

19 Indonesia

Land area	1,811,570 sq. km†, 1,918,663 sq. km (official)
Population (1989)	184.6 million
Population growth rate (1987–2000)	1.7 per cent
Expected maximum population (2150)	355 million
Gross national product (1987)	US\$450 per capita
Rain forest (see maps)	1,148,400 sq. km
Monsoon forest (see maps)	30,740 sq. km
Closed broadleaved/coniferous forest (1980)†	1,138,950 sq. km
Annual deforestation rate (1981–5)†	6000 sq. km
Annual deforestation rate (late 1980s)	up to 12,000 sq. km
Roundwood production*	173,598,000 cu. m
Roundwood exports*	1,131,000 cu. m
Fuelwood and charcoal production*	133,989,000 cu. m
Sawlog and veneer log production*	36,690,000 cu. m
Sawlog and veneer log exports*	3000 cu. m

* 1988 data from FAO (1990)
† FAO/UNEP (1981); FAO (1988)



Indonesia is a huge archipelago extending for 4500 km between the Asian and Australian continents. Once more or less completely covered in tropical rain and monsoon forests, Indonesia still retains well over one million square kilometres of such forests, more than any other nation in the region. Worldwide, only Brazil has more rain forest than Indonesia. There are major biogeographical differences between the different parts of Indonesia, of which the most important are between the western and the eastern ends. This difference is most clearly seen in the animals, which form two groups, divided by Wallace's Line, which lies east of Borneo at the edge of the Sunda continental shelf and is one of the sharpest zoogeographical frontiers in the world. The single most important family of tropical timber trees, the Dipterocarpaceae, is found almost entirely in the lowland rain forests west of Wallace's Line, but in general this frontier is much less important for plants than for animals.

Major exploitation of the Indonesian rain forests for timber began in the 1960s and is continuing today. The lowland rain forests of Sumatra and Kalimantan have been particularly heavily logged and now, although very large areas of forest cover remain, very little is pristine. Exploitation has often been destructive because Forest Department rules have been widely ignored. Moreover, once roads have given access to formerly inaccessible areas, farmers have often moved in after the timber companies and then cleared the relict, regenerating forest for either permanent or shifting cultivation. An exceptionally long and severe drought in 1982–3 was followed in Kalimantan by forest fires, mostly started inadvertently by these farmers. Over thirty thousand sq. km were burned, mostly comprising logged forest containing a lot of dry debris, but there are reports of widespread regeneration. Forests have also been lost through conversion of land to plantation agriculture and to transmigration schemes (see chapter 5).

In recent years the government has progressively tightened enforcement of regulations concerning forest exploitation and timber processing. Indonesia prohibited log exports in 1980; all exported timber is now either sawn or converted to plywood, of which Indonesia is a major world supplier. Export of raw rattan was banned in 1986.

Indonesian forests are fabulously diverse and rich in species. Serious damage, however, has been done over the past quarter century by the rampant timber industry, especially to the west Indonesian dipterocarp rain forests. Some wildlife is known to have been seriously affected, for example clouded leopard, Sumatran rhinoceros and elephant in Sumatra. Exploitation is now starting to focus on the east Indonesian forests. In the late 1970s, FAO and IUCN collaborated on a major review of the requirements for adequate conservation. Reserves which exist, or were proposed following this review, cover 10 per cent of the land area and if effectively implemented should conserve most of the nation's heritage of species. In Indonesia there is now a need to implement existing conservation plans and this will necessitate the strengthening of conservation institutions and a greater conservation awareness amongst decision makers and the public.

INTRODUCTION

Indonesia comprises a 4500 km long chain of islands stretching from Sumatra in the west to Irian Jaya, the western half of the island of New Guinea, in the east. This archipelago of 13,667 islands, of which about 1300 are habitable, forms the greater part of the phytogeographic region technically termed Malesia.

The three islands of Sumatra, Borneo and Java, together with intervening smaller ones, lie on the Sunda continental shelf and formed part of mainland Southeast Asia until geologically recent times. To the west of Sumatra, however, lie the Mentawai Islands separated from it by a deep ocean trench. New Guinea lies on the Sahul continental shelf and has had a land connection with Australia.

In contrast Sulawesi and many of the Moluccan islands appear to have had no recent connection with either continent and to have been islands for a very long time.

The long arc of Sumatra, Java and the Lesser Sundas has a spine of high mountains which in Sumatra runs close to the western coast and which contains many extinct and a few active volcanoes. The island of Borneo is mountainous in the centre and to the north, and has a main range separating Kalimantan from Sarawak and Sabah. Sulawesi is mountainous virtually throughout. New Guinea contains some of the highest country in the southern hemisphere, with most of its mountain ranges lying just to the north of the island's north-west/

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south-east axis. Much of this high country exceeds 4000 m and it culminates in Irian Jaya, in the 5039 m Gunung Jaya (Mount Carstenz). In contrast the eastern half of Sumatra, southern and eastern Borneo, and south-western New Guinea are low-lying and in parts swampy.

The peoples of Indonesia are diverse in racial origin, and the nation contains a rich mixture of languages, cultures, religions and customs. There is a central government based in Jakarta (which as Batavia was capital of the former Dutch East Indies), but the country is divided for many administrative purposes into provinces.

The Forests

Indonesia was once clothed in tropical rain forests except for the southern islands of eastern Java, Madura, Bali and the lesser Sunda islands which had tropical monsoon forests. This belt of seasonally dry climate and forests extends into southern Irian Jaya, and northwards into parts of southern Sulawesi.

Indonesia contains more tropical rain forest than any other nation in the Asia-Pacific region. All the different tropical rain forest formations found in Malesia occur in Indonesia, and in fact form their greatest extent here, as is described in the next section.

There are major regional differences in the floristics of the forests. The most important is that lowland rain forests of the Sunda shelf islands, Sumatra and Borneo, have an abundance of Dipterocarpaceae. Animals show even stronger regional differences between western and eastern Indonesia, bounded by Wallace's line. Some key features of the original forest cover may be summarised by islands and island groups as follows:

Sumatra (*Sumatera*)

- Lowland evergreen rain forest, dominated by dipterocarps, once occurred throughout the lowlands.
- Peat swamp forest and mangroves are extensive along the eastern coast.
- The major mountain spine has extensive montane rain forest, much of it still intact.
- In parts of the slightly dry central intermontane valley and in the far north occur the only natural pine (*Pinus merkusii*) forests in Indonesia (FAO, 1982; Whitten *et al.*, 1984).

Java

- Rain forests were probably originally found in south-western Java and in montane areas, but are now restricted to isolated montane patches.
- Teak, probably introduced by man, is extensively planted in the seasonal lowlands in the centre and east.
- Natural monsoon forests, formerly extensive in northern and eastern Java, are now all heavily disturbed.
- Where fire is excluded the forest begins to change to lower montane forest, subalpine forests and, on the highest mountains, temperate herbaceous formations. Extensive montane grasslands have resulted from forest destruction by fire.
- Limestone karst occurs on the southern and north-eastern coasts, most of which are now planted with teak.
- Freshwater swamp forests and mangroves occur in a few small patches.

Lesser Sunda Islands (*Nusa Tenggara*)

- Savanna woodland with *Casuarina* and *Eucalyptus* now covers most of these islands.
- Evergreen rain forest was never extensive and only survives in isolated patches in steep valleys on south-facing sides of mountain ranges; elsewhere, there are monsoon forests and extensive grasslands.
- Timor once had extensive natural sandalwood (*Santalum album*) forests (FAO, 1982).
- The montane rain forests are not luxuriant and are characterised by an absence of swathing bryophytes, although some have beards of the lichen *Usnea*.

Kalimantan

- Lowland evergreen rain forests occur up to about 1000 m; above them occur montane forests which, as is the case everywhere in the region, have abundant Fagaceae, Lauraceae and Myrtaceae.
- Kalimantan has massive areas of lowland rain forest as well as extensive mangroves, peat and freshwater swamp forests, and the largest heath forests (kerangas) in Southeast Asia.
- Degradation is extensive, and there are now large areas of secondary forest, and *Imperata cylindrica* grasslands on land degraded by shifting cultivation and excessive forest exploitation.

The Toraut River in Dumoga-Bone National Park, Sulawesi, provides water for irrigation schemes in the valley below. N. M. Collins

