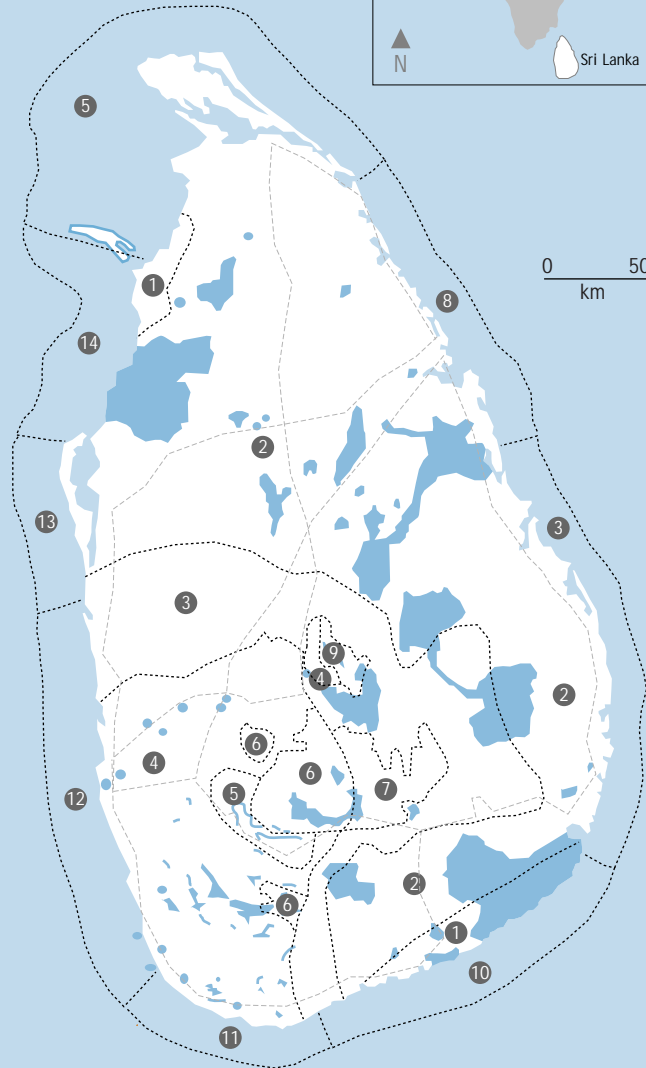


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■ Protected areas
- - - - - Bioregions (see Table 1)



Sri Lanka

Ranjith Mahindapala

SUMMARY

Sri Lanka has the highest biodiversity per unit area of land among Asian countries for flowering plants and for all vertebrate groups except birds. It contains one of the world's 18 biodiversity hot spots. The country has more than 3,350 species of flowering plants and over 300 species of ferns and fern allies. There is also considerable diversity of fauna, with over 50 species of teleost fishes, nearly 100 species of amphibians, over 125 species of reptiles and nearly 100 species of mammals.

Sri Lanka ratified the Convention on Biological Diversity (CBD) in 1994 and began preparing a Biodiversity Conservation Action Plan (BCAP) two years later. The Ministry of Transport, Environment and Women's Affairs took the lead in this effort. The BCAP is a complementary strategy to the National Environmental Action Plan (NEAP) of 1992 and its recent update. The BCAP falls within the overall policy framework of the NEAP.

The development of the BCAP was facilitated with a grant from the World Bank, and was supplemented by substantial funding from the government of Sri Lanka. It took nearly 18 months to complete. IUCN Sri Lanka was commissioned to facilitate BCAP formulation on behalf of the government.

The process was intensely participatory, involving 16 stakeholder groups including NGOs. The draft was reviewed and refined through four separate workshops, with the participation of key state institutions, NGOs and national experts. The BCAP identifies areas for action according to sector and institution responsible.

A three-year program will refine the recommendations for BCAP implementation. The environment ministry has established a National Steering Committee to provide oversight and coordination at the highest level in government. The committee includes secretaries of key ministries, three experts on biodiversity, and representatives from NGOs and the private sector, and provides policy guidance in implementing BCAP recommendations and the CBD.

Key issues

- indifference on the part of state agencies to biodiversity conservation;
- a well-informed society which appreciates the need for wise use of natural resources;
- the need for development activities, and the difficulties of balancing development and conservation;
- rich biodiversity, with a high value and potential.

Background

Sri Lanka is an island with a total land area of 6,570,134 ha, a coastline of 1,600 km and an Exclusive Economic Zone that extends up to 320 km beyond the coastline. The total cultivated land in the country and the forest cover comprise 39 per cent and 24 per cent, respectively.

Broad coastal plains surround a central mountainous area which rises to elevations of 2500 m. The mountains are the catchments for over 100 major rivers that flow across the lowland plains to the sea.

Variation in altitude creates three thermal zones: the hot low country, the warm mid-country and the cool up-country. Rainfall also varies greatly, and includes two monsoon and two inter-monsoon seasons. The broad range in rainfall and altitude has created a wide variety of terrestrial ecosystems, such as tropical lowland rain forests, montane forests, dry monsoon forests, wet and dry grasslands and inland wetlands. They are matched by a diversity of coastal and marine systems, including seagrass beds, coral reefs, estuaries and lagoons, and associated mangrove swamps.

Sri Lanka has a total population of 18.8 million¹ and a population density of 292 people per sq. km. It has a high adult literacy rate (89 per cent), and the average life expectancy at birth is 72 years for males and 76 for females. Infant mortality is low at 15.9 per cent; over 90 per cent of the population has access to advanced health care. In 1996, the per capita GDP of the country was US \$760 and the population growth was 1.1 per cent. The main economic base is manufacturing, followed by agriculture.

Sri Lanka's biodiversity resources

Sri Lanka has some of the richest biodiversity in Asia. This high biodiversity is closely related to the insular and relatively isolated environment as well as to topography and climate. These factors also support a large number of endemic

species of fauna and flora. The wet zone rain forests provide habitats of special importance, supporting 94 per cent of the country's woody endemic plants and 75 per cent of the endemic animals.

Vegetation includes over 3,350 species of flowering plants, 23 per cent of which are endemic, and 314 species of ferns and fern allies, 57 per cent of which are endemic. Species diversity is also high among mosses, liverworts, algae and fungi². There is also considerable invertebrate faunal diversity³.

Vertebrate fauna include 51 species of indigenous teleost fishes (one third of which are endemic), 22 species of introduced fish used for food, and about 350 species of marine fishes, including ornamental fishes and food species. There are 39 species of amphibians⁴ from 10 genera, one of which is endemic. Reptilian fauna comprise two species of crocodiles, five species of marine turtles, three species of tortoises, 92 species of snakes (approximately half of which are endemic, and 13 are marine), 21 species of geckos (6 of which are endemic), 14 species of agamid lizards (10 of which are endemic), two species of monitor lizards, and 21 species of skinks, 17 of which are endemic and all of which are rare.

Over 390 species of avifauna are found, including 169 species of migrants. The 23 endemic bird species are confined mainly to wet zone forests. There are 86 indigenous and 10 introduced species of mammals; 12 are endemic. The territorial waters around the island provide habitat for 38 species of marine mammals, including a rare species of dugong. There are more than 550 threatened faunal species in Sri Lanka, more than half of which are endemic.

Crop genetic diversity is also high, especially for rice (*Oryza sativa*). Many of the indigenous rice varieties in Sri Lanka can tolerate pests, an adverse climate and a range of soil conditions. Several indigenous varieties of millet, sorghum and maize also exist; about 500 types of pepper (in addition to seven wild species); about ten wild races of cardamom and several indigenous varieties of betel and chili. Indigenous grain legumes, root and tuber crops and fruit crops such as banana, mango and citrus also have a wide genetic variability. Similarly, there are many varieties of indigenous vegetables such as cucurbits, tomato and eggplant. There are also 170 plant species of ornamental value (74 of which are endemic), including several species of orchids and foliage plants of commercial importance that occur naturally in forests. In terms of plantation crops, several varieties of coconut are maintained locally. Domesticated animals of economic value include some indigenous species of buffalo, cattle, fowl and fish that are resistant to pests and disease.

Biodiversity under threat

In the past few decades trends in economic development have threatened the nation's unique indigenous biological wealth. Rapid deforestation — from a forest cover of 70 per cent in 1900 to less than 24 per cent in 1992 — has left only 1.5 million ha of closed canopy natural forest cover. The wet ever-green forests of southwest Sri Lanka are particularly rich in biodiversity and endemic species and the region has been named as one of the 18 biodiversity hot spots of the world. The forests are now fragmented and face severe threats from encroachment and overuse.

Sri Lanka's increasing population density, already high, compounds the problem. The largely agrarian population exerts increasing pressure on limited biological resources. Nearly 5.4 million ha of land (82 per cent of total land area) is still owned by the state (Bloch 1995); almost 1 million ha of this state-owned land is held by farmers through permits or leases (Madduma Bandara 1991). Shifting cultivation continues to cause damage to some of the fragile ecosystems. Increasing pressure on cultivable land has resulted in illegal clearing of land for new cultivation in critical watershed areas, particularly in the central parts of the island. The agriculture-based economy is highly dependent on many plant species for food, medicines and domestic products. Although the rich and diverse ecosystems support many wild relatives of cultivated plants, these genetic resources are being lost.

Coastal and marine ecosystems provide nearly 70 per cent of the country's protein requirements. Coral reefs continue to be destroyed, however, and coastal waters, including estuaries and lagoons, have been over-fished. Natural marshes, home to a variety of organisms, have been lost to development, creating imbalances in ecosystems. Extensive degradation from unregulated resource uses (e.g. mining for coral lime, sand and gemstones) is destroying habitats and critical areas, such as sensitive watersheds and fish nurseries.

The last decade was one of substantial economic development in Sri Lanka. The most significant activity was the Accelerated Mahaweli Project, involving the clearing of some 200,000 ha of forest land in the dry zone for cultivation under irrigation, with related settlements. Large dams and reservoirs were constructed in other parts of the country. These activities brought widespread changes in ecological conditions and adversely affected flora and fauna.

Sedimentation of the Mahaweli reservoirs has become a major problem due to poor management of upper watershed areas; as much as 40 per cent of reservoir capacity has been lost. In addition, pollution accumulation on reservoir

beds causes water quality problems, turbine erosion and other damage. Dredging incurs heavy costs.

Conflict between conservation and development is another threat to biodiversity. This is illustrated by human-elephant interaction in some areas of Sri Lanka. In the southeastern dry zone, for example, several thousand hectares of forests were cleared to establish sugar plantations. As a result, the elephant population is now confined to a small area. During dry weather, the elephants are forced to move out in search of water and invade the sugar plantations of small farmers as well as larger plantations. Human casualties result and irate farmers poison elephants. The authorities are doing their best to mitigate this conflict, but the problem remains acute.

Unemployment, although gradually falling, remains at about nine to ten per cent. The government's main strategy to alleviate unemployment is a program of industrialisation. Employment in the industrial sector is growing at about ten per cent annually, and the government has launched an industrial parks development program and established export promotion zones. Aside from the loss of land caused by these initiatives, several of them are located near conservation habitats and their impact on biodiversity is not well understood.

Despite the legal, policy and institutional support for conservation, the country's biodiversity resources continue to degrade. The growth and movement of populations, the opening of economic markets, and new trends in industrial development will continue to affect biodiversity unless more systematic and stringent corrective measures are taken.

BCAP origin

Sri Lanka ratified the Convention on Biological Diversity in March 1994. The ministry responsible for the environment (then the Ministry of Transport, Environment and Women's Affairs) was appointed as the focal point for the convention; the BCAP was the first in a series of implementation actions. The ministry established a Biodiversity Unit to facilitate the process and to manage the government's biodiversity initiatives. It also formed a network of key government officials to nurture working links with relevant ministries and departments.

The commitment to prepare a BCAP came from several sources:

- the National Environmental Action Plan highlighted the need for greater attention to biodiversity issues;

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- the government was obliged to prepare a BCAP under Section 6 of the CBD; and
- emerging scenarios for economic development reinforced the importance of biological resources.

These factors brought into immediate focus the sustainable use of biodiversity and the need to prepare comprehensive policies and plans to achieve it.

Sri Lanka had already made significant achievements through a series of high-level initiatives in the early 1980s, and a body of legislation and policies had evolved to deal with the protection of biological resources. In 1980, the *National Environmental Act* constituted the Central Environmental Authority. Soon after, in response to the World Conservation Strategy, Sri Lanka began preparing a National Conservation Strategy (NCS), one of the first countries in Asia to do so. In 1988, after a lengthy process of survey and consultation, the NCS was adopted as the centrepiece of the government's policies to deal with environmental degradation in the country.

In 1991, based on the recommendations of the NCS, a National Environmental Action Plan (NEAP) was adopted for a five-year period (1992–1996). Implementation led to a revised NEAP, in 1994, for the period 1995–98. Over the years these environmental policy frameworks have helped shape several generations of sectoral and national development strategies (MoE 1991; MoE 1993; MoE 1998).

The National Conservation Strategy, the National Environmental Action Plan, the Forestry Sector Master Plan (Ministry of Forestry, Lands and Agriculture, 1995), the Coastal 2000 (Coast Conservation Department, 1992) and the National Coastal Zone Management Plan (Coast Conservation Department, 1996) are some of the policy instruments addressing biodiversity conservation. Many government institutions are responsible for translating these policies into action, including the Forest Department, Coast Conservation Department, Department of Wildlife Conservation, Central Environmental Authority, Department of Agriculture, Botanical Gardens and Zoological Gardens.

Other evidence of political commitment is reflected in the ratification of the CBD, as well as the Ramsar, Climate Change, and CITES conventions; the radical revision of the Flora and Fauna Protection ordinance; and the enactment of a law to establish National Heritage Wilderness Areas. The inclusion of an Article in the Constitution on the preservation of the environment also indicates strong political support for biodiversity conservation.

Box 1. Development of the BCAP

The environment ministry set up an inter-ministerial coordinating committee on biological resources to consult on the preparation of the BCAP, since biodiversity conservation and sustainable use affect almost all sectors. The BCAP was undertaken in several stages, as follows:

Phase I: Establishing the institutional capacity in the environment Ministry; identifying key personnel in other ministries and agencies; and establishing the necessary inter-sectoral links (June, 1994).

Phase II: Identifying information required; preparing Terms of Reference for each section of the BCAP and preparing the Strategy for the Preparation of a Biodiversity Action Plan for Sri Lanka (July–September, 1994).

Phase III: Preparation of the BCAP (July 1996–February 1998).

The Strategy for the Preparation of a Biodiversity Action Plan for Sri Lanka, prepared in 1994, contains 14 sections. Sections 1-3 present a synopsis of biodiversity in Sri Lanka; Sections 4-12 deal with various aspects of the conservation and sustainable use of biodiversity and identify the key issues. Section 13 proposes an operational strategy for preparation of the BCAP and Section 14 proposes the interim measures to be undertaken by agencies until the BCAP is accepted (Ministry of Transport, Environment and Women's Affairs, 1994). The Ministry of Transport, Environment and Women's Affairs, with the concurrence of the Cabinet of Ministers, appointed the National Experts' Committee on Biodiversity to advise the Ministry on matters relating to Sri Lanka's biodiversity and the country's obligations under the CBD.

Preparation of the BCAP started in mid-1996, and the first draft was reviewed in April 1997. The document then went through several drafting stages and was approved by the Cabinet of Ministers on 27 August, 1998. BCAP preparation was supported by the Global Environment Facility (GEF), with a grant of US\$151,000 through the World Bank, and was linked to the development of a large GEF project proposal relating to the conservation and sustainable use of medicinal plants.

BCAP development

IUCN Sri Lanka prepared the BCAP on behalf of the environment ministry, assembling a team of subject matter specialists and its own in-house experts. IUCN international staff also provided input on BCAP coverage and design.

The BCAP team met with a large number of stakeholders, including NGOs representing a broad spectrum of interests. Round-table discussions were held with several groups of NGOs, state agencies, technical specialists, experts in key state institutions, and advisory committees from other agencies with a stake in biodiversity resources. These meetings enabled the BCAP team to identify key sectoral issues. Another round of meetings was held with relevant agencies once the issues were reviewed and the needs of the sectors defined. This provided sectors within government with numerous opportunities to discuss issues and remedies with the BCAP team. Similarly, other groups, including NGOs, were consulted on a number of occasions so that the BCAP would accurately reflect their concerns. This consultation process continued from August 1996 to February 1997.

The first draft of the BCAP was ready by April 1997. This draft was presented to stakeholder groups, including NGOs, at four workshops over three months. The comments received at these workshops led to further revisions.

The entire process was monitored and guided by a specially appointed Steering Committee. The committee was chaired by the Secretary of the Ministry of Environment and included representatives of key sector ministries. The Environment Secretary or his representative chaired all stakeholder meetings and workshops. In this way, the ministry maintained its links with the BCAP preparatory team and the overall process.

Community participation: The government recognised the role of important stakeholders in preparing and implementing the BCAP, particularly communities in or near critical ecosystems. Representatives of these communities were consulted by means of round-table meetings during BCAP preparation. Special attention was given to the role of local communities in managing natural systems. The need to examine and institute co-management was recognised, as were user rights and tenure arrangements. Communities were categorised according to demographic, cultural and economic features. Since their perceptions, dependency and social and cultural values differ, this was a prerequisite to identifying their roles in the management process.

NGO participation: The participation of NGOs in the BCAP process was also critical because of their important role in natural resource management. NGOs and community-based organisations can mobilise communities in conservation through awareness raising, establishment of forest plantations, provision of technical guidance, acting as a link between the communities and the state, and in assisting and cooperating in law enforcement in multiple-use natural forests.

Private sector involvement: The BCAP team ensured that the private sector was well represented in workshops and other fora during the preparatory phases. The private sector needs to be involved in biodiversity conservation through an appropriate policy and legal framework. This group has already shown interest in several areas, such as the protection of river catchments and fragile environments where sloping agricultural land technology (SALT) has been initiated to arrest soil erosion. Other areas of interest include private forest plantations, commercial multi-cropping and environmentally benign technologies in agriculture. The private sector is already involved in public awareness campaigns for biodiversity conservation.

Relationship to development planning

Working with resource development sectors

The preparation of the BCAP was supported by the GEF, with substantial input from IUCN and the environment ministry. The ministry maintained a network of Biodiversity Liaison Officers in each of the stakeholder ministries, departments and agencies. Through this network, as well as regular consultation with the network members, the ministry kept stakeholder agencies interested in the BCAP process. In addition, the ministry conducted a series of awareness programs for state officials at various levels, commencing with the Secretaries of Ministries.

The network of liaison officers was established primarily to facilitate inter-ministerial and inter-departmental coordination in matters relating to biodiversity conservation. The approval of the BCAP by the Cabinet of Ministers provided further encouragement for this coordination. There is a recognized need for regular activities to maintain the interests of the partner agencies if biodiversity concerns are to be effectively integrated into sectoral planning.

Internalising BCAP costs

Prior to the approval of the BCAP, biodiversity related activities were funded from the general budget of the ministry of environment. Once the BCAP was approved by the Cabinet of Ministers, the Biodiversity Secretariat was funded through a separate government budget line provided specifically for its activities. The secretariat is also able to draw on donor funds available in the ministry. It has received a substantial grant during the last three years from IUCN's South and Southeast Asian Regional Biodiversity Program, which has been used to equip it, provide grants for special studies, support the Legal Task Force and the Biosafety Committee, and defray the costs of meetings of the National Experts' Committee.

The BCAP identifies sectoral as well as cross-sectoral areas for planning further work in more detail. It is expected that sectoral activities will be undertaken by the respective agencies, either as a part of their own programs or as special programs. With time, as sector agencies recognise the need to address biodiversity issues within their operations, it is likely that they will make specific budget allocations for this purpose.

The approach to cross-sectoral concerns identified in the BCAP is somewhat different. Since they do not fall neatly within a particular institution, the Ministry of Environment will have to take the initiative with funding provided through the Biodiversity Secretariat.

BCAP scope and objectives

The goal of biodiversity conservation

Sri Lanka endorses the principles of the CBD in recognising the intrinsic value of biological diversity and the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological systems and their components for the well-being and survival of all living beings.

Box 2. Broad objectives of the BCAP

The following broad objectives have been set:

- building capacities and developing programs to gain a better understanding of the different components of the country's indigenous biological diversity and the processes that govern their functioning;
- identifying adverse impacts (including potential impacts) on the different components of biodiversity, to take action to mitigate them and to avert potential adverse impacts;
- building capacities and developing programs to enhance the populations of species which are in demand and are under threat due to excessive collection;
- managing bioresources so as to conserve biodiversity while enabling the use of the resources within sustainable limits; and
- enhancing public awareness of biodiversity and encouraging public participation in its conservation.

The overall national goal of the BCAP, therefore, is to conserve the biological diversity of Sri Lanka, while fostering its sustainable use for the benefit of the present and future generations.

The BCAP process involved an exhaustive review of sectoral and cross-sectoral concerns in developing a plan of action. This review considered all existing sectoral plans and policies, the more important being the Forestry Sector Master Plan, Strategy for Wetland Conservation in Sri Lanka, Coastal 2000: Recommendations for Resource Management Strategy for Sri Lanka's Coastal Region, and the National Agricultural Development Plan.

Sector objectives

The BCAP sets out specific sector and cross-sector objectives to build into future programs. It does not attempt to set priorities among these activities, except where early action is required as identified by the Conference of the Parties or by other policy sources.

Forests

- promote conservation of indigenous forest species both within and outside protected areas;
- involve communities on the fringes of forests in participatory activities for the conservation and sustainable use of biodiversity;
- increase timber supplies through forest plantations, which will reduce the pressure on natural forests to producing timber.

Wetlands

- ensure that both natural and human-made wetlands are properly managed and conserve and sustainably use wetland biodiversity;
- promote the restoration of ecologically important degraded wetlands.

Coastal and marine systems

- promote sustainability in the use of coastal and marine bioresources in the fisheries and tourist industries;
- strengthen current government initiatives to increase stakeholders participation in the conservation of coastal and marine resources.

Agricultural systems

- adopt agricultural and crop plantation practices that will enhance the conservation of biodiversity;
- promote practices for the conservation of biodiversity among farmers and other land-owners.

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Selected biodiversity regions

- ensure that those biodiversity regions requiring the most urgent attention for conservation are accorded high priority.

Biodiversity information

- ensure that all sources of information on Sri Lanka's biodiversity are centrally documented;
- formalize and regulate access to information on biodiversity.

Legal measures

- develop sound legislation to ensure the conservation and sustainable use of the country's indigenous biological diversity, particularly those components under threat;
- provide for equitable sharing of benefits by resource owners and users from the use of genetic resources and indigenous specialised knowledge.

Institutional support

- ensure that institutional arrangements are in place, with adequate resources and staff, in all those government organizations concerned with the conservation and sustainable use of biological diversity.

Valuation of biodiversity

- develop methodologies and expertise for the proper valuation of the country's biodiversity;
- develop mechanisms to incorporate biodiversity values into national accounting and decision-making at various levels.

Biodiversity regions

In the late 1980s the government decentralised the state administration. Provincial Councils were established with mandated functions and enjoy a degree of autonomy in specified areas, such as the environment; provincial planning exercises, for example, take into account biodiversity conservation requirements. The central government retains the power to identify specific areas of action within the provinces. The BCAP process defined Sri Lanka's biodiversity regions and then ranked them to identify which would require action on the part of the central government or provinces. In situations of limited financial and human resources, all levels of government need to focus on those areas requiring the most urgent attention.

The identification of biodiversity regions for Sri Lanka is a new concept, and the regional demarcation presented in the BCAP should be treated as provisional. The identification of terrestrial biodiversity regions was based on a careful analysis of current climatic and geophysical classifications, fauna and flora distribution patterns, and biodiversity richness. Coastal and marine biodiversity regions were defined within a belt extending 300 m inland from the level of high tide out to 22.2 km (12 nautical miles) into the ocean. Biodiversity regions within this area were defined according to characteristic biological resources (e.g. coral reefs) and their uses, as well as the presence of special habitats. Altogether, 15 biodiversity regions were identified (Table 1).

The assessment of relative importance for conservation action was made according to a number of criteria, the most significant being a threat from continued human disturbance. On the basis of this priority ranking, six regions were identified for urgent attention: terrestrial regions 4, 5 and 6; and coastal and marine regions 11, 13 and 14.

Table 1. Sri Lanka's biodiversity regions

#	Description	Key climatic and biological features
1	Arid zone	tropical thorn scrub with isolated trees. Altitude 0-100 m. Annual rainfall less than 1250 mm (mainly from Oct.-Jan.). More than 5 dry months*.
2	Dry zone	Dry mixed evergreen forest. Altitude 0–500 m. Annual rainfall 1250–1900 mm (mainly Oct.- Jan.), 4–5 dry months.
3	Intermediate zone	Moist evergreen forest. Altitude 0–1000 m. Annual rainfall 1900–2500 mm. Less than 3 dry months.
4	Lowland wet zone	Tropical (lowland) wet evergreen forest. Altitude 0-1000 m. Annual rainfall 2500–5000 mm. No dry months.
5	Sub-montane Wetlands	Sub-montane evergreen forest. Altitude 1000–1500 m. Annual rainfall 2500–5000 mm. No dry months.
6	Wet highlands	Montane evergreen forest. Altitude 1500–2500 m. Annual rainfall 2500–5000 mm. No dry months.
7	Intermediate Highlands	Dry patanas. Altitude 1000–1500 m. Annual rainfall 1900–2500 mm. Less than 3 dry months.

* dry month: a month with less than 50 mm rainfall

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8	Kathiraveli to Mullaitivu (mineral sands)	Coral reefs and rocky habitats (comparable to bio-region 9), mangrove habitats, lagoons and estuarine systems (Trincomalee), mineral sands (Mullaitivu area). Large marine mammals (whales). Important fisheries.
9	Panama to Kathiraveli (eastern lagoon systems)	Near-shore coral reefs (relatively extensive but less than in bio-region 14). The Great and Little Basses reefs, mangrove habitats associated with lagoon systems, multiple lagoons and estuarine systems (Batticaloa). Important for fisheries and has minimal human interference (Panama to Kalmunai).
10	Tangalle to Panama (wildlife habitats)	Rocky and sandstone habitats, shield lagoons and estuarine deltas (Tangalle to Ambalantota), extensive sand dunes (Ambalantota to Dorawa Point), and large lakes and lagoons (Iewayas). Conservation areas including national parks and turtle nesting sites. Coastal wetlands include a RAMSAR site, and salt production in Iewayas.
11	Hikkaduwa to Tangalle (near-shore coral beds)	Rocky and near-shore coral reefs and pockets of mangrove habitats (Koggala, Polwattu modhara in Weligama). Important for fisheries and tourism. Coral beds over-exploited for lime; coastal erosion.
12	Chilaw to Hikkaduwa	Coastal marshes and lagoon systems, (Chilaw to Peliyagoda), pocketed mangrove habitats (Chilaw, Bolgoda, Panadura, Kalutara, Bentota), and sandstone rocky habitats and sandstone reefs (Galle Face to Mt. Lavinia). Beach seine fishery, tourism associated with sandy beaches, and high human population density.
13	Kandakuliya to Chilaw (western marshes)	Coral reefs, sandstone reef habitats, swamp marshes, lagoons and associated mangrove ecosystems (Puttalam), important for fisheries and prawn farming.
14	Mannar to Kandakuliya (large off-shore coral beds)	Extensive coral reefs, sandstone reef habitats, sand dunes, mud flats, salt marshes (Kalpitiya), and limestone rich soil. Dugong sightings.
15	Mullaitivu to Mannar (limestone beds)	Coral reefs lie off-shore (north of Jaffna Peninsula). Sandstone reef habitats, limestone rich soil, shallow-wide continental shelf, salt marshes, lagoon systems, associated mangrove habitats (Jaffna), sand dunes. Fish resources unexploited for the past decade.

Adapted from Ministry of Forestry and Environment 1999.

Implementation arrangements

Before BCAP

In 1992 the Ministry of Environment and Parliamentary Affairs was the focal point for biodiversity. It established an inter-ministerial coordinating committee to provide guidance on the use and conservation of biological resources. This committee also provided valuable input during Phase I of BCAP preparation. By 1994, when Phase I and II of BCAP preparation were completed, the environment was under the purview of the Ministry of Transport, Highways, Environment and Women's Affairs. That ministry, with the approval of the Cabinet of Ministers, appointed the National Experts' Committee on Biodiversity to advise it on matters relating to implementation of the CBD. Work of the National Experts' Committee was coordinated by the Biodiversity Unit of the Ministry functioning under a Deputy Director. On 9 June, 1997, the environment portfolio became part of the Ministry of Forestry and Environment, which finalized BCAP preparation.

After BCAP

Biodiversity Secretariat

With BCAP's acceptance by government, the Ministry of Forestry and Environment upgraded its Biodiversity Unit to a Biodiversity Secretariat, as recommended in the BCAP, with a full-time director.

The secretariat's main functions are as follows:

- liaise with the relevant state agencies to identify priorities and develop mechanisms to incorporate BCAP's recommended actions into their implementation plans;
- liaise with governmental organizations and the provincial administration in the preparation of project proposals under the BCAP;
- monitor the implementation of recommendations in the BCAP;
- initiate action on cross-sectoral activities identified in the BCAP;
- organize meetings of the National Steering Committee (NSC) and Task Forces (TFs);
- prepare documents for, and maintain records of, all meetings of the NSC and TFs;
- attend to the day-to-day administration of all ministry activities dealing with biodiversity; and
- liaise with the Secretariat to the CBD.

National Steering Committee

The approval of the BCAP by the Cabinet of Ministers on 27 August 1998 provided the impetus for the government to set in motion a series of actions, commencing with the establishment of the National Steering Committee on Biodiversity. The committee has the following functions:

- provide policy guidelines to the ministry for translating the recommendations of the BCAP into an implementation program, and coordinate these activities at the national level;
- provide policy guidelines to the ministry on the CBD, Conferences of the Parties, Subsidiary Body for Scientific, Technical and Technological Advice, and the Global Biodiversity Forum;
- identify areas in the BCAP requiring the government's urgent attention;
- provide guidance and advice to the ministry, and through it to the Biodiversity Secretariat, for overall coordination of biodiversity conservation activities identified in the BCAP; and
- periodically review the biodiversity implementation plan.

This committee has met once to consider policy guidelines for implementing the BCAP. The National Experts' Committee on Biodiversity continues to meet regularly under the aegis of the Ministry of Forestry and Environment to provide advice on various aspects of biodiversity conservation.

Task forces

The BCAP also recommended that Task Forces be appointed to study BCAP recommendations and provide advice to the NSC. The Legal Task Force, for example, was appointed by the ministry to formulate legislation on access and benefit sharing relating to genetic resources. The basic functions of the Task Forces will be as follows:

- study the BCAP recommendations for action;
- evaluate existing activities in relation to these recommendations;
- identify high-priority areas for action and work out a program of action, assigning responsibilities for implementation;
- provide expert advice to the NSC on matters of relevance to their subject areas, as and when necessary;
- critically examine papers and recommendations prepared by experts for the National Steering Committee in relation to identified issues;
- regularly monitor and review progress in implementation; and
- undertake any other activities specified by the NSC.

Box 3. Environmental Policy and Management Committees

In addition to the secretariat, the Ministry of Forestry and Environment has established a series of Environmental Policy and Management Committees relating to a number of key sectors (e.g. land, agriculture, industry, built environment etc.), including biodiversity.

The committees will provide much-needed integration of biodiversity with other sectors, particularly within those agencies involved in development activities, which currently give low priority to biodiversity concerns.

The key functions of the committees are as follows:

Policy

- review sectoral plans of the National Environmental Action Plan;
- identify and deliberate on sectoral policy issues; and
- identify new issues relating to environmental management.

Planning

- assess sectoral policies and development programs for environmental sustainability;
- initiate and update sectoral databases; and
- identify areas for donor assistance.

Management

- ensure compliance with environmental policies through incentives, monitoring, etc.; and
- coordinate activities of special programs.

Implementation

The BCAP did not identify priority areas for action; that is the responsibility of the Task Forces. While awaiting the appointment of the Task Forces, the Ministry of Forestry and Environment, with the assistance of the National Experts Committee and the National Steering Committee has identified several key issues requiring attention, including access to genetic resources, biosafety and alien invasive species.

Access to genetic resources

The Legal Task Force (LTF), which includes representatives from all key stakeholder ministries and departments, NGOs and legal experts, has undertaken a comprehensive review of the existing national legislation and administrative procedures and control of access to genetic resources.

As in many other developing countries, the existing legal mechanisms in Sri Lanka are inadequate to ensure the sustainable use of bio-resources and the equitable distribution of benefits arising from them. It has been recognised that there is a need for new legislation to safeguard Sri Lanka's interests in terms of Articles 15, 16 and 19 of the CBD. This new legislation will do the following:

- establish a designated authority and processes for considering applications for biodiversity prospecting and developing appropriate agreements with applicants;
- provide legal sanctions for violations; and
- provide a statutory system to put in place procedures for applications, monitoring, etc.

The legislative framework being prepared addresses the scope of legislation, powers and functions of the approving authority, protocols for receiving applications, minimum terms for prospecting agreements, responsibilities of the applicant in regard to prior informed consent, means of public access to records, and penalties and sanctions for violations. In regard to intellectual property rights (IPR), a recent review of the existing legal mechanisms has shown that indigenous knowledge rights require more comprehensive protection.

As the enactment of a new law is likely to take time, an inter-agency committee will be established (with representatives from all relevant agencies) to examine requests for research on and collection and use of genetic resources for scientific and commercial purposes. In the meantime, implementation of a donor-funded project on conservation and sustainable use of medicinal plants has necessitated the urgent formulation of strategies to regulate access to indigenous knowledge, "soft" technologies (such as ethnobotanical and ethnopharmacological information), and other information collected through the project.

The Ministry of Health and Indigenous Medicine, which is implementing the project, is currently reviewing the existing legislation as well as public response to the scope of legislation required to safeguard traditional knowledge relating to the use of medicinal plants. Based on this review, new legislation on access to traditional knowledge relating to medicinal plants will be proposed if the existing legislation is inadequate. As an interim measure, guidelines for safeguarding IPR in collecting ethnobotanical information have been prepared. Furthermore, special employment contracts for project employees have been drawn up to safeguard confidentiality.

Although most of the state organisations that deal with the conservation and use of biodiversity also carry out research, it is inadequate. The BCAP promotes further research in biodiversity, and encourages collaboration with centres of excellence abroad, which will enhance the national research capability. Action has been taken to formulate national criteria for research collaboration. The draft national criteria, which include a self-regulatory code of ethics for researchers in the country and rules for regulation of biodiversity and biotechnology research as related to biodiversity, are now being examined by the Ministry of Forestry and Environment.

Biosafety

Under Article 8 (g) of the convention, Sri Lanka is expected to have mechanisms to “regulate, manage or control the risks associated with the use and release of living modified organisms resulting from biotechnology”. Articles 19 (3) and (4), which emphasise the need for safety in biotechnology, received attention at the Second Conference of the Parties, and an ad hoc Working Group on Biosafety was established in 1995. The Ministry of Forestry and Environment recognized these developments as important in implementing the BCAP, and set up a National Biosafety Committee to do the following:

- oversee any activity related to Genetically Modified Organisms (GMOs) and products derived from or containing GMOs so that any biosafety risks associated with them are identified and can be managed; and
- advise the Ministry of Environment about the regulation of activities related to GMOs. These activities include GMO importing, research and development, contained use, planned release to the environment and marketing.

The NBC has prepared the first draft of the guidelines applicable to different stages of development and the use of GMOs.

Alien invasive species

The issue of alien invasive species was another area identified as having high priority by the Ministry of Forestry and Environment (with the assistance of the National Experts' Committee). A list of alien invasive plant species was prepared (Jayasuriya, 1999) and information has been gathered about the recently identified exotic, *Mimosa pigra*, which is spreading very rapidly in the central province (Marambe, 2000). The committee's attention is also focused on the recently discovered invasive plant, *Parthenium hysterophorus* (whitehead).

The Biodiversity Secretariat has commissioned a study to prepare a national list of alien animals. This list will classify introduced animal species according to one of four categories: beneficial, threatened, neutral and impact unknown.

The threatened species list

IUCN Sri Lanka has updated the threatened species list for Sri Lanka; in so doing, consideration was given to the globally accepted criteria used for preparation of such lists. Using the available material and input from experts, criteria for threatened species have been developed for both flora and fauna. These criteria have been applied to a large number of species and “Red Lists” – lists of threatened species — have been prepared (IUCN, 2000).

Another study examined the role of the botanic gardens, zoological gardens and aquaria as ex situ conservation sites for flora and fauna. Only a handful of threatened endemic species are found there, however, and the study emphasized the need to make better use of their potential for biodiversity conservation.

Box 4. Special programs

The Biodiversity Secretariat, with donor assistance, will implement the following special programs during the next three years.

- a) assign priorities to the recommendations of the BCAP with the assistance of specially-appointed Task Forces;
- b) prepare proposals for specific activities emanating from the outputs from (a) above;
- c) strengthen the capacity of the Biodiversity Secretariat;
- d) create awareness of the BCAP, including the preparation of a popular version of the BCAP in the local languages and short films;
- e) strengthen biodiversity considerations in EIA assessments;
- f) prepare a BCAP for a high-priority biodiversity region as a pilot exercise;
- g) develop detailed monitoring systems, including indicators, which will include review of BCAP; and
- h) establish a biodiversity database.

Monitoring and follow-up

Monitoring of the BCAP is in its infancy. Although formal indicators have not been developed for monitoring progress in BCAP implementation, informal

procedures do exist. These involve regular reviews of biodiversity activities by the Biodiversity Secretariat and the National Experts Committee.

One of the first reviews of the status of BCAP implementation was undertaken in early 1998 with the preparation of the First National Report on implementing Article 6 of the CBD submitted to the Fourth Conference of the Parties. The report assessed biodiversity conservation activities since Sri Lanka's ratification of the convention (Ministry of Forestry and Environment 1998).

Some biodiversity initiatives were also reviewed in the NEAP update and further examination will be made in the upcoming State of Environment Report. Most significantly, a comprehensive review of the BCAP is planned within the next three years, which will assess implementation and set the baseline for subsequent reviews.

Lessons learned

A participatory approach

The Ministry of Environment enlisted active participation of the stakeholders, particularly NGOs, at all stages of the preparation of BCAP. This was a key feature of the BCAP preparatory process. It was a rare instance of a government initiative employing a wide consultative process in preparing a nationally important plan, and it gave the stakeholders a sense of ownership of the plan.

The time available for the preparatory process was limited, essentially because of donor funding. Some stakeholders felt that the preparatory process was too short for a plan of this nature, resulting in misconceptions that the BCAP was donor-driven.

Involving state agencies

Although the preparatory phase of the BCAP involved state agencies with a stake in biodiversity, a continuing dialogue with these agencies would have provided a solid foundation for implementation, which requires their strong support. The rather long interval between the preparation of the BCAP and its approval by government was a distinct disadvantage, since interest in matters relating to BCAP implementation waned. The delays in activating the National Steering Committee (which provides guidance to the implementation process) and the inability of the Biodiversity Secretariat to respond quickly to issues have also adversely affected BCAP implementation.

The BCAP preparatory process should have established a link with large development projects affecting biodiversity, such as the Accelerated Mahaweli Project, which require specific interventions relating to biodiversity conservation. It is now clear that the Biodiversity Secretariat should take special note of future development projects with possible adverse impacts on biodiversity and closely liaise with them to mitigate negative effects.

The National Steering Committee

The National Steering Committee, which is expected to provide overall policy guidance and leadership in the implementation of BCAP, has so far met only once. This apparent inactivity in the nascent stage of BCAP implementation has prevented sectoral agencies from engaging in the process and meeting their respective obligations under the plan. The situation is further aggravated by the committee's complex and somewhat confusing inter-committee coordination structure.

Awareness campaigns

Since the ratification of the convention by Sri Lanka, there have been ad hoc attempts to mount general awareness raising programs aimed at the public at large. In hindsight, it would have been more useful to have a concerted, well-directed awareness campaign relating to the CBD itself and create a sense of responsibility in various stakeholders about their roles in meeting its requirements. The awareness programs targeting the state sector had marginal impact; little demonstrable commitment to biodiversity conservation has been shown. Indeed, creating awareness among school children should have been a high priority, since they are a means of conveying information. Ideally, the BCAP preparatory process should have had an independent initiative to develop a well-targeted communication strategy on natural resources conservation and sustainable use.

Recommendations

Establish priorities: The BCAP contains a large number of sectoral and cross-sectoral recommendations. Obviously, it is not possible to implement activities relating to all of them. It is a matter of urgency to establish priorities with a view to developing an implementation plan.

The Biodiversity Secretariat: The Biodiversity Secretariat, established at the time Sri Lanka ratified the Convention, has not adequately developed its capacity to respond to the various issues in the BCAP. It needs technical expertise in order to provide the government with sound advice. It has to

develop a realistic work plan, and must develop working partnerships with other key state agencies who have a stake in biodiversity conservation.

The Secretariat needs to take the initiative in activating the National Steering Committee, which will provide the means of inter-sectoral coordination. It is particularly important at this early stage of BCAP implementation to give the process credibility so that the partners can be encouraged to take the initiative in their respective sectors.

The government has established a series of committees to integrate biodiversity concerns into development planning. The structure and inter-relationships of these committees appears overly complex; it would be useful to develop a more workable system which would better engage stakeholder agencies.

Communications: Even at this late stage it is productive to develop a sound communication strategy directed at educating the state agencies. The purpose is twofold: first, to provide knowledge on natural resources conservation with special reference to biodiversity; and second, to create a sense of responsibility and ownership in implementing the convention.

Environmental Impact Assessments: Although EIAs are now obligatory for many development projects, there is inadequate emphasis on projects' effects on biodiversity. This needs to be addressed.

Bioregions: BCAP has introduced the important concept of bioregions. Establishing bioregions allows the government to focus scarce resources on the most urgent problems. In Sri Lanka, some bioregions are more vulnerable to degradation than others and some are under greater development pressure. While the BCAP identifies those bioregions which require urgent attention, biodiversity conservation strategies are needed for each of them, with a view to conserving critical habitats.

Database: Information and data on natural resources in the country are spread over a number of institutions, and some are not properly preserved. These data are essential for proper planning and for developing conservation strategies. A central database, incorporating all available information, should be established and be easily utilized by policy planners.

The private sector: The potential role of the private sector in biodiversity conservation needs to be recognized. While the public sector is also important, it would be almost impossible to implement a plan effectively without the active support of the private sector. Immediate action is needed to strengthen partnerships with the private sector to involve them in biodiversity conservation.

Chronology

1980	<i>National Environmental Act</i> and establishment of the Central Environmental Authority
1988	Preparation of the National Conservation Strategy (NCS)
1991	Preparation of the National Environmental Action Plan (NEAP), based on recommendations of the NCS
1992	Inter-ministerial Coordinating Committee to advise on biological resources established by the Ministry of Environment and Parliamentary Affairs
1993	Appointment of the National Experts' Committee on Biodiversity
1994	Revision of NEAP (March) Ratification of CBD by Sri Lanka (June) Establishment of the Biodiversity Unit in the Ministry of Environment and Parliamentary Affairs Preparation of the strategy for BCAP
1995	Forestry Sector Master Plan prepared
1996	National Coastal Zone Management Plan prepared (July) Preparation of BCAP begun
1998	(February) BCAP completed (August) Cabinet of Ministers approves the BCAP Biodiversity Secretariat established, Ministry of Forestry and Environment
1999	National Steering Committee on biodiversity set up Ministry of Forestry and Environment establishes a coordinating system to integrate environmental considerations with national planning (Committees on Environmental and Policy Management) Appointment of the Legal Task Force for preparing legislation on access to genetic resources and benefit sharing.

Suggested reading

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Endnotes

1. In 1998.
2. More information is available in Abeywickrama (1987), Wijesinghe (1994) and *Flora of Sri Lanka*.
3. Inland waters contain over 140 species of Rotifera, 10 species of shrimp, several species of freshwater lobsters, crabs, and fresh and brackish water prawns, and 31 species of fresh water molluscs (of which 12 are endemic). The marine invertebrate fauna include 201 species of crabs and over 171 species of corals from 65 genera. Indigenous terrestrial invertebrates include over 400 species of Arachnids from over 236 genera, 242 species of butterflies, 139 species of mosquitos, 525 species of carabid beetles, from 140 genera (of which ten genera and 127 species are endemic), and 265 species of land snails (of which over 90 species are endemic).
4. Amphibia has been recently revised by Pethiyagoda and Manamendra-Arachchi (1998).