



THE GOVERNMENT OF BRUNEI DARUSSALAM

THE 5TH NATIONAL REPORT TO THE CONVENTION ON BIOLOGICAL DIVERSITY

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EXECUTIVE SUMMARY

Brunei Darussalam became the 191th party to the Convention on Biological Diversity on 27 July 2008. With this accession, the Convention provided the country of an international conservation platform and further strengthens the ongoing conservation efforts and strategies on sustainable uses of biological and natural resources in accordance with national and international standards and commitments. This document presents the 5th National Report of Brunei Darussalam to CBD in accordance with Article 26 of the Convention and decision X/10 of the Conference of Parties and will provide key information on Brunei biodiversity including national strategic actions and programs for biodiversity conservation.

Brunei Darussalam has a diverse ecosystem and is considered among the countries with high forest cover. The natural vegetation of the country is tropical evergreen rain forests estimated to be around 75% of the country's total land area and composed primarily of old growth forests. The national forest reserves constitute 41% of the country's total land area and are protected by law. The forest structures and composition of these forests remains intact and represent national importance in terms of biological composition, unique landscape, forest production areas, forest recreation areas and other special uses.

The country is also blessed with rich marine biodiversity. The coastal waters of Brunei are characterized with a series of shallow shoals and patch reefs that provide habitat for corals, a wealth of fishes, and a myriad of reef dwelling invertebrates including corals, fishes, mollusks, crustaceans and echinoderms. Important marine resources are protected under the Fisheries law that provides for the establishment and management of marine reserves and protected areas.

The basic laws of Brunei Darussalam provided for the conservation and sustainable utilization of the country's biodiversity and natural resources. As such, the implementing policies, rules and regulations concerning biodiversity and natural resources management is parallel to the objectives and admiration of the Convention.

This report also presents the updates of biodiversity management and conservation in the country in accordance to the national biodiversity strategies and action plans and the 2015 and 2020 Aichi Biodiversity Targets. In general, the country is on track and with its biodiversity conservation management strategies progressing in accordance with the CBD targets.

1. INTRODUCTION

This report represents Brunei Fifth National Report to the Convention on Biological Diversity in accordance with Article 26 of the Convention and decision X/10 of the Conference of Parties. This document will provide key information on Brunei biodiversity including national strategic actions and programs for biodiversity conservation.

This national report is composed of three major parts, as follows:

- Part I - An update on biodiversity status, trends, and threats and implications for human well-being;
- Part II - The national biodiversity strategy and action plan (NBSAP), its implementation and the mainstreaming of biodiversity; and
- Part III - Progress towards the 2015 and 2020 Aichi Biodiversity Targets and contributions to the relevant 2015 targets of the Millennium Development Goals.

1.1 Brunei Country Overview

Brunei Darussalam is a small Islamic Sultanate located on the northwest coast of Borneo Island. It has a total land area of 576,532 hectares covering an anomalous shape of two enclaves of which each enclave is surrounded on land by Sarawak, Malaysia. The country has a 161-kilometer coastline bordering the South China Sea and consists of high-profile sandy beaches with a complex estuarine mangrove and mud-flat zone in the northeast. The western enclave is characterized by hilly lowland with fast emerging infrastructure developments that contains most of the country's population. The thinly populated eastern enclave is composed generally of dense forests and is hillier.

The population of the country is estimated to be around 423,000 (2011) with more than three-fifth of the population classified officially as Malay including a number of indigenous people such as Duzun, Belait, Tutong, Kedayan, Murut and Bisaya. Chinese makes up about one-fourth of the population. The literacy rate is estimated to be 94.7%.

The country enjoys a distinct tropical climate with year-round high rainfall, high temperatures, and high humidity. Climatic changes are influenced by monsoon winds of which northeast monsoon can be observed during the months of December to March while southeast monsoon occurs from June to October.

Brunei Darussalam enjoys a stable economy with a mixture of foreign and domestic entrepreneurship, government regulation, welfare measures, and village tradition. Crude oil and natural gas production

is the main natural resources and accounts for about 90% of the country's gross domestic products.

Map 1
Map of Brunei Darussalam



The country is governed by the constitution and the national tradition of the Malay Islamic Monarchy, the concept of *Melayu Islam Beraja* (MIB). The three components of MIB cover Malay culture, Islamic religion, and the political framework under the monarchy. It has a legal system based on English common law as superseded by the Islamic Shariah Law in some aspects.

1.2 Biodiversity Legal, Policy Framework and Governance

The legislation of the Forest Act in 1934 was among the milestones in forestry and biodiversity management. The law was based on British legal concept and form and largely patterned from the forest laws and regulations of the Federated Malay States. Initially, the Act provided the basic law for administration of the forests, reservation of forest lands, harvesting of forest produce, grant of customary gratuitous rights to forest-dependent inhabitants, stipulating penalties for violations and prescribing forest royalties. The Forest Act officially became Chapter 46 of the Laws of Brunei. In response to the challenges and opportunities in the forestry sector, the law was amended in 2007 and gave emphasis on the importance of

biological diversity conservation, biological prospecting, access and benefit sharing, enforcement and forest protection.

The implementation of the National Forest Policy in 1989 provided the basic planning and management principles and guidelines for the country's forest resources. The Policy was embedded into a Forestry Strategic Plan that leads to the consolidation of the country's protected area system as well as sustainable use of forest for production purposes.

The Wildlife Protection Act of 1978 (Revised 1984) provided for the protection of the country's wildlife and the establishment of wildlife sanctuaries. It strengthened the regulatory power of the government to control, apprehend and prosecute illegal wildlife gatherings. In view of recent developments on wildlife monitoring and control, the Ministry of Industry and Primary Resources intends to review and amend the Act to be more effective and responsive to current situation.

The Wild Fauna and Flora Order of 2007 serve as the national legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) for the protection of the country's wildlife, particularly endangered species. The Order provided the administrative structures and mandate of concerned government agencies in the implementation of CITES regulations, terms and condition.

The Fisheries Order 2009 that repealed the Fisheries Act (Chapter 61) is one of the key policies that govern the protection and management of the marine biodiversity in Brunei Darussalam. One of the provisions of the Fisheries Order is the establishment and management of the marine reserves and marine parks. This provision catalyzed the establishment of the Marine Protected Area Network in 2012 as one of the key measures to protect and conserve the biodiversity of the fragile coral reef habitat and its marine plants and animals including corals, fishes, mollusks, crustaceans and echinoderms.

The Department of Fisheries (DoF) under the Ministry of Industry and Primary Resources (MIPR) is responsible for the execution of Fisheries Order 2009 that gave mandate to manage and administer the fishery resources and fishing activities in Brunei's coastal areas and exclusive economic zone. The Fisheries Order 2009 came into force in 2009. Complementing the Order are subsidiary legislations which were enacted under the Fisheries Act and has remained in force. This includes all the fisheries regulations that directly or indirectly intended to protect marine biodiversity such as the MPA, mesh size regulations, fishing zonation and fishing moratoriums. Other policy

measures that affect marine biodiversity include the establishment of the NPOA IUU, to implement responsible fishing practices. Another measure to protect endangered species is the ban on the sales and catching of sharks and other endangered species such as the Napoleon wrasse

The Brunei Darussalam Long Term development Plan - Wawasan 2035, among others, also highlighted the continuing efforts to conserve the country's remarkable biodiversity, rain forests and natural habitat as an environmental strategy. Specifically, the plan stressed the development of forest resources, conservation and protection of the natural forest and environment and the development of ecological tourism industry as the main focus of the forestry sector.

Brunei Darussalam accession to the Convention of Biological Diversity (CBD) on 27 July 2008 provides the country an international conservation platform. It further strengthens the ongoing conservation efforts and strategies on sustainable uses of biological and natural resources in accordance with national and international standards and obligation.

1.3 Overview of Brunei Biodiversity

Brunei Darussalam has a diverse ecosystem and is considered among the countries with high forest cover. The natural vegetation of the country is tropical evergreen rain forests. The Global Forest Resource Assessment 2010 has estimated Brunei forest cover to be around 75% and composed primarily of old growth forests. The country has seven distinguishable forest types: mangrove forests, beach-type forests, freshwater swamp forests, peat swamp forests, 'kerangas' forests, mixed-dipterocarp forests and montane forests. The landscapes of these forests are very evident based on their floral composition, forest formations, soil conditions and micro-environment.

The national forest reserves constitute 41% of the country's total land area and are protected by law. The forest structures and composition of these forests remains intact and represent national importance in terms of biological composition, unique landscape, forest production areas, forest recreation areas and other special uses.

The Forest Act categorized the country's forests into five functional classifications, as follows: protection, production, recreation, conservation and national park.

Protection forests refer to forest areas which are designated to remain in a preserved condition. These forests are necessary to protect the critical soil and water resources in order to minimize the occurrence of floods, droughts, erosion and pollution. This functional

forest is also delineated to protect the unique landscapes and to preserve indigenous flora and fauna that contribute to the general ecological stability of the country.

Production forests reserves are sustainably managed forest resources that support the demand of the country's forest-based industry for raw wood materials. The utilization of forest resources is subjected to strict and conservative regulations to ensure the sustainability of the resource for future use.

Recreational forests refer to the unique forest ecosystems with wonderful biological landscapes within easy access to the country's populace. These forests are further developed and enhanced for outdoor recreation purposes to promote social, psychological and physical well-being of the people.

Conservation forests are forest ecosystems set aside for preservation and biodiversity conservation for scientific, educational and research purposes.

National parks are areas with distinctive geologic, topographic and other unique formations of special interest. These areas are reserved to main the original landscape, biological composition and natural habitat of wildlife.

Table 1 presented the area coverage of the country's forests based on functional classifications.

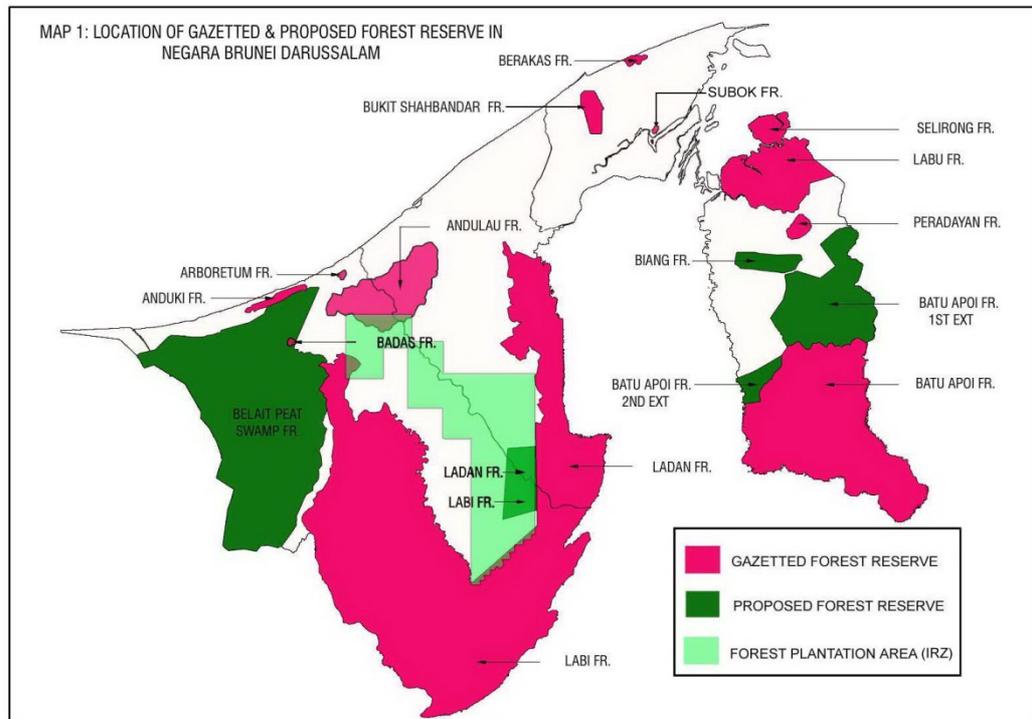
Table 1
Functional Forest Classification
Brunei Darussalam

Forest Classification	Gazetted Area (hectares)	Proposed Area (hectares)	Total Area (hectares)	Percent of the Total Land Area
Protection Forest	18,562	0	18,562	3.22
Conservation Forest	28,562	3,173	31,684	5.50
National Park	46,210	2,644	48,854	8.47
Recreation Forest	4,211	80,624	218,650	37.92
Production Forest	138,026	234	4,445	0.77
Total	235,520	86,675	322,195	55.88

Despite the country's limited land area, the National Herbarium has recorded 162 families of Angiosperm and Gymnosperm including 918

genera and 3,621 species in the country. Faunal diversity in the country is composed of 121 mammal species, 474 bird species, 182 amphibians and reptiles and 500 species of marine fish and invertebrates.

**Map 2
Gazetted Forest Reserves of Brunei Darussalam**

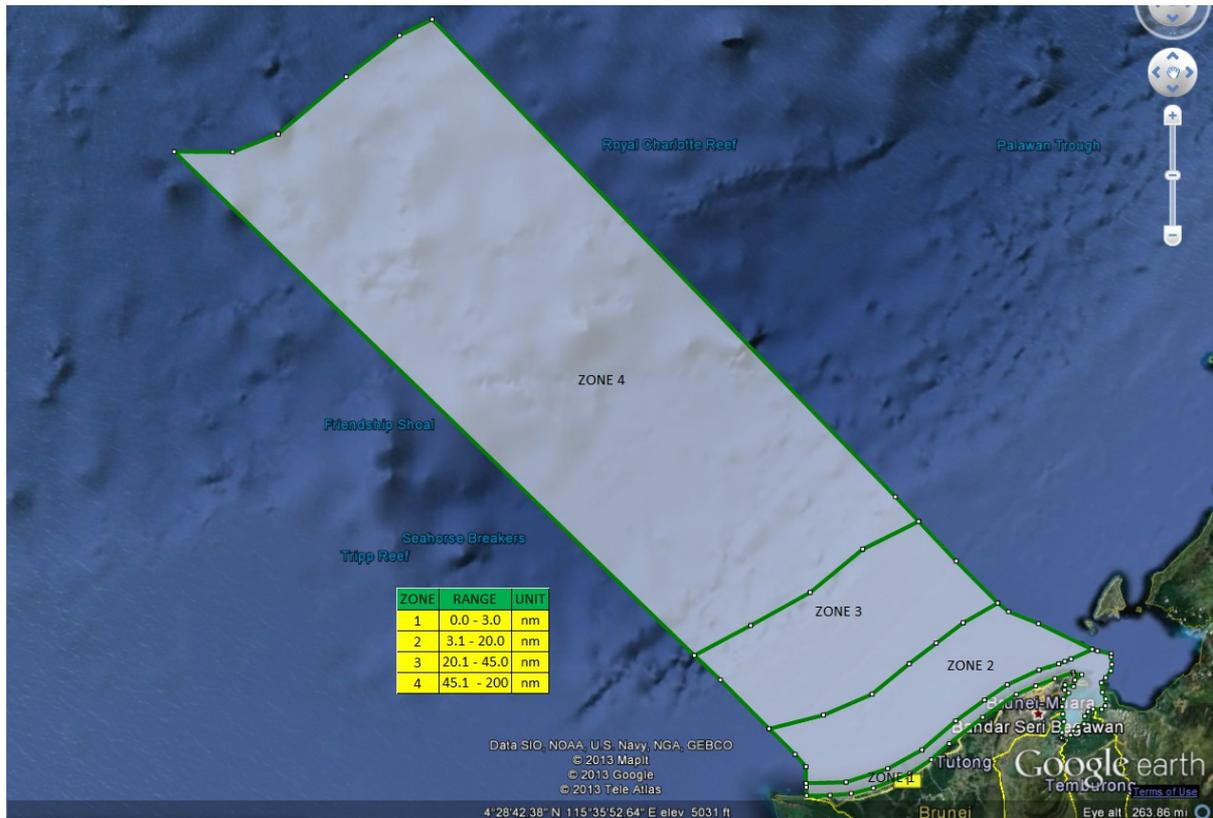


The country is also blessed with rich marine biodiversity with various marine flora and fauna in its diverse marine ecosystem. The coastal waters of Brunei are punctuated by a series of shallow shoals and patch reefs that provide habitat for corals, a wealth of fishes, and a myriad of reef dwelling invertebrates including corals, fishes, molluscs, crustaceans and echinoderms.

The rich marine biodiversity of Brunei waters is found in the limited marine area covering rectangular strip of about 41,188 square kilometers from the coast to the far end of the 200 nm Exclusive Economic Zone (EEZ) as shown in Figure 1. The coastline stretched of Brunei is about 161 km.

Figure 1

Exclusive Economic Zone of Brunei Darussalam and Fishing Zonation



2. PART ONE - An Update on Biodiversity Status, Trends and Threats and Implication for Human Well Being

2.1 Status of Important Biodiversity Components

2.1.1 Forest Biodiversity

Brunei Darussalam tropical rain forests represent the most dominant biodiversity component in the country. It extends from the coastal plains up to the hill forest ecosystems that include inland waters such as lakes and rivers.

The seven forest types of the country can be further categorized based on their geographical and altitudinal distribution, swamp/lowland forests and hill/upland forests. Swamp or lowland forests occur in low-lying lands and generally subjected to tidal, seasonal or continuous flooding and inundation by water. Forest ecosystems under this category include mangrove forests, beach-type forests, freshwater swamp forests and peat swamp forests. Hill or

upland forests are those generally located on high and dry grounds and composed of heath forests, mixed dipterocarp forests and montane forests.

In terms ecological and biological systems, there are 33 distinguishable bio-ecotypes and distributed based on the table below.

Table 2
Type of Forests and Bio-ecotypes

Type of Forests	No. of Bio-ecotypes
Mangrove Forest	7
Beach-type Forest	1
Freshwater Swamp Forest	3
Peat Swamp Forest	9
Heath Forest	5
Mixed Dipterocarp Forest	3
Montane Forest	5

The management and conservation of gazetted forest reserves that comprises around 55% (to include proposed extension areas) of the country's total land area remains under the government management jurisdiction and are well protected and preserved.

Belait Peat Swamp Forests

The collaboration between Wetland International Malaysia and Brunei Shell Petroleum aims to develop a biodiversity action plan for the Belait peat swamps, a communication plan to prevent fire incidents in the peat areas and to develop a plan for ecological restoration of disturbed key areas. The project area comprises the Badas peat Dome (bounded in the figure by the blue line) and the Rasau area to the west off the Belait River.

Most of the project area is critical habitat, as shown by the figure.

The definitions of critical habitat are as follows:

Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory

species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.

Figure 2
Identified Critical Areas of the Belait Peatswamp forests



The critical habitat includes all types of peat swamp forest, kerangas and kerapah forests, the kapur paya (*Dryobalanops rappa*) forest in the coastal zone at Anduki/Lumut and some coastal forest at Lumut.

The Alan forests in particular are of enormous biodiversity value, Brunei being virtually the last stronghold of these unique forest types globally. The Alan forests (PSF2-4) make up the bulk of the critical habitat. They are considered to be critically endangered ecosystems in their own right, in addition to the critically endangered and endangered floral and faunal species they contain. According to draft criteria being developed for the IUCN Red List of Threatened Ecosystems, they would also be classified as critically endangered ecosystems.

Despite rapid development in the coastal zone of the project area, there are still diverse areas of high value which qualify as critical habitat, such as the remnants of the once extensive *Dryobalanops rappa* forests, unique coastal forest and remnants of Alan Batu forest.

Highlights of the floral and faunal surveys included:

- **Flora:** 202 plant species were recorded during the survey, of which 5 are critically endangered species, 6 endangered species and 16 endemic to Borneo.

- **Dragonflies:** 77 species were recorded during the study, of which 14 are endemic to Borneo. 6 new records for Brunei were found, with one species new to science.
- **Fish:** 52 species were recorded, including a new record for Belait District
- **Amphibians:** 21 species were recorded during the survey, with 4 Bornean endemics
- **Reptiles:** 23 species were recorded during the survey of which 3 are Bornean endemics. Although the critically endangered hawksbill turtle was not recorded during the surveys, it is still thought to use some of the beaches in the project area for nesting.
- **Birds:** 194 species of were recorded. 9 were found to be Bornean endemics while 2 species are endangered. 60% of all birds so far recorded in Brunei were recorded in the project area during these relatively limited surveys.
- **Bats:** 19 species (21 including acoustic records) were recorded during the survey. One species is endemic to Borneo. A significant finding was the large number of flying foxes (*Pteropus vampyrus*) moving into the peat swamp forests of the project area at times when members of the tree family Sapotaceae are flowering and fruiting. This emphasises the seasonal importance of the project area to faunal populations from outside.
- **Mammals:** 28 species other than bats were recorded. Two endangered cats were recorded through camera trapping: the Bornean Clouded Leopard, *Neofelis diardi borneensis* and the Flat-headed cat, *Prionailurus planiceps*. Other species recorded, which are listed as Vulnerable, but which may qualify for endangered status, were the Marbled Cat, *Pardofelis marmorata*. Bearded pig, *Sus barbatus*, Sunbear, *Helarctos malayanus*, Slow Loris, *Nycticebus coucang*, Banded Palm Civet, *Herpestes brachyurus*, Sambar Deer, *Rusa unicolor* and the Pig-tailed Macaque, *Macaca nemestrina*.

Flora: Of the threatened tree species, many are dipterocarps, mostly found in the Kerangas and Kerapah mosaic in the east of the project area, making the sand ridge areas hot spots for tree diversity.

In terms of priority habitats, **Alan Batu peat swamp forest, Kerangas and Kerapah** stand out as having the most critically endangered and endangered floral and faunal species, besides fulfilling criterion 4 as endangered ecosystems.

The Alan forests probably have one of the highest densities of endangered species in the world simply because the canopy is almost 100% dominated by *Shorea albida*. The Kerangas and Kerapah areas have the highest diversity of threatened tree species in the project area.

All peat domes in middle and upper Belait District would also qualify as critical habitat.

2.1.2 Marine and Coastal Biodiversity

Brunei Darussalam has 161 kilometers of coastline and 210 square kilometers of coral reefs. The coral reef condition was considered to be good to fair having at least 50% of the reefs with more than 50% live coral cover. The country hosts a total of 400-reefbuilding corals species from 70 genera and 15 families with an additional 29 species that requires further taxonomic study.

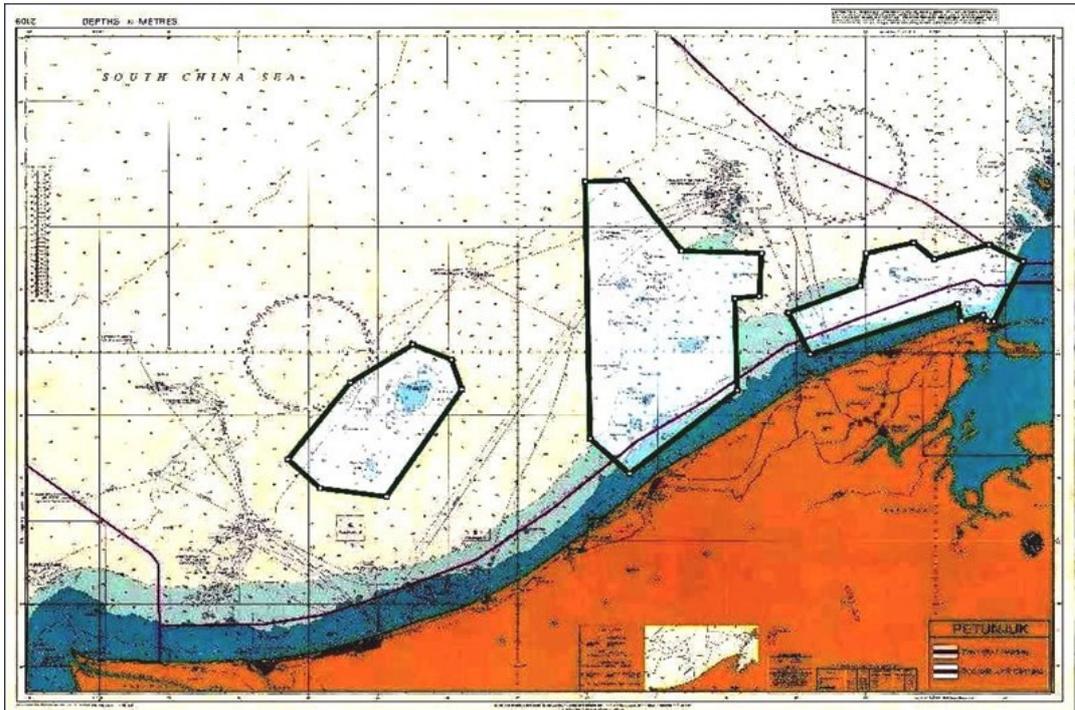
Brunei Darussalam reefs can be divided into three categories, as follows: fringing reefs, atoll and patch reefs. The table below shows the distribution of the country's reefs according to the above-mentioned categories.

Table 3
Reef Distribution

Categories	Reef Distribution
Fringing reefs	Pelong Rocks Pulau Punyit
Atoll	Louisa Reef
Patch reefs	Abana Rocks, Two Fathom Rocks Colombo Patches, Nankivell Rocks, Otterspool Patches, Brunei Patches, Cunningham Patch, Victoria Patches, Ampa Patches, Porter Patch, Fairley Patch, Browne Patch, Chearnley Patch

Brunei Darussalam has 6 Marine Protected Areas (MPA) covering around 182.53 square kilometers of which 3 of it contain coral reef as the dominant habitat. Most of these MPAs were established more than 2 decades ago and are managed at the national level. Map XX shows the distribution of MPAs and coral reefs of the country.

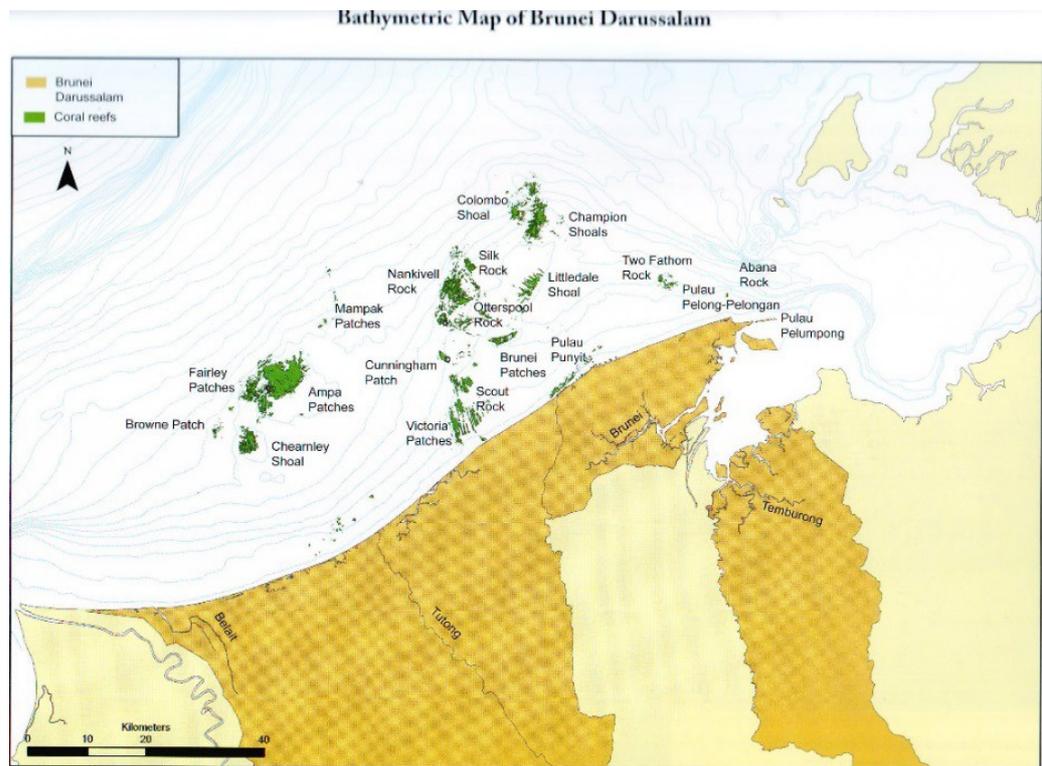
Map 3 Marine Protected Areas of Brunei Darussalam



Status and trends

The total area of the coral reefs of Brunei Darussalam is about 50 km² as shown in Figure 2. The diversity of the corals yields a total of 410 reef building coral species. Brunei coral reefs are mainly submerged shoals and with the exception of several near shore islands, are more than seven meters deep at their shallowest. Brunei coastlines are in good condition, many featuring interesting communities with a high coral cover of an average 37%.

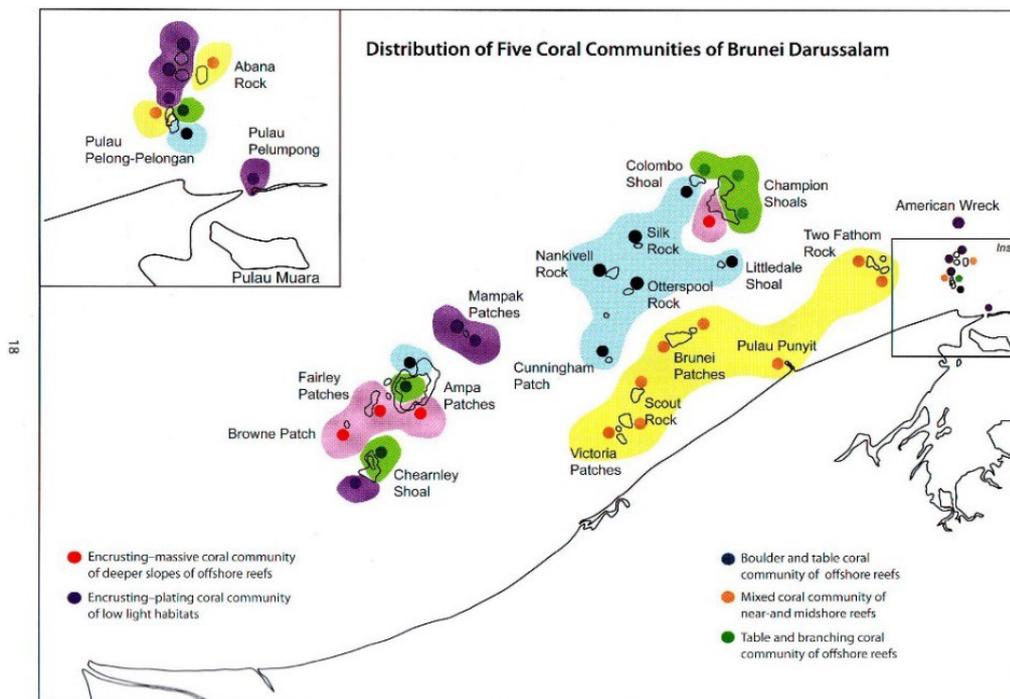
Figure 3
Brunei's Coral Reefs



As is typical of most reefs of the Indian and the Pacific Oceans, four major coral families, the Acroporiidae, Faviidae, Poritidae and Fungiidae collectively contribute most species and in case of Brunei some 70 percent.

Brunei's reefs host five broad kinds of coral communities, each with characteristic species and growth forms as shown in Figure 3 namely: 1) mixed coral community of near and mid-shore reefs, 2) encrusting-plating coral community of low light habitats, 3) encrusting-massive coral community of deeper slopes of offshore reefs, 4) table and branching coral community of offshore reefs, 5) boulder and table coral community of offshore reefs.

Figure 4
Coral Communities in Brunei Darussalam



Fishes on reefs are analogous to birds in tropical forests. Many are beautifully colored, while others are distinctively shaped. On the reef fish diversity of Brunei, the total reef fish fauna consists of 711 species in 259 genera (including one new and undescribed genus) and 82 families. The "top ten" families with most number of species on Brunei coral reefs include the gobies (Gobiidae - 93 species), wrasses (Labridae - 79 species), damselfishes (Pomacentridae - 66 species), cardinal fishes (Apogonidae - 45 species), groupers (Serranidae - 36 species), butterflyfishes (Chaetodontidae - 31 species), parrotfishes (Scaridae - 25 species) snappers (Lutjanidae - 23 species), surgeonfishes (Acanthuridae - 23 species), and trevallies (Carangidae - 18 species).

Reef molluscs are another particularly successful group in terms of diversity. Like the fishes, these have adopted an amazing variety of modes of life as herbivores, detritivores, parasites, scavengers, filter feeders and predators, filling many marine niches. Representatives of all molluscan groups can be found in Brunei: chitons, snails, clams, nudibranchs and cephalopods. A total of 475 species from two groups were found in Brunei including 385 species of gastropods and 90 species of bivalves. For the echinoderms, 984 species were listed in Brunei with 12% of which is considered endemic. There are also 11 species of stomatopods found in Brunei waters.

Seagrass diversity in Brunei is yet to be determined but with at least 13 species are recorded including *Halophilia sp* and *Halodule sp* in the isolated patches on sandy substrate offshore and in the inner Brunei Bay areas. Extensive seagrass beds were also found intertidally around some of the islands of inner Brunei Bay, particularly Pulau Muara Besar (PMB), sub-tidally off PMB and offshore on substrata between coral reef patches. Seagrass beds are important food source for the endangered dugong (*Dugong dugon*) and the green turtle (*Chelonia mydas*) that are also found in Brunei. Seagrass beds like the mangrove areas, also serve as critical habitat and nursery area for a number of commercially important marine species of fish and shrimps. A total of 79 species of fish belonging to at least 34 families are found in the within mangrove areas in the Brunei Estuary.

There are 12 species of shrimps from 3 genera (*Penaeus*, *Metapenaeus* and *Parapenaeopsis*) that is found in Brunei such as white shrimp, and yellow shrimp groups. They are found mostly in the estuary and along the coast. Two tiger shrimp species, *Penaeus monodon* and *Penaeus semisulcatus*, are also found offshore, with the latter in relatively deeper waters.

Around 400 species of demersal fishes belonging to 179 genera and 100 families are also found in Brunei, however, only 100 species are commonly caught. About 2/3 of demersals caught by fishers in Brunei belongs to slipmouth, goatfish, threadfin bream, shark and ray groups. There about 100 species of pelagic fishes belonging to 50 genera and 20 families that are found in Brunei waters. The pelagic species in Brunei are divided into small pelagics and large pelagics.

Marine mammals were also observed in Brunei waters including the commonly sighted bottlenose dolphin (*Tursiops truncatus*). The Irrawaddy dolphin (*Orcaella brevirostris*), Spinner dolphin (*Stenella longirostris*) and finless porpoise (*Neophocaena phocaenoides*) and dugong (*Dugong dugon*) are also found in Brunei waters. Species of great whales, short fin pilot whale, pygmy sperm whale, tropical whale, Brydes's whale and Minke whale have been recorded in Brunei.

The sandy coastline of Brunei provides suitable nesting sites for marine turtles and out of 7 known species in the world, 4 of them are recorded as nesting or frequenting Brunei shores. These are the hawksbill, green turtle, Olive Ridley and the giant leatherback.

Threats

Industrial discharges or spillages and inadequately treated or untreated sewage could pollute terrestrial water bodies, estuaries and/or marine environment. The main concerns are the possible impact of pollution on the biodiversity of aquatic plants and animals or the marine ecosystems. As hydrocarbon is the leading industry in Brunei, there is always the potential of oil spillage, whether from tankers, pipelines or rig accidents. Red tides are also a phenomenon that threatens marine biodiversity.

Coral bleaching, elevated sea temperatures. Acidification, destructive fishing practices, and sedimentation due to careless logging or agricultural practices, dredging or land filling are among the most obvious threats to coral reefs and other marine life. Other natural disturbance such as climate change, typhoons, earthquakes, flooding, predator or disease outbreak also impact the biodiversity of the marine life.

Large predatory species including groupers, trevallies, Napoleon wrasse and sharks are scarce on Brunei reefs, an indication of overfishing. The apparent unrestricted use of both commercial trawl nets and small-scale gillnets in the vicinity of Brunei's coral reefs is a major problem that needs to be addressed.

Implication for human well-being

Brunei Darussalam has long depended on coastal resources for food, livelihood and shelter. Today, the role of coastal resources remains significant. Many productive economic activities, including oil and gas operations, are concentrated in the coastal zone. Before the oil and gas resources were developed, the majority of the population relied on agriculture and fisheries as means of livelihood and source of food. Today, fish and fish products still figure prominently in local diets. Despite increases in supply and consumption of livestock, fish remains the main source of animal protein for Bruneians.

Some coastal features or habitats are significant or critical because of their contribution to the coastal zone's biodiversity, productivity and functional integrity (e.g. mangrove, seagrass beds, coral reefs, islands, estuaries) or their current value to the national economy.

Mangrove forests spanning 184 km² provide coastal protection, harbor unusual wildlife and export nutrients to hereby areas. The mangroves of Brunei estuary and associated rivers are particularly important to maintain the high fisheries potential in the area and adjacent coastal waters. It act as nursery and breeding grounds for many economically important fishes and crustaceans and export detritus and nutrients into nearby systems which form the food base of a complex of marine organisms, which in turn support valuable estuarine and near shore fisheries.

The large estuaries (Brunei, Tutong and Belait) covering 400 km² serve as important nursery/feeding grounds for fishery resources. Brunei estuary is of major significant as site of the local fishery for shrimps and fishes. The estuaries of Belait and Tutong are also important artisanal fishing grounds. Mudflats characterize most estuaries and the major ones are located adjacent to mangroves. Mudflats serve as habitats for many mollusks and crustaceans and a variety of worms. During high tide, various fishes, shrimps, crabs and molluscs forage for food on mudflat.

Brunei Darussalam's with a very limited sea as well as coral reef area, it is particularly important to conserve the relatively small amount of these prized resources. Despite the relatively homogenous habitat, the reefs host highly diverse coral communities, generally in good condition, as exemplified by a strong ratio of live: dead coral cover as indicator of reef health and low levels of coral injury. The coral communities are most notable in respect of the very unusual co-occurrence of high distinctive suite of reef-building (hard) corals, soft corals and gorgonian sea fans. Several reef areas are particular of conservation importance. This includes the near-shores reefs of Pulau Pelong-Pelongan and Abana Rock, the mid-shore reefs of Victoria Patches, Brunei Patches and Littledale Shoal and the offshore reefs of Colombo Shoal, Mampak and Ampa Patches. These collectivity capture all major coral community types, and very high proportion of biodiversity, conferring significant important with respect to biodiversity conservation.

2.1.3 Species Biodiversity

Floral Species of Brunei Darussalam

Brunei Darussalam has 5,000 species of vascular plants with 2,000 tree species. At present, a number of expeditions and studies are

ongoing within the different forest ecosystems of the country to update its floral resources information. All the plant specimens collections are kept at Brunei National Herbarium (BRUN).

Table 4
Floral Species of Brunei Darussalam (Seed Plants)

Subdivision/Classes	No. Families	No. Of Genera	No. of Species
Angiosperms:			
Dicotyledon	135	763	3,042
Monocotyledon	37	245	713
Gymnosperms	5	9	31
Total	177	1,017	3,786

In 2012, sixty five flowering plants have been short-listed as endemic to Brunei: 1 at the genus level, 56 at the species level, 6 at the subspecies level and 3 at the variety level. The best represented plant families among the endemics are: Begoniaceae (15), Araceae (8), Gesneriaceae (7), Orchidaceae (5), Zingiberaceae (5), Arecaceae (5), and Myristicaceae (3). Most of the endemics (35 of them) are herbs. Few (7 of them) are trees or treelets.

Mammals

There are about 121 mammal species in the country, of which half of them are rodents (squirrels, rats, and porcupines). Tree shrews, squirrels, monkeys, and apes are active during daytime while nocturnal species are composed of shrews, moon-rat, pangolin, civet, wild cat, flying lemur, and flying squirrels. Large terrestrial herbivores include bearded pig, mouse deer, barking deer, and sambar deer. The clouded leopard cat is Brunei's largest wildcat species. Sun bear or *beruang* can also be found in Brunei forests and the only mammal species that pose danger to human in the forest.

There are two Bornean endemic species found in Brunei; the proboscis monkey (*Nasalis larvatus*) and the tufted ground squirrel (*Rheithrosciurus macrotis*). Proboscis monkey can be found in riparian-riverine forests, coastal lowland forests, mangroves forests, peat swamp and freshwater swamp forests. The distinct characteristic of this monkey is the large protruding proboscis or nose, from which it takes its name. The big nose is thought to be used to attracting mates and also serves as a resonating chamber, amplifying their "honking" warning calls. When the monkey becomes agitated, its nose swells with blood making warning calls louder and more intense. Proboscis monkeys are evaluated to be endangered on the IUCN Red List of Threatened Species.

Tufted ground squirrels on the other hand can be found primarily on the ground or lower tree trunks, but sometimes feeds in tall trees. This squirrel is rarely seen and seems to occur in small numbers even under optimum conditions. Most records are from tall dipterocarp forests, but also recorded in old orchards and recently logged forest.

Past records and observations showed that orang hutan (*Pongo pygmaeus*) also occurs in the forest of Brunei Darussalam. However at present, there had no citing of the wildlife. The native wild cattle (*Bos javanicus*), known locally as tembadau, seladang, or banteng, can also be found in Tutong District in the past before it become extinct. Further, the only known Bornean fossil elephant (*Elephas maximus*) tooth came from a cave in the Belait District.

Birds

Brunei Darussalam is a haven for birds of different species. Recent surveys estimated that Brunei has around 471 species of birds. In Brunei, a casual bird watcher doesn't have to go to the forest to observe birds. Birds of diverse species are already visible in urbanized environment and live along with human community. It is worth to mention that hornbills can be observed gliding along the houses in the Belait district. This scenario shows the harmonious relationship between the species and the human community.

All eight (8) Bornean species of larger birds (eagles, pheasants, and hornbills) occur in the country. However, the most evident bird groups in the country are the brownish color babblers which feed on insects in the lower level of the forest canopy comprising 26 species group.

Reptiles and Amphibians

Fifty (50) reptile species can be found in Brunei Darussalam including the estuarine crocodile (*Crocodylus porosus*) and the false gharial (*Tomistoma schelegelii*). These crocodiles can be found and breed in riverine areas, coastal forests, and vegetation around lakes. Several amphibians are also observed in the country with around 98 species

Fishes

There are about 103 freshwater fish species in Brunei Darussalam of which 100 are native to Brunei waters and 3 species were introduced. They inhabit a great variety of habitats ranging from small torrential streams to estuarine, highly acidic ecosystems and also alkaline waters.

2.2 Securing Biodiversity - Protection and Conservation

Biodiversity concerns are largely governed by the basic laws, rules and regulations that provides for the administration of forests and associated natural resources. In addition to the legal framework provided in item 1.2, other relevant environmental laws that directly and indirectly attend to biodiversity conservation include the following:

- 1909 Land Code, as amended (1982) and the 1949 Land acquisition Act that governs the land allocation and management of all lands, including private use and tenure of land in the country.
- 1967 Antiquities and Treasure Trove Act, provides for the protection of historical sites and antiquities.
- Town and Country Planning Act, provides for the national development planning, particularly with respect to land allocation.
- 1972 Fisheries Enactment regulates fishing activities in the country and the designation of protection zones and areas for exploitation.
- Fisheries Order 2009. Brunei already has a very modest network of MPAs, as the coral reefs fringing the Pelong Rocks (2 ha) and Pulau Punyit (8 ha) are marine wildlife sanctuaries protected under the Antiquities and Treasure Trove Act (1967). In 2011, Brunei Darussalam proposed the establishment of a large, multiple-use MPA or a network of reserves (Fig 4). MPAs provide many benefits including conservation of biodiversity and maintenance of ecosystem processes and functions, such as nutrient cycling and replenishment. MPA also support fishery management and provide for research, education, recreation and nature-based tourism.

Under the current national initiative, the proposed National Biodiversity Order is in its advance stage and will be approved soon for implementation. The Order will facilitate the implementation of biodiversity conservation and management in the country. On the other hand, the Environmental Protection and Conservation Order aim to protect and manage the environment and to integrate environmental concerns into private and public decision-making processes. The proposed order is still under development and deliberation.

Another paradigm shift to protect and conserve the country's biodiversity is the recent announcement of the Ministry of Industry and Primary Resources (MIPR) to stop timber harvesting operations at the production forest reserves of the country. As such, timber harvesting operations will be reallocated in a specific area devoted for timber plantation development. At present, the policy is

undergoing comprehensive study to assure its effective implementation in the purview of sustainable forest management.

There is also an action call for protection status for the Badas dome and linking of Badas Forest Reserve to Andulau Forest Reserve by a protected corridor based on Sungai Badas.

To increase the biodiversity knowledge-based of the country, the government of Brunei Darussalam is also opening its windows for further collaboration pertaining to research and development of its biological resources with potential local and global research institutions. This move also responds to the need of increasing the in-house technical capabilities of the country in managing biodiversity concerns.

2.3 Invasive Alien Species

Invasive alien species (IAS) remains a threat in maintaining biodiversity in the country. Major sectors such as forestry, agriculture and fisheries are continuously affected by IAS to include insects, diseases, weeds, fish, marine animals and vertebrate animals. Their past introduction and establishment in the country had caused considerable damage to respective habitats by reducing production yields, quality and increase production costs.

Some of the IAS present in the country include to following:

- Highly pathogenic avian influenza
- Food and mouth disease
- Cocoa pod borer (*Conopormopha cramerella*)
- Diamondback moth (*Plutella xylostella*)
- Beet armyworm (*Spodoptera exigua*)
- Leaf miners (*Chromatomyia horticola* and *Liriomyza huidobrensis*)
- Water hyacinth (*Eichhornia crassipes*)
- Itch Grass (*Rottboellia cochinchinensis*)
- Barnyard grass (*Echinochloa crus-galli*)
- Siam weeds (*Chromolaena odorata*)
- *Acacia Spp*
- *Mimosa pigra*
- Golden Apple Snail, (*Pomacea canaliculata*) and Black Apple Snail (*Pomacea insularis*)
- Papaya Ring Spot Virus
- Citrus Greening Disease (*Candidatus Liberobacter asiaticum*)
- Virus Disease of Honeybees
- African Catfishes (*Clarius gariepinus* and *C. lazera*)
- Pacu (*Piaractus brachypomus*)
- *Cyprinus carpio* (Common carp)

- *Lutjanus kasmira* (Bluestripe snapper)
- *Ctenopharyngodon idella* (Grass carp)
- *Monopterus albus* (Asian swamp eel)
- *Hypophthalmichthys nobilis* (Bighead carp)

2.4 Importance of Biodiversity

Brunei Darussalam and its communities have great appreciation to its green environment and rich natural ecosystem. Although not much economic valuation has been conducted to estimate the monetary values of biodiversity and environmental services that the people enjoy, the growing recognition of these services by the populace can assure high positive values.

The table below presented the importance of biodiversity as perceived by Brunei communities, as follows.

Table 5
Importance of Biodiversity

Thematic Areas	Importance to Communities	Importance for Ecosystem Integrity	Importance for other values
Forest Biodiversity	<ul style="list-style-type: none"> • Daily subsistence on food, herbal & medicinal plants, freshwater, wood, house components • Recreational, educational, cultural • Gene bank • Fresh water supply 	<ul style="list-style-type: none"> • Productive habitats • Healthy ecosystem • Maintain ecosystem services • Home to endemic species including threatened species 	<ul style="list-style-type: none"> • Biological control for pest and diseases • Climate change • Wildlife population • Aesthetic • Biotechnology & related industries • Animals and insects for pollination
Inland Waters Biodiversity	<ul style="list-style-type: none"> • Food • Human habitat • Timber & non-timber products • Medicine & herbs • Education • Recreation • Tourism • Fisheries and aquaculture 	<ul style="list-style-type: none"> • Food security • Adaption to climate change • Gene pool 	<ul style="list-style-type: none"> • Agriculture pest control • Watershed • Greenhouse gas regulation • Carbon storage • Micro-climate function • Transportation • Nutrient cycling • Run-off regulation • Biodiversity values • Pharmaceutical values

			<ul style="list-style-type: none"> • Cultural and & heritage values
Marine and Coastal Biodiversity	<ul style="list-style-type: none"> • Human habitat • Ornamental fishes • Timber & non-timber products • Medicine and herbs • Education • Recreation • Tourism • Fisheries & aquaculture 	<ul style="list-style-type: none"> • Home to endemic & threatened species • Food security • Support for migratory birds • Gene pool • Existence value • Adaptation to climate change 	<ul style="list-style-type: none"> • Nursery ground for near shore fisheries • Storm protection • Prevention of coastal erosion • Nutrient recycling • Biodiversity values • Pharmaceutical values • Cultural & heritage values
Agricultural Biodiversity	<ul style="list-style-type: none"> • Human habitat • Fisheries & aquaculture • Agricultural products • Fuel wood sources • Timber & non-timber products • Medicine & herbs • Education • Agro-tourism 	<ul style="list-style-type: none"> • Food security • Soil erosion control • Pest control • Prevention of transmission of disease • Gene pool for agricultural production • Existence value • Adaptation to climate change 	<ul style="list-style-type: none"> • Animal and insects for pollination • Agricultural pest control • Greenhouse gas regulation • Carbon storage • Micro-climate function • Nutrient recycling • Biodiversity values • Pharmaceutical values • Cultural & heritage values

3. PART TWO - The National Biodiversity Strategy and Action Plan, Its Implementation and the Mainstreaming of Biodiversity

This chapter provides an overview of Brunei Darussalam initiatives with regards to the implementation of the National Biodiversity Strategies and Action Plans (NBSAP). Generally, various existing laws and national policies address biodiversity conservation in the country. The provisions of existing legislations provided the country with 13 strategies in implementing biodiversity conservation and management, as follows:

- Improve the scientific knowledge base
- Enhance sustainable utilization of the component of biological diversity
- Develop a center of excellence in research in tropical biological diversity
- Strengthen institutional framework for biological diversity management
- Strengthen and integrate conservation programs

- Integrate biological diversity consideration into sectoral planning strategies
- Enhance skills, capabilities and competence
- Encourage private sector participation
- Review legislation to reflect biological diversity needs
- Minimize impact of human activities on biological diversity
- Enhance institutional and public awareness

3.1 Strategies and Actions

3.1.1 Improve the scientific knowledge base

The enhancement of local knowledge and scientific base for managing the country's natural resources and environment has been among the top priorities of the government. A number of field expeditions to include flora and fauna identification have been continuously implemented to update existing biodiversity information and database. Joint collaborations between the government and international academic institutions are also ongoing in developing local expertise in environmental and natural resource management. The recent establishment of the Brunei Tropical Biodiversity Centre and the Brunei Agro Technology Park has facilitated the conduct of related researches and innovation in support to biodiversity conservation and management.

3.1.2 Enhance sustainable utilization of the component of biological diversity

The existing forestry laws, rules and regulations of the country highlighted the importance of sustainable and multiple use of forest and its associated resources. The country is also fully committed to achieve SFM and now in the process of forest certification to ensure that forestry activities are within acceptable norms and standards. A set of criteria and indicators is being developed and getting ready for stakeholders acceptance and confirmation.

The Belait Peatswamp BAP actions will implement reforestation in degraded forest areas with sago planting at Kuala Balai.

3.1.3 Develop a center of excellence in research in tropical biological diversity

Brunei Darussalam has opened its windows for more collaborations pertaining to the conduct of related biodiversity researches in the country. International academic and research institutions are very much welcome to enter into

agreement with relevant government agencies in exploring and studying the rich biological composition of the country's natural environment. The recent establishment of the Brunei Tropical Biodiversity Centre serves a structural venue to conduct studies and related researches.

The Belait Peatswamp BAP actions call for the development of a centre of excellence in peatland research, which is supported by MIPR.

3.1.4 Strengthen institutional framework for biological diversity management

The government has long recognized the importance of strengthening the institutional capacities for biological diversity management. It acknowledged the importance of close coordination and holistic approach in resource management that puts all important sectors such as forestry, agriculture, fisheries, tourism and industry under one umbrella organization, the MIPR.

At present, the MIPR is continuously strengthening its organizational structure to respond with the current challenges in natural resource management.

3.1.5 Strengthen and integrate conservation programs

The establishment of the Brunei Heart of Borneo (HoB) initiative has strengthened and integrates natural resources conservation and management program of the country. The HoB is composed of multi-sectoral stakeholders coming from government and non-government agencies. Its main objective is to coordinate the sustainable utilization, management, conservation and preservation of the countries limited natural resources. The HoB also caters for the conduct of researches to support resources management and improving institutional governing structures.

The Marine Biodiversity Centre is established with the purpose to undertake the conservation and management of the marine biodiversity. It is also designed to harness greater public understanding of the marine ecosystem and the inhabitants. Also, to promote awareness especially to the young generation of the current environmental issues that threatens our vital oceans resources which is essential to the survival of our marine biodiversity.

3.1.6 Integrate biological diversity consideration into sectoral planning strategies

Biological diversity considerations are considered in the planning strategies of Brunei Darussalam. As such, the Brunei Darussalam Long-Term Development Plan has specifically highlighted the continuing efforts to conserve the country's biodiversity, rain forests and natural habitat. Among others, this statement forms part of the national strategy for the environmental management.

3.1.7 Enhance skills, capabilities and competence

The government is continuously investing on human resources development of the country. The upgrading of local academic institutions are implemented to develop the country's youth cope up with the demand for technical people who will be involved in natural resources management in the near future. Potential and existing technical personnel are also encouraged by the government to continue their higher education to become experts in their chosen field of work.

3.1.8 Encourage private sector participation

The government of Brunei Darussalam always welcomes the participation of the private sector in biodiversity conservation programs. Every year, the participation of the private sector is increasing up to the point that some environmental initiatives are being led by the private sectors with no or minimal government intervention.

3.1.9 Review legislation to reflect biological diversity needs

The government recognizes the importance of a legal framework for effective biodiversity conservation and management. At present, a new biodiversity law is in the process of formulation and consultation with relevant stakeholders. The Wildlife Protection Act is also subjected for comprehensive review in order to be more responsive to the current wildlife situation in the country. With the current policy direction of the MIPR pertaining to timber harvesting will also subject the Forest Act for a comprehensive review and amendment.

3.1.10 Minimize impact of human activities on biological diversity

The implementation of the Environmental Impact Assessment (EIA) in the country is spearheaded by the Department of Environment, Parks and Recreation. The EIA is required for all

development projects to ensure environmental safety and health. The forestry law, rules and regulation also gave significant considerations in biodiversity conservation. As such, protection zones are delineated at the forest management unit level to protect endangered and threatened species, and critical areas.

3.1.11 Enhance institutional and public awareness

The government also recognizes the importance of institutional reforms in biodiversity conservation. The MIPR has just restructured its organization to strengthen natural resources management. The new structure has considered concerns pertaining wildlife and biological researches.

Public awareness programs on environment and natural resources conservation is an integral part of the MIPR and other government agencies. Specifically, the Forestry Department is conducting annual events such as nature camps, international day of forests, nature excursion, environmental talk, mass tree planting and other activities that raise awareness on forests and natural resources conservation.

Non-governmental (NGOs) also play an important role in the implementation of CBD in Brunei Darussalam. They are able to engage the public, government agencies, private sector as well as local communities in various activities such as public awareness activities, conservation projects, dialogues and capacity building workshops and seminars.

On the fisheries sector, the Department of Fisheries is conducting annual events such as Farmers and Fishermen Days, and World Oceans Day. DoF also launching the Coral CARE program booklet in June 2104. This booklet on “Coral CONSERVATION, AWARENESS, REHABILITATION and ENRICHMENT Program” or “Coral CARE Program”, provides an outline management and conservation initiatives in relation to coral reefs being undertaken by the Department of Fisheries, Ministry of Industry and Primary Resources. It also provides up-to-date perspective of coral reefs, the ecological functions and economic value of coral ecosystems of our country and the region. This Coral CARE Program is an initiative to support and complement the works and programs of the Department of Fisheries of the Ministry of Industry and Primary Resources in the conservation, protection, rehabilitation and replanting of degraded / damaged coral reefs.

3.1.12 Promote international cooperation and collaboration

The government of Brunei Darussalam encourages collaboration with other countries and with international organisations to enhance its capacity and capability in managing its biodiversity. Brunei has established collaboration and cooperation with several developed countries in many aspects of biodiversity research and management such as the Japanese International Corporation Agency (JICA), Leiden University, Kew Garden, National Institute of Technology Evaluation, Japan (NITE), Singapore National Parks, Smithsonian University, Singapore - MIT Alliance for Research and Technology (SMART) and many other biodiversity projects.

The Heart of Borneo conservation project is also an initiative to strengthen collaboration of three countries namely Malaysia, Indonesia and Brunei Darussalam in biodiversity conservation within the Borneo Island.

3.1.13 Exchange of Information

Exchange of information between natural resources administrators and managers is a necessity for a holistic approach in biodiversity conservation. The agencies under the MIPR who has jurisdiction over forests, agriculture and fisheries, to include biodiversity research center and the Brunei HoB, shares relevant information for effective implementation of laws, rules and regulations. Relevant information is also shares between ministries and academic institutions as necessary.

3.2 Mainstreaming Biodiversity

Biodiversity conservation forms part of the major concerns of the government of Brunei Darussalam. The Brunei Darussalam Long-Term Development Plan - Wawasan 2035, is a 30-year development framework that provide the national vision, outline of strategies and policies for development and national development plans. Wawasan 2035 aspire to excel in the following areas:

- An educated, highly skilled and accomplished people
- Quality of life
- Dynamic and sustainable economy

In order to achieve the above-mentioned aspirations, the government had developed and implemented an integrated and well-coordinated national strategy comprising eight elements, as follows:

- Education strategy
- Economic strategy
- Security strategy
- Institutional development strategy
- Local business development strategy
- Infrastructure development strategy
- Social security strategy
- Environmental strategy

The environmental strategy directly responds in mainstreaming biodiversity conservation in the government system. Under this strategy, it calls for the proper protection and conservation of the country's natural environment and cultural habitat. Specifically, it focuses on the following;

- Continuing efforts to conserve Brunei Darussalam's remarkable biodiversity, rain forests and natural habitat.
- Implementing the highest environmental standards for existing and new industries in Brunei Darussalam in accordance with established international standards and practices.
- Establishing clear guidelines for the proper preservation of buildings and landmarks of cultural and historical value.
- Strictly enforcing appropriate regulations regarding the maintenance of environment that affect public health and safety.
- Supporting global and regional efforts to address trans-border and regional environmental concerns.

3.3 Integration of Biodiversity Conservation in the National Development Plan

In view of the direct and strong provisions of Wawasan 2035 for biodiversity conservation, the 5-year national development plans have integrated biodiversity concerns in its implementation. Specifically, biodiversity conservation and development is integrated in the primary sector development of the plan under the forestry sector, as follows;

- Protection of trans-boundary forests
- Development of tropical biodiversity center
- Development of forest resources
- Development of timber plantation
- Conservation and protection of the natural forest and environment
- Development of ecotourism industry

4. **PART THREE - Progress towards the 2015 and 2020 Aichi Biodiversity Targets and contributions to the relevant 2015 targets of the Millennium Development Goals**

The Government of Brunei Darussalam is committed to achieve the aims and objectives of the Aichi Biodiversity Targets and contribute to the relevant targets of the 2015 Millennium Development Goals. The following will describe the country's update and progress in achieving the targets.

Target 1 - By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Brunei Darussalam is actively implementing biodiversity awareness programs for all levels of society. Biodiversity and nature resources conservation topics are already introduced at all academic levels taking into consideration of exposing our youth in such discipline during their early years of studies. A number of programs and related activities on environment are also initiated by the private sector which is a positive indication of their growing awareness on environmental and biodiversity concerns.

Target 2 - By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning process and are being incorporated into national accounting, as appropriate, and reporting system.

The growing awareness on the importance of biodiversity in almost all sectors of society has started the academic sector to estimate the monetary values of some environmental services. At the moment, although no monetary values for environmental services are considered in the national accounting system, such values are noted descriptively.

Target 3 - By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.

Incentives and subsidies are available for performing companies in the country. In the forestry sector, sawmilling companies who are further investing in downstream finish products and more efficient wood processing are entitled to some incentives for their good performance. A proper market-based incentive is under study at the moment for related industry.

Target 4 - By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

With the country's limited land and natural resources, the government is very keen in the implementation of sustainable strategies to assure the long-term (if not infinite) use of its resources. At present, the MIPR announced a new policy direction of stopping timber harvesting in all production forest reserves to increase the country's forest conservation areas. Timber harvesting will be reallocated in an areas intended for timber plantation development.

Target 5 - By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

The government of Brunei Darussalam is proud to announce that all its gazetted forest reserves still maintain 100% forest cover and are still in their pristine stage. The country is still in the process of increasing the gazetted forest reserves from 41% to 55% of the total land areas for more environmental stability.

Target 6 - By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Brunei Darussalam still enjoys rich fisheries resources. To sustain this status, the government has implemented efficient fish culture and farms to support the fisheries industry and at the same time maintain the rich marine resources of the country. A number of MPAs are also in place to protect important fisheries and marine areas.

Target 7 - By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

The management integration of the agriculture, fisheries and forestry sectors is part of the management strategies of the MIPR. All these important primary sectors are placed under one umbrella organization in order address the inter-relationship between ecosystems and thereby address its sustainability using a holistic and landscape approach.

Target 8 - By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

The use and importation of inorganic fertilizers in the country is highly regulated. The country has set its sustainable target for agriculture purposes of not more than 1% of the country's land area and thereby controls the leaching of important nutrients to adjacent ecosystems. The use of organic fertilizers is also encouraged for use in the country.

Target 9 - By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

Brunei Darussalam, especially the academic sector, has doing further study of alien invasive species that are found in the country. In a parallel initiative, the government is strengthening its quarantine service in regulating the entry of potential invasive species in the country.

Target 10 - By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

The government is continuously raising the awareness of the country's populace with the importance of marine and coastal resources especially the coral reefs. The implementation of the EIA system in the country is expected to facilitate the mitigation of possible adverse effect to the coastal and marine ecosystems.

Target 11 - By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

The government of Brunei Darussalam is committed to preserve and conserve the gazetted forest reserves of the country covering 41% of the total land area. At present, there is a proposal to further increase the gazetted area by 14% more to improve the ecosystem corridors and composition of the forest reserves. The declared MPAs covering 182.53 sq. kms are highly protected and in close watch of the government law enforcer.

Target 12 - By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

The preservation and conservation of endangered and threatened species are stipulated in existing forestry laws, rules and regulations. At present, the government is continuously collaborating with academic and research institutions in the conduct of flora and faunal expeditions to determine and identify new and unknown species within the natural ecosystems of the country.

Target 13 - By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

In terms of agricultural biodiversity conservation and management, there are few livestock breeding centres directly involved in the conservation of farm animal genetic resources and genebanks for crops genetic resources.

The table below presents summaries of germplasm collection conserved in Brunei Darussalam.

Table 6
Examples of Ex-situ conservation of Indigenous Fruit Species Maintained at Various Institutional Field Genebank

Institution	Location of Genebank/Arboretum
Department of agriculture	<ul style="list-style-type: none"> • Sungai Peradayan Agriculture Section • Kilanas Agriculture Research and Development Centre • Birau Agriculture Research Station • Luahan Agriculture Station

In-situ conservation involves the maintenance and development of live populations of animals in their adaptive environment, or as close to it as is practically feasible. Breeds currently being conserved *in-situ*.

For Microbial and Fungal Genetic Resources, an action plan on microbial diversity is being developed. It strives to develop; and implement coordinated and holistic strategies with the intention of

conserving and optimizing the utilization of microbial diversity. This is aimed to enhance productivity and improve the environment of agro-ecosystems.

Target 14 - By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

The existing forestry laws, rules and regulations acknowledge the multiple use and services that the country's forest ecosystems can provide. It also recognizes the rights and roles of the local communities who are dependent of forests as part of their cultural practices.

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

The role of the country's forest ecosystem in sequestering atmospheric carbon is highly recognized by the government. As such, all timber harvesting and related utilization of forest resources inside the country's peat swamp forests are not allowed. Brunei peat swamp forests are still in pristine condition and acknowledged to be among the most preserved peat swamp ecosystem in the island of Borneo.

Target 16 - By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation

Brunei laws recognize the rights of its community to enjoy and utilize its natural resources. At present, the country is still in the process of developing its bio-prospecting policies taking into account the fair and equitable sharing benefits between parties.

Target 17 - By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

The proposed biodiversity law is still under process of development. If legislated, it will provide the basic legal framework for all biodiversity concerns of the country. It also aims to consolidate and strengthen related biodiversity provisions from related laws and

would address policy gaps for effective implementation of the national biodiversity strategy and action plans.

Target 18 - By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

Local and traditional knowledge, innovations and practices are widely accepted and recognized in Brunei Darussalam. It may not yet be fully documented, but these knowledge and practices are already integrated in existing policies, rules and regulations pertaining to natural resources management and are implemented effectively.

Target 19 - By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

The government of Brunei Darussalam has opened its window for collaborations with both local and international institutions regarding the conduct of biodiversity researches. The country is still in the understanding and learning processes of its rich natural flora and fauna aiming to develop effective and efficient conservation management strategies. Updating of database is also being undertaken.

Target 20 - By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.

The government of Brunei Darussalam is committed finance and implements its biodiversity plans and strategies. At present, the 5-year National Development Plan addresses a number of biodiversity concerns as stipulated in Wawasan 2035. Financial and technical supports are also welcome especially from the private sectors in the conduct of related biodiversity conservation activities.

5. CONCLUSION

Brunei Darussalam is committed to conserve and preserve its rich natural resources for the enjoyment and appreciation of its present and future generations. Its membership to the CBD has strengthened its institutional framework of management in compliance to international and regional standards and provided a venue for the country to collaborate with experts pertaining to biodiversity concerns.

In general, Brunei Darussalam is on track in achieving the 2015 and 2020 Aichi Biodiversity Targets, including relevant 2015 targets of the Millennium Development Goals.

Appendix 1
Information Concerning the Reporting Party and Preparation of 5th National Report

Contracting Party	
NATIONAL FOCAL POINT	
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