

MALAYSIA'S NATIONAL POLICY ON BIOLOGICAL DIVERSITY

(Official declaration: Thursday, April 16 1998, Kuala Lumpur, Malaysia,
Ministry of Science, Environment and Technology)

VISION

TO TRANSFORM MALAYSIA INTO A WORLD CENTRE OF EXCELLENCE IN CONSERVATION,
RESEARCH AND UTILISATION OF TROPICAL BIOLOGICAL DIVERSITY BY THE YEAR 2020.

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.

PRINCIPLES

Conservation and sustainable utilisation of the nation's biological diversity will be based on the following principles:

- (i) The conservation ethic, including the inherent right to existence of all living forms, is deeply rooted in the religious and cultural values of all Malaysians;
 - (ii) Biological diversity is a national heritage and it must be sustainably managed and wisely utilized today and conserved for future generations;
 - (iii) Biological resources are natural capital and their conservation is an investment that will yield benefits locally, nationally and globally for the present and future;
 - (iv) The benefits from sustainable management of biological diversity will accrue, directly or indirectly, to every sector of society;
 - (v) The sustainable management of biological diversity is the responsibility of all sectors of society;
 - (vi) It is the duty of Government to formulate and implement the policy framework for sustainable management and utilisation of biological diversity in close cooperation with scientists, the business community and the public;
 - (vii) The role of local communities in the conservation, management and utilisation of biological diversity must be recognized and their rightful share of benefits should be ensured;
 - (viii) Issues in biological diversity transcend national boundaries and Malaysia must continue to exercise a proactive and constructive role in international activities;
 - (ix) The interdependence of nations on biological diversity and in the utilisation of its components for the well-being of mankind is recognized. International cooperation and collaboration is vital for fair and equitable sharing of biological resources, as well as access to and transfer of relevant technology;
 - (x) Public awareness and education is essential for ensuring the conservation of biological diversity and the sustainable utilisation of its components;
 - (xi) In the utilisation of biological diversity, including the development of biotechnology, the principles and practice of biosafety should be adhered to.
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OBJECTIVES

- (i) To optimise economic benefits from sustainable utilisation of the components of biological diversity;
 - (ii) To ensure long-term food security for the nation;
 - (iii) To maintain and improve environmental stability for proper functioning of ecological systems;
 - (iv) To ensure preservation of the unique biological heritage of the nation for the benefit of present and future generations;
 - (v) To enhance scientific and technological knowledge, and educational, social, cultural and aesthetic values of biological diversity;
 - (vi) To emphasize biosafety considerations in the development and application of biotechnology;
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RATIONALE

Biological diversity is usually considered at three levels: genetic diversity, species diversity and ecosystem diversity.

- (i) Genetic diversity is the diversity within species, as measured by the variation within genes of individual plants, animals and microorganisms. Genetic diversity occurs within and between populations of a species
- (ii) Species diversity refers to the variety of living organisms on earth
- (iii) Ecosystem diversity refers to the variety of habitats, biotic communities and ecological processes in the terrestrial, marine and other aquatic environments.

2. Much of the nation's biological diversity has yet to be investigated and documented. Lack of data impedes efforts to better utilise the nation's biological resources. Continuing habitat destruction is leading to loss of the nation's biological diversity even before much of it could be documented. Loss of biological diversity would include loss of species with the potential to be developed into useful products.

3. This biological diversity has important economic, technological and social implications for the nation. Of particular significance are :

- (i) Economic Benefits
- (ii) Food Security
- (iii) Environmental Stability
- (iv) National Biological Heritage
- (v) Scientific, Educational and Recreational Values
- (vi) Biosafety

Economic Benefits

4. The diversity of biological resources provides direct economic benefits. This biological diversity provides timber and non-timber goods in the forestry sector, food and industrial crops in the agricultural sector, and food in the fisheries sector.

5. Agriculture, forestry and fisheries have been major contributors to national wealth creation. They contributed 13.6 percent of the national gross domestic product in 1995, and accounted for nearly 16 percent of total employment and 12.1 percent of total export earnings. Export of major timber products totalled RM 9.9 billion in 1995. Export earnings from three major agricultural commodities alone - rubber, palm oil and cocoa - totalled RM 14.0 billion in 1995. The contribution from the fisheries sector to the gross national product was RM 2.0 billion in 1995. The tourism industry relies on the country's diverse and unspoilt natural beauty, including unique species of plants and animals in national parks, wildlife reserves, bird parks and in marine parks and the adjacent coral reefs. In 1994, tourism contributed RM 8.3 billion to the national economy.

6. Even with the important structural transformations occurring with industrialisation, these economic sectors will remain important. Agricultural activities will not only continue to earn foreign exchange from commodity exports, but will also form the base for expanded and value-added activities throughout Malaysian industry.

The narrow genetic base of the industrial crops requires introduction of exotic genetic variability for future crop improvement.

7. The diversity of our indigenous fruit species has not been fully exploited. Crops such as durian and banana are good export earners. However, others such as citrus, rambutan, duku, langsung, mangosteen and cempedak have not been fully exploited for the export market.

8. Certain indigenous plants, animals and their derivatives have long been used in traditional medicine in Malaysia. For example, roots of "tongkat ali" (*Eurycoma longifolia*) contain biologically active compounds having the potential to be developed as antimalarial drug. Many plants, not presently used in traditional medicine, also contain biologically active compounds that are likely to be the starting materials for a large number of drugs. The crude extract of the bark of "bintangor" (*Calophyllum lanigerum*) contains the active component against the HIV virus. There is therefore, a need for the nation, endowed with rich biological diversity and steeped in a traditional healing culture, to develop the economic potential of the medicinally useful plants. Nearly one quarter of medicine prescribed in the United States of America are of plant origin, for example, and the market for plant-derived pharmaceuticals is estimated at US\$9 billion per year in the United States alone. In the OECD (Organisation for Economic Cooperation and Development) countries, the total retail value of plant-based drugs was US\$43 billion in 1986.

9. Biotechnology is a multi-billion ringgit industry worldwide, and has been identified by the Government as an area of high priority. Advances in this field could lead to crop and livestock improvement through genetic engineering. They could also result in the development of products such as pharmaceuticals, antibiotics and vaccines from the components of biological diversity.

10. Floriculture is a multi-million ringgit industry. Presently, it involves mainly exotic flowers and local orchids. There is great potential for promoting indigenous flowers from our forests. The world market for cut flowers and potted plants is worth billions of US dollars and the annual growth rate is about 10%. With the right strategy, Malaysia could capture a large slice of this market.

Food Security

11. Food is a basic necessity. For the nation to progress and develop, it must ensure the availability of food. This is a major objective of the National Agricultural Policy.

12. Plants and animals including fish, are the pre-eminent source of food. Malaysia is particularly rich in biological diversity. It is thought to harbour some 185,000 species of fauna and about 12,500 species of flowering plants. Only a handful of species have been utilised for food production at the global level, but Malaysia harbours many potential species which could be developed into food sources in the future.

13. Humans derive almost 60% of their calories and proteins from three species of plants, viz. maize, wheat and rice. During the period 1986-88, 2665 calories per capita per day was available to Malaysians and cereals supplied 45.9 percent of this amount. Cereals also supplied 42.7 percent of the available protein supply of 24.6 gm per capita per day during the said period.

14. Rice is an important staple food for Malaysians, and a number of wild species and landraces of rice are found in the country. Protection of such biological diversity is critical for the breeding of improved varieties with higher yield and/or resistance to pests and diseases.

15. A variety of beneficial organisms and their habitats are important for ensuring the protection and productivity of our crops. Bats and weevils are important pollinators of durian and petai, and oil palm respectively. In biological control of pests, owls and snakes control rat populations in rice fields and oil palm plantations. Strict control over the introduction of pests and diseases from abroad is also necessary to ensure the protection and productivity of our crops.

16. Mangrove swamps are feeding and nursery grounds for fisheries, and are the habitats of several of our important commercial fishes and shrimps that are important sources of protein for the nation. This habitat requires protection for ensuring food security.

Environmental Stability

17. Biological diversity includes one or a combination of species and richness; species interactions; interactions between organisms and the non-living components of the environment; behaviour; life-history and physiological diversity; physical diversity of a habitat, made up of the diverse shapes and movements of different organisms; the sum of all the biological diversity of all the different habitats or ecosystems in an area. It is in maintaining this complexity in ecosystems that there is environmental stability and consequently ecological services of value to human society assured.

18. Ecological services, functions beneficial to humanity derived from ecosystems, include improvement of air and water quality, maintenance of hydrological regimes, soil generation, soil and watershed protection, recycling of nutrients, energy supply, carbon sequestration and oxygen release. The variety of biological organisms in ecosystems helps to stabilise the environment, thus maintaining ecological services and providing human societies with a wide range of essential and basic amenities such as habitable environments, materials, water supply and productive soils in a sustainable manner, and aesthetic and recreational opportunities.

19. A natural asset of Malaysia is, therefore, its wealth in biological diversity. Reduction in this biological diversity will upset the balance within ecosystems as it is generally accepted that a certain amount of species and genetic diversity is needed to uphold the cyclical relations within the ecosystems and hence maintain ecological services. Losing diversity means losing the ecosystem resilience, leading to adverse effects on human lives. Loss of genetic resources, floods, deterioration in quantity and quality of water supply, decline in food supply, loss in productive soils, and loss in potentially useful biological resources are some of the detrimental effects of the reduction in or loss of biological diversity.

20. There has probably been a general reduction in genetic diversity of flora and fauna in Malaysia, as a result of intensification of forest conversion to cash-crop agriculture beginning in the early 1970s. This is best illustrated by the reduced population levels of fauna. The Sumatran rhinoceros, which occurs in small numbers at several locations in the peninsula, has a viable breeding population only in Taman Negara and the Endau-Rompin forests. The Javan rhinoceros became extinct in the

peninsula in 1932 due to poaching. The tiger population in the peninsula has dwindled to about 500 from about 3,500 in the early 1950s. The "seladang" (gaur) population is down to about 500 individuals scattered across several reserves. About 1,200 elephants remained in 1992, scattered over several states.

National Biological Heritage

21. Malaysia is one of the twelve "megadiversity" countries of the world. These countries together contain at least 60 percent of the world's known species. The island of Borneo containing the states of Sabah and Sarawak has been listed as one key area for endemism.

Flora

22. The flora of Malaysia is exceedingly rich and is conservatively estimated to contain about 12,500 species of flowering plants, and more than 1,100 species of ferns and fern allies. Many of these are unique and are found nowhere else in the world. In Peninsular Malaysia, for example, well over 26% of the tree species are endemic. Higher endemism is expected in the herbaceous flora with some of the larger genera estimated to be endemic in more than 80% of their species. Many endemic plants are localised in their distribution, being found only in a few valleys or mountain tops.

23. Much remains to be known of the flora of the country, especially of lower plants such as the bryophytes, algae, lichens and fungi. The fungi constitute the major plant diversity of the country but the total number of species is not known.

24. The terrestrial flora, as well as fauna, are found in a range of habitats and ecosystems from the lowlands to the top of the highest mountains, and in a wide range of forest types. These forest types form the cradle of the country's biological diversity. The lowland dipterocarp forest is extremely rich in species diversity. For example, 814 species of woody plants of 1 cm diameter and larger were found in a 50 hectare area in such a forest type. Now not much remains of this forest type due mainly to agricultural expansion.

25. Endemism in plant species is high in freshwater habitats. In Peninsular Malaysia, for example, 80 species in freshwater swamps and 27 species in river systems are known to be endemic. Another 70 and 41 species respectively are known to be rare.

26. The marine ecosystem surrounding the country's landmass, which includes the coral reefs, is extremely rich in the variety of life-forms. The coral reef community in Malaysia is considered to be one of the most diverse in the world. But the marine flora and fauna have been poorly documented. The flora include phytoplankton, seaweeds and sea grasses.

Fauna

27. There is an even greater diversity of fauna in the country. In the vertebrates, there are about 300 species of wild mammals, 700-750 species of birds, 350 species of reptiles, 165 species of amphibians and more than 300 species of freshwater fish. Endemism in the states of Sabah and Sarawak is higher than in Peninsular Malaysia. While there are about 1,200 species of butterflies and 12,000 species of moths in Malaysia, little is known of other groups. A conservative estimate is that there are more than 100,000 species of invertebrates.

28. Freshwater habitats such as the lowland slow-flowing streams and upland rivers with water torrents support a diverse aquatic invertebrate fauna and a variety of fish. Marine fauna include fish, cuttlefish, squids, sea urchins, giant clams, sea cucumbers, copepods, segestid shrimps, arrow worms and many other large and small organisms.

Microorganisms

29. This group is very poorly known. This lack of information is a global phenomenon.

Genetic resources

30. Malaysia is rich in plant genetic resources. As an example, fruit resources are very diverse in the country. There are 28 species of durian (*Durio*) and its relatives in Malaysia. All with the exception of *D. zibethinus* are wild. The mangoes are equally rich, with 22 species, and only three or four of these are being utilised. There are 49 species of mangosteen and its wild relatives in Peninsular Malaysia but only *Garcinia mangostana* is popularly eaten. Other examples of large genera with edible fruits include *Artocarpus* (cempedak) and *Nephelium* (rambutan).

31. Available information on animal genetic resources relate to livestock or farm animals. Malaysian jungle fowls, wild pigs, swamp buffaloes, Kedah-Kelantan cattle and local goats are considered true indigenous animals of Malaysia. Non-indigenous animals are mainly breeding chickens, pigs, cattle and goats which have been imported into this country from all over the world. Importation of these animals has enriched the gene pool of the different species considerably.

The Cultural Heritage

32. The rich biological resources have given rise to a rich cultural heritage of sustainable use amongst the indigenous people of Malaysia, especially those dependent on the forest for their livelihood. The elements of the rich cultural heritage, which relate to nature, are reflected in handicrafts, the belief and religious system and the use of plants and animals of the forest. The indigenous people of Sarawak, for example, have for generations used the sago of a palm (*Eugeissona utilis*) found in the forest.

Scientific, Educational and Recreational Values

33. Much of our biological diversity has yet to be scientifically investigated. There is a need to enhance efforts in research and development. Our scientific base needs to be developed and strengthened so that opportunities in fields such as genetics, biotechnology, pharmaceuticals, agriculture and fisheries could be fully explored.

34. Malaysia's biological diversity will continue to provide the resources for training and education for an increasing number of Malaysians. This will be at all levels, from school education to university, and in industrial training and in public awareness.

35. Biological diversity is protected in national and state parks, wildlife sanctuaries and other conservation areas. These protected areas also provide recreational and ecotourism opportunities.

Biosafety

36. The creation, transportation, handling and release of genetically modified organisms (GMOs) carry certain environmental, safety and health risks that are still inadequately understood. For instance, the introduction of GMOs could have adverse effects on ecological stability in forests and farms, in unintended or unpredictable ways, if the process is not properly controlled. Genetically modified plants may interbreed with wild relatives and their progeny could become pests. The release of GMOs may have adverse natural feedback as our knowledge of their population dynamics is limited. Biosafety concerns should thus receive high priority. In the development of biotechnology, especially genetic engineering, there must be corresponding development of an adequate regulatory framework for biosafety.

STATUS OF CONSERVATION AND MANAGEMENT OF BIOLOGICAL DIVERSITY

Overview

Malaysia's location in the humid tropics provides a favourable climate to support rich and diverse life forms, from the microscopic organisms such as bacteria and plankton to macroscopic species such as fishes, birds and mammals.

2. Within the terrestrial ecosystems, forests are the major repository of biological diversity. Over 90 percent of terrestrial biological species in Malaysia occur within natural forests. In comparison, agricultural land, which supports a number of flora and fauna with commercial values, is characterised by low species diversity.

3. Aquatic ecosystems include both freshwater and marine environments. Coral reefs and coastal mangroves have been identified as very important in terms of biological diversity. These are habitats which support diverse forms of life and are very productive.

4. Over the period 1970 to 1992, natural forest in the whole of Malaysia was reduced by 19.3 percent, mainly in conversion to the agricultural crops, oil palm and rubber. The forests cleared, with irreversible loss of biological diversity, were predominantly lowland dipterocarp forests and, to a lesser extent, swamp forests, both peat and freshwater, and mangrove forests. 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. Loss of these habitats still continues as most development plans relegate the notion of conservation to low priority status.

5. The genetic base of our important agricultural crops is narrow. Malaysia relies on exotic germplasm, especially of rubber, oil palm, cocoa and pepper, for crop improvement. Further narrowing of the genetic base would lead to stagnation in the development of these commodity crops as well as require increased vigilance against pests and diseases.

In-situ Conservation

6. To protect and conserve the diversity of biological species in Malaysia, a number of *in-situ* measures have been instituted. These, to maintain plants and animals in their original habitats, have to take into consideration as many representative natural ecological habitats as possible to sustain breeding populations of flora and fauna.

7. The network of protected areas on land, as of 1992, includes 2.12 million hectares of National and State Parks, Wildlife Sanctuaries, Turtle Sanctuaries and Wildlife Reserves. Another 3.43 million hectares of natural forest within the Permanent Forest Estate of 14.28 million hectares are protected as water catchment areas. The network of Virgin Jungle Reserves in Peninsular Malaysia and Sabah protects a limited range of biological diversity in small forested areas as gene pools within larger (usually commercial) forest reserves or agricultural areas.

8. By the end of 1994, the surrounding marine waters of 38 offshore islands in Peninsular Malaysia and Labuan had been gazetted as marine parks. In addition, one

national park in Sarawak, three in Sabah and one state park in Terengganu protect coastal and marine ecosystems.

9. These conservation efforts are inadequate for a number of reasons:
- (i) Several important habitats are under-represented. For example, wetlands such as mangrove forests, peat swamps and freshwater swamps are not adequately protected. Apart from being important as resting places for migratory birds, in regulating the hydrological regime, and in supporting fisheries, these habitats also support some unique flora and fauna because of their distinctive characteristics at the interface of terrestrial and aquatic systems. Limestone and quartz hills are other examples of unprotected habitats.
 - (ii) Conservation efforts of individual species are targeted towards large animals, and to some extent birds. There is little emphasis on the conservation of individual species of plants, insects or fish (marine and freshwater). This is due mainly to the lack of adequate knowledge.
 - (iii) Conservation is given low priority in existing land-use policies resulting in competition for land utilisation.
 - (iv) The establishment of marine parks in Peninsular Malaysia focuses on aquatic considerations. Additional attention must be accorded to the adjoining terrestrial components as these too, if unduly disturbed, will have negative impacts on the marine ecosystem.
 - (v) Common marine and terrestrial biological resources (e.g. in transboundary areas) lack adequate regional and international cooperation in their conservation and management.
 - (vi) Efforts at conservation of landraces of indigenous plant species such as fruits and rice are inadequate, and these landraces are being eroded at a rapid rate.

***Ex-situ* Conservation**

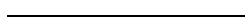
10. *Ex-situ* conservation maintains species outside their original habitats in facilities such as arboreta, zoological gardens, seed genebanks, *in vitro* genebanks and field genebanks. Seed genebanks are considered safe and cost

effective for seed-producing crop species. Field and *in vitro* genebanks are particularly useful for species with seeds that are difficult to store.

11. *Ex-situ* conservation makes it easier for scientists to access, study, distribute and use plant genetic resources.

BOX 1 : EXAMPLES OF <i>EX-SITU</i> CONSERVATION IN MALAYSIA	
ARBORETA	medicinal plants fruit trees timber species ornamentals
SEED GENE BANKS	rice
FIELD GENE BANKS	vegetables rubber oil palm cocoa fruit trees coconut orchid
<i>IN VITRO</i> GENE BANKS	sweet potato cassava
CAPTIVE BREEDING CENTRES	timber species Sumatran rhinoceros seladang sambar deer
REHABILITATION CENTRES	orang-utan
TURTLE SANCTUARIES	marine turtle
TURTLE HATCHERIES	river terrapin marine turtle

12. Currently, *ex-situ* conservation of plants, including timber species, is solely in arboreta and small collection centres. Animals are being maintained in zoos, rehabilitation centres and captive breeding centres. Collections of specific microorganisms are deposited in universities and research institutions.



BOX 2 : EXAMPLES OF EX-SITU COLLECTION CENTRES IN MALAYSIA	
Johor	Research Station, Palm Oil Research Institute Malaysia, Kluang
Malacca	Zoo, Air Keroh
Penang	Botanic Gardens Rice Genebank, Malaysian Agricultural Research & Development Institute, Seberang Perai
Perak	Terrapin Hatchery, Bota Kanan
Sabah	Agriculture Research Station, Ulu Dusun Arboretum, Forest Research Centre, Sepilok Orang-Utan Rehabilitation Centre, Sepilok Orchid Centre and Agriculture Research Station, Tenom Sabah Parks Orchid Garden, Poring
Sarawak	Botanical Research Centre, Semengoh Sungai Sebieu Agricultural Park, Bintulu Wildlife Rehabilitation Centre, Semengoh
Selangor	Arboreta, Forest Research Institute Malaysia, Kepong Bukit Cahaya Agricultural Park, Shah Alam Captive Breeding Station, Sungai Dusun Experimental Station, Rubber Research Institute Malaysia, Sungai Buloh Medicinal Plant Garden, Universiti Pertanian Malaysia, Serdang Orchid Collection, Malaysian Agricultural Research & Development Institute, Serdang Taman Pantun, Universiti Kebangsaan Malaysia, Bangi Zoo Negara, Ulu Kelang
Federal Territory	Rimba Ilmu, Universiti Malaya, Kuala Lumpur
Terengganu	Turtle Sanctuary, Rantau Abang

13. Whilst there are a number of *ex-situ* plant collection centres distributed around the country, there is an urgent need for a national botanical garden.

Sectoral Policies

14. Development activities in the various economic sectors have profound impacts on biological diversity. To minimize such adverse impacts and to promote the conservation of biological diversity and the sustainable development of its components, it is essential that such considerations are incorporated into development plans at the planning stage itself. Biological diversity considerations be addressed as an important component in policy documents to ensure effective coordination and integration. The development plans concerned are the Five-year Development Plans and the Second Outline Perspective Plan (1991-2000) which embodies the New Development Policy.

The Legislative Framework

15. 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, for instance, the Fisheries Act 1985 deals mainly with the conservation and management of fisheries resources, the Protection of Wild Life Act 1972 deals with the protection of wildlife, and the National Forestry Act 1984 deals with the management and utilization of forests alone. Some were legislated without specific consideration given to the issue of conservation and management of biological diversity as a whole. The legislation is also inadequate in that species endangered due to habitat destruction are not protected by way of a national law for endangered species.

16. The most distinct feature of the legislative framework relating to biological diversity is that under the Federal Constitution, the authority to legislate for matters relevant to biological diversity does not fall under one single authority. Although some responsibilities in respect of issues related to biological diversity conservation and management are shared between the Federal and State authorities, some others do fall under the responsibility of one authority alone, be it the Federal or State authority. This is specified by the Federal Constitution, under the Federal, Concurrent and State List of the Ninth Schedule. Thus there are some matters, for example, protection of wild animals and wild birds, and National Parks, which fall under the legislative authority of both the Federal and State Governments, in accordance with the Concurrent List of the Ninth Schedule. However, there are also some matters which fall under the legislative authority of the State alone, for example forest and agriculture. Furthermore, in respect of Sabah and Sarawak, the Concurrent and State Lists are modified.

17. To the extent that some laws are federal legislation and some are state enactments, in sum this means that not all legislation enacted will apply to the whole of Peninsular Malaysia, Sabah and Sarawak. Since this is the constitutional position, the question of how uniformity of laws may be promoted, particularly in respect of matters which fall under State jurisdiction alone, needs to be properly addressed.

18. As an example, among the legislation relevant to biological diversity, the Environmental Quality Act 1974 and the Fisheries Act 1985, being federal legislation, may apply to Peninsular Malaysia, Sabah and Sarawak as well. However, there are other relevant enactments which are specific either to Peninsular Malaysia, Sabah or Sarawak, covering for example, native peoples' rights, forestry, protected areas and wildlife.

19. From the viewpoint of effective conservation and management of biological diversity and in light of the above, it appears that the current legislative framework creates some restrictions, thereby causing some deficiencies.

20. Firstly, there is an absence of an integrative approach across the sectors, due to the limited scope of various enactments in relation to biological diversity conservation. There is also lack of consideration of the overall objectives of biological diversity conservation. Secondly, this results in a lack of comprehensive coverage of biological diversity issues. Finally, the areas of jurisdiction of Federal and State Governments as defined in the Constitution lead to non-uniform implementation between states.

BOX 3 : PARTIAL LIST OF LEGISLATION RELEVANT TO BIOLOGICAL DIVERSITY

Federal	Environmental Quality Act 1974 Fisheries Act 1985 Pesticides Act 1974 Plant Quarantine Act 1976 Customs (Prohibition of Exports)(Amendment) (No.4) Order 1993
Peninsular Malaysia	Waters Act 1920 Taman Negara (Kelantan) Enactment 1938 Taman Negara (Pahang) Enactment 1939 Taman Negara (Terengganu) Enactment 1939 (The State Parks from the above three Enactments constitute Taman Negara) Aboriginal Peoples Act 1954 Land Conservation Act 1960 National Land Code 1965 Protection of Wildlife Act 1972 National Parks Act 1980 National Forestry Act 1984
Sabah	Parks Enactment 1984 Forest Enactment 1968 Fauna Conservation Ordinance 1963
Sarawak	National Parks Ordinance 1956 Wildlife Protection Ordinance 1958 Forests Ordinance 1954 Natural Resources Ordinance 1949 as amended by Natural Resources and Environment (Amendment) Ordinance 1993 Public Parks and Greens Ordinance 1993 Water Ordinance 1994

International Cooperation and Linkages

21. *The Langkawi Declaration on the Environment and Development* of 1989 by the Heads of Government of Commonwealth countries marked a significant step in the evolution of Malaysia's prominent role in environmental issues in international fora. This role was further strengthened in the negotiations leading to the United Nations Conference on Environment and Development (UNCED) in June 1992 in Rio de Janeiro, Brazil. Our international role must be complemented with decisive action at the national level.

22. 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.

23. Further, the parties to the Convention must, in accordance with their capabilities, provide financial support and incentives to their national activities to achieve the objectives of the Convention. They must present to the Conference of Parties reports on measures taken for the implementation of the provisions of the Convention and their effectiveness in meeting the objectives.

24. In addition to the *Convention on Biological Diversity*, Chapters 15 and 16 of Agenda 21 are devoted to biological diversity and biotechnology respectively, and they also outline the responsibilities of nations.

25. Malaysia is also a Party to the *Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)* since 1978 and is a member of the World Conservation Union (IUCN). CITES carries with it certain obligations with regard to control of trade of flora and fauna between countries.

26. Malaysia ratified the *United Nations Framework Convention on Climate Change* on 13th July 1994 and acceded to the *Convention on Wetlands of International Importance Especially as Waterfowl Habitat (RAMSAR Convention)* on 10th November 1994.

27. Malaysia is an active participant of the International Board for Plant Genetic Resources Regional Committee for South-East Asia (IBPGR/RECSEA). Through the IBPGR/RECSEA, Malaysia has participated in a highly successful cooperative programme in plant genetic resources with Indonesia, Papua New Guinea, Philippines and Thailand. National research institutions like the Malaysian Agricultural Research and Development Institute (MARDI), Rubber Research Institute of Malaysia (RRIM) and the Palm Oil Research Institute of Malaysia (PORIM) have participated in this programme. The IBPGR is now known as the International Plant Genetic Resources Institute (IPGRI).

28. Malaysia became a member of the FAO Commission on Genetic Resources for Food and Agriculture in 1993.

STRATEGIES FOR EFFECTIVE MANAGEMENT OF BIOLOGICAL DIVERSITY

Effective management of biological diversity to achieve the objectives of the National Policy on Biological Diversity will be guided by the following fifteen strategies:

1. Improve the Scientific Knowledge Base

Survey and document the biological diversity in Malaysia, and undertake studies to assess its direct and indirect values, and identify the potential threats to biological diversity loss, and how they may be countered.

2. Enhance Sustainable Utilisation Of The Components Of Biological Diversity

Identify and encourage the optimum use of the components of biological diversity, ensuring fair distribution of benefits to the nation and to local communities.

3. Develop A Centre Of Excellence In Industrial Research In Tropical Biological Diversity

Establish Malaysia as a centre of excellence in industrial research in tropical biological diversity.

4. Strengthen The Institutional Framework For Biological Diversity Management

Establish and reinforce the mechanisms for planning, administration and management of biological diversity.

5. Strengthen And Integrate Conservation Programmes

Increase efforts to strengthen and integrate conservation programmes.

6. Integrate Biological Diversity Considerations Into Sectoral Planning Strategies

Ensure that all major sectoral planning and development activities incorporate considerations of biological diversity management.

7. Enhance Skill, Capabilities And Competence

Produce a pool of trained, informed and committed manpower in the field of biological diversity.

8. Encourage Private Sector Participation

Promote private sector participation in biological diversity conservation, exploration and sustainable utilisation.

9. Review Legislation To Reflect Biological Diversity Needs

Review and update existing legislation to reflect biological diversity needs and introduce new legislation where appropriate.

10. Minimise Impacts Of Human Activities On Biological Diversity

Take mitigating measures to reduce the adverse effects of human activities on biological diversity.

11. Develop Policies, Regulations, Laws And Capacity Building On Biosafety

Introduce measures for the incorporation of biosafety principles and concerns, especially in relation to genetic engineering, and the importation, creation and release of genetically modified organisms.

12. Enhance Institutional And Public Awareness

Promote and encourage the understanding and participation of the public and institutions for the effective conservation and protection of biological diversity.

13. Promote International Cooperation And Collaboration

Promote international cooperation and collaboration in order to enhance national efforts in biological diversity conservation and management.

14. Exchange Of Information

Promote and encourage the exchange of information on biological diversity at local and international levels.

15. Establish Funding Mechanisms

Identify and establish appropriate funding mechanisms for biological diversity conservation and management.

Strategy 1: IMPROVE THE SCIENTIFIC KNOWLEDGE BASE**Action Plan**

1. Undertake and intensify biological resource inventories and systematic studies to document species diversity.
2. Strengthen existing herbaria, and establish natural history museums to support documentation of species diversity.
3. Initiate long-term studies on demographic, genetic and environmental variation of indigenous as well as exotic species.
4. Intensify research on the functional aspects of ecosystems and ecological processes therein.
5. Undertake a thorough study to formulate appropriate terms, conditions and safeguards for the identification and extraction of genetic materials and other biological resources.
6. Develop a database of biological diversity and an effective information dissemination system.
7. Establish an inventory of traditional knowledge on the use of species and genetic diversity.
8. Evaluate the economic contributions of biological diversity to the value of goods and services in the national economy.
9. Monitor the status of the components of biological diversity.
10. Survey and document exotic species and populations which threaten biological diversity.
11. Undertake research to develop methodologies and techniques for recovery and rehabilitation of degraded land, *inter alia*, through reintroduction of appropriate species.

Strategy 2: ENHANCE SUSTAINABLE UTILISATION OF THE COMPONENTS OF BIOLOGICAL DIVERSITY**Action Plan:**

1. Undertake appropriate activities in biological diversity prospecting, via new crops, pharmaceuticals and other biological products.
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2. Develop natural resource accounting methods that promote conservation and sustainable use of biological diversity.
3. Ensure the development of sectoral and cross-sectoral policies, plans and programmes which integrate considerations of biological diversity conservation and sustainable use.
4. Ensure sectors performing Environmental Impact Assessments (EIAs) accord due priority to biological diversity.
5. Undertake research and monitoring of the impacts of resource utilisation on biological diversity.
6. Provide incentives to encourage conservation of biological diversity and sustainable use of its components.
7. Ensure efficient dissemination of relevant information, together with appropriate extension services, to assist various sectors to conserve and sustainably use biological resources.
8. Facilitate participation of local communities in traditional sustainable use of biological resources.
9. Ensure fair distribution to the nation and local communities of benefits arising from the use of biological resources.

Strategy 3: DEVELOP A CENTRE OF EXCELLENCE IN INDUSTRIAL RESEARCH IN TROPICAL BIOLOGICAL DIVERSITY

Action Plan:

1. Establish a mechanism to harness and develop components of biological diversity into useful products.
2. Harness biological diversity by:
 - (a) attracting highly competent scientists to develop high technology in the field of biological diversity;
 - (b) utilising high technology, including biotechnology, to develop pharmaceuticals and other industrial products;
 - (c) training of local scientists and technical personnel in high technology in the utilisation of biological diversity.
3. Develop the necessary expertise so that such a mechanism facilitates industrial research and development in biological diversity in the tropics.

Strategy 4: STRENGTHEN THE INSTITUTIONAL FRAMEWORK FOR BIOLOGICAL DIVERSITY MANAGEMENT

Action Plan:

1. Set up a high level policy formulation, coordination and advisory body with effective representation from all relevant Federal ministries and agencies and State governments. To assist this committee, a secretariat should be created at the relevant ministry.
2. Establish a national centre for biological diversity with the task of coordination of programmes, implementation, monitoring, evaluation, priority setting and information management. In the interim period, a technical working committee should be established to initiate and undertake this task. This committee could set up task forces to address relevant issues on biological diversity if and when necessary.
3. The participation of the private sector and non-governmental organisations (NGOs) should be included where appropriate.
4. Identify, reinforce or establish biological diversity programmes and facilities in existing institutions.
5. Establish or strengthen resource management units at state and local government levels and promote implementation mechanisms between federal, state and local governments.

Strategy 5: STRENGTHEN AND INTEGRATE CONSERVATION PROGRAMMES**Action Plan:**

1. Expand the network of *in-situ* conservation areas to ensure full representation of ecosystems and all ecological processes therein.
 2. Strengthen capacity and role of *ex-situ* facilities in conservation activities and research, with a view to complementing *in-situ* conservation.
 3. Expand *ex-situ* conservation centres to cater for threatened species, for breeding and selection and as repositories for germplasm i.e. genebanks, botanical and zoological gardens and arboreta.
 4. Ensure public involvement in planning and management of protected areas, taking into consideration the involvement of local communities.
 5. Develop mechanism for ensuring compatibility between conservation and sustainable development.
 6. Determine minimum viable population sizes for species and critical minimum size of conservation areas.
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7. Review collection activities and the effectiveness of existing regulatory and management arrangements.

Strategy 6: INTEGRATE BIOLOGICAL DIVERSITY CONSIDERATIONS INTO SECTORAL PLANNING STRATEGIES

Action Plan:

1. Ensure biological diversity conservation is a factor in planning and impact assessment of sectoral and cross-sectoral development programmes.
2. Study the impact of national and state policies and priorities on conservation and sustainable use of biological diversity.
3. Develop tools to analyse and evaluate development plans and strategies which may have impact upon biological diversity.
4. Review current sectoral policies, plans and programmes to determine the extent to which use of biological resources reflect conservation needs and recommend appropriate measures therein.
5. Ensure that biological diversity issues are incorporated in long-term and medium-term development plans (e.g. Five Year Development Plans, Outline Perspective Plans, National Development Plans).
6. Ensure efficient dissemination of relevant information and extension services to promote cross-sectoral integration in the sustainable use of biological diversity.
7. Ensure that biological diversity conservation is a major factor in the management of our biological resources.

Strategy 7: ENHANCE SKILL, CAPABILITIES AND COMPETENCE

Action Plan:

1. Identify critical skill requirements and undertake programmes to develop the human resource base in the appropriate areas.
 2. Utilise research institutes and universities to build up competence in relevant areas.
 3. Enhance research, planning and management capabilities through collaborative programmes amongst local organisations and between local organisations and established foreign institutions.
 4. Provide reward structures and design reward mechanisms to strengthen appropriate fields for education to achieve conservation and sustainable use of biological diversity.
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5. Develop or reorientate education and training programmes with specific reference to conservation and sustainable use of biological diversity.
6. Develop training programmes for public participation in biological diversity conservation.

Strategy 8: ENCOURAGE PRIVATE SECTOR PARTICIPATION

Action Plan:

1. Facilitate contacts between private sector and public sector in order to improve design and transfer of appropriate technology, including biotechnology.
2. Encourage the formation of appropriate joint venture projects with multinational and other corporations to encourage science and technology transfer in enhancing the economic value of biological diversity.
3. Provide incentives to the private sector to undertake activities in conservation and sustainable utilization of biological resources.
4. Encourage the establishment of consortia to complement government and public efforts in the conservation of biological diversity.

Strategy 9: REVIEW LEGISLATION TO REFLECT BIOLOGICAL DIVERSITY NEEDS

Action Plan :

1. Identify existing legislation pertaining to biological diversity and review their adequacy.
 2. Identify areas where new legislation or major enhancements to existing legislation are needed for :
 - (a) commitments under the Convention on Biological Diversity and Agenda 21;
 - (b) regulating and managing biological resources including the introduction and implementation of codes of practice for collectors;
 - (c) intellectual property and other ownership rights;
 - (d) the development and utilisation of genetically modified organisms with due regard to provisions ensuring safety procedures in their handling and release to the environment;
 - (e) introduction of alien species or population that threaten ecosystems, species and populations;
 - (f) management of threatened or endangered species and populations.
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3. Review Environmental Impact Assessment (EIA) and other related legislation to strengthen requirements for assessing direct or indirect biological diversity loss or degradation.
4. Improve the effectiveness of existing legal mechanisms by creating awareness of conservation regulation and by stricter law enforcement.
5. Review existing state and federal legislation pertaining to biological diversity in order to promote uniform implementation between states.

Strategy 10: MINIMISE IMPACTS OF HUMAN ACTIVITIES ON BIOLOGICAL DIVERSITY

Action Plan:

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.
2. Develop methods of evaluating the long-term hazards, as well as the viability of populations and ecosystems, due to development.
3. Develop national emergency response systems for major threats to biological diversity, including early warning systems, notification procedures and salvaging measures.
4. Ensure effective enforcement for the compliance of mitigation and rehabilitation measures in all activities that present potential dangers to biological diversity.
5. Rehabilitate degraded habitats where biological diversity has been reduced in particular those within conservation areas and their adjacent areas.
6. Encourage measures to preserve, improve and enrich biological diversity in urban areas.
7. Adopt measures to alleviate the impact of human activities on the displacement of wildlife.

Strategy 11: DEVELOP POLICIES, REGULATIONS, LAWS AND CAPACITY BUILDING ON BIOSAFETY

Action Plan:

1. Formulate legislation and regulations on biosafety, in relation to activities and products arising from biotechnology, especially genetic engineering, including the importation, experimentation, storage and release of genetically modified organisms.
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2. Ensure measures are taken to prevent the country from becoming a location for hazardous research activities.
3. Establish a committee on biosafety that includes representatives from the environment, health and research fields, and keep abreast of developments in this field in the international arena.
4. Adopt an Environmental Impact Assessment (EIA) procedure for biotechnology research and activities, including assessment on safety and social impacts.
5. Establish an enforcement unit on biosafety within an appropriate government department.
6. Develop training programmes in biosafety management and practice.

Strategy 12: ENHANCE INSTITUTIONAL AND PUBLIC AWARENESS

Action Plan:

1. Increase awareness within the civil service at both federal, state and local government levels as well as in professional bodies and the private sector through courses and training programmes.
2. Enhance mass media coverage of biological diversity issues.
3. Incorporate the study of biological diversity and related fields into the curricula of schools and institutions of higher learning.
4. Promote and support the biological diversity activities of nature clubs and societies.
5. Incorporate the notion of conservation of biological diversity and sustainable use of its components as an element of environmental awareness and training programmes.
6. Recognise the role of non-governmental organisations (NGOs) in the conservation and sustainable utilisation of biological diversity.

Strategy 13: PROMOTE INTERNATIONAL COOPERATION AND COLLABORATION

Action Plan:

1. Identify areas of research and technology requirements where cooperation and collaboration are needed.
 2. Identify and develop collaboration with relevant international and national institutions involved in biological diversity which would promote mutual benefits.
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3. Develop bilateral and multilateral arrangements where appropriate, *inter alia*, for germplasm exchange, technology transfer, and technical and scientific information exchange.
4. Promote regional collaboration in biological diversity, in particular on transboundary issues e.g. establishment of transfrontier national parks, and the effects of pollution on biological diversity.
5. Recognise accepted international practices in germplasm exchange and technology transfer.

Strategy 14: EXCHANGE OF INFORMATION

Action Plan:

1. Identify and review existing mechanisms to facilitate the exchange of information relevant to the conservation and sustainable use of biological diversity.
2. Establish or strengthen systems for the exchange of such information at national and international levels through networking, and by establishing databases and information centres :
 - (a) information centres and networks to disseminate relevant information prepared by government, research and educational institutions, industry, non-governmental organizations (NGOs) and individuals;
 - (b) central directories of relevant data sets, information centres and networks;
 - (c) establishing and enhancing relevant databases and data management capabilities.
3. Seek cooperation to address the repatriation of information, in particular those not in the public domain.

Strategy 15: ESTABLISH FUNDING MECHANISMS

Action Plan:

1. Review current funding options relating to biological diversity and identify the potential for reallocation of resources for implementation of the strategies of the National Policy on Biological Diversity.
 2. Seek new and additional incentives, funding sources and mechanisms, at both the national and international levels, for the implementation of the strategies.
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Funding sources should include government, non-governmental organisations (NGOs) and the private sector.

3. Establish trust funds for the conservation and management of biological diversity.

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