFR) provided they offer replacement areas (which do not need to have forest). For the non-production part of the PFR, gazetted catchments, and other areas to contribute to a Protected Areas System it must clear for all parties involved that it is an inviolable decision due to the long-term planning nature required for natural resource and biodiversity assets. See also the following Footnote.

32 Systematic conservation planning involves assessing existing Protected Areas and – if necessary – complement these to ensure (for further details, see NRE, 2008):

- Representativeness, comprehensiveness and balance
- Adequacy
- Consistency
- Cost effectiveness, efficiency and equity

- Coherence and complementarity

While these characteristics define the System overall, they also serve as criteria against which individual areas can be assessed for their potential and actual contribution to the System relative to other areas. In applying these criteria and selecting System components, consideration should be given to questions of irreplaceability and flexibility.

33 From Fox JED. 1972. *The natural vegetation of Sabah and natural regeneration of the dipterocarp forests.* PhD thesis. University of Wales.

34 In 2005 the timber industry contributed about 2.9% of Malaysia's Gross Domestic Product and 5% of its total export earnings. Additionally, it provides added income and employment opportunities through downstream processing and the development of value-added products for the domestic and export markets. www.ceicdata.com/google/Malaysia_Timber.htm (accessed 24 October 2007).

35 See further in: Foley *et al*. 2005.

36 Lindenmayer & Franklin. 2006.

37 Today practically all chemicals produced on land have found their way into the marine systems – in large part through the drainage of rivers into the sea. Riparian vegetation helps to reduce not only sediment load in the rivers but also waterborne pollution.

38 The *Reference Document* also includes information which overwhelmingly confirms that the presented management interventions comply with existing Policy and Plan provisions (i.e. Table 2 in Annex 1 of NRE, 2008).

39 By Thomas Sui. From FD/Danced, 1999.

40 See for instance SEA cases 5.1 to 5.3 in Dalal-Clayton & Sadler (2004). They correspond to: *Slovak Energy Policy* (pp. 190); *Framework SEA of the Polish National Development Plan 2004 – 2006* (pp. 194); and *SEA of Energy Policy of the Czech Republic* (pp. 199). Several countries apply SEA to long-term national policies and plans including Australia and Canada. As far as the EU is concerned policies are not part of the EU SEA Directive (2004) but several countries have their own systems in place (e.g. Denmark, Finland, Netherlands and UK).

41 By Teh Yew Kiang. From FD/Danced, 1997.

Mah Meri Mask [1]

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The *Common Vision on Biodiversity* has been prepared in a consultation process between NRE, line agencies and key stakeholders to natural resource and biodiversity assets.

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This document outlines a *Common Vision on Biodiversity* of the Ministry of Natural Resources & Environment - NRE.

Its main audience is planners, decision-makers and practitioners at all levels of federal, state and local government. It explains what biodiversity is, why it is important, how to keep it and what measures are required to ensure a constant provision of ecosystem services essential for human livelihood.

The Common Vision on Biodiversity responds to provisions and priorities contained in existing government policies, plans and programmes but it is chiefly concerned with implementation and operational aspects in pursuit of sustainable development. Importantly, it also serves to rally support for a shared perception of issues, priorities and required inter-agency actions throughout the government apparatus and civil society.

This summary is based on a more comprehensive paper with the subtitle *Reference Document* which hopefully will appeal to not only practitioners but also managerial staff keen on further exploring the important topics mentioned here.

Also available is an *Executive Summary*.

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