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Wildlife Conservation in the State of Sabah

by

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SUMMARY

The rich flora and fauna of Sabah is partly protected by the large areas of forest and by the undeveloped state of the country, particularly the east coast. Sumatran rhinos and orang-utans are, however, threatened species, and there is a need for game and bird sanctuaries, virgin jungle reserves to preserve examples of flora, and the staff to enforce protection in these sanctuaries.

An excellent new Fauna Conservation Ordinance came into force in 1964. Some of its important features are briefly explained.

INTRODUCTION

Sabah is a land of dense, evergreen, equatorial rain forests, rugged mountains and innumerable rivers covering 29, 000 square miles. The physiography of the country is dominated by the Crocker Range (4000-6000 feet), which follows the western coast line fifteen miles inland for 160 miles from Kudat in the north to the Sarawak border. The range has various spurs outlying to the east, one of which culminates in the granite massif of Mount Kinabalu (13, 445 feet).

The population at the last census in 1960 was 454, 000, of which about a quarter were Chinese and three fifths were made up of indigenous races. Most of this population is concentrated in the interior and west coast residencies with a density of 66 persons per square mile along the flanks and either side of the Crocker Range. In these regions extensive shifting cultivation is practiced and only the upper-most ridges are free of it.

The two east coast residencies of Tawau and Sandakan are very sparsely populated with less than 2 persons per square mile. Except around the towns of Sandakan, Lahad Datu and Tawau, this side of the country is covered by lowland dipterocarp forest with only an occasional river or timber camp to interrupt the canopy. Thus, in contrast to the poverty of wildlife on the populated west coast of Sabah, the eastern parts of the country have a rich and plentiful fauna.

FAUNA OF SABAH

The larger animals include the Sumatran or two-horned rhinoceros *(Didermoceros sumatrensis)*, the orang-utan *(Simia satyrus)*, the Sunda Island or grey gibbon *(Hylobates moloch)*, the crab-eating macaque *(Macaca irus)*, the pig-tailed macaque *(Macaca nemestrina)*, the banded leaf monkey *(Presbytis femoralis)*, the Sunda Island leaf monkey *(Presbytis aygula)*, the maroon leaf monkey *(Presbytis rubicundus)*, the white-fronted leaf monkey *(Presbytis frontatus)*, the silvered leaf monkey *(Trachypithecus pyrrhus)*, the proboscis monkey *(Nasalis larvatus)*, the tarsier *(Tarsius tarsier)*, the Malay bear *(Helarctos malayanus)*, the binturong *(Arctictis binturong)*, the clouded leopard *(Felis nebulosa)*, the marbled cat *(Felis marmorata)*, the leopard cat *(Felis bengalensis)*, the flat-headed cat *(Felis planiceps)*, the scaly anteater or pangolin *(Manis javanica)*, the Asiatic elephant *(Elephas maximus)*, the bearded pig *(Sus barbatus)*, the larger mouse deer *(Tragulus javanicus)*, the smaller mouse deer *(Tragulus kanchil)*, the sambur *(Cervus unicolor)*, the barking deer *(Muntiacus muntjak)*, and the banteng *(Bibos sondaicus)*.

SUMATRAN RHINO AND ORANG-UTAN

The two animals most threatened by man are the Sumatran rhino and the orang-utan. The former has been ruthlessly hunted for many generations and is now nearly extinct. Very occasionally tracks are reported, but the last time an animal was seen by a member of the Forest Department was in 1957.

Before the war orang-utan were fairly plentiful between Sandakan and the Kinabatangan. The hunting or capture of them was prohibited under the former Wild Animals and Birds Preservation Ordinance. This did not prevent a lot of adults being killed and young animals sent to zoological parks throughout the world. The usual specious story of the mother being killed when an isolated tree was felled was difficult to refute. With the responsibility for enforcing an ineffectual ordinance split between Residents, District Officers and Forest Officers, little effective protection could be achieved until the new Fauna Conservation Ordinance came into force and the Game Branch of the Forest Department became established in 1963.

In 1928 five orang-utan were collected by F. C. Wonder within eight miles of Sandakan, and the Harvard Primate Expedition collected seven in 1937 (Davis: Bulletin of the National Museum, Sinagpore). Twenty seven of these apes, 14 male and 13 female, are held for studies on social behaviour and the higher mental processes at a laboratory in America. It is their intention to breed them when they reach sexual maturity. It is not known how many, if any, came from Sabah. Between 1957 and 1963 twenty orang-utan were exported officially from Sabah to zoological societies, nine to the United Kingdom, seven to Australia and four to Denmark. None have been sent since 1963, but in 1964 four were illegally captured and two were killed. So far this year six babies have been found in captivity, and there may still be one or two to come before the force of the new ordinance percolates through to all would-be hunters.

The Game Branch had to take immediate steps to prevent any further drain on the orang-utan population and decided to attack the problem on two fronts. On the one side the aim is to dissuade hunting and capture of these apes, by prosecuting every case that comes to light with the uttermost vigor, by publicizing the severe penalties involved, and by spreading propaganda about the need for the benefits to be derived from protecting these animals. On the other hand an attempt is being made to rehabilitate all captured animals back into their native haunts. No export to zoological gardens is contemplated unless an animal is found unsuited for rehabilitation.

FOREST RESERVES

The rich flora and fauna of Sabah is partly protected by the large areas of forest and by the undeveloped state of the country. Forest reserves afford full legal protection for animals and birds, and 10,500 square miles or thirty five per cent of the country has been constituted permanent forest reserve. This is a great advantage, but complacency about the security of these resources will lead to disaster. For one thing Sabah is a land of diverse races, many of whom have lived for centuries a semi-nomadic existence largely dependent on hunting. The ethics of wildlife conservation and the laws connected with it are hard for them to understand or support. They kill many animals for food, often in excess of their needs, but who can blame them for this! Again, within the productive forest reserves, vast areas of forest are being felled for timber every year. In the process the environment is changed, and the habitat may become unsuited to many animals and birds. These forests are being regenerated, but it may be ten years before a semblance of the original environment reforms.

There is thus an additional need for a game sanctuary or sanctuaries for the larger mammals, bird sanctuaries for birds with rather special habitats, virgin jungle reserves to preserve examples of the flora entirely undisturbed by man, and of course the extra staff to enforce protection in these sanctuaries. It is intended that virgin jungle reserves will be set aside within forest reserves in blocks of about 200 acres to every ten or fifteen square miles of logged forest. They also serve as holding grounds for a residual stock of smaller mammals and birds until the surrounding forest has been regenerated.

GAME SANCTUARIES

No game sanctuaries have been so far constituted. One is proposed for a remote and little explored area in the Upper Segama and there are two or three other areas which might be suitable.

BIRD SANCTUARIES

There are five such sanctuaries. The most important is approximately fifty square miles in extent and covers marshland, padi fields, small coconut plantations, village and the hills between the Tempasok and Pandasan Rivers near Kota Belud. There are a large number of buffalo and horses in the sanctuary. During the migatory season, garganey *(Anas querquedula)*, tufted duck *(Aythya fuligula)*, mallard *(Anas platyrhynchos)*, shoveller *(Anas clypeata)* and wigeon *(Anas penelope)* have been recorded. Pin-tail snipe *(Capella stenura)*, Swinhoe's snipe *(Capella megala)*, American golden plover *(Pluvialis dominica)*, little ringed plover *(Charadrius dubius)*, common sand piper *(Tringa hypoleucos)*, collared pratincole *(Glareola pratincola)*, yellow wagtail *(Motacilla flava)*, are found in large numbers.

It is interesting to note that the only Malaysian record of the black coot *(Fulica atra)* was made by Burgess in this sanctuary, and it was also here that the pied barrier *(Circus melanoleucus)* was for the first time recorded in Sabah, by Medway, in February, 1964. The sanctuary can be reached by Land Rover from Kota Belud where there is a good rest house, and the area is well worth a visit by naturalists. Bird ringing was attempted by Medway during November, 1964, but had to be abandoned as the traps were continually broken by buffalo and horses.

VIRGIN JUNGLE RESERVES

Forty of these have been so far set aside covering about 14, 000 acres. Included in this category are one or two small forest reserves on hills in the middle of alienated land.

REHABILITATION CENTER FOR ANIMALS

All protected animals and birds which have been illegally captured are forfeited by order of the court and handed over to the Chief Game Warden. With a view to returning the animals back to the wild, a small scale experiment is being carried out in a forest reserve of 10, 000 acres on the East Coast. Nine young orang-utan are kept there and given all the freedom they require. They are encouraged to climb, make nests and move about freely in the forest. With the provision of their natural surroundings it is hoped to stimulate their natural instincts and their incentive to feed, roam and to survive on their own. Most of the orang-utan are very young, and it will take several years of patient handling before they can be introduced into the wild. If the experiment proves a success the young apes will be released in batches in some remote forest reserve, preferably a game park if one is constituted on the East Coast. If they do not learn to survive on their own they can form a semi-wild breeding colony. Other animals such as gibbons, bears and wild birds are also treated in a similar manner. It will be some time before any results are obtained.

LEGISLATION

The Fauna Conservation Ordinance, 1963, (Act. No. 11 of 1963) came into force on 15th July, 1964. It repealed the Turtle Preservation Ordinance, and the Wild Animals and Birds Preservation Ordinance. The new ordinance is administered by the Forest Department. The Conservator of Forests is the Chief Game Warden and other officers of the department have been appointed Deputy Game Wardens, Assistant Game Wardens and Game Rangers. Some of the important features of the ordinance may be briefly explained here.

1. Protected Animals

The Sumatran rhinoceros, dugong, tarsier, orang-utan, gibbon and proboscis monkey are completely protected. Very severe penalties are prescribed for hunting them, the maximum penalty being five years imprisonment and a fine of $5,000.00.

2. Game Animals

Elephant, clouded leopard, banteng and Malay bear are game animals and can be hunted under a game license issued by a Game Warden.

License fees are as follows:

Elephant	$100.00 per head
Clouded Leopard	40.00 " "
Banteng	50.00 " "
Malay Bear	20.00 " "

No game license may authorise the hunting of female elephants.

Barking deer, mouse deer, and sambur cannot be hunted in Game Sanctuaries and Forest Reserves, but a Game Warden may issue Forest Game Licenses to hunt deer in Forest Reserves. At present no Forest Game licenses are issued to shoot animals or birds in Forest Reserves.

3. Birds

The Act affords protection to several species of birds and a comprehensive list is attached to this paper. (Annex 1).

Although the Megapode enjoys protection its eggs can be taken for egg collection. The maximum penalty for hunting a protected bird is imprisonment for 3 months and a fine of $500.00.

4. Trophies

Trophies can only be retained when they are taken from animals killed under a license, or when a certificate of ownership has been issued by a Game Officer.

5. Illegal methods of hunting

It is illegal to hunt any animal from a stationary or moving vehicle, or from a car or aeroplane to drive or disturb any protected animal. Hunting within half a mile of a saline or mineral lick and the setting of any trap or snare which is likely to cause injury to humans is also illegal.

6. Exceptions to criminal liability

It is permissible to kill or injure an animal in the immediate defense of human life. It is also permissible to kill any protected animal (except orang-utan or rhinoceros) or bird which is trespassing or attempting to trespass in or upon any cultivated land. The circumstances have to be reported forthwith to a Game Officer, Forest Officer or Police Officer, and the burden of proof that such killing or wounding was necessary is on the person who carried it out.

Birds not protected under the ordinance can be hunted without a license outside game sanctuaries, bird sanctuaries and forest reserves.

7. Turtles

The green turtle and the hawksbill turtle cannot be hunted except under license. The present policy is not to issue any licenses for the hunting of these turtles. The indigenous races of Sabah, can, without a license collect turtle eggs in certain areas on the west coast and off Semporna.

In the Sandakan Residency eight islands have been declared turtle farms and the rights to collect turtle eggs are disposed of each year by the Deputy Game Warden. Turtle

eggs can be collected in other areas in the State only on a license issued by a game warden. March is the closed season, and turtle eggs cannot be collected anywhere in the State during this month.

During the last war large numbers of turtles were slaughtered by Japanese soldiers on the islands near Sandakan. The islanders themselves do not kill any of the turtles, but in the Tawau Residency the Cocos Islanders working on the estates used to kill a certain number of turtles every month as they considered the flesh necessary for their well being. It is proposed in 1966 to establish a turtle hatchery on one of the Sandakan islands.

STAFF

A start has been made with wildlife conservation in Sabah, and the state is fortunate in having an excellent game ordinance. There are however many serious problems ahead. The chief of these is to attract and keep sufficient properly trained staff to administer the game laws, supervise the reserves, look after the rehabilitation project and undertake a variety of field studies.

At present the Game Section has an establishment of nine of which only six posts have been filled. None of my colleagues has any specialised training. Partially trained staff with at least some basic veterinary knowledge of hygiene and animal care are urgently required for the rehabilitation project. Other projects such as population counts, behaviour studies, investigations into the status, habitat and future of endangered species, ways and means of containing elephant within the reserves and elephant control generally apart from shooting – none of these can be undertaken by local staff at present. We must appeal to I.U.C.N. and other outside bodies for help with experienced zoologists and other experts for these studies. The staff problem is a twofold one: first to get Government to agree to establish posts at a sufficiently attractive salary, and then to find suitable applicants to fill the posts. I am not sure which is the more difficult.

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ANNEX 1

PROTECTED BIRDS

FRIGATE BIRDS:	Fregatidae
Lesser Frigate Bird	*Fregata ariel*
DARTERS:	Anhingidae
Darter	*Anhinga anhinga*
HERONS AND BITTERNS	Ardeidae
Dusky-Grey Heron	*Ardea sumatrana*
Purple Heron	*Ardea purpurea*
Reef Egret	*Egretta sacra*
Chestnut Bittern	*Ixobrychus cinnamoneus*
STORKS:	Ciconiidae
Storm's Stork	*Ciconia stormii*
Lesser Adjutant Stork	*Leptoptilos javanicus*
EAGLES, HAWKS, KITES:	Accipitridae
Honey Buzzard	*Pernis ptilorhynchus*
Crested Goshawk	*Accipiter trivirgatus*
Grey-Headed Fishing Eagle	*Ichthyophaga ichthyaetus*
Lesser Fishing Eagle	*Ichthyophaga nana*
Crested Serpent Eagle	*Spilornis cheela*
OSPREYS:	Pandionidae
Osprey	*Pandion haliaetus*
FALCONS:	Falconidae
Common Falconet	*Microhierax caerusescens*
White-Fronted Falconet	*Microhierax latifrons*
Peregrine Falcon	*Falco peregrinus*
MEGAPODES:	Megapodiidae
Megapode	*Megapodius freycinet*
PARTRIDGES AND PHEASANTS:	Phasianidae
Long-Billed Partridge	*Rhizothera longirostris*
Ferruginous Wood Partridge	*Caloperdix oculea*
Red-Breasted Tree Partridge	*Arborophila hyperythra*
Chestnut-Breasted Tree Partridge	*Arborophila charltoni*
Black Wood Partridge	*Melanoperdix nigra*
Crested Green Wood Partridge	*Rollulus roulroul*
Crimson-Headed Wood Partridge	*Haematortyx sanguiniceps*
Crestless Fireback Pheasant	*Lophura erythrophthalma*
Crested Fireback Pheasant	*Lophura ignita*
Bulwer's Pheasant	*Lophura bulweri*
Malaysian Peacock-Pheasant	*Polyplectron malacense*
Great Argus Pheasant	*Argusianus argus*
CRAKES AND RAILS:	Rallidae
White-Breasted Waterhen	*Amaurornis phoenicurus*
STONE PLOVERS:	Burhinidae
Reef Thick-Knee	*Esacus magnirostris*
GULLS:	Laridae
Black-Naped Tern	*Sterna sumatrana*
Bridled or Brown-Winged Tern	*Sterna anaetheta*
PIGEONS AND DOVES:	Columbidae
Black-Naped Fruit Pigeon	*Ptilinopus melanocephalus*
Pickering's Imperial Pigeon	*Ducula pickeringi*
Metallic Wood Pigeon	*Columba vitiensis*
Grey Wood Pigeon	*Columba argentina*
Spotted-Necked Dove	*Streptopelia chinensis*

Emerald Dove	*Chalcophaps indica*
Nicobar Pigeon	*Caloenas nicobarica*
HORNBILLS:	Bucerotidae
White-Crested Hornbill	*Berenicornis comatus*
Bushy-Crested Hornbill	*Anorrhinus galeritus*
Wrinkled Hornbill	*Aceros leucocephalus*
Wreathed Hornbill	*Aceros undulatus*
Black Hornbill	*Anthracoceros malayanus*
Pied Hornbill	*Anthracoceros coronatus*
Rhinoceros Hornbill	*Buceros rhinoceros*
Helmeted Hornbill	*Rhinoplax vigil*
HONEYGUIDES:	Indicatoridae
Malaysian Honeyguide	*Indicator archipelagicus*
THRUSHES AND CHATS:	Turdidae
Orange-Headed Ground Thrush	*Zoothera citrina*
Everett's Ground Thrush	*Zoothera everetti*
Chestnut-Headed Ground Thrush	*Zoothera interpres*
BABBLERS:	Timaliidae
Black-Browed Jungle Babbler	*Trichastoma perspicillatum*
WOOD SHRIKES:	Prionopidae
Bald-Headed Wood Shrike	*Pityriasis gymnocephala*

Part I

Mammals

Threatened Species of Large Mammals in Tropical South East Asia and the Importance of Sanctuaries (Including National Parks and Reserves) in their Conservation

by

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SUMMARY

Due to pressure from human populations and ever insistent demands for more land, sanctuaries in South East Asia are of inestimable importance for preserving rare and endangered species. With poverty, hunger and often illiteracy as prevalent as they are, the main emphasis should be on the economic or tourist value of wild life. The co-operation and assistance of the local inhabitants are vital if any progress is to be made in nature conservation. Some practical methods of ensuring this co-operation are discussed, including buffer zones, publicity and education, and provision of local amenities.

While legislation protecting endangered species is necessary the difficulties in enforcing such legislation in emergent and developing countries makes it imperative to preserve these rare species in sanctuaries. Pressures from human populations in the countries of Asia are much greater generally than in North America and Africa. Consequently sanctuaries in Asia are usually smaller in size and require more management and greater protection. The Javan and Sumatran rhinos, the brow-antlered deer, the anoa, the tamarau, the orang-utans, and to a lesser degree the seladang, kouprey, and Malayan tapir are animals of South East Asia that urgently require protection if they are to be preserved from extinction.

Where poverty, hunger, and often illiteracy are prevalent among the local people, it is of little avail to stress the importance of wild life on aesthetic, cultural and scientific grounds. The main emphasis should always be on their economic value; in other words, rare animals are of infinitely greater value to the local villagers if kept alive in their natural habitat than if killed and eaten. Rare wild animals will attract visitors from nearby cities and tourists from abroad and thus provide the sorely needed revenue for development.

The problem of preserving rare species of wild life in existing or proposed sanctuaries in South and South East Asia is largely political and administrative. It depends ultimately on the careful drawing up of laws and the full co-operation of the local villagers.

Drawing on experience gained at Kaziranga Sanctuary in North East India, where the Great Indian Rhinoceros is preserved, it has been found that the creation of a buffer zone of varying width around the sanctuary in which no firearms or other weapons may be carried except by bona fide inhabitants of the zone for the actual protection of their own crops from vermin, has done a great deal to keep away poachers.

Anyone from outside caught inside the buffer zone with a firearm can be immediately arrested, while those living within the zone can then be more carefully watched and

controlled. An ideal buffer zone would be devoid of human activities, but, as in the case of Kaziranga, it can contain villages, cultivations, grazing grounds, etc.

To ensure the co-operation and assistance of the inhabitants living and working in the vicinity of a sanctuary, the importance of publicity and education cannot be over-estimated. The inhabitants must be convinced of the monetary value of wild life; the local members of the legislature who live near the sanctuary must be convinced of the long-term economic advantages of the wildlife resource and must themselves spread the gospel of nature conservation among their constituents. Basically the animals belong to the local people and they could well be regarded by them as living money earners, particularly if there is some concrete proof of the profit from tourism to the country as a whole in the form of a special school or water supply. Some special project (in addition to the normal work of development) publicly proclaimed as being the result of funds derived from the rare species or sanctuary concerned, should create a very favorable impression on the local people.

Local human populations adjacent to a rare species of wild life should be induced to take a pride in their accidental trusteeship – protectors of this valuable natural resource rather than destroyers of it. It is significant that poachers of the rhinoceros in Kaziranga are forced to do their illegal killing secretly and in the remote interior away from and unknown to the local inhabitants who would resist such interference from outsiders.

In the event of a rare species having to be transported to a new area more suitable for its supervision and protection, as might happen in the case of the Sumatran rhinoceros, it is even more important to have previously enlisted the support of the local population. To create new conditions of wild life as potential crop-raiders might arouse resentment in a new area unless the inhabitants of the neighborhood could be previously persuaded to accept the new situation with its land requirements and risks, in their own and in the national interest.

It is on the co-operation of the local villagers that many of the endangered species and their sanctuaries depend, and it is mainly by such simple and practical methods that under-developed peoples can be persuaded to become conservation-minded.

Threatened Species of Fauna of Thailand

by

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SUMMARY

The author describes the rich wildlife resources of Thailand and gives the reasons for their steadily dwindling numbers. He lists the seriously threatened species and those that should be watched among the mammals, birds, turtles, and other reptiles.

INTRODUCTION

Thailand in the old days was one of the richest countries in wildlife resources. Mr. John Bradly wrote in his book, 'A Narrative of Travel and Sport In Burma, Siam, and the Malay Peninsula', that when he and his friends travelled on foot from Rangoon to Bangkok in 1876 that they often saw rhinoceros on their way. Elephants and buffaloes (possibly gaur and banteng) were numerous and found in herds of varying numbers many times a day. Even before and during the last World War, game animals were still very numerous in every part of the country. In one day's hike, one usually saw a few herds of elephants and banteng, and one or two herds of gaur. The sambar and barking deer were found often. The calls of big game animals were heard very often especially in December and January when most of them were mating.

The rich wildlife resources of this country began to be depleted very seriously after the end of World War II when surplus transport and fire-arms became easily available to the people. Game animals were slaughtered by shooting from jeeps with spotlights using rapid rifles and machine guns. Not only was wildlife destroyed wantonly but the forest habitat was cleared and burned at an alarming rate to expand areas for cultivation. Squatters did not hesitate to move in and settle even in reserved forests.

CONSERVATION EFFORTS

In 1950 a number of people, mostly old hunters, alarmed at this destruction of animal and forest formed 'The Association for the Conservation of Wildlife'. Ten years later (1960) they succeeded in getting the government to pass a game law, but this law is only letters printed with black ink on white paper unless it is properly enforced. Most important are:

1. well trained and dedicated wardens,
2. an adequate budget for proper patrolling,
3. co-operation between various government departments, and
4. public education.

The first three of these are sadly lacking in Thailand, the lack of money for proper patrolling being the most outstanding. Without such patrolling in the near future forest and wildlife resources will be doomed. All countries in South East Asia badly need well trained forest wardens. The best remedy for this would be if some international organization such as the IUCN could provide training facilities such as wildlife experts to teach and train in rotation in countries in this region.

Public education in Thailand is more promising. Conservation education has been introduced into the teaching curriculum of all classes in the schools, and the Association for the Conservation of Wildlife is active in giving lectures and arranging 4 or 5 trips

a year. The Asia Foundation is very co-operative in providing funds and printing bulletins on conservation news. It is hoped that with the coming generation conservation education will have progressed greatly.

MAMMALS – SERIOUSLY THREATENED SPECIES

1 and 2. Javan and Sumatran Rhinoceros *(Rhinoceros sondaicus* and *Didermocerus sumatrensis)* were once common in many parts of the country but they have been killed for their horns. It is not too pessimistic to say that they have already been wiped out although a very few may still survive in secluded corners on the Tenasserim Range. Karen hunters have brought horns and parts of their carcasses for sale at Karnchanaburi market each year during the past few years. To make a survey there would disclose their presence to the villagers, especially the Karen hunters, and would send the animals to their doom more quickly.

3. Kouprey *(Novibos sauveli)* were once found in the northeast, north of Dongrak Range in the areas of Burirum, Surin, Srisakes, and Korat. The last herd was seen at Dong Eo-jan Forest southwest of Korat in 1950.

4. Thai Eld's Deer *(Cervus eldi siamensis)* used to be plentiful in the open plains and dry forest in every part of Thailand north of Petchaburi. Because of its curved antlers it could not flee into dense forest so after the end of World War II it was wiped out quickly by hunting in jeeps. There may be a few small herds left.

5. Hog deer *(Hyelaphus porcinus annamiticus).* Its habitat is high grass on open plains. When this is burned the deer is easily shot at night. There may be a few individuals left in remote areas at Chiengrai and the northeast.

6. Wild Water Buffalo *(Bubalus bubalis).* At present these have been lost to every part of the country save one area at Ban Rai Forest at Udhai Dhani. They are easy to kill because they habitually return to muddy pools to wallow. Their survival will not be long there because the Karen hunters are moving into this territory from Burma. This area at present is one of the best habitats for the big game animals of the country. Thailand should immediately set this area aside as a reserve with adequate funds for patrolling before it is too late.

7. Dugong *(Dugong dugong)* were once often seen along the coast of the inner gulf of Thailand from Sriracha to Rayong. They are often caught accidentally in fishing nets and drowned: if caught alive they are killed at once for meat. The Game Law Committee has suggested putting this sea mammal on the protected list of the fisheries and it is only hoped that this will be done before it is too late.

MAMMALS – SPECIES THAT SHOULD BE WATCHED CAREFULLY

1. Serow *(Capricornis sumatraensis)* was once found on most of the mountains and many of the islands of Thailand. Nowadays there are only a very few on some steep hills and on a few islands. Although this animal is in the strictly protected category it is much feared that the law cannot protect them unless they are in a national park or reserve because the villagers value their oil and bone marrow for curative properties for arthritis, fractures, and rheumatism, and then kill them wherever they are found.

2. Goral *(Nemorhedus goral)* was occasionally reported from some steep mountains along Mae Ping River. The number has never been estimated.

3. Elephants *(Elephas maximus indicus).* Once abundant in every part of the country the number of elephants has been reduced drastically especially since World War II through the clearing of forests and hunting for ivory and meat by villagers who find them easy prey, in spite of the 'Elephant Preservation Law'. Females and the young are killed first because they are more tender. Elephant meat is often sold as gaur or banteng meat. One elephant can provide meat for a whole village for many weeks.

4. Gaur *(Bos gaurus)* is the most magnificent game animal in the world, once found in abundance in jungles throughout the country. It has been much hunted and its habitats disturbed so it is found now only in small herds in remote forest.

5. Banteng *(Bos banteng)*. Before the end of the war the banteng were rather abundant in every part of the country and were found as far as Surat Dhani in the peninsula. At present they are found in small herds in very remote areas. Originally plains-loving, diurnal animals they have changed their habitat to dense forest and become nocturnal in order to survive.

6. Malayan tapir *(Tapirus indicus)* are found now mostly in the south and west of the country. They are decreasing in numbers very rapidly because of trapping for export to zoos and shooting for fun and meat.

7. Leopard and Black Panther *(Panthera pardus)*. The skin of this animal (both the black and the spotted forms) is in great demand and a good spotted one sells for 2000 baht ($100 U.S.). The animals are also sought by animal dealers for the zoo trade.

8. Clouded Leopard *(Neofelis nebulosa)*. It is usually rather rare in Thailand, but when it is found it is trapped for zoos.

9. Binturong *(Arctictis binturong)* is found widespread in dense forests. It is timid and easily caught alive or killed. It is also wanted by zoos.

10. Gibbons *(Hylobates* spp.). The common gibbons in this country are the common white-handed gibbon *(Hylobates lar entelloides)* found mostly in the west and south of the country and the crowned gibbon *(Hylobates lar pileatus)* found in the east. Gibbons are much in demand for zoos and as pets for both Thai people and foreign visitors. Felling of forests destroys their habitat so nowadays they are found only in deep forests. Because they are difficult to catch the villagers usually shoot the mothers in order to catch the baby and very often both die from the wound, or from falling from high trees, or from malnutrition when in captivity.

11. Monkeys *(Macaca* spp.). Tens of thousands of monkeys have been exported yearly to the United States for making polio vaccine in the last decade (1955-65) and some kinds have already been wiped out from parts of the country. The Thai government has now restricted the export to 700 animals a month which helps a little.

    They are also trapped and shot for meat and sometimes sold smoked in the market at 4 or 5 baht (about 25 cents U.S.) a piece.

    The easily caught Crab-eating monkeys, which stay in the mangroves near the seashore, have suffered the most, then the Pig-tail and Stump-tailed monkeys in the south: the Rhesus and Hill macaque in the north have fared somewhat better than the others. Since monkeys are still known to raid crops, they have not been put on the protected list to avoid adverse public criticism.

12. Langurs or leaf-eating monkeys *(Presbytis* spp.) are dwindling in numbers very quickly, because the villagers believe that their fresh blood, when mixed with liqueur and taken orally, possesses some property in giving strength to the body and in curing some diseases. Langurs are hunted for their blood and their flesh, smoked and served as food. They are now found only in some remote areas far away from habitation.

BIRDS – SERIOUSLY THREATENED SPECIES

All big birds in the stork family are threatened by:

1. shooting for sport;
2. the draining of marshes: and
3. the lack of natural havens where they can feed and roost peacefully.

The following birds are rarely seen at present and all are seriously threatened species.

1. Sarus Crane *(Grus antigone sharpii)*. This beautiful big bird is very rarely seen at present in this country. Six birds were seen in Phu Kadung National Park six years ago, four were shot later on and only two were seen last year. Four birds came to roost at the Open-billed Stork Sanctuary at Wat Phai Lorm, Pathum Dhani in January last year. Two were shot by poachers and the other two had to fly away to save their lives.

2 and 3. The Giant Ibis *(Pseudibis gigantea)* and Davison's Black Ibis *(Pseudibis papilosa davisoni)*. There may still be a few of these birds in remote areas but they have neither been seen nor reported in the past ten years. Recently Giant Ibis were reported at some deep jungle ponds in northeast Cambodia.

4. The Black-necked Stork *(Renorhynchus asiaticus)* and the White-necked Stork *(Ciconia episcopus)* are now very rarely seen in this country, although they are more common in neighboring Cambodia.

5. The Greater Adjutant Stork *(Leptoptilos dubius)* is also very rare in Thailand nowadays, although the lesser species is still found occasionally in certain areas.

BIRDS – SPECIES THAT SHOULD BE WATCHED CAREFULLY

1. The White Ibis *(Threskiornis melanocephalus)*. A small flock of six or eight birds are still seen from time to time at the Open-billed Stork Sanctuary at Wat Phai Lorm but they are very rarely seen anywhere else nowadays.

2. The Painted Stork *(Ibis leucocephala)* has become scarcer in the past ten years. However, big flocks may be seen feeding in mud flats and rice fields near the seashore between Tachin and Meklong Rivers at the end of the rainy season.

3. The Spotted-billed Pelican *(Pelecanus philippensis)* has also become scarcer in the last decade. A few dozen are seen at widely scattered lakes, mud flats, and rice fields.

4. Argus Pheasant *(Argusianus argus argus)* is found only in the peninsular provinces. Many of them have been trapped in the past ten years for export to zoos and animal dealers in other countries although the Government has restricted the number of birds to be exported.

5. Burmese Peacock Pheasant *(Polyplectron bicalearatum)* and Malayan Peacock Pheasant *(Polyplectron malacense)*. The former is found north of the Isthmus of Kra and the latter south of that isthmus. The birds are being trapped and exported in large numbers every year for zoos.

6. Green Pea Fowl *(Pavo muticus)*. Once it was abundant in every jungle, but now it is very rarely seen. It is hunted intensively by trappers for sale as pets and by villagers for its excellent meat.

TURTLES

There are no seriously threatened species, but species which should be watched carefully as their numbers are dwindling are the river turtles and the sea turtle.

1. River Turtle *(Batagur baska)*. This species has dwindled very rapidly because its habitats (river banks) have been occupied by people, and fishermen hunt the turtle and its eggs for meat.

2. *Platysternum megaciphalum*. This species is usually found in mountain streams, three to four thousand feet or higher. It is strange looking and is heavily collected for sale in the pet market.

3. Sea Turtles. Of all four species in the Thai seas, the Green Turtle *(Chelonia mydas)* is the most common one, the Hawksbill Turtle *(Eretmochelys imbricata)* comes next. These two are of economic importance to Thailand because the Thai people like to eat their eggs. The Government has given concessions for

egg collecting at different places along the seashore. The concessionaires have to hatch certain numbers of eggs of these two turtles and release their hatchlings back into the sea. According to the regulation of the Fishery Department, 21,350 hatchings of the Green Turtle and 2,525 of the Hawksbill should be released every year. Such an excellent regulation should be quite enough to preserve these two species of sea turtles from being depleted, but it needs some honesty on the part of both official inspectors and concessionaires.

4. The Leathery Turtle *(Dermochelys coriacea)* is found, but not in large numbers, on the Indian Ocean side of the Thai peninsula and very few in the Gulf of Thailand. This turtle should also be included in the hatching regulation as the above two are.

OTHER REPTILES

There are no seriously threatened species but the three varieties of crocodiles – false gavial, brackish water, and fresh water – should all be watched carefully as their skins are in great demand by trappers. Fresh water crocodiles are found nowadays in Bung Borapet Lake of the Fishery Department at Nakon Sawan. Brackish water and false gavial crocodiles may be found but only in small numbers at the mouth of rivers in the south of Thailand where they are covered with mangroves. They are no longer found as they were in their old habitats, but they may be saved from extinction by the crocodile farms which raise them for their skins. It is difficult to put crocodiles on the protected list because people are afraid of them.

Threatened Species of Small Mammals in Tropical South East Asia
The Problem in the Philippines

by

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SUMMARY

Small land mammals constitute about 76·4 per cent of the entire land mammal fauna of the Philippines. Certain species – cloud rat, macaque, civet and leopard, flying lemur, scaly ant-eater, and mouse deer – face extinction with the destruction of their natural habitat due to ruthless deforestation and human utilization as articles of diet or for certain articles of commerce. Recommendations are made to reverse this process.

Annex 1 consists of a summary of the Philippine Land Mammal Fauna, and Annex 2 lists those which should be considered threatened species.

INTRODUCTION

There are about 7100 islands in the Philippine archipelago and their sizes vary widely, but almost all of them possess certain species of land mammals, chiefly small mammals. Out of approximately 242 species and subspecies of land mammals listed, only 18 are larger forms (tamarau, deer, and pigs). Bats, rats, and mice together form 76·4 per cent of the entire land mammal fauna. A summary of the fauna appears in Annex 1 (page 3) and small threatened mammals, Annex 2.

Present Status in the Conservation of the Philippine Land Mammals

It is safe to generalize that at present the large Philippine land mammals are all either being threatened with total extinction as in the case of the tamarau *(Anoa mindorensis* (Heude)) or are showing definite trends towards depletion of their numbers as in the deer *(Cervus* spp.) and wild pigs *(Sus* spp.).

The small land mammals of the Philippines include the following groups listed below in descending order based on the number of forms representing the various groups, the present abundance of the members of each group, and on the commonness of occurrence of the members of each group on their respective islands of distribution.

1. Bats. Bats occur in almost all types of vegetation and other types of habitat, including close proximity to man. Many Filipinos living in remote villages consider bats part of their diet, but these are in the minority. The main cause of depletion of population of bats in certain localities is the destruction of forests, their natural habitat. However, bats of all species are still in normal numbers and they are in no danger of depletion.
2. Rodents. Rats and mice occur in almost all types of habitat in the Philippines. By excessive deforestation and the consequent planting of crops which are attractive to rats, an imbalance of the ecosystem has occurred resulting in a great increase in the population of the common field rats *(Rattus rattus mindanensis* and *Rattus exulans* subspp.) especially in Mindanao. This has caused very great loss in crops and thus far has proven impossible to control.

   Most rats and mice endemic to the Philippines live in special habitats such as high mountain tops or dense forest and their numbers have remained normal. One species of rat, however, the cloud rat, [*Crateromys schadenbergi*

ANNEX 2

THREATENED SPECIES OF PHILIPPINE SMALL LAND MAMMALS

1. *Crateromys schadenbergi* (Meyer) – Cloud Rat
2. *Macaca* spp. – Macaques
3. *Viverra tangalunga* Gray – Civet
4. *Paradoxurus* spp. – Palm Civet
5. *Felis minuta* Temminck – Leopard Cat
6. *Cynocephalus volans* Linnaeus
7. *Tragulus nigricans* Thomas – Mouse Deer or Chevrotain

Rhinoceros and Seladang – Malaya's Vanishing Species

by

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SUMMARY

The necessary rural expansion in Malaya during the past five years has created and is creating very serious problems in the field of wildlife conservation particularly for the Sumatran rhinoceros and the seladang. The distribution and location of individual rhinoceros are reviewed based on the author's personal knowledge gained from extensive experience over the past twenty years in Malaya. Seladang, although numerically greater than rhino, are just as vulnerable because their habitat is that land most suitable for cultivation.

Distribution maps of rhino and seladang are presented.

INTRODUCTION

During the past five years the face of Malaya has altered considerably in more ways than one, but the expansion of rural development, necessary as it may be to a growing nation, has created very serious problems in the field of wildlife conservation. The two most threatened species are the Sumatran rhinoceros *(Dicerorhinus sumatrensis)* and the seladang *(Bos gaurus)*. I am of the opinion that only one species of rhinoceros now exists within the limits of the Malay Peninsula, there being no evidence of the continued presence of the Javan one-horned *(R. sondaicus)*.

THE RHINOCEROS

There is little enough positive information on the rhinoceros at all and that contained in this paper is all that the writer has been able to collect over the past twenty years or so. Details of known habitats are undoubtedly correct, but it has not been possible to ascertain the exact number of animals existing therein, and any estimate given is conservative.

Commencing our survey in the south of the peninsula, the last known rhino in the State of Jahore was shot in 1947 although a few may still exist in the swamps.

Currently, the first rhinoceros to be found – about three in number – are located in north Selangor on the banks of the Bernam River where I found two adults and one young in 1949. A sanctuary of some 10, 700 acres was created for their total protection by the Selangor State Government a few years ago; this is now surrounded by cultivation on three sides. It is unfortunate that no corresponding reserve has been made in Perak in the extensive swamp forest across the river which the rhino are known to cross.

Continuing northward, in 1949 the hind quarters of a solitary rhino were seen in the steep foothils of Gunong Bubu.

It is in the Bintang Hijau Forest Reserve in northern Perak and the contiguous Gunong Inas Forest Reserve in south Kedah, that we find the highest concentration of rhinoceros known in Malaya. The rocky inhospitable terrain, containing a series of precipitous 4000 to 6000 foot mountains, is well-watered and has frequent wallows and a number of

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fine salt licks, which when I inspected them in 1956 were regularly visited. The wide game trails were much used by both rhino and elephant. In fact the Assistant Game Warden of Perak photographed a rhino at a salt lick a year or so later.

No estimate of the rhino population there can be made without considerable research, but at the present time the whole area is relatively undisturbed apart from logging at some places and tin mining at Klian Intan.

In the upper reaches of the Perak River in the hilly country bordering Thailand there seem to be some rhino but it has not been possible to fix their number: the tracks of one mature animal were seen in 1964.

In the remote hilly bamboo forest of north Kedah bordering Thailand we heard an unknown number of rhinos and found a number of fresh wallows and dung heaps in April 1941.

We now turn our attention to the States of Kelantan, Trengganu, and Pahang. Trengganu, I am convinced holds a few animals in the relatively unexplored hinterland although it has not been possible to verify this. The former King George V National Park, now known as Taman Negara, contains large tracts of land in all three of the above-mentioned states, and there is irrefutable evidence of the presence of rhinoceros within that part of Pahang and also in a high remote region in South Kelantan. Last year a solitary adult was seen in Tembeling valley near Park Headquarters and was seen again some weeks ago. To the east and south east of the park (in the upper reaches of the Sungei Tekai and the foothills of Gunong Irong and Gunong Tapis) there is a great sweep of unexplored difficult country which could very easily contain rhinoceros.

The Krau Game Reserve in Central Pahang is also imperfectly known since no exploration has been done there since before 1941 at which time an adult rhino frequented certain salt licks in the southern quarter. Aborigines inhabiting these regions have told me of the presence of a few rhino on the western slopes of Gunong Benom and at a frequently used salt lick high up in the Ulu Klau Ketchil.

We are now left with southeast Pahang which for the greater part is a vast area of swampy jungle, mainly unexplored and unknown insofar as wildlife is concerned. From this area there periodically emerge migrations of the Bearded Pig *(S. barbatus)* which the aborigines slaughter as they swim the rivers. Apart from these migrations, this animal is practically unknown in Malaya, and it would certainly not be too far fetched to expect to find rhinoceros somewhere in that wild region, especially in the upper valley of the Sungei Endau.

From the available information, then, we can be sure that a few rhinoceros still exist in Malaya, but we cannot say how many, and we do not know where they all are. The summary in Annex 1 is an attempt to estimate the population from the knowledge at our disposal.

THE SELADANG

The seladang *(Bos gaurus)* while numerically in a much stronger position than the rhino, is, because of its habits, just as vulnerable, if not more so. It is a creature of the lowland river valleys seldom going even as high as 2000 feet. It grazes and browses on grass and low-growing vegetation on islets and river banks and in clearings made and abandoned. Since such country is the most easily developed, being accessible and with the best soil, the seladang is very easily left homeless. Once a herd is broken up and scattered they fall prey to carnivores and hunting, the breeding cycle may be interrupted and a steady decline in numbers sets in until the whole herd ceases to exist. In some areas of Pahang herds of 30 or more that existed in 1941 – 18 years ago – have disappeared. It is certain that seladang populations currently living in areas due for rural development are doomed unless some means of saving them can be found. At present these magnificent animals are still to be found throughout the country (except in Malacca, Perlis, and Selangor) occurring in greatest numbers in Pahang, parts of Upper Perak, and South Kelantan.

(As a matter of interest while on the subject, it has been reported to me that a small herd of Banteng *(Bos sondaicus)* still exists in a certain very remote part of Kedah although there has been no positive record of the presence of this animal for many years).

Salt licks so important to wildlife have been destroyed by cultivation and now a series of dams for hydro-electric power to be constructed on the Perak River and the Sungei Muda in Kedah will submerge the greatest known concentration of salt licks in Malaya. The development of a vast area of 150, 000 acres in Pahang known as the Jengka Triangle now inhabited by both seladang and elephant, and the building of roads into hitherto inaccessible country, populated only by aborigines and wildlife, show that the problems of conservation are becoming progressively more acute.

ANNEX 1

ESTIMATED POPULATION OF RHINOCEROS IN MALAYA

Locality	Number Definitely Known	Probable
Johore	Nil	2
Selangor/Perak (Ulu Bernam)	3	4
Selangor (U. Kenaboi)	Nil	1
Gunong Bubu	Nil	1
Perak/Kedah	2	4
Ulu Kedah (Thai border)	2	4
Perak/Kelantan border	Nil	2
National Park	2	4
Ulu Trengganu	Nil	2
Krau Reserve	Nil	2
Southeast Pahang	Nil	2
Ulu Perak/Thai Border	1	2
	10	30

FIG. 6

Areas in Malaya where Rhinoceros have been Reported

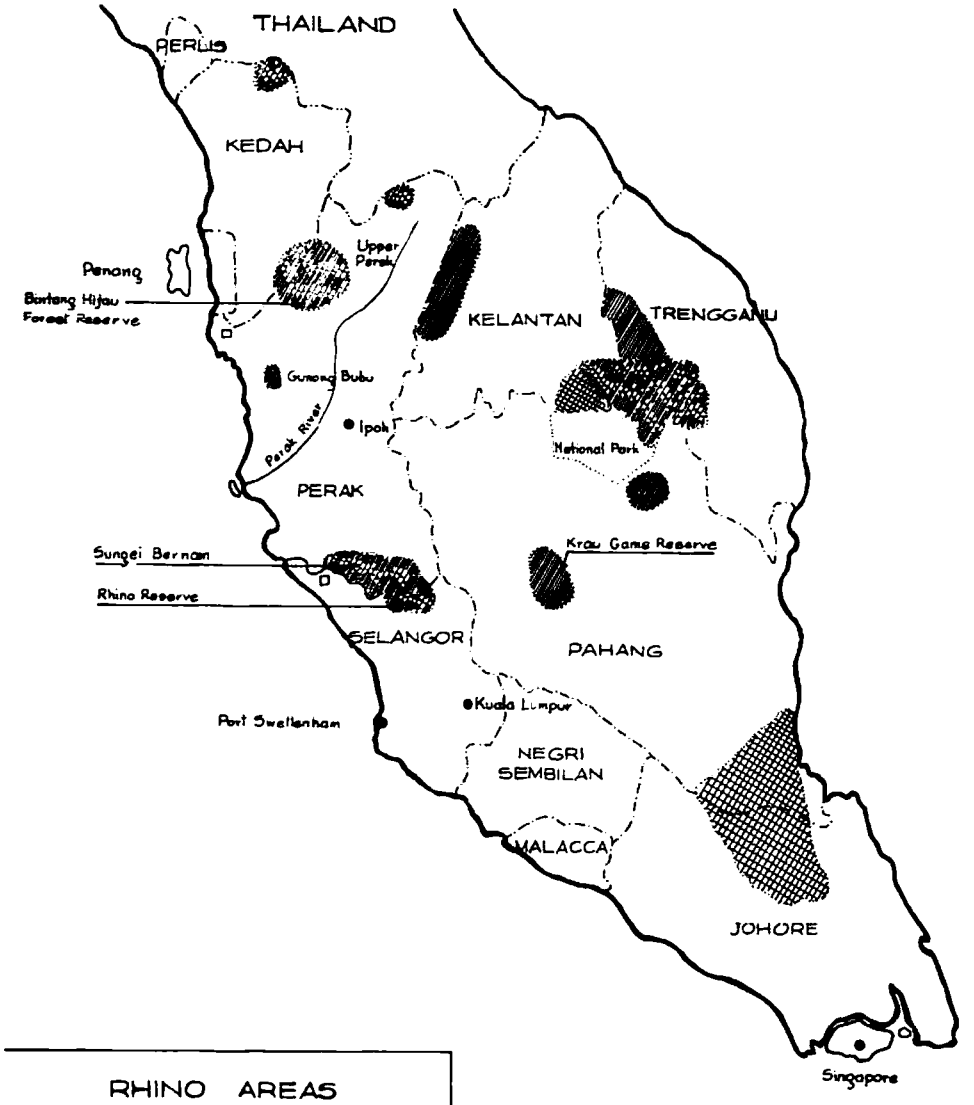
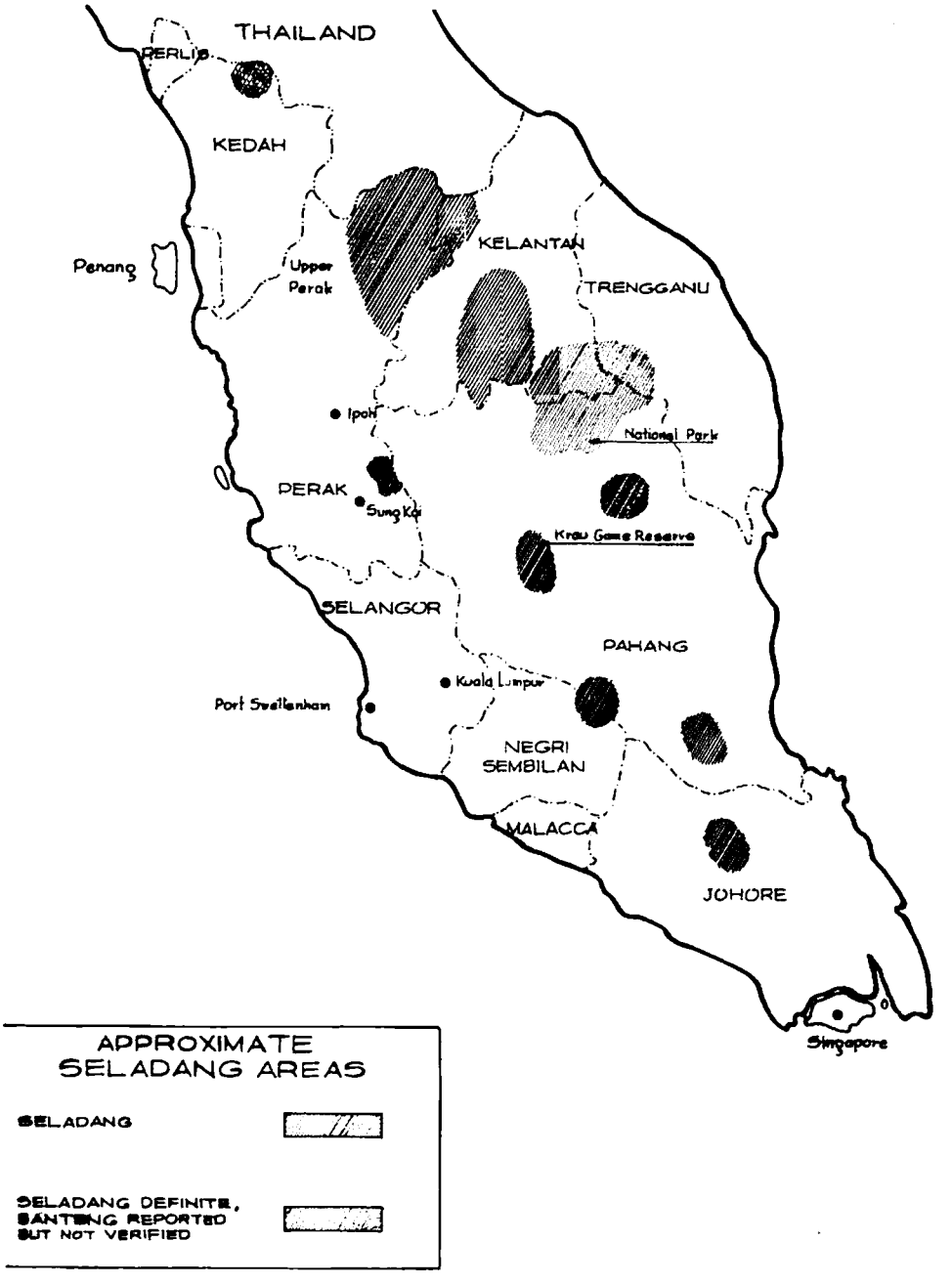


FIG. 7

Areas in Malaya where Seladang are Found



Threatened Species of Rhinoceros in Tropical S.E. Asia

by
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SUMMARY

The author presents the most recent reports on the status of the three species of Asian rhinoceros – Javan, Sumatran, and Great Indian – and reviews the reasons for the decline in their numbers. While the World Wildlife Fund conservationists appreciate the need for urgency in the rhino projects, they have regrettably made little progress thus far, due to lack of funds.

An extensive annex presents illustrations, and a refutation of the belief in the aphrodisiac qualities of the rhino horn.

INTRODUCTION

There are in all five species of rhinoceroses two of which live in Africa and three in Asia. The following report deals only with the latter – the Great Indian rhino *(Rhinoceros unicornis)* the Javan rhino *(Rhinoceros sondaicus)* and the Sumatran rhino *(Dicerorhinus sumatrensis)*. (See Annex 1.) Since we know of the actual situation of these rhinoceroses in Asia only by hearsay, part of this paper may be incorrect; we would appreciate any suggestions for improvement.

HISTORY

It should be pointed out that although the African rhinos are relatively young compared with the Asian ones, all rhinoceroses can be traced far back into the Tertiary, the Great Indian and Javan to the Upper Pliocene (approximately 5 to 7 million years B.C.), and the Sumatran rhino, even to the Upper Oligocene (approximately 30 million years B.C.) (In comparison the African rhinos date only to the early Pleistocene - approximately one million years B.C.) There are few other mammals, as far as we know, that can be traced back continuously to such a date. This fact alone justifies all efforts to prevent the extinction of the Asiatic rhinos.

We know so little about the biology of these unique rhinos that we are in no position to say if the population has reached a figure below which we cannot save the species. There is no doubt, however, that it is a seriously threatened species as the following figures of existing Asiatic rhinos deduced from reports show:

Javan rhino	40
Sumatran rhino	150 - 170
Great Indian rhino	675

REASONS FOR DECLINE

There are several reasons for the alarming decline in the numbers of the Asiatic rhinoceroses which has occurred in the last hundred years.

Poaching

Poaching still goes on to a very large extent! There is a tendency for people to think that poaching is an insurmountable problem. It is, of course, nothing of the kind, for good management on the part of conservation personnel together with the encouragement they deserve from higher authorities can bring about an entirely satisfactory level of control, as has been shown in southern Africa.

The most appalling drain on the Asiatic rhino population has come through the wanton killing of the animal for its horn, believed by the Chinese and other Asiatic populations to have powerful aphrodisiac properties. The amount of money received for one horn can be more than a lifetime's normal wages of an ordinary worker. The failure by western conservationists to break down these erroneous beliefs may be because we do not understand the correct way to go about the conversion. It is hoped, therefore, that the proper method of halting these flights of imagination will be put into effect by conservationists who live in the East. In view of the importance that is being attached to the rhino horn, I have considered it necessary to add a short paper on its uses which may help towards a better understanding of the problems involved. (see Annex 2.)

Technical Improvement of Firearms

As recently as 175 years ago the rhinoceros was considered invulnerable and the only mammal without enemies. (See Buffon, 1750 and 1804). The improvement of firearms during the last century has now made the rhinoceros one of the easiest of the big game animals to kill.

Increase in Human Population

The explosive increase in human population results in constant demands for increasing farmland. This in turn leads to a considerable reduction of the natural habitat of the rhinoceros with all its implied consequences. Some pessimists say that the increasing human population and what it entails means the inevitable loss of the species. This of course is plain nonsense and entirely overlooks such vital factors in the development of a country as proper planning for recreation and tourism. Selected areas of natural habitat should be set aside in perpetuity as natural reserves and in these the retention of the rhinos presents no problems. There are many examples in Africa of animals and reserves bringing immense revenues to the countries fortunate enough to possess them.

Insufficient Nature Conservation Control

Control in many wild life sanctuaries at the present time is inadequate, largely because insufficient sympathy, understanding, and encouragement are given to the conservation officers. Control is not difficult when it is in the hands of men dedicated to the protection of wild creatures, and men of that caliber come readily to the fore when a wildlife department is being properly administered. There are some who consider that the considerable sums necessary to maintain a sound conservation organization represent money badly spent. Little thought, or regard to the lessons which can be learned from others, is needed to appreciate that few investments result in such great return, much of it often of a quite imponderable nature. In tourism alone it has to be remembered that those who flock to see wildlife in its natural habitat contribute immense sums to other branches of the country's economy during the course of their stay.

ACTUAL SITUATION OF THE THREE ASIATIC RHINOS

Javan Rhinoceros

Dr. Lee Talbot (1965), in carrying out a survey of the Udjung Kulon Reserve at the request of the Indonesian Government with particular attention to the Javan Rhino, reported that there were still rhino, probably several dozen though the number might well be less, living in the reserve. At the time of the survey no young were found, but since that time one juvenile rhino at least has been seen. What is urgently needed is a distribution and status survey, for it is impossible to develop sound plans for the future without possession of precise facts. There has been some poaching and neglect in the Reserve but all things considered it is still in remarkably good condition.

To assure the survival of the species:

1. reproduction must be assured, and
2. the Reserve must received adequate protection.

Sumatran Rhinoceros

Lord Medway (1965) reported that a small number of Sumatran rhinos survive wild in the hilly regions of north and north central Malaya and in addition a small group, including a juvenile, have lived for five years in the Ulu Bernam Forest Reserve in Selangor. The small population of rhinoceroses is severely threatened and only immediate action can save them.

In the case of this species also, the vital thing is for an early biological survey which happily the Malaysian authorities have already embarked upon.

Great Indian Rhinoceros

Mr. E.P. Gee (1964) reports that there are 185 rhinos in Nepal, 65 in Bengal, and 375 in Assam, a total of 625 (see Annex 3.).

Although the rhinos in India are completely protected, they are constantly under great pressure from a rapidly increasing population. It is encouraging to learn from a report by Mr. Richard Willan, Katmandu, Nepal, with regard to a rhino sanctuary there, that all the villages in the area were moved out, involving a resettlement of some 4000 people so the whole place is free of settlement. There have been no reports of poaching, and rhinos have been seen in some numbers there recently.

It is up to the conservationists to assist the Government in convincing the people that the rhinos alive are a great asset as a tourist attraction and thus can help to increase the country's revenues considerably.

WORLDWIDE CONSERVATION EFFORTS

The dangerous situation which is facing virtually all of the rhinoceros species is well known at IUCN headquarters, and it has been the subject of much discussion at repeated meetings of the SSC. The urgency of the problems associated with the various rhinos has also been conveyed to the WWF, with the result that various projects have been prepared for inclusion in what is known as the Green Book. There are numbers of projects detailed in the Green Book and six are listed in Annex 4.

Although the various rhino projects have for the most part been granted an 'A' priority, because Trustees of the WWF fully appreciate the urgent need for carrying them out, it has regrettably to be reported that they have not yet made much progress. WWF has many commitments and it has so far proved most difficult to obtain those very considerable contributions necessary to fulfill them all. Many organizations have been very helpful and it should be put on record that among them the Fauna Preservation Society has been most positive and generous in its assistance: its Hon. Secretary, Mr. Fitter, has also been most helpful and interested in all problems associated with saving the rhinos.

Acknowledgements:

I am much indebted to Col. Jack Vincent for his assistance in the preparation of this paper. My thanks are also due to the various members of the Rhinoceros Group who have regularly given important information, in particular to Mr. E.P. Gee, Lord Medway, and Dr. Lee Talbot.

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ANNEX 1

THE CLASSIFICATION OF THE RECENT RHINOCEROSES

after G.G. Simpson, publ. 1945

Order PERISSODACTYLA

Suborder CERATOMORPHA

Superfamily RHINOCEROTOIDEA

Family RHINOCEROTIDAE

Subfamily RHINOCEROTINAE

Genus RHINOCEROS Linnaeus

Species *Rhinoceros unicornis* (Linnaeus 1758), Great Indian Rhinoceros

Species *Rhinoceros sondaicus* (Desmarest 1822), Javan Rhinoceros

Subfamily DICERORHININAE

Genus DICERORHINUS Gloger

Species *Dicerorhinus sumatrensis* (Fischer 1814), Sumatran Rhinoceros

Genus CERATOTHERIUM Gray

Species *Ceratotherium simum*

Subspecies *Ceratotherium simum simum* (Burchell 1817), Square-lipped Rhinoceros (South African typical race)

Subspecies *Ceratotherium simum cottoni* (Lydekker 1908), Square-lipped Rhinoceros (Northern subspecies)

Genus DICEROS Gray

Species *Diceros bicornis* (Linnaeus 1758), Black Rhinoceros

ANNEX 2

THE RHINOCEROS HORN

The horn of the rhinoceros differs considerably from all horns that can be found in other mammals. This can readily be seen from Fig. 1.

The Rhinoceros Horn is actually no horn at all, but is made up similarly to the skinhorns (Cornu Cutaneum) (see Fig. 2) that are found as pathological growths frequently in other mammals including Homo sapiens.

This alone is ample proof that it cannot act as an aphrodisiac since the horn is comparable to the epidermis which definitely can never contain sexual hormones such as testosterone. The widely spread belief in the mechanical effects of the ground horn and the very sharp small hairy parts it contains is based on an absolutely false theory. When taken in any form, the ground horn therefore being discharged as urine through the penis, will have been completely dissolved on passing through the stomach into the kidneys and from there into the gall bladder. All hairy parts that may have been contained in the original food will on their long way be chemically dissolved.

The conclusion to be drawn is this – that from all scientific considerations it is clear that the rhinoceros horn cannot act as an aphrodisiac. This holds true for the horns of all rhinoceros species. The known difference in price between the horn of the African and the Asiatic species is without any foundation.

ANNEX 3

ESTIMATE OF NUMBERS OF GREAT INDIAN RHINOCEROS

(from Mr. E.P. Gee, November 29, 1964)

Nepal			185
Bengal	Jaldapara	60	
	Gorumara	5	65
Assam	Kaziranga	275	
	Laokhowa	25	
	Orang	12	
	Manas	15	
	Sonarupa	5	
	Elsewhere	43	375
	Total		625

ANNEX 4

WWF Project Book (Green Book)

C Asian Series	Title of Project:
No. 11/1964 (Potential)	Asiatic Rhinoceros species A study trip to Assam, Nepal, Sumatra, Borneo and Java
No. 47/1962 C/I/9 (Full)	Great Indian Rhinoceros Ecological survey in northeast India
No. 73/1963 C/I/12 (Full)	Sumatran Rhinoceros Ecological study in Malaya
No. 87/1963 C/II/3 (Full)	Rhinoceros Sanctuary, Chitawan dist., Nepal Purchase of a jeep and a motorboat
No. 120/1964 C/II/4 (Full)	Udjung Kulon Nature Reserve, Java Purchase of vehicles and equipment for the Javan Rhinoceros Conservation Program
No. 145/1964 C/I/15 (Full)	Javan Rhinoceros Ecological survey of the species and its habitat
No. 173/1965 C/I/18.1	Wildlife of India Surveys of the Great Indian Rhinoceros, the Kashmir Stag and the Fauna of the Corbett National Park, India

The Various Horns

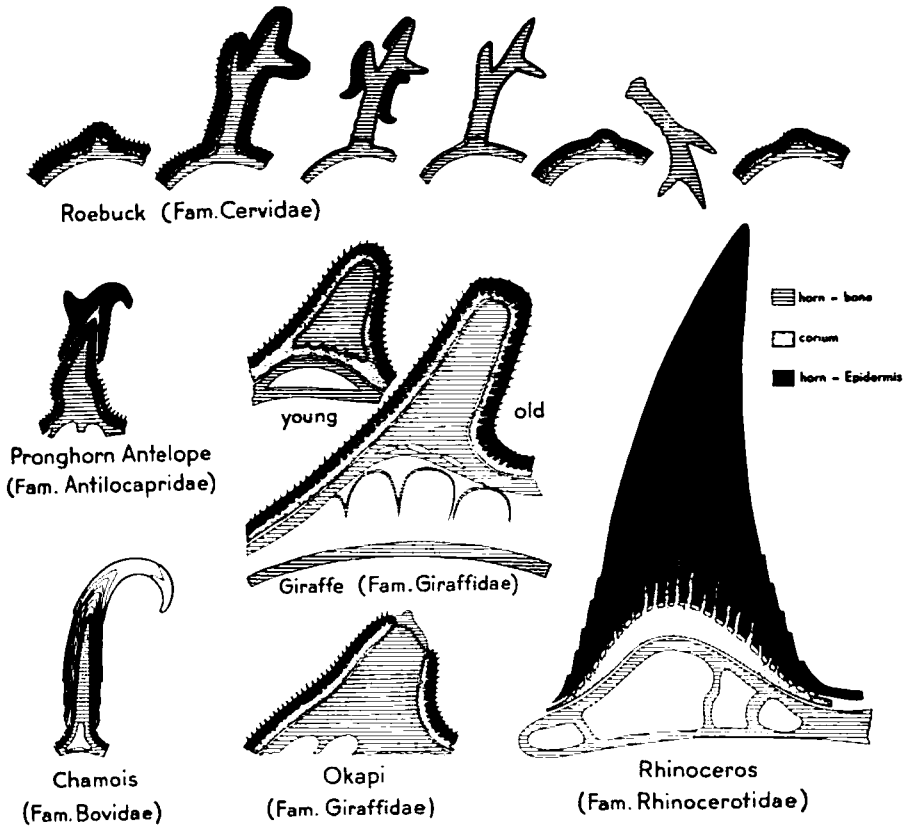


Fig. 8

Cross Section Through Rhinoceros Horn

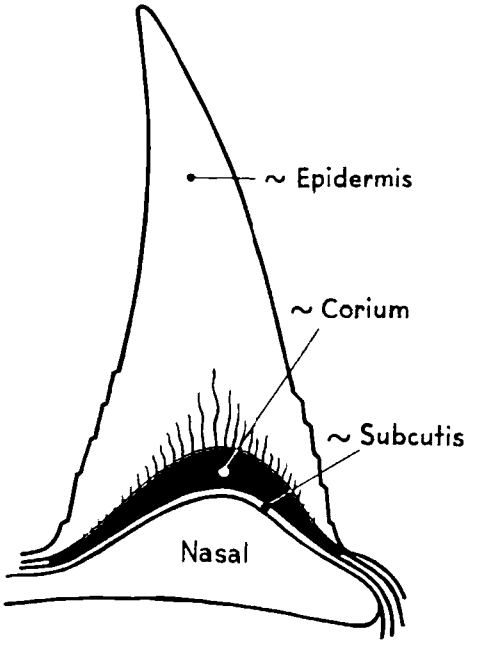


Fig. 9

Conservation Needs of the Orang-Utan

by

MRS. BARBARA HARRISSON
Sarawak Museum, Kuching, Sarawak, Malaysia

SUMMARY

The orang-utan is threatened with extinction within the next decade unless large, absolutely protected reserves are created, illegal traffic in orang-utans is stopped, and more research on the status of the wild orang-utan is carried out.

The Orang-utan *(Pongo pygmaeus* syn. *Simia satyrus)* is threatened with extinction, probably within the next decade (Harrisson, 1961) because of

1. the threat to the animal's habitat, and
2. the drain on the remaining wild populations through the indiscriminate trading of captive babies.

Legislation, publicity and previous resolutions of the IUCN have so far had little effect. The following are suggestions to remedy the situation.

PROTECTED RESERVES

The first suggestion must be to create a safe space – that is, protected reserves – where a good number of wild orang-utans will be permitted to live undisturbed into the future; where no firearms may be carried and where the habitat itself is unexploitable by man. Logging, no doubt, disturbs the animals and puts them under pressure even if fruit trees are left standing (Schaller 1961; Harrisson 1963). Orang-utans subsist on a great variety of vegetable and animal matter which is collected from undisturbed rain forests by extended migrations throughout the seasons.

The main difficulty in planning for an orang-utan reserve is the requirement of a large area. From nest-counts first executed by Schaller (1961) in Sarawak we know that an average 1·5 square miles of forest is required for each individual. Unfortunately also, the animal has been scattered over the past centuries and decades of centuries within Borneo and Sumatra and survives mostly in small groups in widely separated areas. Large rivers – which are not crossed – and mountain ranges over 5000 ft. provide additional barriers.

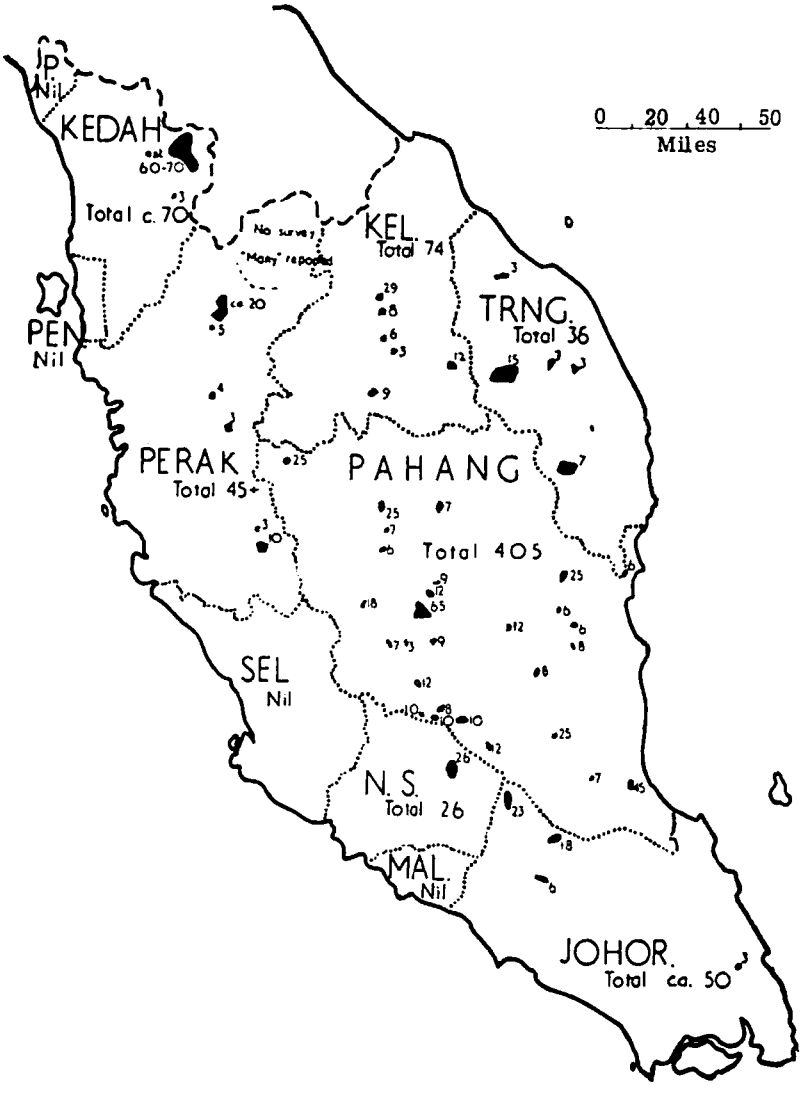
If we look for areas large enough to provide security for an approximate number of between two and three hundred orang-utan in territories which are occupied by him to date, we must look towards Indonesian Sumatra and Malaysian Sabah. This we have done since 1963 when these same issues were discussed by IUCN in Nairobi. The Loeser Reserve of Sumatra is firmly on the map for several years but lacks effective security. The Sabah government was approached in 1963 with a request for help in providing a sanctuary for the orang-utan in largely uninhabited and inaccessible areas in the Ulu Segama of eastern Sabah. In spite of the vast resources of exploitable and accessible timber elsewhere in Sabah and the fact that no population pressures operate in the country or are likely to become operative, the promotion of the proposed reserve has been slow.

ILLEGAL TRADE

Selfish considerations which have blocked the proposed reserve in Sabah have also dominated the illegal collection of babies and their trade abroad. The Malaysian States of Sabah and Sarawak have effectively prevented this trade in their own territories by

Fig. 18

Location and Size of Known Saladang Herds in Malaya



Part 3:

Regional Considerations

Problems of National Parks and Reserves in Indonesia and Emerging Countries

by

MR. HASAN BASJARUDIN
Head, Directorate of Forestry, Bogor, Indonesia

SUMMARY

For some regions in Indonesia the only way to ensure the preservation of both wildlife and wilderness is in a strict nature reserve which is absolutely protected. The author gives reasons why nature reserves should be thus protected and lists the many rare and interesting Indonesian animals and plants that are threatened species. Since 1964 the Directorate of Forestry has embarked on a new program in the field of nature conservation with particular emphasis on the integration of tourism within reserves. It seeks close co-operation with other national and international agencies for the better protection and management of nature reserves and wildlife.

INTRODUCTION

In accordance with the Nature Protection Act of 1941, Government Gazette No. 167, any area can be proclaimed a nature reserve or park in order to conserve wildlife, forests, natural features etc. At this time in Indonesia we have 117 regions in this category (66 in Java, 29 in Sumatra, 14 in Kalimantan and Celebes, and 8 in other islands) totalling 3 million hectares or about $2\frac{1}{2}$ per cent of the total forestland in our country.

Although these reserves are located in different islands throughout Indonesia, this has not insured that our natural resources – animals and plants – are appreciated yet by all the people. According to our experience, the forestlands are shrinking because of the practice of shifting cultivation, and most of the big animals outside the nature reserves are victims of illegal hunters. The reports that many people in Sumatra still catch orang-utans and kill elephants outside the game reserves are deplored. For some regions in Indonesia the only way to ensure the preservation of both wildlife and wilderness is in a strict nature reserve which is absolutely protected.

PRESERVATION OF WILDLIFE IN INDONESIA

The following points should be stressed in trying to focus public attention on the preservation of wildlife in Indonesia and other emerging countries:

1. Flora, fauna, natural features and geological formations should be protected against disturbance and destruction.
2. Biological sciences need to obtain a real picture of a natural forest, soil structure, wildlife etc. which is essential for forestry, agriculture, animal husbandry, etc.
3. Natural areas are useful for the education of the public and particularly for students in biology, geology, ecology, etc.

4. Animals such as wild oxen, deer, barking deer, wild buffalo, pig, and game birds breeding in a game reserve may migrate to a hunting area and thus provide a major source of food.
5. Nature reserves providing for watershed management will prevent erosion and landslides.
6. These areas will invite tourism and recreation since they are usually in picturesque and attractive regions.

We in Indonesia have the good fortune to harbor many important, rare, and interesting species for example:

1. Animals
   (a) Both the Sumatra rhinoceros and Java Rhinoceros (Löser Game Reserve and Udjung Kulon).
   (b) The orang-utan in North Sumatra and Central/West Kalimantan.
   (c) The elephant and tapir in South Sumatra.
   (d) The giant monitor (Komodo dragon) in the islands of Komodo, Padar and Rintjah.
   (e) The bird of paradise and crown pigeon of South Moluccas and West Irian.
   (f) The wild ox and Java tiger in 'Udjung Kulon' Reserve and 'Baluran' Nature Park.
   (g) The dwarf buffalo and hogdeer in North and Central Celebes.
   (h) The white starling of Bali and the black cockatoo (Cacatus) of Coràm.
2. Plants
   (a) The big flowers *Rafflesia* in Sumatra, Kalimantan and Java.
   (b) *Amorphophallus titasum* and *Rauwolfis* species in Sumatra and Java.
   (c) All kinds of orchids s.o. the *Vanda, Dendrobium, Ronanthora* and other species.
   (d) The flora of the lowland forest of Udjung Kulon.

All of the above, both plants and animals, are threatened species and only strict nature reserves, like Udjung Kulon, can act as a sanctuary for the safeguarding of the few remaining individuals.

GOVERNMENTAL ORGANIZATION

In Indonesia the two bodies entrusted by the government with nature conservation are

1. the Directorate of Forestry and its Nature Conservation and Wildlife Management Division and
2. the National Institute for biological research (Botanic Garden).

These two working in co-operation deserve great credit for safeguarding the one-horned rhino in Udjung Kulon. Without their efforts the rhino would probably be extinct.

The Directorate of Forestry with the assistance and close co-operation of other agencies conerned (Police Service, Civil Service, Botanic Garden, Information Service, Customs etc.) tries to accomplish its task in the field of nature conservation by:

1. Disseminating information throughout the country by means of manuals, posters, pictures, pamphlets.
2. Enforcing the existing laws and regulations and punishing any violations.
3. Encouraging conservation education in the schools and for the general public.

With the establishment of the Ministry of Forestry in June 1964, and a forestry conference in December a new policy and work program in the field of nature conservation was drawn up to include the following:

1. The importance of reserves.
2. Management of natural resources.
3. The function of reserves for the public.
4. Integration of reserves with tourism.
5. Nature conservation as a means of our people's revolution.

Starting in 1965 the Directorate of Forestry has been working hard to develop some tourist areas for both native and foreign visitors, within some of the reserves (three in Java, including 'Pangandaran' near Bandung and 'Baluran' in East Java; two in Sumatra, and one each in Bali and Komodo) without injury to the plant and animal life.

NON-GOVERNMENTAL CO-OPERATION

The Directorate keeps in close touch with foreign associations such as the IUCN in Morges and the Pacific Science Association in Hawaii as well as the Naturalist's Society in Bogor.

I take this opportunity to express my gratitude to those agencies and persons, especially the IUCN, Dr. H.J. Coolidge, and Dr. and Mrs. Talbot, who were so kind to arrange my participation in the 8th General Assembly of the IUCN in Nairobi in 1963, during which I had the opportunity to visit many national parks in East Africa.

The many suggestions of the Talbots in late 1964 became a great contribution to the better protection and management of our national parks, nature reserves and wildlife.

Thus, in co-operation with organizations at home and abroad our Directorate seeks to find the best ways of tackling problems, and establishing the basic principles of preservation and the management techniques for our nature parks and equivalent reserves.

ANNEX 1

LIST OF NATURE RESERVES IN INDONESIA

No.	Name of nature reserve	Total area in hectares	Classification[1]	Particulars
1	2	3	4	5
	WEST JAVA			
1	Angke	15	1, 2, 4	birds incl. water-fowl.
2	Artjadomas	2	1, 8	
3	Dungus Iwul	9	1, 4, 8	
4	Gebungan	2	1, 4, 7	
5	Getas	-	1, 8	tree.
6	Gunung Djagat	126	1, 4, 8	
7	Gutji	2	1, 6, 7	mineral spring.
8	High plateau Dieng	85	7, 9	
9	Janlappa	32	1, 4	dipterocarpus.
10	Junghuhn	2·5	8	
11	Karang Bolong	0·5	1, 2	bird nests.
12	Keling	60	1, 7	
13	Koorders monument (Pandjalu)	16	7, 8, 9	
14	Malabar	6	1, 4, 7	
15	Moga	1	1, 7	waterfall.
16	Nusa Kambangan	77	1, 4, 5	*Rafflesia patma, Pisonia sylvestres.*
17	Pagerwunung Darupono	30	1, 4, 9	natural teak forest.
18	Panaitan	17,500	1, 4, 6	wilderness.
19	Panandjung – Pangan-daran	457	2, 4, 5, 7, 9	wild ox, Rafflesia.
20	Papandajan	844	6, 9	crater.
21	Peson Subah	10	1, 4	lowland forest.
22	Pringombo	58	6, 8	
23	Pulau Bokort	18	1, 2, 4	waterfowl.
24	Pulau Dua	8	1, 2	waterfowl, pelicans.
25	Pulau Rambut	20	1, 2, 4	white and black ibis.
26	Rantja Danau	2,500	1, 2, 4	waterfowl, xeriphyl plants.
27	Sekapung	2	6, 7	
28	Sukawajana	32	4, 7, 9	
29	Takokak	50	1, 4	mountain flora.
30	Tangkubanprahu	22	6, 7, 9	
31	Tangkubanprahu (P. Ratu)	33	6, 7	

No.	Name of nature reserve	Total area in hectares	Classification[1]	Particulars
1	2	3	4	5
32	Telagabodas	265	6	
33	Telagapatengan	150	9	
34	Telaga Randjang	-	1, 6, 7	mountain lakes.
35	Telagawarna	23	7, 9	
36	Tjadasmalang	2	1, 4, 7	
37	Tjibanteng	447	1, 2	birds, wild ox.
38	Tjibodas	1,040	1, 4, 5, 6, 7, 9	birds, black leopard.
39	Tjigenteng-Tjipandji	10	1, 4	mountain flora.
40	Tjikepuh	10,000	3	birds, wild ox, sea turtles, deer.
41	Tjimungkat	56	1, 4, 5	birds, owls, hawks.
42	Tjurug Bengkawah	-	1, 7	waterfall.
43	Udjung Kulon	37,500	1, 2, 4, 5, 6, 7	Javan rhino, wild ox, tiger, black leopard, *Pavo muticus*, lowland forest.
44	Ulolanang Ketjubung	71	1, 4	Dipterocarpaceae.
45	Widjaja Kusuma	0·5	1, 4	*Pisonia sylvestres*.
	EAST JAVA			
46	Ardjuno Lalidjiwo	580	1, 2, 4	
47	Baluran	25,000	2, 7	wild ox, wild buffalo, deer, black leopard.
48	Bawean	15	2	Bawean deer.
49	Banjuwangi Selatan	62,000	2, 4, 5	wild ox, deer, sea turtles, wilderness.
50	Besowo Gadungan	7	1, 4, 7	
51	Gua Nglirip	3	6	limestone caves.
52	Gunung Abang	50	1, 4	
53	Gunung Baung	200	1, 4, 7	
54	Gunung Pitjis	22	1, 4, 7	
55	Gunung Sigogar	200	1, 4, 7	Quercus.
56	High plateau Yang	15,000	2	leopard, deer.
57	Kawah Idjen	2,560	1, 4, 6, 7	
58	Laut Pasir Tnegger	5,240	6, 7, 9	caldera.
59	Manggis Gadungan	12	1, 4, 7	
60	Nusa Barung	6,100	1, 2, 4, 5	deer and birds.
61	Pantjur Idjen	9	1, 4	
62	Pulau Sempu	877	1, 2, 4	
63	Ranu Darungan	380	1, 4, 5	

No.	Name of nature reserve	Total area in hectares	Classification[1]	Particulars
1	2	3	4	5
64	Ranu Kumbolo	1,340	1, 7	
65	Ranu Pani Regulo	96	1, 4, 7	
66	Saobi, Kangean	430	2, 5	Megapodius and birds.
67	Sungei Kolbu	9	1, 4	
68	Tjeding	2	1, 6, 7	
	SUMATRA			
69	Baringin Sati	0·1	8	*Ficus benjamina.*
70	Batang Palupuh	3·5	1, 4	*Rafflesia arnoldi.*
71	Batu Gadjah	1	6	
72	Batu Ginurit	1	8	
73	Bengkulu	71	1, 4	*Rafflesia arnoldi.*
74	Berbak	190,000	1, 2, 4	*Dicerorhinus sumatraensis.*
75	Bungamas Kikim	1	1, 8	archaeology.
76	Despatah	0·3	1, 4	*Rafflesia arnoldi.*
77	Dolok Saut	39	4	
78	Dolok Tinggiradja	167	1, 6, 7	
79	Dusun Besar	12	1, 4, 5	*Vanda hookeri*, fowl.
80	Gedung Wani	-	1, 2	elephant, deer.
81	Gua Ulu Tiangko	1	8	prehistory, archaeology.
82	G. Rakata, P. Sertung	2,500	1, 6	
83	Kluet	20,000	2, 4	orang utans.
84	Lau Debuh-debuh	7	1, 6	sulphuric mud.
85	Lembah Anai	211	1, 7	
86	Lembah Harau	298	4, 5, 6, 7, 9	butterflies.
87	Mount Indrapura	125,000	1, 4, 5	mountain goats.
88	Mount Loser	416,000	2, 5	Sumatran rhino, orang-utan, mountain goat, elephant, birds.
89	Mount Wilhelmina (Longkat)	200,000	1, 2	orang-utans, tapir, mountain goat, elephant.
90	Rimbo Panti	3,500	1, 4, 5	
91	Serbojadi	300	1, 2, 4	orang-utans, Rafflesia.
92	Sibolangit	115	1, 4, 7	

No.	Name of nature reserve	Total area in hectares	Classification[1]	Particulars
1	2	3	4	5
93	South Sumatra	356, 000	2, 5	*Dicerorhinus sumatrensis*, wild buffalo, elephant, tapir, gibbon.
94	Tjawang	0·2	1, 4	*Rafflesia arnoldi*.
95	Way Kambas	130, 000	1, 2	*Dicerorhinus sumatrensis*, elephant.
	BORNEO			
96	Kotawaringin	100, 000	2	orang-utan, *Nasalis larvatus*, wild ox.
97	Kutai	306, 000	2	orang-utan, *Nasalis larvatus*.
98	Lo Pat Fun Pi	8	1, 4	
99	Mandor	195	1, 4	*Vanda* sp.
100	Mount Palung	30, 000	2, 7	
101	Padang Luwai	1, 000	1, 4, 7	orchids.
102	Sampit	205, 000	2	orang-utan, *Nasalis larvatus*, wild ox.
	CELEBES			
103	Batimurung	10	2, 5, 6	rhinoceros.
104	Mas Papaja Radja	160	1, 5	turtles.
105	Mount Lokon	100	1, 6	
106	Mount Tangkoko Batuangus	4, 446	1, 2	hogdeer, anoa, *Megacepholon maleo*.
107	Napobalano	9	1, 4, 7	*Cynopitecus niger*, *Anoa depressicronis*.
108	Panua	1, 500	1, 5	*Megacephalon maleo*.
109	Tanggala	123	1, 5, 7	anoa.
	BALI			
110	Bukit Batukahu	1, 600	4, 6, 7	
111	Sangeh	10	1, 4	holy forest, dipterocarpus.
112	West Bali	20, 000	2, 4	Bali tiger, white starling, deer.

No.	Name of nature reserve	Total area in hectares	Classification[1]	Particulars
1	2	3	4	5
	LESSER SUNDA ISLANDS			
113	Komodo Island	30, 000	2, 5	*Varanus komodoensis*, deer.
114	Mt. Rindjani	40, 000	4, 5, 6	Photinia, fowl, mineral spring.
115	Padar-Rintjah Island	16, 500	2, 5	*Varanus komodoensis*, deer.
	MOLUCCAS			
116	Mount Api	80	2	seabirds.
	WEST IRIAN			
117	Mount Lorentz (Trikora)	40, 000	1, 2, 4, 5	birds of paradise, crowned pigeon, Nicobar pigeon, black and white cockatoos.
	Total = ± 3 million hectares			

[1] The numbers in column 4 indicate the classification of each nature reserve:

1 = strict nature reserve
2 = animal sanctuary
3 = game reserve
4 = botanic
5 = zoologic
6 = geologic
7 = aesthetic
8 = historic
9 = recreation.

Brief Notes on Park Development and Public Education in Bako National Park, Sarawak, Malaysia

by

DR. PETER S. ASHTON
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VOLUNTARY ASSISTANCE IN PROVIDING AMENITIES IN BAKO NATIONAL PARK

Considerable labor expenses may be involved in the essential tasks in a national park of providing a well cleared network of paths, of clearing a well-demarcated boundary, and of clearing campsites. At Bako costs were considerably reduced by securing the voluntary support of the local Boy Scouts and also of certain secondary schools. The central campsite having already become established, parties of schoolboys and Scouts came down during their holidays and with great enthusiasm cut the new paths with the assistance of a local guide who had previously staked out the best routes. Bridges and ladders up rock falls and other obstacles had to be made professionally, but the jungle experience gained by the schoolboys and Scouts was a useful addition to their training, and was, in fact, extremely popular.

THE NEW GUIDE TO BAKO NATIONAL PARK

When Bako National Park was originally constituted, a small guidebook was published giving details of the facilities available and a short introduction to the natural history of the area. Recently a more comprehensive guide has been completed, giving the same information on facilities, and also popular but informative articles by authorities in the respective fields of geology, ornithology, botany and other aspects. This serves

(a) to encourage a deeper interest in the unique natural amenities of the park itself by the public in general, and

(b) to provide a basis of knowledge about the park for educational purposes.

One of the main purposes of Sarawak's proposed national parks is to provide the country's school children with outside laboratories where the natural sciences, and particularly biology which is of critical importance in an agricultural country such as Sarawak, can be taught. This familiarity with the importance of national parks from school age onwards will also, of course, lead to an increasing awareness among the educated public of the importance of conservation in general.

Plan for the Conservation of Nature in Vietnam[1]

by

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SUMMARY

Vietnam with its variety of climate, and topography offers great opportunities for the systematist and the ecologist. A list of proposed national parks and reserves in both low and high altitudes is given. The author makes a plea for regional co-operation in establishing parks in order to obtain maximum efficiency.

INTRODUCTION

Owing to its location at the crossroads of several regions and to the variety of its climate and topography, Vietnam offers numerous possibilities to scientists in the study of ecology, flora, and fauna. Consequently, the conservation of nature in this country is of great interest both to the systematist and the ecologist.

Since 1958, thanks to the efforts of IUCN, the public authorities have been interested in and concerned with the safeguarding of natural resources. The study of the principal sites to be protected was undertaken at the request of the government, thanks to the assistance of Dr. Ruhle, National Park Service of the U.S.A., in 1961. The National Conservation Committee was founded in 1965, consisting of representatives from the Ministries of Education, Agriculture, and Public Works. The National Park at Trang-bom, created in 1958, will be put on a continuing basis; the national parks of Bach-Mâ and Hai-Van are awaiting ratification.

It is with this encouraging prospect that we propose today the following suggestions.

CONSERVATION OF ANIMALS THREATENED WITH EXTINCTION

The existing laws are ineffective in protecting some rare animals (rhinoceros, tapir, kouprey and gaur, etc.), and we should also draw attention to the necessity of protecting some habitats used by migratory birds. Among the interesting sites some, such as Iles Paracels, Iles des Pecheurs, and Iles des Deux-Frères, could be easily converted into reserves. Among other sites, those which are in mangrove forests deserve special attention. In fact, exploitation and management of mangrove forests will bring as yet little known but certainly harmful changes to bird life. Therefore, an urgent need is a study of migratory birds, in their habitat, their egg-laying site at present, etc. Vietnam lacks ornithologists. Help from the IUCN would be very useful particularly as the latter might co-ordinate research in several countries at once.

THE CONSERVATION OF FLORA

The ground flora is relatively better known than the fauna although some regions are better explored than others. The preservation of the former, of course, goes together with that of the ecological sites. Protection is absolutely necessary for these areas which serve as type localities for many endemic species, comprising ten to twenty per cent out of a total of about 7,000 species. The regions of Bach-Mâ, Vong-Phu, Hôn-Bà, Dalat, and Châu-dôc can be mentioned.

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[1] Original in French.

The conservation of two important ecological factors, namely climate and water, should be a concern of primary importance, not only for the technically advanced countries, but also for developing ones. In effect, for many countries in the latter category, the ratio of forests to the cultivated areas is already close to the optimum, beneath which there is a great risk of harmful and hardly remediable change of climate. In Vietnam as in most countries of South East Asia prevention of over-exploitation of forests, fire fighting and plans for the decrease of shifting cultivation are insufficient. The alteration of the climate is sometimes perceptible in one generation.

In this connection, we wish to point out that the project for the installation of an oil refinery at Nhatrang is not advisable; the residues of this industry would surely change, not only the hygienic conditions of the best seaside resort in Vietnam, but also the ecological conditions for marine fauna and flora, which are amongst the best known of the China Sea.

PROTECTED SITES

In connection with the sites to be protected, we propose the following:

Regions of Low Altitudes

The regions of low altitudes are those that are adjacent to the populated areas. They are the most threatened and moreover, difficult to protect.

The Con-Son Island (Poulo-Condor) located at the mouth of the Mekong River has a rich vegetation, unspoiled and relatively well explored. Its flora is interesting because it represents the most southern flora conserved in Vietnam.

The Châu-dôc mountains, among which is the Nui-Cam (716 meters), are also interesting. Besides a few endemic and rare species found there, its vegetation gives an idea of the original vegetation of the country. We hope that the Nui-Cam, which is at the moment a forest reserve, could be usefully made into a completely protected reserve.

The Col de Blao and the Cap Varella are already on the list of reserves to be created in the 1961 project submitted to the government. The Col de Blao, uninteresting from the economic point of view, contains a fauna and flora ranging from the plain level to the sub-montane level (1, 000 meters). The Cap Varella represents one of the rare localities where the tropical forest descends to the sea level.

Regions of High Altitude

Besides the region of Bach-Mâ-Hai-Van, already studied and protected and the Langbian region, which is mentioned in the aforesaid project of the Ministry of Agriculture, we wish to draw attention to two other regions:

The Region of Hôn-Bà, south of Nhatrang, reaching its highest point at 366 meters, the flora of which has been well studied.

The Chu-Yan-Sin, the highest point in Vietnam (2, 405 meters), economically is not very interesting but biologically important.

In short the system of reserves and national parks, which we are going to present to our national committee, has been selected so as to obtain a variety from the ecological point of view and to protect the interesting fauna and flora.

THE NEED FOR REGIONAL CO-OPERATION

To be realistic, one must accept the fact that the creation of numerous parks and reserves necessary for the conservation of the flora, fauna and ecological heritage will be difficult in South East Asia for quite a long time.

Therefore, it would be desirable to co-ordinate the efforts of the various states in order to obtain maximum efficiency.

For the very close neighbouring countries where the biotypes are very similar (like the geographical Indochina) it would be useless to create reserves which are ecologically similar, but there is urgent need to establish together a system of diversified

reserves. Therefore, it would be desirable that people responsible for the conservation program of a country are knowledgeable about reserves and parks of neighboring countries in order to create in their own country a complementary system. Later on, when circumstances will allow, every country will, of course, be able to have its own complete system of biological reserves.

Conservation of Limestone Hills in Malaya

by

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SUMMARY

The importance of limestone hills in South East Asia as features worthy of conservation for their contribution to the landscape, study of geomorphology, geology, ecology of plants in specialized habitats and of animals in the peculiar communities of the caves, their major significance in biogeography and archaeology is reviewed. Religious and tourist interests are noted. The heavy pressure to exploit the limestone hills for valuable and/or easily accessible minerals is discussed in relation to the need to co-ordinate conservation and exploitation in a planned manner. The need for appropriate legislation and the efforts of those to obtain it are reported. A special plea is made for Batu Caves.

INTRODUCTION

This account refers mainly to Malaya where limestone (like unmetamorphosed sandstone) is among the rarer of the major formations exposed above the surface. Limestone hills are more common in parts of Burma and Thailand, so that conservation problems are perhaps less pressing there (moreover the author has insufficient experience of these more northern parts of South East Asia). Sabah and Sarawak are somewhat better endowed with limestone hills than the States of Malaya and exploitation is only just beginning in East Malaysia, where dolomite is required as a fertilizer (freight constitutes nearly three quarters of the cost of imports from Malaya) and a need for constructional materials is developing. Therefore similar problems are likely to arise as in Malaya although perhaps more slowly.

LANDSCAPE, GEOMORPHOLOGY AND GEOLOGY

The limestone hills rise precipitously from the valley floors as tower karsts, which either as single pillars or as groups form a very characteristic landscape. These provide valuable scenic relief especially in the Kinta Valley where the landscape has been devastated by hydraulic tin mining. (Molesworth Allen 1961). The geomorphology is imperfectly understood (Paton 1964 and Gobbett 1965) and quarrying may prevent proper assessment. Malayan limestone shows a wide range in chemical composition from calcite (calcium carbonate) to dolomite (the magnesium-calcium salt), the geological age varies and the degree of metamorphosis. Fossils are rare in the metamorphosed rocks adjacent to the granitic intrusions, but occur in the peripheral deposits (Jones 1961). Although paleontologists may welcome some exposures by quarries and mines, they can hardly be reconciled to the total destruction of some of the smaller sites.

ECOLOGICAL HABITATS

The range of habitats is exceedingly wide, both outside on the hill surface and inside in the numerous caves. Limestone is free draining and liable to many forms of erosion, thus the topography is broken, desiccated cliffs and knolls alternate with damp hollows and 'hanging valleys'. Owing to the lack of silica or other residues after limestone has been dissolved in rain water the soil is usually very thin consisting in sheltered places of an accumulation of peaty plant remains subject to severe leaching. The variety of

Forest fires are a serious problem especially in the areas abandoned by shifting cultivators and invaded by tall grass. These are often deliberately set for hunting purposes and aid in destruction of the species. Nothing is done to cope with the problem.

H. There is no program of soil and water conservation.

I. 1. The Departement des Eaux et Forêts is responsible for wildlife.

2. Adequacy of laws etc.:

In theory a hunter must have a hunting permit, but in practice the inhabitants of both lowlands and mountains live mainly by hunting and gathering.

3. During the Buddhist Lent, which coincides with the season for the dropping of young for many mammals, hunting is officially prohibited. Unfortunately, this regulation is frequently ignored.

4. No training provided for wildlife personnel.

5. Nothing is being done about any problem of wildlife control.

6. There are no game reserves.

7. No research at government level; the only research carried on is by members of the Royal Society of Natural Sciences of Laos.

J. Threatened species:

Nil.

K. Pesticides:

Nil.

L. Public education in conservation:

Nil.

M. Training of conservation personnel:

Nil.

1. and 2. There are no training schools or opportunities for advanced training for conservation personnel (but are there even any conservation personnel? 1ch).

3. International experts from the UN or ECAFE could be sent to the Direction de l'Agriculture or the Departement des Eaux et Forêts to point out the problems.

N. Urgent Conservation problems:

The problem of shifting agriculture by mountain inhabitants is certainly a worrisome question. Several solutions could be recommended, or perhaps a compromise between them:

1. Some leguminous species, strong enough to resist invasion of the tall grass, might be planted on abandoned sites to enrich the soil.

2. Reforestation might be attempted with natural species for timber and firewood; orchard species (oranges, tangerines, lemons, tea, coffee, cinnamon); species with essential oils where feasible; and tree plantations (teak, benzoin) when the villages appear to be stable and no longer nomadic.

3. Everything should be done to educate and persuade the village chiefs to induce the villages to settle down, giving them enough room, and taking care not to upset the tribal and clan customs.

Status of Conservation in Malaya

by

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A. General Data:

1. Area: c.50,000 square miles.
2. Population: $7\frac{1}{2}$ million.
3. Economy: Rubber and tin exports.

B. Government Departments and Official Organizations concerned with Conservation:

1. Department of Forestry, Kuala Lumpur; with State Forest Officers in each State.
2. Game Department; Chief Game Warden, Seremban, Negri Sembilan.
3. Department of Fisheries: Director, Kuala Lumpur.
4. Department of Agriculture: Director, Kuala Lumpur.

C. Organizations concerned with research into conservation:

All Departments listed above B have research branches.

D. Private conservation organizations:

Malayan Nature Society (P.O. Box 750, Kuala Lumpur, Malaya, Malaysia) 600 members, general conservation.

E. National Parks and equivalent reserves.

1. The organization responsible for the establishing and maintaining Malaya's National Park (Taman Negara) is the Game Department. The objective of establishing and maintaining of our Taman Negara is principally for the conservation of our country's fauna and flora.
2. Malaya has only one national park (Taman Negara). It was established in 1938, and named the King George V National Park. It is located in the three States of Pahang, Kelantan and Trengganu. The most significant feature of the park is that it contains a good representation of most of the fauna and flora found in our country.
3. Public information is offered in the form of a park brochure. However, not many of these brochures are available to the public due to lack of funds.
4. At present no training is given to park staff due to lack of manpower and funds.
5. At the present moment the Park has a modern 4 roomed rest house, two two-roomed chalets and five two-roomed halting bungalows.
6. The Taman Negara is under the charge of a superintendent who is a game warden. He is responsible for the administration and control of the park. The Superintendent is responsible to the Chief Game Warden who is the Officer in Charge of the Park. At present the emphasis is on recreation, tourism; conservation is sadly lacking due to shortage of manpower.
7. Ninety nine per cent of the Park is kept in its true wilderness.
8. No exploitation, except for fishing which is under license at $5/- (Malayan dollars) per person for a period of 30 days.
9. The protection of the park is, sad to say, ineffective; there is poaching, both for fish and game, and the illegal collection of bamboo and rattan.

10. No exotic introduction.

11. The major problems facing our park are:

    (a) The lack of training for the staff;

    (b) Poaching and illegal collection of bamboo and rattan;

    (c) Over-emphasis on the catering for tourists:

    (d) Lack of personnel, and

    (e) Lack of funds.

12. The Malaysian Government has approved a plan for the spending of (Malayan dollars) $750, 000/- for the development of the park over the next 5 years – 1966 to 1970 - to build more facilities to cater for more tourists. With this development it is hoped that we could get funds to recruit more game rangers for conservation work.

F. Other areas:

The Game Department has two areas in mind which could be created Game Reserves. The area which is situated in Upper Perak along the Perak River has an area of 17, 808 acres. In this comparatively small area are situated 11 salt licks. Wildlife, especially the larger species like elephants, seladang and rusa, is abundant. The second area is in central Pahang in the Tasek (lake) Bera area which covers about 10 square miles. In this area, apart from land animals, there are also wild duck, coots, rails and crakes.

G. Forest conservation:

1. Forest Area: 67 per cent.

2. Forest Reserves: 26 per cent.

3. Types of Forest Reserves:

    (a) Protective.

    (b) Productive.

    Within them are located virgin jungle reserves and other research areas.

4. Training provided for forestry personnel:

    (a) Senior officers: 3-6 months training under the guidance of the officers of the F.R.I., Kepong, to orientate graduates from Forestry Institutions abroad in local forestry.

    (b) Subordinate staff: 11 months elementary forestry training at the Forest School, F.R.I., Kepong. A refresher course catering for the senior grades of staff is being started covering selected subjects only.

5. Illegal clearing for shifting cultivation by the aborigines constitutes a significant forestry problem, although such a practice has also been common among the other races of the country. The main factors involved are difficulty of control and inadequate legislation. A weak policy might also be a factor.

6. Logging carried out by private industry.

7. There is a Forest Research Institute at Kepong. Although not too badly funded, it is inadequately staffed.

8. Reforestation:

    (a) Program carried out by government.

    (b) Generally reforestation is by natural regeneration aided by protection. Where natural regeneration failed or is inadequate, the forest is enriched by planting. Regular plantation is established where the area is decidedly poor but suitable for exotic tropical conifers.

    (c) Selective poisoning is used.

    (d) Averaging over the last four years (1961-64) the area cut annually is of the order of 66, 600 acres and the area reforested is 50, 800 acres. Thus the

area reforested amounted to approximately 76 per cent of the area cut. It should be realized that there is still a considerable amount of back-log brought about by the Japanese occupation of the country and the emergency that followed.

(e) Both native and exotic species are used in reforestation.

(f) Reforestation is quite successful generally. Where reforestation is in high forest by natural means or by enrichment planting it is adequately protected but where regular plantations of conifers especially are concerned, fires are still a serious threat.

9. Forest fires are not generally a problem but they are with regular plantations of conifers. Man is generally the cause and measures are being taken to prevent occurrences, such as constant clearing of fire breaks and the provision of adequate fencing.

H. Soil and Water Conservation:

A number of irrigation projects are in hand, intended to more than double the area of rice cultivation under controlled water supply within a few years. Major hydro-electric schemes are also in operation, under construction and planned. The Federal Land & Development Authority (Jalan Gurney, Kuala Lumpur) are probably concerned in some of this.

I. Conservation of wildlife:

1. The Game Department is responsible for conservation of wildlife.

2. The laws protecting wild life are found in the Wild Animals and Birds Protection Ordinance No. 2 of 1955. The present ordinance is considered to have many 'loop-holes' and requires revision.

3. Enforcement of this Ordinance is inadequate, as the Game Department is facing a serious shortage of staff and trained officers. Public support is also lacking.

4. No training at the present moment.

5. At present staff of the Game Department take action to drive animals away from the cultivation they are destroying as soon as such a case is reported. As a final resort 'leaders' of the herd may be shot and killed to drive the animals away.

6. (a) The CHIOR Game Reserve has an area of 14 square miles. It is situated north of Sungei Siput, north of Perak.

(b) The Taman Negara has an area of 1677 square miles. In addition to being a game reserve, it is also Malaya's only National Park. The object of this Park is for the conservation of the fauna and flora indigenous to this country.

(c) The Sungkai Game Reserve has an area of 15 square miles. It is situated southeast of Bidor, Perak.

(d) The Krau Game Reserve is situated east of Raub, Pahang. It has an area of 252 square miles. In this Game Reserve are many Elephants and Seladang.

(e) Sungei Dusun Game Reserve has an area of 10,700 acres. It is situated southwest of Tanjong Malim, Perak.

(f) Bukit Batu Game Reserve has an area of $7\frac{1}{2}$ square miles. East of Kuala Kubu Bahru, Selangor.

(g) Gold Course Kuala Lumpur Reserve.

(h) Port Dickson Island Bird Sanctuary is situated on Pulau Burong (2 roods), Pulau Babi (1 rood) and Pulau Perjudi ($1\frac{1}{2}$ rood). They are situated to the southwest of Port Dickson.

(i) Segamat Wild Life Sanctuary (146 square miles) and Endau-Kluang Wild Life Reserve (401 square miles). Both these reserves are situated on the northern border of Johore and Pahang.

(j) Endau-Kota Tinggi Wild Life Reserve (878 square miles) is situated north of Kota Tinggi, Johore.

(k) Kuala Pahang Bird Sanctuary has an area of 5 square miles situated to the east of Pekan, Pahang.

Note: The objectives of a c d f i j are for the conservation of wildlife. As for b above in addition it also serves as a place of recreation for tourists. g h and k are chiefly for the conservation of Birds. Finally, e the Sungei Dusun Game Reserves were created for the conservation of the Rhinoceros found there.

7. Wildlife Research:

(a) Research projects are being carried out.

(b) No research division in government body responsible for wildlife.

(c) In addition to the rhinoceros, research on the elephants *(Elephas maximus)*, gaur or seladang *(Bos gaurus)* and sambur deer *(Cervus unicolor)* are deemed most urgent.

J. Threatened species of animals and plants;

1. Javan and Sumatran Rhinoceros *(Rhinoceros sondaicus)* and *(Didermocerus sumatrensis)*. Both species are believed by both the Malays and Chinese to be a 'miracle animal' and that all parts of the animals have some medicinal value to cure all kinds of illness. It is believed that scrapings of the rhinoceros horns made into a brew and taken will cure cancer and other diseases! An ounce of rhinoceros horn would fetch anything up to $350.00 (Malaysian dollars), dried rhino blood could be sold at $45.00 an ounce and even its dung is readily bought by Chinese practitioners.

The gaur or seladang *(Bos gaurus)* is poached for its meat.

2. In the opinion of responsible officers of the Game Department, if no action is taken now the rhinoceros will disappear altogether from our country in 5 years time. The gaur or seladang can last a little longer – perhaps ten years time.

3. Measures to prevent extermination:

The creation of more game reserves in areas where these animals are found. A stricter law, for the maximum penalty under the present Ordinance is 6 months imprisonment and/or a fine of $1,000/- for killing a totally protected animal which includes the rhinoceros, is insufficient to act as a deterrent. And finally the recruitment of more officers and Game Rangers to enforce the law.

K. Pesticides:

1. Liberally used. Sodium arsenite widely used as herbicide, in plant control in both forestry and plantation. We have no knowledge of the extent of the use of other poisons.

2. Not answered.

3. Such poisons can hardly be other than dangerous.

4. We believe research is being carried out on pesticides. Refer to Rubber Research Institute, P.O. Box 150, Kuala Lumpur, in addition to organizations listed under (B).

L. Public education on Conservation:

1-4. Generally there are no programs in conservation education; refer to Education Department.

5. Private bodies: See (D) above.

6. Little by little, success is being made in educating the public.

7. No texts as such are available.

M. Training of conservation personnel:

1. Training schools:

   (a) There are training schools for forestry personnel. (see G, 4 above).

   (b) None for wildlife management.

   (c) None in national park management.

   (d) None in other aspects of conservation.

2. No opportunity for advanced training in above subjects (as such).

3. Dr. Lee Talbot was here recently: his report has not yet been published.

4. For training we believe that it would be preferable to send local staff abroad to established institutes, rather than to bring in 'international experts' unacquainted with local conditions, without special sponsoring from the Government, but see N 1, and N 2 below.

N. Urgent conservation problems:

We give below comments of:

1. An officer of the Game Department

   'In my opinion the most urgent conservation problems facing my country today are listed as follows:

   (a) the lack of staff of the Game Department;

   (b) no facilities and trained staff to do research work:

   (c) no facilities to train the staff of the Game Department:

   (d) lack of public support.

   To approach the above problems particularly on a b c above, high officials of the Government should be made to see and understand the importance of the conservation of wild life to this country and the world at large by local individuals /organizations and international organizations like the IUCN and others. Once the high officials of the Government see the point and give us their support I feel sure the problem will solve itself. As for d above, once problems a b and c are solved then we could start on the 'education' of the public by running civic courses and lectures at schools, etc.

   Presently international organizations could help immensely by sending us experts to help us in doing research work and the training of our officers overseas'.

2. An authorized spokesman of the Department of Forestry –

   'Beside what has been indicated under G4 above, at present there is no other forestry training available in the country. Professional training has always been obtained from abroad. What are needed are training facilities for the intermediate and higher level in the form of a college and the establishment of a School of Forestry or a Faculty of Forestry within the existing University of Malaya. International assistance could help in the establishment of the faculty in the form of personnel for the teaching staff whilst in the case of the college, since it is going to be a completely new institution, both funds and personnel would be required. The possibility of a joint training at the existing College of Agriculture with the assistance of the Forest Research Institute might be investigated'.

   In our opinion, public education is of crucial importance. Since this task has not been taken over by the Education Department, it falls on private bodies (D, above). Funds to support current conservation programs of the Malayan Nature Society would be extremely useful.

Acknowledgments:

In preparing our reply we have drawn fully on letters from the State Forest Officer, Negri Sembilan and Malacca, on behalf of the Chief Conservator of Forests, and from Mr. Bernard Thong, for the Chief Game Warden, States of Malaya. We gratefully acknowledge the help of these gentlemen.

ANNEX 2

Common Pesticides Used in Philippine Agriculture and Public Health Programs

I. Insecticides:

A. Chlorinated Hydrocarbons:

1. DDT
2. BHC (Lindane or gamma isomer)
3. Dieldrin
4. Aldrin
5. Endrin
6. Chlordane
7. Heptachlor
8. Methoxyclor

B. Organo-phosphates:

1. Methyl parathion
2. EPW
3. Malathion
4. Diazinon
5. Dimethioate
6. Dipterex
7. Lebaycid
8. Phosphamidon

C. Carbamate:

1. Sevin

II. Fungicides:

1. Zineb
2. Maneb
3. Captan
4. Copper (various forms)
5. Burdo mixture
6. Ferbam
7. Anti-biotics (Blasticidin, Agrimycin)
8. Mercurials

III. Herbicides

1. 2, 4-D
2. MCPA
3. Karmex
4. 2, 4, 5-T

IV. Rodenticides:

1. Sodium Fluoroacetate or '1080'
2. Fluoroacetamide or '1081'
3. White arsenic
4. Warfarin
5. HCN dust fumigant

V. Molluscide:

1. Metaldehyde

Conservation in Sabah, Malaysia

by

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A. General Data:

1. Area: 29,388 square miles
2. Population: 454,421 (1960 Census)
3. Economy: mainly dependent on export of timber and agricultural products.

B. Government departments and official organizations concerned with conservation:

1. Forest Department (P.O. Box 311, Sandakan, Sabah) – Management and control of forest exploitation, and conservation of wild life.
2. Sabah National Park Board of Trustees: (c/o Conservator of Forests, P.O. Box 311, Sandakan, Sabah) – control and management of National Parks.

C. Organizations concerned with research into conservation:

1. Research Branch of the Forest Department, Sabah.
2. Sabah Museum.
3. Research Branch of the Agriculture Department.
4. Sabah Society, P.O. Box 547, Jesselton.

D. Private conservation organizations:

None.

E. National Parks:

1. Sabah National Park Board of Trustees established by National Park Ordinance, No. 5 of 1962, for the purposes of controlling and managing the national parks. The Board of Trustees shall –
   (a) be a body corporate to be known by the name of 'The Sabah National Parks Trustees', with perpetual succession and a common seal;
   (b) in its corporate name, be capable of suing and being sued;
   (c) be capable of holding, purchasing or otherwise acquiring for the purposes of a national park any movable property, and of alienating such property;
   (d) be capable, with the approval of the State Secretary, of holding, purchasing or otherwise acquiring for the purposes of a national park any immovable property and, with such approval, of alienating any such property; and
   (e) exercise the powers and perform the duties conferred upon it by this Ordinance.
   (f) The duty and function of the Board is to control, manage and maintain national parks and, where they consider it desirable so to do, to purchase any property for such purposes. The main objective is to preserve vegetation and wild life of places of interest.
2. List of National Parks:

   The one park, so far, is Kinabalu National Park comprised of 275 square miles, constituted on May 16, 1963, lies about 35 miles east of Jesselton the capital of Sabah, Malaysia, and surrounds Mount Kinabalu (13,455 ft.) which is the highest mountain in South East Asia. It forms part of the Crocker Range, a belt of mountainous country bordering the South China Sea.

3. Information leaflets about the Kinabalu National Park are available; effectiveness is not yet assessed.

4. No training of park persons at present. Enquiries have been made of the possibility of training park personnel in the African College of Wild Life Management. Enquiries were also made from the University of London Conservation Course. The latter requires high academic qualifications which the present personnel do not possess. The former proved to be mainly for game management with nothing or little of the management of national parks. Australia, New Zealand and U.S.A. are other possibilities.

5. Facilities are provided for visitors by prior arrangement with the Park Warden. At Park Headquarters there is at present accommodation for 20 persons; en route to the summit of the mountain there are four climbers' huts spaced at approximately $2\frac{1}{2}$-3 hours walking distance apart. See Annex 1.

6. The park is managed with multiple emphasis – preservation of scenic value, vegetation and wild life, and tourism. It is managed by a Board of Trustees and Park personnel.

7. Consistent with the objects of management, the park is generally kept as true wilderness.

8. Exploitation or commercial activity is prohibited.

9. The protection of park areas is effective. There are a very few old settlements established within the park area prior to reservation: it is proposed to excise these areas where possible or to resettle the inhabitants elsewhere. There are no illegal settlements within the Park: some poaching is believed to take place around the perimeter while visitors do sometimes remove vegetation, especially orchids.

10. Exotic plants and animals are not being introduced. But, with the specific permission of the Park Warden ornamental plants, shrubs and trees may be introduced around staff quarters and buildings situated on the perimeter of the park.

11. The major problems facing the national park are training of personnel (see 4 above) and lack of funds. National park funds come from annual Government grants, voluntary contributions and gifts or bequests of money. Funding of this nature is uncertain.

12. Other Comments: None.

F. Other areas immediately proposed as National Parks:

1. Pulau Gaya – presently a forest reserve (Domestic reserve). An island comprising 3,150 acres, and located opposite Jesselton is proposed as a national park because of its scenic value, beautiful beaches, wealth of marine life and coral reefs lying in crystal clear water.

2. Bukit Padang (old reservoir area), Jesselton. About 150 acres – protection of *Nepenthes;* recreational area.

3. Leila Forest Reserve, Sandakan. About 730 acres. Protection of flora and recreational area.

G. Forest Conservation: (as of end of 1964).

1. 23,350 sq. miles out of 29,388 square miles = 80 per cent is under forest.

2. Forest Reserves constitute 9,885 square miles – 33·6 per cent notified and proposed 11,560 = 39·3 per cent.

3. Objectives of Forest Reserves

Class I - Protection Reserves, maintenance of forests essential on climatic or physical grounds = 976·85 square miles

" II - Commercial forests for supply of timber and other produce to meet the general demands of trade = 8,402·94 square miles

carried forward 9,379·79 square miles

		brought forward	9,379·79 square miles
Class III	-	Domestic forests, for the supply of timber and other produce for local consumption =	74·65 square miles
" IV	-	Amenity forests for local amenity or arboretum work =	119·81 square miles
" V	-	Mangrove forests	320·16 square miles
			9,884·56 square miles

4. Forestry training:

   (a) A 3 months introductory course on general and elementary forestry practice at Sandakan Forest School. New recruits after serving 3-6 months, are trained in this school.

   (b) A 9 months course at the Kepong Forest School, Malaya, to train and qualify foresters for promotion to forest ranger.

   (c) Overseas training at Rangers' School Coimbatore, South India, for staff in the intermediate cadres whose educational qualifications are inadequate to admit them for entry to an Australian or English University.

   (d) Overseas training under the Colombo Plan leading to a B.Sc. degree in Australia for officers in the intermediate cadres who have higher qualifications such as Overseas School Certificate or a Philippine B.Sc. (Forestry) degree.

5. Excepting 'shifting cultivation' practiced by natives on the West Coast, Interior and along the Kinabatangan, and illegal logging on a small scale on areas near rivers; illegal clearing and illegal logging are not problems. Shifting cultivation occurs mainly in secondary forest but a small amount of virgin forest is destroyed each year. Government settlement schemes are now helping to solve this problem. Illegal logging is encouraged by the high price paid for export logs. It increases when prices are high and diminishes when prices are low. Illegal logging is confined to State land and when rampant it is difficult to control because of lack of staff. Most of the field staff are engaged in looking after logging and silvicultural operations in the Permanent Forest Estate (Forest Reserves).

6. Logging is carried out entirely by private firms.

7. Research is carried out with a Forest Botanist, Ecologist, Plantations Officer and a Wood Technology Section. They are reasonably well funded but inadequately staffed.

8. Reforestation:

   (a) Where the indigenous forest is logged within forest reserves the forest is regenerated using natural seedlings. The treatment is undertaken by the Forest Department using the tropical uniform system, that is by poisoning the relics left after logging and all the non-commercial and defective commercial trees over 6 inch diameter so as to allow the uninhibited growth of existing commercial seedlings and saplings.

   (b) Reafforestation proper is mainly limited to trials and small scale plantations of exotics on degraded grasslands on the East Coast of Sabah.

   (c) Selective poisoning: see (a) above.

   (d) We aim to regenerate all the logged over areas within the Permanent Estate as and when they are logged, but in some years we have not quite kept up with logging due to lack of labor. In 1963, 33,000 acres were treated and in 1964 the area treated amounted to 21,500 acres. Reafforestation (plantations) at present amounts to twenty or thirty acres per annum but will increase in the next five years to about 300 acres per annum.

   (e) Indigenous species in the indigenous forests: mainly exotics (pines and Araucaria) in the reafforestation areas.

   (f) The indigenous forests are free from damage; the trial plantations are subject to occasional small fires.

9. Forest fires are no problem at present.

H. Soil and water Conservation:

1. Soil and water conservation is not a serious problem at present. There is close liaison between the Agriculture, Lands & Surveys and Forest Departments. Areas too steep for agriculture and cultivation are constituted Forest Reserves and wholly protected. Water Catchment Areas are also put under Forest Reserve.

2. Forest, Agriculture and Lands & Surveys Departments are concerned with such problems. Proposals for Forest Reservation are agreed on by these Government Departments.

3. Forest Reservation is legally covered by the Forests Ordinance, 1954. Forest Reservation provisions are adequate and strict enough.

4. Existing Projects:

Paragraph G. 3 refers. Class I Reserves are mainly reserves to conserve soil and water.

I. Conservation of Wild Life:

1. Game Branch of the Forest Department is the responsible authority.

2. The Fauna Conservation Ordinance (No. 11 of 1963) is adequate.

3. There is at present inadequate enforcement of the law due to lack of staff. Recruitment is slow due to lack of suitable candidates.

4. Practical training only for wildlife personnel; there is no academic training as yet.

5. Crop raiding elephants are a serious problem especially with the recent expansion in agricultural development near Sandakan, Lahad Datu and Mostyn. Attempts to scare them away with firecrackers are not very successful and often the leader has to be shot. The Staff is at present inadequate to deal with this problem.

6. Game Reserves:

(a) Kota Belud Sanctuary: Approximately 50 square miles in extent. Covers marshland, paddy fields, coconut plantations, village and hills between the Tempasok and Pandasan rivers near Kota Belud. To protect migratory birds during the season.

(b) Mantanani Sanctuary: Comprising Mantanani Besar and Lungisan Islands.

Two small islands in Kota Belud District.

To protect Frigate birds, Megapodes and Pied

Imperial Pigeons.

(c) Labuan Sanctuary: Comprises area round the Labuan War Cemetery, Hospital and old Government House.

To attract and protect birds round this area.

Records scanty.

(d) Sipidan Sanctuary: Sipidan Island, Semporna District. Covers an area of 7·68 acres. Turtle eggs are collected on this island by natives. It was constituted a Sanctuary in 1932. (original records lost during World War II).

It is the haunt and breeding place of four species of pigeon.

(e) Bohaydulang Sanctuary: In Semporna District, and covers an area of 76·80 acres. Constituted a Sanctuary in 1937. There is now a cultured pearl industry and a police post on the island.

To protect the Megapode.

7. (a) (b) and (c) No wildlife research projects as such as yet; it is hoped to carry out research on the ecology, breeding and feeding habits of rhinoceros, dugong, orang-utan, hawksbill and green turtle, but the Game Branch of the Forest Department is an executive body and is not equipped to undertake research at present.

J. Threatened Species.

1. (a) Wild Animals:

Rhinoceros – Killing the animals for their alleged therapeutic properties.

Orang-utan – Hunting and capture of young animals for export to collectors for Zoos.

Dugong – Killed for food.

(b) Plants:

Palms: *Orania* near Kudat, shifting cultivation and land alienation. *Corypha* near Kudat and Bandau being killed by Agricultural Department because it is considered as a host for insect pests in coconut. Some lowland Dipterocarps, such as *Shorea gratissima* which only occurs at sea level. Land alienation taking up their habitats. On Kinabalu some rare endemics suffer from souvenir hunting tourists e.g. *Potentilla leuconota*.

2. Rhinoceros probably extinct very soon. Expert investigation of the status of this species is urgently required. Orang-utan – Local opinion is that there are many more orang-utan than outside authorities believe. More stricter patrols, propaganda and rehabilitation of confiscated animals may save this species.

3. Measures to prevent extermination:

More lowland research and virgin jungle reserves are needed as well as sanctuaries for the threatened species. It is feared that the rhinoceros population has been reduced to such a level that the species can no longer maintain itself.

K. Pesticides:

1. Pesticides against insects are not used in forestry and are only used on a very small scale in agriculture in Sabah. Arboricides are extensively used for eliminating weeds in agricultural estates and also in poisoning the unwanted commercial trees in forest operations. The effect of using sodium arsenite on the flora in lowland dipterocarp forest has not been evaluated; but since undergrowth below 6 inches diameter is in the main not poisoned this threat is not considered to be very serious. No wildlife has been reported killed by sodium arsenite in the forest.

2. The Subsidiary Legislation to Poison (Agricultural and Industrial) Ordinance, Cap 99 – The Poisons (Sodium Arsenite Regulations) 1953 provides regulation for the importation, sale, storage and use of sodium arsenite.

3. Effects on wildlife:

See (1) above.

4. No research regarding pesticides is being carried out as yet.

L. Public education on conservation:

No problem at present, apart from some pamphlets on the flora and fauna of Kinabalu National Park. Some useful work in publicizing conservation problems is done by the Sabah Society which produces a quarterly journal.

M. Training of Conservation Personnel:

1. There are facilities for training in forest management but none in any other aspects of wild life conservation.

2. No opportunity for advanced training.

3. and 4. See N below.

N. Urgent Problems:

The most urgent problem is to obtain and train sufficient staff to deal with the present day to day conservation duties of the Game and Forest Department. Thereafter to undertake research into the status of threatened species and to disseminate among the public a real appreciation of the principal needs and vital importance of the proper conservation of Sabah's wild life and natural resources.

International assistance is needed to supply the necessary training facilities and to loan an experienced zoologist to initiate research projects.

I gratefully acknowledge the assistance given by Messrs. A.J.T. Bayles, V.M. Corpuz, W. Meijer and G.S. de Silva of the Forest Department and Mr. P. Thomas of the Department of Agriculture in the preparation of this paper which answers briefly a questionnaire from the UNESCO Regional Working Group.

ANNEX I

Details of Accommodations at Mt. Kinabalu

1. Park Headquarters, Simpang Kinabalu, Semi-permanent structure situated near the Kambarangan Road junction at the 35th M.S. Ranau Road. Communal dining room/lounge, kitchen, bathrooms and pit latrines. Two dormitory type rooms each with 5 double tiered beds (10 persons); water supply, tables, stools, oil lamps, oil cooking stoves; a limited number of sleeping bags, blankets and sheets for hire. Caretaker i/c.
2. Climber's Huts (En route to summit; all prefab. Aluminium with plank floors and glass louvre windows)
   (a) Layang[2] (elevation approx. 8,700 feet)

   Double Hut; each half comprising sleeping accommodation $12\frac{1}{2}$ by 10 feet with subsidiary kitchen room $7\frac{1}{2}$ by 5 feet and supplied with mirror, oil lamps, tier-bunk beds (8), table and stools, oil cooking stove (2 burners), cooking pots, fry pan, basins, buckets, some cutlery, crockery, mugs, dustbin etc.

   (b) Panar Labah – Huts Nos. 1 and 2 – (Elevation approx. 11,000 feet).

   Each comprising sleeping accommodation 15 by 10 feet with subsidiary kitchen room 10 by 5 feet. Similar to the Layang[2] Hut.

   (c) Sayat[2] (Elevation approx. 12,500 feet).

   Comprising sleeping accommodation 10 by 10 feet with subsidiary kitchen room 5 by 5 feet furnished in a similar manner to the Layang[2] Hut but with only 4 tier-bunk beds.
3. An unfurnished prefab 'Altent' structure with plank floor together with other temporary buildings at ex-Royal Society Base Camp, at Mesilau. (Opposite to Kundasang about 2 miles walk in).

   Sleeping bags with detachable inner cotton sheet linings and blankets may be hired from Park H.Q. Flysheets and camp beds are also usually available for hire. There is a small charge for the use of the huts. All applications for accommodation should be addressed to the Park Warden, c/o Forest Office, Jesselton (Phone 2234).

Conservation in the State of Sarawak, Malaysia

by

DR. J.A.R. ANDERSON
Office of Conservator of Forests, Kuching, Sarawak, Malaysia

A. General Data:

1. Area of Sarawak: 48,342 square miles
2. Population: 744,529 (1960) 2·5 per cent increase per year 1947-60.

Principal racial groups	Population	Percentage of total population
Iban	237,741	31·9
Chinese	229,154	30·8
Malay	129,300	17·4
Land Dayak	57,619	7·7
Melanau	44,661	6·0
Other indigenous	37,931	5·1
Other Non-indigenous (Asian)	6,492	0·9
European	1,631	0·2
	744,529	100·0

3. Economy: largely dependent on primary products of which the most important are rubber, timber, pepper and sago.

B. Government departments and official organizations concerned with conservation:

1. Ministry of Agriculture and Forestry, (Kuching, Sarawak, Malaysia) has the overall responsibility for agricultural, forestry and conservation policy within the state.

2. Forest Department, (Kuching. Sarawak, Malaysia) is largely responsible for the implementation of the Wild Life Protection Ordinance and the National Parks Ordinance. Senior forest officers are appointed as game wardens and wardens of national parks. The Conservator of Forests is the appointed Chief Game Warden and until recently was the ex-officio Chairman, Board of Trustees, National Parks.

3. Board of Trustees, National Parks, (c/o Ministry of Agriculture and Forestry, Kuching, Sarawak, Malaysia) is responsible for control, management and maintenance of the national parks. The Board is at present being reconstituted.

4. Sarawak Museum (Kuching, Sarawak, Malaysia). The Curator, Sarawak Museum, takes an active interest in all conservation matters. He is a Game Warden and a member of the Board of Trustees, National Parks, and is also executive officer of the Turtles Board.

5. Turtles Board, (c/o Ministry of Agriculture and Forestry, Kuching, Sarawak, Malaysia) has the responsibility to control and operate the turtle industry in accordance with the Turtle Trust Ordinance.

C. Organizations concerned with research into conservation:

See B above.

D. Private conservation organizations:

Nil.

E. National Parks:

1. Board of Trustees, National Parks. The authority of the Board is laid down in the National Parks Ordinance. The Board makes recommendations to the Minister, Agriculture and Forestry, regarding the constitution of new parks. The constitution of new parks requires the approval of the Governor in Council. An objective of the recent Board of Trustees was to constitute a series of national parks which will include areas of all the principal primary vegetation communities that occur in Sarawak.

2. One national park (Bako National Park) has been constituted. Proposals to constitute a further nine parks have received the approval in principle of the Minister, Agriculture and Forestry, and constitution on some of these parks is proceeding. A list of all parks, constituted and proposed is attached as Annex 1.

3. No public information or interpretive services.

4. Training of park rangers is undertaken in Sarawak.

5. In the Bako National Park a bungalow and hostel are provided for visitors, and a second small bungalow reserved for visiting scientists. Similar facilities are proposed for some of the new parks.

6. Each park will be managed by a Park Warden (a forest officer appointed by the Minister, Agriculture and Forestry), and by a Board of Management, appointed by the Board of Trustees, National Parks. The principal emphasis is to preserve areas of primary vegetation and associated wild life and to provide recreational facilities in natural surroundings for the peoples of Sarawak.

7. The Bako National Park is, and the proposed parks will be, composed of areas of almost entirely primary vegetation, except in small localities where facilities are provided for visitors.

8. No commercial activity is permitted in parks, though rights for the removal of small amounts of forest produce from limited localities may be allowed.

9. Protection of the Bako National Park is entirely effective.

10. No exotic plants or animals are introduced.

11. Sarawak is in an early state of development as regards the constitution of national parks and the major problem is to persuade the people of the State of the need for conservation and for national parks.

No other comments.

F. Other Areas:

All areas for proposed parks are included in Annex I.

G. Forest Conservation:

1. Approximately 70 per cent of total land is under forest.

2. 24 per cent is forest reserve.

3. The objective of the forest reserves is primarily for productive forest.

4. Senior staff university training abroad leading to a degree in Forestry; junior staff training courses held in Sarawak.

5. Little problem of illegal clearing or logging at present though owing to pressure on the land it is likely to increase in the future.

6. Logging is carried out by private industry under license.

7. Forest Research Branch comprises three senior officers. Estimates for next five years have recently been approved under the Malaysian Development Program 1966-1970 and these should prove adequate. No additional staff required at present.

8. Reforestation:

   (a) Carried out by Forest Department staff.

   (b) By natural regeneration assisted by silvicultural treatment.

   (c) Not answered.

   (d) Silvicultural treatment at present is only undertaken in peat swamp forest approximately 80 per cent of the exploited permanent forest estate in this forest type is treated annually. There is little working at present in the permanent forest estate in the hills.

   (e) Native trees are used in reforestation. Exotics (principally pines) are being tried on a purely experimental scale.

   (f) A complete covering of trees will follow on any land that is logged whether silvicultural treatment is undertaken or not. The land is adequately protected.

9. Forest fires no problem.

H. Soil and Water Conservation:

With a relatively small population in Sarawak soil and water conservation has not been a major problem in the past. Some work is at present being done by the Agriculture Department and the Irrigation Branch of the Public Works Department. Erosion in areas under shifting cultivation can be severe.

I. Conservation of Wild Life:

1. Organizations responsible:

   (a) Forest Department

   (b) Sarawak Museum

   There is no Game Department in Sarawak.

2. Protection of wild life is covered by the Wild Life Protection Ordinance (1958).

3. The law is not adequately enforced, mainly because most of the native races are living in relatively inaccessible areas where it is difficult or virtually impossible to control illicit killing of protected animals.

4. No specialized training in wild life protection is given.

5. No problem of wildlife control.

6. Provision is included in the Wild Life Protection Ordinance for the constitution of Wild Life Sanctuaries, but in fact no such sanctuaries have been constituted.

7. (a) Sarawak Museum is undertaking research projects on wild life, particularly on the orang-utan and other arboreal mammals. The ecology of bird life in primary forest is also being studied.

   (b) No research division in the government is responsible for wildlife.

   (c) Preliminary surveys should be undertaken in all proposed national parks, particularly the Gunong Mulu National Park, to determine the wild life population and its density.

J. Threatened Species of Animals and Plants:

1. (a) All the following animals and birds are protected by law:

Long-nosed monkey *(Nasalis larvatus)*	No immediate danger
Orang-utan *(Simia satyrus)*	Position desperate, work being undertaken.
Rhinoceros *(Rhinoceros sumatrensis)*	Virtually extinct

Reef egret *(Egretta sacra)*	No immediate danger
Cattle egret *(Bubulcus coromandus)*	" " "
Storm's stork *(Ciconia stormi)*	Rare, but little information.
Lesser adjutant stork *(Leptoptilos javanicus)*	" " " "
White-bellied sea eagle *(Haliaetus Leucogaster)*	No immediate danger
Gray-headed fishing eagle *(Ichthyophaga ichthyaetus)*	" " "
Black-naped tern *(Sterna sumatrana)*	" " "
Brown-winged tern *(Sterna anaetheta)*	" " "
Pied imperial pigeon *(Ducula bicolor)*	" " "
Green turtle *(Chelonia mydas)*	An international problem
Hawksbill turtle *(Eretmochalys imbricita)*	" " "
Leatherback turtle *(Dermochelys coriacea)*	" " "

(b) The following animals are not yet protected but nevertheless are threatened:

Dugong *(Sirenia)*	Very rare on Sarawak coast, little information.
Wild ox *(Bos sondaicus)*	Very few herds are now in existence, pressure of population is destroying their natural habitat.
Niah cave gecko *(Cyrodactylus)*	Localized distribution confined to Niah limestone caves.
Cave earwigs *(Arixania esah)*	" " "

(c) The principal plants that are threatened with extinction occur on limestone hills. Many of these plants are endemic to particular hills. In addition certain orchids have a very localized distribution and are much sought after by collectors. Further information is required on both groups of plants.

2. See notes after each species listed above – length of time threatened species is expected to survive.

3. Measures to prevent extermination:

(a) The problem is complex and varies with the different species. Legal protection by itself is quite inadequate if this protection cannot be enforced. It is considered that the constitution of a series of national parks, adequately patrolled, is likely to give protection to some of the threatened animals and birds on the above list and also to many species (such as the leaf monkeys, gibbons, lemurs, pheasants, and hornbills) which though not immediately threatened are likely to be so in the future. The establishment of these parks, and in particular the Gunong Mulu National Park should have priority in the overall scheme of conservation.

(b) In certain cases, for instance that of the terns and storks, further measures should be taken to adequately protect the breeding grounds of birds.

(c) The conservation of turtles and dugong (and dolphins) is a problem that can only be solved by international co-operation, and measures should be taken by international bodies interested in conservation.

(d) The plight of the orang-utan is desperate and immediate measures in Borneo and Sumatra should be taken to ensure the survival of this species. Work is being undertaken now and Mrs. Barbara Harrisson will report on proposals for conservation.

K. Pesticides

Pesticides are at present little problem in Sarawak. Sodium arsenate is used in silvicultural treatment by the Forest Department but its use is not considered to be dangerous to wildlife as it is only applied in peat swamp forest.

L. Public education or conservation:

1. Preliminary programs have been started.
2. Programs carried out by co-operation between the Sarawak Museum and Radio Malaysia, Sarawak.
3. A course on natural history, including conservation, is being prepared by the Schools' Broadcasting Section of Radio Malaysia, Sarawak, in co-operation with the Sarawak Museum.
4. See 3 above.
5. No private bodies interested in conservation.
6. Not applicable.
7. No texts available.

M. Training of conservation personnel

1. No training schools or other facilities.
2. No opportunity for advanced training.
3. In future some training of national park and possibly Game Department (if established) staff may be required.
4. See paragraph N below.

N. Urgent Conservation Problems:

The most urgent conservation problems are:

1. Conservation of orang-utan. Mr. and Mrs. T.H. Harrisson are the experts on this subject and Mrs. Barbara Harrisson will submit a report to the Working Group.
2. The constitution of the proposed national parks. This is largely an internal problem concerning the Ministry of Agriculture and Forestry, the Board of Trustees National Parks and the Forest Department. International assistance would be of value in providing strong support for the program. When the Gunong Mulu National Park is constituted it would be of the greatest value to have the assistance of a qualified wild life expert to survey the wild life in the park to determine the species representation and its approximate density within the park.
3. Full implementation of the provisions of the Wild Life Protection Ordinance. The establishment of a Game Department in Sarawak is a first necessity.
4. International co-operation on the protection of turtles.

ANNEX I

National Parks in Sarawak, Malaysia

A. Constituted:

1. Bako National Park

Established 1st May, 1957, with extension 1st January, 1960.

Location: Situated on a peninsula at the mouth of the Sarawak River in the southwest of Sarawak.

Area: 10·5 square miles.

Description: An interesting area of unique primary vegetation, which is largely tropical heath forest but is very varied. Twenty-five vegetation communities, including mangrove and mixed dipterocarp forest, occur. The Long-nosed Monkey *(Nasalis larvatus)* is well established within the park. Recreational facilities, including two bungalows and a hostel, are provided for visitors, and an extensive series of paths through the park is maintained.

B. Proposed:

1. Gunong Mulu National Park:

Status 1965: Proposals to constitute this park have been approved by the Sarawak Government and preliminary proclamations issued.

Location: On the watershed between Tutoh (tributary of the Baram River) and the Mendalam (tributary of the Limbang River) rivers; the international boundary between Sarawak and Brunei forms part of the northern boundary of the park.

Area: 239 square miles.

Description: A superb area of primary vegetation. Almost the whole of Gunong Mulu itself, Sarawak's second highest mountain (7, 798 feet) falls within the park and primary forest occurs from the base, at approximately 400 feet, to the summit. The unique limestone mountains Gunongs Api and Benarat rising to over 5, 000 feet (probably the highest limestone between north Thailand and New Guinea), are within the park. Wild life abounds.

A small group of nomadic Punans live in the park and their rights will be protected.

2. Matang National Park:

Status 1965: Proposals to constitute approved in principle by Minister of Agriculture and Forestry. Proposed boundaries at present being examined.

Location: Twelve miles west of Kuching, the capital of Sarawak, in southwest Sarawak.

Area: 8·5 square miles.

Description: An area of rugged terrain on the sandstone mountains Gunong Serapi (2, 988 feet) and Gunong Matang. Lower slopes covered with mixed dipterocarp forest and the upper with submontane tropical heath forest. An interesting flora and fauna occurs within the park.

Easily accessible from Kuching the park will provide excellent recreational amenities for the population of the capital.

3. Gunong Gading National Park:

Status 1965: Proposals to constitute approved in principle by the Minister of Agriculture and Forestry. As the whole area falls within reserved forest constitution should not be difficult.

Location: On the coast thirty miles west of Kuching, near the town of Lundu.

Description: A compact group of small mountains (highest 2, 900 feet) consisting of granodiorite and entirely covered with dipterocarp forest. Of great scenic beauty and of botanical interest.

Will become easily accessible from Kuching when the Kuching Lundu road is completed.

4. Sabal National Park:

Status 1965: Proposals to constitute approved in principle by Minister of Agriculture and Forestry. Constitution likely to be delayed as area lies close to border with Indonesia.

Location: In southwest Sarawak adjoining Kuching Simanggang road, seventy-five miles from Kuching.

Area: 5 square miles approximately.

Description: A broad transect of primary vegetation of ecological interest that is mainly not represented in other proposed parks.

5. Pelagus Rapids National Park:

Status 1965: Proposals to constitute approved in principle by Minister, Agriculture and Forestry, and by the Divisional Development Committee. Boundaries at present being examined. Constitution not likely to prove difficult as the proposed park largely falls within reserved forest.

Location: Ten miles upriver from Kapit on the Reijang River in Central Sarawak.

Area: 20 square miles approximately.

Description: An area of primary forest bordering on the most famous rapids in Sarawak. Of great scenic beauty and likely to have a great recreational potential for the residents of Sibu and the Lower Rejang. The vegetation along the rapids includes some endemic species.

6. Simalajau National Park:

Status 1965: Proposals to constitute approved in principle by Minister, Agriculture and Forestry. Little difficulty is envisaged in constituting park as whole area falls within the Simalajau Forest Reserve.

Location: On coast ten miles northeast of Bintulu in Central Sarawak.

Area: 15 square miles approximately.

Description: An area of rocky coastland with diverse vegetation types containing one of few remaining undisturbed coastal terraces dominated by *Agathis alba*.

Will provide some of the best bathing and recreation facilities in Sarawak.

7. Sungei Dalam National Park:

Status 1965: Proposals to constitute approved by Sarawak Government and preliminary proclamations issued. Whole area formerly reserved forest and no difficulties are expected.

Location: On the outskirts of the town of Miri in northern Sarawak.

Area: 2 square miles.

Description: An exceedingly interesting small area of undisturbed tropical heath forest on very infertile soils. Easily accessible from Miri.

8. Lambir National Park:

Status 1965: Proposals approved by Sarawak Government and preliminary proclamations about to be issued.

Location: Fifteen miles from Miri and bisected by the main road that runs south from the town.

Area: 16 square miles approximately.

Description: A steep ridge of ecological interest that will preserve a range of vegetation communities that are localized in Sarawak and contains many interesting plants.

Access is easy from Miri and the proposed park will provide excellent recreational facilities for the people of that town.

9. Loagan Bunut National Park:

Status 1965: Proposals approved in principle by Minister, Agriculture and Forestry. Precise area of park not yet decided.

Location: Near the confluence of the Baram and Tinjar rivers twenty miles south of the town of Marudi in northern Sarawak.

Area: 20 square miles.

Description: The object of this park is to conserve an area of peat swamp forest. This forest type is being heavily exploited at present and there is a danger that no undisturbed forest will be preserved.

A shallow lake within the area will provide recreational facilities. It is known to have a rich migrant bird life and will be of particular interest to ornithologists.

10. Niah National Park:

Status 1965: Approved in principle by Minister, Agriculture and Forestry, and by the Divisional Development Committee. Constitution not likely to prove difficult as area is within reserved forest.

Location: Thirty-five miles southwest of Miri in northern Sarawak.

Area: 15 square miles approximately.

Description: The limestone massif of Gunong Subis is situated in the center of the proposed park. The Great Cave has one of the first archaeological sites in South East Asia and the millions of cave swifts and bats are of great zoological interest. The limestone flora is undisturbed and is of botanical interest, and includes many endemic plants.

Nature Conservation in Singapore

by

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A. General Data:

1. Area: about 230 square miles.
2. Population: 1, 445, 929 (1957 census). Today, it is estimated to be 1, 800, 000.
3. Singapore's economy is based on commerce and light industries.

B. Official conservation organizations:

Three Government Departments and one statutory board are concerned with conservation. They are the Botanic Gardens, the National Museum, the Water Department of the Public Utilities Board and the Nature Reserves Board.

C. Organizations concerned with research into conservation:

There is no central body conducting research into conservation alone. Research activities in the Botanic Gardens, the National Museum and the University of Singapore have strong bearing on conservation.

D. Private conservation organization:

The Malayan Nature Society, Singapore Branch, (c/o Department of Botany, University of Singapore) is intimately concerned with conservation problems. It has a membership of about 150 adults and 100 schools and junior members. Together with the parent body in Kuala Lumpur, it is responsible for the numerous conservation projects (like protection of the leathery turtle etc.) now in progress in Malaya.

E. National Parks and other reserves:

All the Nature Reserves in Singapore come directly under the control of the Nature Reserves Board (c/o Botanic Gardens, Singapore). The Water Catchment is the responsibility of the Water Department in Singapore. These Nature Reserves are protected by the Nature Reserves Ordinance No. 8 of 1955 which became law on 6th March 1951. This Ordinance prescribes for the full protection of animals, plants, soils and minerals within the reserves, the employment of Reserve Rangers etc.

The reserves are as follows:

1. Bukit Timah Nature Reserve. Lowland Dipterocarp Forest, approximately 184 acres, situated on Bukit Timah Hill (alt. 580 feet) in the center of the island. This is an important reserve as it is the only portion of uncut lowland dipterocarp forest left on the island.
2. Pandan Nature Reserve. Mangrove Swamp Forest, approximately 300 acres, situated on the eastern bank of the Jurong River Estuary southwest of Singapore. Though disturbed, the forest still contains interesting species of animals and plants.
3. Kranji Nature Reserve. Mangrove Swamp Forest, approximately 50 acres, situated in the north-north-west corner of the island.
4. Water Catchment. Old secondary forest mainly. Acreage appproximately 4, 000. It is situated right in the center of the island and adjoining the Bukit Timah Reserve.

These reserves are set aside and reserved for the preservation of the flora and fauna contained therein for purposes of biological research, biological education and recreation. About 90 per cent of the reserve area is true wilderness. Introduction of exotic