

Sabah

Species Conservation Priorities in the Tropical Forests of Sabah, East Malaysia

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Introduction

Sabah (Fig. 1), occupying 76,000 km² of the northern part of the island of Borneo, is the second largest of the thirteen states in the federation of Malaysia. Geologically, Sabah consists largely of relatively young sedimentary formations. The terrain is hilly throughout the interior and western regions, and Mount Kinabalu, which rises to 4101 m above sea level, is the highest peak in southeast Asia.

Sabah can be divided broadly into five regions. In western Sabah there are high hill ranges divided by fertile valleys and plains which are cultivated by the oldest indigenous inhabitants of Sabah. Central Sabah is dominated by rugged, sparsely inhabited highlands 300-1,000 m in altitude. Most of Sabah's remaining primary forest with high timber stands occurs here. In the northeast are plains and low hills with predominantly poor, sandy soils. There are old indigenous communities along all major rivers.

In the southeast is an area of mixed topography on old volcanic rocks with fertile soils. This was the region to undergo the first extensive, large-scale plantation farming in Sabah. The eastern central part of Sabah consists mostly of flat or rolling terrain less than 300 m in altitude. Almost all of this region, previously uninhabited by man, was logged during the 1960's and 1970's, and is now the region of rapid, large-scale agricultural development. All major towns and settlements are in the western valleys and plains, with the exception of three on the east coast. Public roads link all the main western communities. There is one east-west road from Kota Kinabalu to Sandakan, and a second road will soon be completed in the southern part of the state. There is an extensive road network in eastern Sabah, built and maintained largely by logging companies and agricultural estates.

Natural habitats in Sabah can be divided very broadly into three main classes: mangrove and fresh water swamps, evergreen dipterocarp forest, and montane forest. Along most of the east coast and parts of the west coast are swamps, mostly mangrove, and, further inland, permanent or seasonal fresh water swamps. Apart from the locally distinct floral communities in freshwater swamps, animals of interest here are the proboscis monkey (*Nasalis larvatus*), a Bornean endemic, and the estuarine crocodile (*Crocodylus porosus*). Only a very small fraction of the mangrove is afforded total protection in the form of "Virgin Jungle Reserve," a class of protected forest reserve intended primarily to preserve representative samples of forest formations. Local people traditionally cut mangrove trees for domestic purposes and for sale, but this is a localized activity. Extensive areas are now cut under license primarily for chip or particle board. (Fig. 2)

The natural vegetation on land from sea level to about 1,000 m is evergreen dipterocarp forest. The majority of the largest trees present (more than 180 cm in girth and 30 m tall) belong to the family Dipterocarpaceae. There is great diversity both within and

between the various dipterocarp formations. It is these forests which yield timber and which have been the major sources of Sabah's wealth over the past three decades. Logging is "selective," unless the land is designated for agricultural development, in which case all growth is felled and burnt. In practice, selective logging involves removal of approximately 10 big trees from each hectare (the actual number is highly variable), with accompanying, unintentional destruction of about half of the remaining plants.

In Silabukan Forest Reserve, eastern Sabah, a 0.5 hectare plot of primary forest was found to contain about 118 tree species

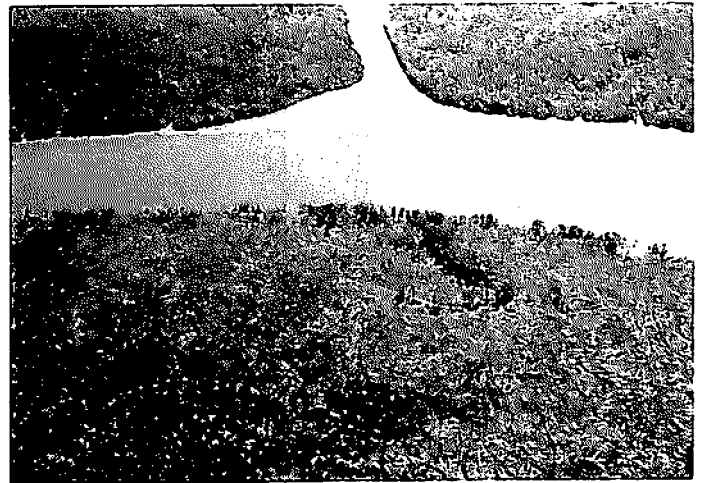


Fig. 1: Clear cutting of mangroves in Sabah chip wood production (photo by R. A. Mittermeier).

(more than 30 cm in girth). An equivalent area of forest investigated 20 years after logging contained 43 species, of which 18 were secondary species which grew up after logging had opened the tree canopy. Some tree species may go extinct over wide areas after logging, unless sufficient seedlings remain and grow into productive trees. At present, the only studies of forest regeneration refer to common, commercially valuable species. According to Forest Department estimates, more than 30% of Sabah's forests were logged in the period 1971-1980. There is no doubt that, ultimately, the great majority of Sabah's forest cover will consist of logged dipterocarp forest. Thus, a conservation priority is investigation of the effects of logging on the survival of the flora of dipterocarp forests. It is heartening to find that logging in itself does not seem to lead to the extinction of any mammal or bird species; it is the pattern and extent of logging which are important. Animals are mobile, however, whereas plants are not and it is likely that at least some plants are highly sensitive to the

changes in microclimate occurring after logging.

On the hills and mountains higher than 1,000 m in altitude are montane forests which contain few or no big trees of the family Dipterocarpaceae. Most montane forests occur in western Sabah, where two fine conservation areas provide protection for most, if not all of the montane flora and fauna characteristic of north-western Borneo. Kinabalu National Park (76,800 ha.) contains two separate major peaks (Kinabalu, 4,101 m; Tambuyukan, 2,580 m), dipterocarp forest, both sedimentary and ultrabasio-derived rocks, and an astoundingly diverse flora and fauna, with many species endemic to the Park region. The Crocker Range Protection Forest Reserve (129,815 ha) consists of a long, narrow range of hills rising to a maximum of about 1,500 m.

There are two authorities in Sabah whose policies include a commitment to conservation of the native flora and fauna. The Sabah Forest Department is responsible for management of forest reserves, which cover nearly 50% of Sabah's land area. All but 5% of the Forest Reserve area is classed as "commercial": liable to be logged. The Wildlife Section (officially still known by the rather dated name of Game Branch) of the Sabah Forest Department is responsible for conservation of mammals, birds and other large vertebrate animals throughout Sabah, except in the national parks (see below). The most important existing law referring to protection of wild animals outside national parks is the Fauna Conservation Ordinance of 1963, and its amendments. It is concerned mainly with rules for hunting and collecting wild animals. With a total staff of just over 30 expected to cover 98.5% of Sabah, it is difficult for the Wildlife Section to carry out much more work than its three main long-standing obligations: (1) enforcement of the law, (2) maintenance of the orangutan rehabilitation center (and more recently, a new conservation education center) at Sepilok Forest Reserve, and (3) protection of agriculture from damage by elephants.

A separate organization, Sabah National Parks, is responsible for management of five parks, two on the mainland (Kinabalu and Tawau Hills National Parks) and three island parks (Tunku Abdul Rahman, Palau Tiga and Turtle Islands National Parks; Fig. 1).

Species Conservation in Sabah

Without detracting from the value of national parks in protecting montane, island and marine communities, it should be ap-

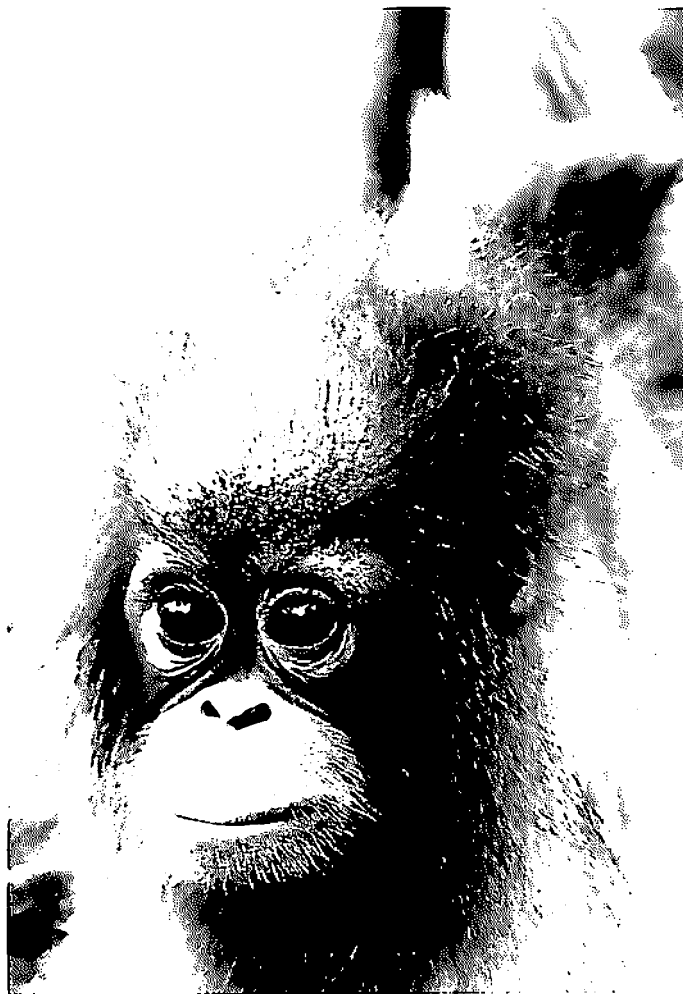


Fig. 3: A young orang kept at the Sepilok Forest Reserve rehabilitation station outside Sandakan. The orang is a major tourist attraction for Sabah, and the Sepilok Forest Reserve serves as both a home for displaced orangs and a focus for conservation education. Surveys are needed to identify areas with good orang populations in permanent forest reserves. Danum Valley may prove to be the most important long-term conservation area for the species (photo by R. A. Mittermeier).



Fig. 2: A group of elephants from Sabah charging the Faunal Survey of Sabah vehicle (photo by John Payne/WWF - Malaysia). The elephant is Sabah's problem species. Hundreds of elephants are in areas designated for agriculture. Ultimately, Silabukan-Lumerau will probably be the most important conservation area for elephants in Borneo.

parent that the policies and actions of the Forest Department are of prime importance in the conservation of the dipterocarp forests, and therefore their fauna. In Sabah, it is primarily the Assistant Chief Game Warden who recommends conservation measures for the fauna of the dipterocarp forests. In 1978, the newly appointed Warden, Patrick Andau, initiated a survey of the status of mammals and birds throughout Sabah. With sponsorship from WWF Malaysia in providing technical assistance, a faunal survey of Sabah was carried out between 1979-81 (Davies and Payne, 1982). A major, but not unexpected finding of the survey was that four large mammal species — Sumatran rhinoceros (*Dicerorhinus sumatrensis*), elephant (*Elephas maximus*; Fig. 3), banteng (*Bos javanicus*), and orangutan (*Pongo pygmaeus*; Fig. 4) — require special conservation measures if they are to survive in the long-term. It also became apparent that it is the pattern of planned agricultural development, rather than selective logging, which will have the most adverse effects on these, as well as some other species. The current status of each of the four threatened species (all but the elephant protected by law) is presented below.

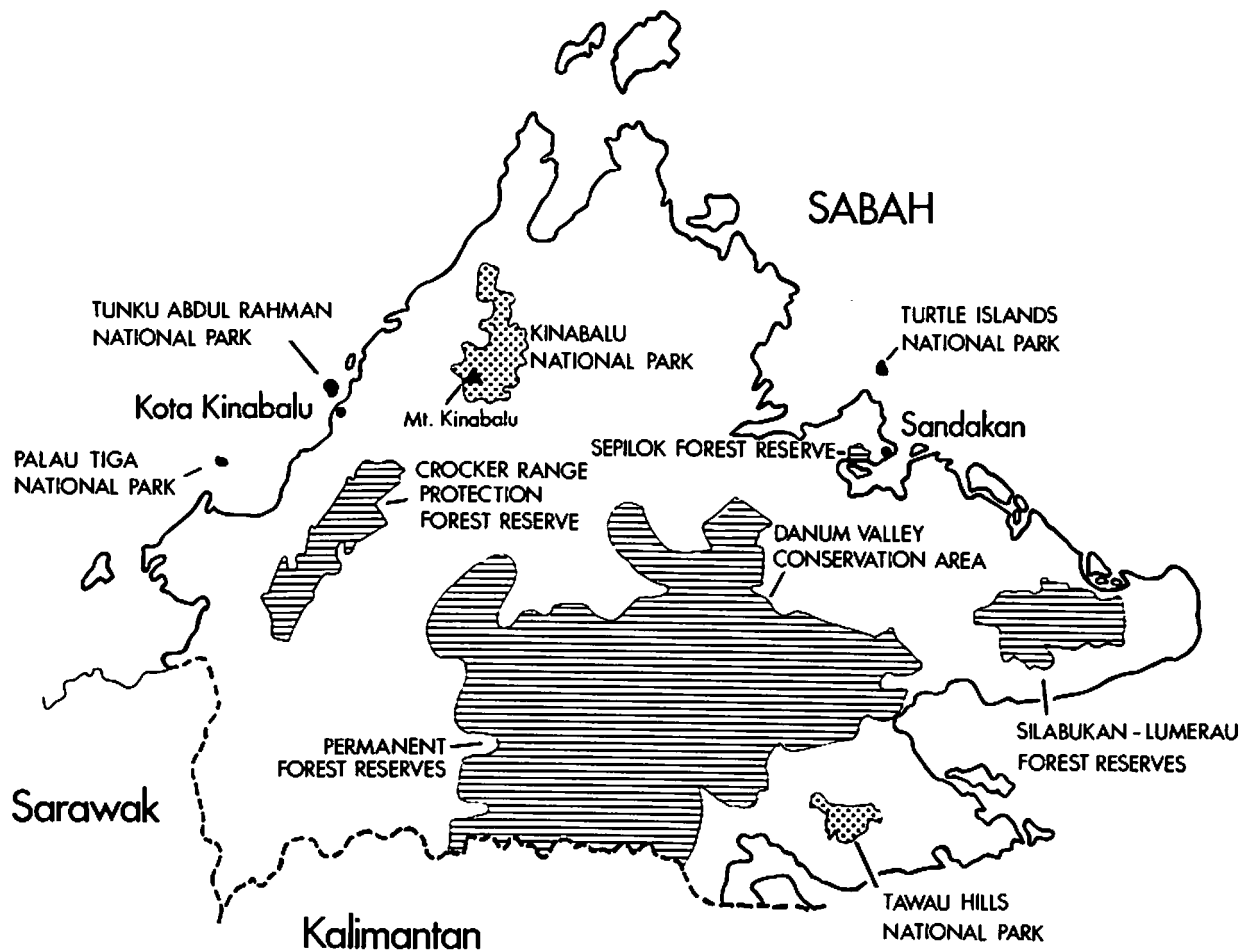


Fig. 4: Map of Sabah showing the location of National Parks and Forest Reserves.

Sumatran Rhinoceros. There are scattered relics of a once widespread rhinoceros population in several parts of Sabah, mostly in the eastern half of the country. The southern-central part of Sabah has never been adequately investigated, so the rhino situation there remains unknown, but for the remainder of Sabah only one area still supports a potentially viable breeding population. This is the area represented by the Silabukan and Lumerau Commercial Forest Reserves. Adjacent areas contain some rhinos, but all such areas are to be converted to cocoa and oil palm plantations.

Elephants. Elephants have a restricted distribution in Sabah, occurring in the southern and eastern portions of central Sabah. They have not existed in northern or western Sabah in recent times, and have been virtually exterminated in the southeast during this century as a result of agricultural development. Current agricultural development policy is such that by the end of this century there will be only two separate blocks of forest large enough to support viable elephant populations. These are the Silabukan-Lumerau Forest Reserve block and the vast area of forest on predominantly rugged terrain in central Sabah. It is expected that the Permanent Forest Reserves will remain as protected areas. The current estimate of the total Sabah elephant population is between 500 and 2,000 individuals, and of these

more than half live in areas designated for agricultural development. Logged forest contains many more known elephant food plants than primary forest, so there is reason to hope that some of the elephants displaced by agriculture will move from their traditional ranges into the Silabukan-Lumerau Forest Reserve block and those areas which reportedly will remain as permanent forest preserves. The distribution of elephants in these latter areas appears to be very sparse and patchy, however, and mainly along the larger rivers.

Banteng. The banteng, widely known as *tembadau* in Sabah, occurs in scattered concentrations throughout much of eastern Sabah; the species has been almost exterminated in the western half of the country. Discounting the threat of illegal hunting, banteng usually thrive in areas of traditional shifting cultivation and logging, as a result of the great increase in the abundance of grasses. But, like elephants, they are only abundant in the flatter, fertile areas designated for agriculture.

Orangutan. The Faunal Survey of Sabah indicated that population densities of orangutans are high (1 or more individuals/km²) only in primary dipterocarp forests at less than about 400 meters above sea level. Unfortunately, it is these forests which have been logged most heavily, and much is due to be converted to agriculture. The situation in the better protected areas is either precarious

or unknown. For example, orangutans exist in parts of Kinabalu National Park and Crocker Range Protection Forest Reserve, but at extremely low population densities, and they are hunted in some areas for food. Equally alarming is that they are unaccountably scarce or absent in certain regions; they appear to be completely absent from Tawau Hills National Park and are very rare throughout much of Silabukan-Lumerau Forest Reserve.

Before finally summarizing recent conservation achievements and suggesting future plans, a note on the importance of hunting to the survival of the above-mentioned species is important. The rhinoceros is now so rare in Sabah as a result of hunting, that any further deaths due to poaching will significantly reduce any chance for its survival in Borneo. The only known breeding population in all of Borneo is in the Silabukan-Lumerau Forest Reserve, yet this area is relatively accessible, and logging commitments made before the importance of the area was recognized in 1980 mean that roads will reach its core sometime this decade. Two rhinos are known to have been poached in Sabah in 1981 and one shot in 1982 (only one of these in the Silabukan-Lumerau Forest Reserve). For elephant conservation, in contrast, hunting has no significance. More elephants lose their habitat as a result of planned agricultural development than are shot annually for crop protection. According to available records over the past ten years, an average of 10 elephants are shot legally per year and perhaps one illegally.

For banteng also, loss of habitat will be the most important factor in population decline. However, illegal hunting is a major threat as well, and has the potential to exterminate populations from proposed conservation areas (see below).

Twenty years ago, hunting was correctly judged to be a major drain on the then existing orangutan population in Sabah. Since then, logging and habitat loss have replaced hunting as the most significant threats for this species.

Conservation Action Priorities

Sabah's existing national parks make a fine contribution to the conservation of montane and island communities. However, the prevailing opinion in Sabah, outside the national parks organization, is that parks are for recreation and not for conservation. For a long time to come, therefore, the onus will be on the Forest Department to manage and conserve dipterocarp forests where so much of the native flora and fauna occur.

Not surprisingly, our knowledge of the distribution and ecological requirements of northern Borneo's lowland flora is inadequate to assess which species may be endangered. With regard to trees, available data would suggest that very few and possibly no species occur exclusively in east central and southeast Sabah where agriculture will replace forest. There are three areas which are expected to be most important for conservation of the lowland dipterocarp communities:

1. *Sepilok Forest Reserve* (4,000 ha) is the best investigated lowland forest in Sabah.
2. *Silabukan-Lumerau Forest Reserves block*. Negotiations are underway to reserve 9,300 ha of primary forest in the middle of this block. This would provide for the conservation of a total plant community and also serve as a temporary holding area for Sumatran rhinos displaced by intensive logging in the surrounding forest. If the plan is successful, this would form the core of a single 123,000 ha block of forest reserve.
3. *Danum Valley*. This area of primary forest has in the past been proposed as a game sanctuary (permissible under current legislation, although no sanctuaries yet exist) and as

a national park. Along with a substantial portion of Sabah's remaining dipterocarp forest, this area lies within the 100-year logging concession of the Sabah Foundation. This organization has a unique advantage, from the conservation viewpoint, over all other governmental and non-governmental organizations in Sabah, in that it can plan for decades in advance, rather than the usual period of 5 years maximum. Sabah Foundation has agreed to retain an area of 42,755 ha of primary forest in the Danum Valley region for wildlife conservation and water catchment protection. An important feature of the Danum Valley conservation area is that it contains several different primary forest formations within a huge surrounding buffer zone of logged forest.

Silabukan-Lumerau Forest Reserve is vital to the conservation of both rhinoceros and elephant in Borneo. In August 1982, the Forest Department allotted 122,980 ha of the existing commercial forest reserve for rhino conservation. This means that logging licenses can still be issued but that there is a stronger case than previously to disallow extensions of land for agriculture.

The large block of permanent forest reserves (Fig. 1) will form an extremely important conservation area, mainly because of its vast size. If present plans are successfully carried out, there will be two large cores of primary forest within the block: Danum Valley and a steep, remote area further west known as Gunung Letung ("the slow loris mountain"; about 50,000 ha), which also lies within Sabah Foundation's concession. It is necessary that more wildlife surveys be carried out in this region, with the highest priority being to investigate the distribution and population status of orangutans.

Two more conservation areas have been proposed for Sabah. The first is about 5,000 ha of coastal swamp and mangrove forest containing proboscis monkeys and crocodiles. The second is 510 ha of logged lowland forest which contains a high density of banteng.

Hopefully, this complex of protected areas will ensure the survival of Sabah's superb wildlife heritage.

Literature Cited

Davies, G. and J. Payne 1982. *A Faunal Survey of Sabah*. IUCN/WWF Project No. 1692, World Wildlife Fund — Malaysia.



Fig. 5: A Bornean gibbon (*Hylobates muelleri*) in the Sepilok Forest Reserve (photo by R. A. Mittermeier).