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PROBLEMS OF WILDLIFE MANAGEMENT IN SOUTH EAST ASIA

By:
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ABSTRACT

Wildlife management is still in the preliminary stages in most parts of South East Asia whereby the Wildlife Department has been given the lowest priority.

In the management of wildlife in South East Asia, there are a number of problem involved. Amongst them include the snooting and killing of wildlife without limitations, licencees taking more game animals than the allowable bag-limits, logging which has destroyed the forest structure and this in turn affects the animal species inhabiting the area, weakness in the wildlife Enforcement Law, Conservation Act and Mining Act, corruptions, smuggling, lack of Nature Study Centres, lack of management research and incomplete information on wildlife, the fast clearance of lowland forest for agriculture, mining problems, crop rotation and lack of training for staffs at all levels.

To overcome the above problems, amongst others are to impose appropriate charges on anybody violating the Wildlife Acts and any other relevant Acts and to create public awareness concerning the necessity of conservation. Also support from decision makers, politicians and the jurisdiction is very important in combating the above problems.

Wildlife Management in a strict sense is relatively recent in most parts of South East Asia. Game Departments better known as licensing agencies for hunting and trade in wildlife were given low priority. Indescriminate shooting and killing of wildlife and the incidence of licencees taking more game than their bag limits were high. Species which have become endangered or extinct is evident of the absence of sustained efforts in the conservation of wildlife.

Variously defined wildlife management is the art of making land and water produce optimum sustained annual crops of the best species of wildlife for use consistent with utilization of land and water for other purposes.

Due to the fertility of lowland forest and the value of timber, most have developed into agricultural lands or logged for wood. As a result lowland tropical rain forest is poorly represented and is fast disappearing. The countries of South East Asia are opening up forests at the rate of 20 acres per minute. At the present rate of forest clearance it is estimated that tropical rain forest will disappear in 10 — 15 years. With it will disappear most of the wildlife that inhabit lowland areas comprising about 80% of the whole spectrum of mammals.

*Logging destroys the forest structure affecting survival of many species of animals particularly those requiring arboreal niches. Oil palm plantations appear to support jungle fowls, leopard and flatheaded cats, cobras, rats and a few species of birds of prey. Tin mines and rice-fields create habitats for a variety of water birds. Indicated are some forms of land utilization beneficial to small groups of mammals and birds but with obvious adverse effects on wildlife in general.

Against this background efforts are being made to conserve wildlife with varying degrees of interest in each country. In all countries there is an awareness of the need for conservation and the importance to set up reserves. For some countries the network of reserves look better on paper than in reality. Inadequacies are to be found in the existing network of reserves as many do not cover the home ranges of species of wildlife they were created to conserve. Many are for smaller than the required minimum area of 100 sq. km. or 10,000 ha. Buffer zones are practically non-existent.

Surveys to demarcate boundaries are urgently needed in most national parks and wildlife reserves of South East Asia. As an effective step all reserves should be incorporated in the national plan. Support for reserves from all levels of population is essential if they are to remain effective. Programmes must be developed to create public awareness.

Nature study centres already exist in Thailand and Malaysia but these are too few to achieve maximum effect. There is an urgent need to increase the number of nature study centres to serve not only students but the whole spectrum of the local population.

Support for conservation is of top priority. Programmes in varying degrees already exist on radio and television networks but films on conservation mainly are of foreign countries. A more direct approach is necessary to illustrate local problems and what is being done in the field of conservation.

A specia! effort to gain the support of decision makers and politicians undoubtedly is topmost in priority if pressing problems in wildlife management are to be solved quickly. Admittedly there is an awareness among this group of people as a result of programmes directed to the people as a whole. This approach is unfortunately slow and good only on a long term basis.

Wildlife laws in most parts of South East Asia are weak. Effective law enforcement is lacking due to an acute shortage of experienced staff. The first step in most of these countries is to strengthen local legislation. More value has to be put on the lives of animals and birds by imposing heavier fines. Penalties for wildlife violations must be clearly provided in wildlife Acts.

The large number of firearms in the hands of people interested in hunting present a serious problem in the conservation of wildlife. In Peninsula Malaysia wildlife species may be killed in defence of crops, life or property. Illegal possession of firearms carries the death penalty but far too many persons have licenced firearms.

In Thailand firearms may be purchased openly from any gun dealer. A unique situation exists in Brunei where firearms are absolutely prohibited from possession by members of the public. Whatever the views on the ban to possess firearms wildlife in Brunei is much better off than the rest of South East Asia.

The support of the judiciary is indispensible as it would be meaningless to impose fines which do not constitute a deterance. An effective system with adequate law enforcement officers equiped to perform their duties with confidence is essential against hostile poachers. In Thailand wildlife rangers are known to have been killed while performing their duties.

Corruption is a serious problem in most of these countries that must be corrected by the creation of good income and attractive future prospects in the wildlife service. Close supervision with a view to promptly remove and action taken against corrupt officers is necessary.

Violations no matter how small including technical offences should be acted upon. To speed up action minor offences may be settled out of court by offering compensation. Serious offences should all go to court and be dealt with accordingly.

Smuggling is very serious throughout the region because of the demand and the high commercial value of many species of wildlife. To curb smuggling it is important for all South East Asian countries to become parties to CITES. The proposed Asean Convention is a further step in the right direction.

Legislation relating to national parks, wildlife reserves and sanctuaries are generally weak. It is not uncommon to see golf courses, crop plantations and even townships in these areas. Obviously such activities do not fit in with the objectives of parks and reserves. It is doubtful if any national park or wildlife reserve has secure land tenure.

*Apart from legislation directly relevant to the protection of wildlife and national parks there are numerous others that are not effectively enforced. In Peninsula Malaysia river terrapins are governed by the river rights laws of each state. These legislations are hardly enforced which explained why *Batagur baska* is endangered. The river rights laws provided well for the conservation of species included in the schedules. In prewar days when these legislations were strictly enforced terrapins were abundant. After the war about 1967 projects had to be developed to prevent extinction of the species.

*The conservation act among others aims is to combat erosion. One can only assume that it is not properly enforced in view of the widespread erosion in the country. The mining act is ineffective in so far as silt traps and relandscaping is concerned. Reafforestation is inadequate to meet losses in the exploitation of timbers.

*The environmental quality Act is being enforced and an increase in emphasis is indicated by the division of environment. This is obviously essential if rivers are to be free of pollution. Oil palm wastes are discharged into rivers since 1968 resulting today in a number of highly polluted rivers. In recent years a number of techniques were developed to produce a clean discharge into rivers. Biological purification appears economical and attractive. The Division of Environment is known to make serious efforts to impose conditions in preventing water pollution. This is a step in the right direction for clean rivers that will in time bring back the rich fish life and animals that was once common in Malaya.

Political stability far outweigh the importance of national parks and wildlife reserves. In the phase of rapid increase of an already dense population there is no alternative but to exploit renewable and non-renewable natural resources. The time constraint which exists in all countries to develop and raise the *standard of living of the people* contributes to existing problems. Whatever the pros and cons conservationists have to work in the light of these realities which are the challenges ahead.

Of significance in the region is the Asean programme for the environment. Conservation is included in this regional programme with regular annual meetings held in rotation. The people involved are high ranking government officials and ministers from relevant ministries of governments. It is an ideal machinery for conservation where decisions are made by people attending the meetings or through them at higher levels.

Under conservation the importance of national parks, trade in wildlife, legislation, training, information exchange and wildlife management research are given prominence. Representatives from the department of wildlife and national parks of each country participate in these meetings, workshops and field trips. Assistance and advice or international organizations like UNEP and IUCN are sought when needed.

Lack of management research resulted in inaccurate administrative decisions as they are based on incomplete data analysis. This has had a serious effect on wildlife. Wrong seasons for hunting have caused heavy mortalities of gravid animals and their young. It is important to step up management research as most if not all

conservation action must be based on a thorough knowledge of the biology of animals and their role in the ecosystem. Emphasis is on *local* departmental scientific staff as foreign scientists are expensive and difficult to attract. Academic research has the role of educating public opinion and increasing basic scientific knowledge. Cumulative results of a series of studies will enhance the knowledge on which management of an area can be based.

A team of scientists should be made available locally or in the region that may be called upon to assist on boundary surveys, vegetation, floral and faunal inventories and to draw up preliminary management plans for conservation areas.

The rapid clearing of lowland forests for agriculture has resulted in massive losses of wildlife habitat in all countries of the region. Apart from being the most fertile, they are unfortunately the richest wildlife areas. There is an urgent need for intensive rather than extensive agricultural practice. Many countries like Japan and Korea have intensive agriculture with results that far exceed production per unit area in the region.

Logging destroys the forest structure. Authorities should make allowance for seasonal migrations, usually altitudinal search for fruits. Logging should follow a cycle of optimum sustained harvest of trees.

*Mining presently occupies about one per cent of the total land area in Peninsula Malaysia. There is no reafforestation programme because the cost of reafforestation for the whole country in mined areas will be extremely high. The problem of silting caused by mining to rivers is most serious to fish life and fish dependent wildlife species. Existing legislation *if* strictly enforced could prevent further silting of rivers and ensure relandscaping of mined areas.

Habitat types of the region are known to science. There is however no satisfactory inventory of each habitat in existence and the extent of its distribution. Wildlife species inhabiting each habitat type has to be investigated to establish densities and their role in the ecosystem. The extent of tolerance of each habitat type to withstand disturbance without seriously affecting the whole ecosystem urgently needs looking into.

Ecologists are still looking for answers to the complex questions of ecosystem management. Investigations have revealed the importance of co-evolution of predators and their prey. of agents of pollination in the reproduction and dispersal of fruiting trees.

A wildlife plan is needed in every country of the region. Such a plan must of necessity have the approval of the highest authority in the country for implementation. A machinery is needed for the plan to be observed at all levels of national development. The plan by its virtue will provide guidelines for action in any situation affecting wildlife.

As a result of forest clearing for agriculture there are now pockets of forest holding species of wildlife unable to interbreed in residual populations. Detailed knowledge of breeding, population structure, behaviour and food habits of most of the species of wildlife is not known. Seral conditions or long term management of habitat are required by some species while others required small specialised ecosystems indicating the need for single species reserves.

Shifting cultivation which leads to various seral contition presents a serious problem in wildlife management. While it is beneficial to some species of wildlife it is detrimental to most because of habitat loss. Shifting cultivation of necessity is quite extensive in the region. In practice the first few crops will provide good harvests but decline as fertility decreases thus necessitating shifts. It will be several years before the first abandoned cultivated area becomes naturally fertile again which explains why extensive areas are needed for shifting cultivation. While waiting for the crops to be harvested wildlife is substituted as food together with vegetable materials.

The place of wildlife and national parks varies from country to country in the region. Wildlife and national parks form a branch of the forestry department in Sarawak, the Philippines and Thailand. National parks appear as a separate department in Sabah while in Peninsula Malaysia wildlife and national parks appear as a department. Wildlife and national parks appearing as a department is more acceptable as indicated by its existence in many countries.

Training of senior, middle and junior grade staff of the department of wildlife and national parks is most urgent. In the region there are already people with adequate practical experience which can best be imparted at field training courses. In the region a training centre offering courses in wildlife management already exist in Ciawi, Indonesia. Malaysia is developing a wildlife training centre initially for junior and middle level staff. Courses in wildlife management are conducted in the African college of wildlife management at Nweka. There is a need to share and foster professional knowledge.

*Refers to Peninsula Malaysia.

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HABITAT REQUIREMENTS FOR THE MALAYAN GAUR
(Bos gaurus hubbacki)

by
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ABSTRACT

The rapid and extensive development of the Lowland Dipterocarp rainforest is seriously affecting the Malaysian Seladang (*Bos gaurus hubbacki*). Its natural habitat of lowland riverine forest is being greatly depleted by development schemes such as agricultural plantations, extensive logging, hydro electric dams and human settlements. Field surveys of six seladang areas in the states of Pahang, Johore, Trengganu and Kelantan have revealed that they were affected or threatened in the near future by such development. In a more intensive study of seladang food requirement in the Lepar River Valley, Pahang, radio telemetry techniques were used. Telemetry locations of three animals over a fourteen month period indicated a heavy use of disturbed areas by the animals. The percentage usage of secondary forest was about 73%, fringe area 45% and palm oil plantation area 20%.

INTRODUCTION

The Malaysian Seladang, *Bos gaurus hubbacki* is a species, found in the tropical rainforest of Peninsular Malaysia. It is recorded in IUCN Red Data Book species (Simon, 1969), under the endangered category. Today, it is found in appreaciable numbers in localised areas in the state of Pahang, Kelantan and Trengganu. It is a lowland animal, inhabiting river valleys and rolling terrains up to 305 m in elevation (Kitchener 1961, Hubaccki 1937). It is therefore possible to accurately define an area where each herd occurs and the type of food preferred by every herd at Ulu Lepar, Kuantan, Pahang.

Previous study on the seladang may help in the analysis of the food habit especially of the herd at Ulu Lepar. The herd were indentified as 1C, 2C and 5C.

STUDY AREA

53.42 km^2 of the study area was situated along the western and 40.47 km^2 on the eastern edge of the Lepar Valley in the proposed wildlife reserve in Ulu Lepar, Kuantan, Pahang. The area was composed of three major land represented by class 111 that was used to study the habitat and food habit of the herds. The study area was located between the elevations of 46 m and 1049 m at the watershed boundary. About 25 percent was agricultural scheme, 50 percent was under secondary forest and about 25 percent under primary forest (Map 1).

The density of the vegetation was highly variable in nature. The growth of grass, legume and vine depended on the location and fertility of the soil in the agricultural scheme. In the logging area, the feeding trail was 85 m with total browse of 39 (1 bite/3.2 m).

The most common grass species present were rumput chengkenit (*Paspalum conjugatum*) and rumput buloh (*Thysanolaena maxima*). The group of seladang would visit this place at least 5 times per year whenever they were in the vicinity.

METHODS

The study took the form of observation of seladang feeding trails. They were either fresh trail, 1 night's, or 1 week's trail and the bedding place was randomly arranged in a complete line. In January 1979 the feeding trails for all herd at Ulu Lepar were directionally surveyed. The location of the herds were carefully recorded in relation to distinct landmarks and boundary. The population of each herd was based on the progress until April '79.

The surveys were conducted at six different places.

i) Block A Asia oil palms
ii) Felda Lepar Utara
iii Sungai Rami Saltlick
iv) MCA Rubber Estate/Oil Palm
v) Natural padang (old communist padang 1948)
vi) Proposed Reserve

Intensive investigations on food habit were also undertaken. A total of 65 observations (2 datas from Taman Negara and 2 datas missing were excluded from the analysis) were made at Block A Asia Oil Palm, 10 observations at Sungai Rami salt lick and 8 observations at MCA Rubber Estate/Oil Palms.

The vegetation density coverage at each observation was collected in coordination with the investigation into the food habit of the herds. They included 3 species of graminoids, shrubs and trees. The densities of all the 3 species were determined by * coverage class.

* Cover class

O — absent	2 — 5% — 25%	5 — 75% — 100%
T — rare to 1%	3 — 25% — 50%	
I — 1% — 5%	4 — 50% — 75%	

Examination into the composition of diets showed the abundance of the species. Some feeding trails were examined and certain places of browse and bite which were suspected or believed to be done by a herd (seldang) were recorded and collection of data was started from the natural padang or breeding place (for example specimen 31 represented by 14 bites of 75% leaf and stem, Makania 16 bites of 20% leaf and stem, *Paspalum conjugatum* 6 bites of 25% leaf).

The above observation can be used as a guideline for management purposes, for example to eliminate derise tree canopy, grass and shrubs in certain areas. This provide a good basic food requirement which results in growth of seladang food plants.

RESULTS

Radio Telemetry:

Our data on observation by radio telemetry equipment are summarised in table 1. Differences exist in the distribution of seladang between primary forest, secondary forest and agricultural scheme. The number of relocations, shows the relationships between all the seladang relocations and the three habitat type.

Table 1

Percentage of seladang habitat components as derived from telemetry locations

HABITAT TYPE	Seladang 1C n = 27	Seladang 2C n= 70	Seladang 5C n = 12	Over all n = 109
Primary forest	26	0	0	6
Secondary forest	70	73	50	70
Agricultural Scheme	4	27	50	24
Agricultural Fringe				
Distance 0-5000 m	33	50	83	50

n — the number of relocations

The distribution of each herd including the collared animals was mainly confined to below 152 m a.s.l. and only 1.8% were found at 229-305 m a.s.l. (Table 2). The seladangs did not favour more than 305 m a.s.l. as increase in elevation reduced the choice of food.

Table 2

Percentage of seladang use at various categories of elevation

Elevation (in feet)	Seladang 1C n = 27	Seladang 2C n = 70	Seladang 5C n = 12	Overall n = 109
0 — 250	51.9	77.1	75.0	76.96
251 — 500	37.0	22.9	25.0	26.6
501 — 750	0	0	0	
751 — 1000	7.4	0	0	1.8
1001 — 1250	0	0	0	0
1251 — 1300	3.7	0	0	1.0

n — the number of relocations

The second activity centre, together with the agricultural scheme area and the adjacent jungle fringe (Asia Oil Palm scheme) were used only on five occasions over the whole study period (Table 3) *

The availability of nine common grasses in the agricultural scheme and forest fringe created an interaction between the three seladang herd and the grasses. (Bamboo grass, *Thysanolaena maxima,* Buffalo grass, *Elensine indica, Makania cordata, Paspalum conjugatum, Ottochloa nodes* and *Phragmites communis*). An overall of forty-nine point five percent (49.5 percent) was recorded.

Symbols: Seed Type Identification

A: Gramineae: **Paspalum conjugatum**
B: Gramineae: *Eleusine indica*
C: Gramineae: *Digitaria sp.*
D: Euphorbiaceae: *Phyllanthus urinaria*
E: Cyperaceae: *Browse species*

F:	Euphorbiaceae:	*Euphorbia sp.*
G:	Gramineae:	*Trema orientalis*
H:	Urticaceae:	*Dillenia indica*
J:	Leguninosae:	*Parkia javanica*
K:	Moraceae:	*Ficus sp.*

*:Sample indentification number lost.

Diet and food availability

The vegetation density coverage fr seladang herd 5C was collected in January 1979 till November 1979. (See Table 4). There were eight species of grasses and they were mostly in the 5% — 25% coverage class. In the home range of the herd 5C. The maximum food production was provided by the legume species (*Makania cordata*). The legume species grew naturally in the new open areas. The herd 1C and 2C possesed only 40% of the coverage class of the herd 5C. A few tree species were found to be common in the home range of herd 5C. Both herd apparently prefered to browse on grass and shrubs.

Eleven species of shrubs were found in abundance in the 0.9 m coverage class, except for *Euphatorium odour* where its coverage class fell only in the 20%. Ten tree species and another two species were found in the home range of 2500 ha.

Eight species of grass were found to be available to the seladang throughout the year. They were first observed in the scats collected during the study period. Thirty-two scat samples were collected (Appendix 1). Only six samples contained *Paspalum conjugatum* and five samples with*Ficus sp* in herd 5C.

DISCUSSIONS

The food habits of the seladang were investigated in the Lepar valley by examining the feeding site and using radio telemetry equipment. The usual feeding routine of a seladang normally start at 5.00 am. The animal would walk through 100 meters of secondary forest to the agricultural scheme before grazing on the lush grasses and legume cover crop available namely Rumput Chengkenit (*Paspalum conjugatum*), Centro legume (*Centrocema pubescens*) and bamboo grass (*Thysanoleana maxima*). Starting from 6.15 am until 8.30 am the animal started to move back into the jungle, where feeding continued, usually browzing on shrubs, plants, trees, woody vines and creepers. Some of the most common plants included Mengkirai (*Trema angustifolia* and *T. tomentosa*) and Mahang (*Macaranga sp*) Simpoh fruit (*Dillenia ovata* and *D. Indica*) and Petai Kerayong (*Parkia javanica*) were the favourites of the animals. From 11.00 am to 4.30 pm the seladang started to find a resting place which was significantly safe from any kind of disturbances. It continued to feed until 8.00 pm until the animal was full and then selected a place to rest for the night in the secondary jungle.

From the feeding surveys in the home range of herd 5C, direct observations on food habits were recorded. It was learnt that seladang would spend their time solely on browsing the grass. Bedding took place 100 — 150 meters away from the forest fringe.

Many seladang in the study area migrate to another within the same home range. The migration occured between the secondary forest and agricultural scheme. It is suggested that this distance is observed when creating a new habitat. Since all the seladang were located in disturbed forest (secondary forest), the pasture should be established around 0-500 meter from the secondary forest (Appendix 11).

Table 4, shows the coverage class of each species in the habitat. Because of the severe condition the seladang faced in the habitat (primary and secondary forest), it was necessary to give a special consideration to the pasture species to be used

for the seladang new habitat. It is expected that the requirement of food, water and shelter for seladang herds would increase (including the availability of artificial salt licks in the home range). Evidence of both migration and feeding habits for all groups of seladang at Ulu Lepar were observed to be the same, except group 1C at Sungai Luit which had a distance between 3001-4000 meter (14.8%) from the agricultural scheme.

RECOMMENDATION

The pasture should be developed near the river and it should contain twenty-nine (29) species of plants within the recommended 3.2 hac plot and 6 hac plot. The undergrowths should consist of Ginger, Fern, Lerek, Bamboo, Mengkirai and *Euphatorium odour.* After cutting all the palms and Dorax groups, the light influx on the undergrowth increased considerably and the plot will be covered by a fairly continuous tree stratum and shady.

Herd 5C needs higher density of vegetation preferably *Paspalum conjugatum* (Rumput Chengkenit). And 3 pastures should be constructed at 2½ miles from the south boundary of the proposed reserve (maintaining the present size plus minimum modification of food preferences). The pastures in the centre of the reserve and close to Sungai Berakit need to be developed further.

Artificial salt licks may be placed at the major activity centre i.e. grazing field to attract more herd into the reserve at 7.2 km entry point. (Refer to map) Eighty-five percent (85.0%) of the visits were made by herd 5C. Six rock salts should be planted at every three month interval to maintain the maximum use of natural pasture and to attract migration of seladang herds into the reserve.

Table 3

Percentage of seladang use at various categories of distance between agricultural schemes

Distance to Agricultural Schemes (m)	Seladang 1C n = 27	Seladang 2C n = 70	Seladang 5C n = 12	Seladang n = 1091
0 — 500	33.3	50.0	83.3	49.5
501 — 1000	11.1	20.0	8.3	16.5
1001 — 1500	18.5	17.1	0	15.6
1501 — 2000	7.4	4.3	0	4.6
2001 — 3000	7.4	7.1	0	6.4
3001 — 4000	14.8	1.4	8.3	5.6
4000 +				

n = number of relocations.

TABLE 4

LIST OF SPECIES AND AVERAGE COVERAGE FOR 5C

Graminoids 8 verities	**Coverage class**
Wire grass	2T, 1-1%, 2-5%, 2-20%, 2-10%
Paspalum conjugatum	2t, 1-3%, 2(1-1%), 2-9%
Bamboo grass	2-10%, T
Legume	5-80%, T
Makania	1-5%, 2T
Cassia	1-3%
Imperata cylindrica	T, 2-10%, 5-30%
Elephant grass	3-40%

Trees 10 varieties	**Coverage class**
Dipterocarpus	2-10%
Pterygota horsfieldii	2-10%
Mallotus spp.	2-10%
Macaranga	T
Shorea spp.	3.30%
Oil Palm	2(1-3%)
Lagerstroemia spp.	1-5%
Koompassia exelsa	2
Dillenia spp.	1, 1-5%
Parkia spp.	3-10%

Shrubs Type II	**Coverage Class**			**Type Symbol**
	0-3'	**3-7'**	**7'+**	
Ginger	T, 3 (2-10%)			
Fern	4T, (3-40%)			
Tepus	2			
Euphatorium odour	2T, 2-10%	2-2%		
	4-6%			
Macaranga spp.	1-1%			
Creepers	2.5%			
Vine	1-1%			
	2-15%			
Rattan	2T			
Bamboo	2-20%			
Tema spp,	T			

APPENDIX 1

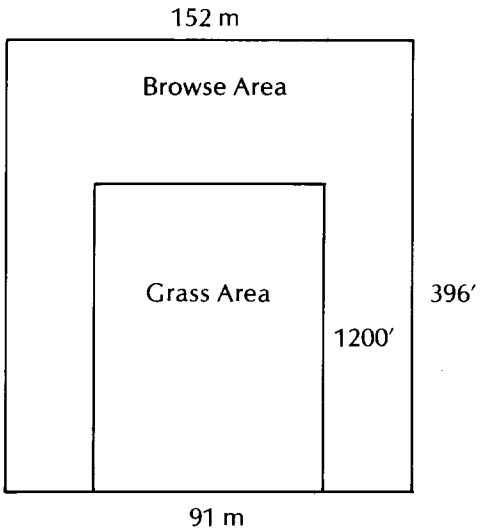
Dung Analysis Sample

Dung Analysis: Seed type and incident in the seladang dung

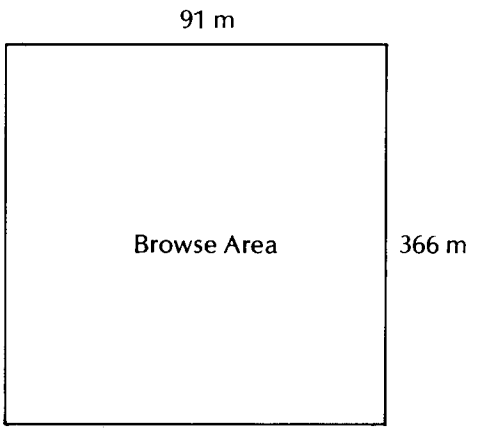
Scat I.D. No.		**Syeed type and incidents**		**Explanation**
		'numerous'	**'trace'**	
1.	20	—	A,J	
2.	21	A	—	
3.	22	A	—	
4.	23	A	—	
5.	24	A	—	
6.	25	A	—	
7.	26	A,B	—	
8.	27	A, B	—	
9.	28	A	C	Seladang # 3C
10.	29	A	B	
11.	31	A	B, C, H	
12.	32	A	B, C, D, G	
13.	33	A	B	
14.	34	A	C	
15.	35	A	B, G	
16.	36	A	B, F	
17.	37	A	B, C, F, G	
18.	38	A	B, F	
19.	39	A	—	
20.	40	—	A, B, G	
21.	41	A	C, G	
22.	42	A	C, G	
23.	47	I	A	Seladang # 4C
24.	112	A, K	—	Seladang # 5C
25.	113	A, K	F	Seladang # 5C
26.	114	A, K	B, H	Seladang # 5C
27.	115	A, K	B, F, H	Seladang # 5C
28.	116	A	E, H, K	Seladang # 5C
29.	117	A, K	E, H	Seladang # 5C
30.	118*	J	A, H	Seladang # 5C
31.	119*	A	G, H	
32	120*	A, J	—	

APPENDIX 2

6 hectares plot



3 hectares plot



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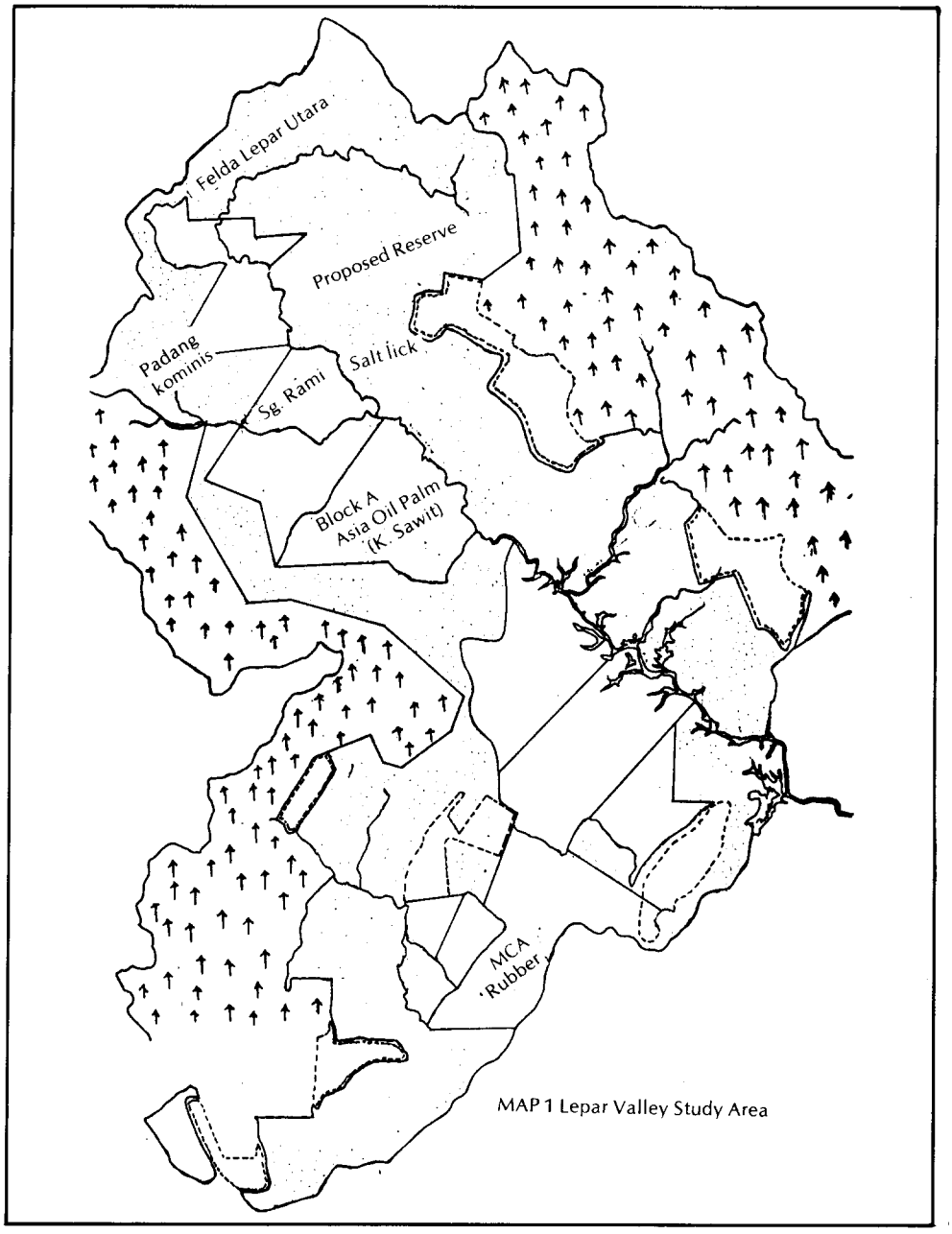

MAP 1 Lepar Valley Study Area

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THE IRRAWADDY RIVER DOLPHIN IN THE BERNAM RIVER

By:
Louis Clement Ratnam

A single specimen of a river dolphin was kept under observation for several hours in the Bernam River in the 20th March, 1980, at the site where canal connects the Bernam river to the S. Tengi. This is close to the rangers post at the Sungai Dusun Game Reserve.

Residents and fishermen in the vicinity reported that the previous day three animals were seen in the same area.

The specimen was estimated at about 1.8m in length. It kept surfacing at intervals of between 5 seconds and 2 minutes. These were extreme times and generally the animal remained submerged between 30 and 60 seconds.

Its movements were slow and unhurried. A rounded head would break the surface revealing a circular nostril placed anteriorily just behind the bulge of the forehead. This movement would be accompanied by a hissing sound of about 1.5 seconds duration (apparently the sound of breathing). There was generally an almost imperceptible pause in movement at this stage before the animal moved forward and down revealing a small rounded and swept back dorsal fin placed about two thirds of the way down the body. Sometimes the pause would be entirely absent and the surfacing and submerging would be one smooth movement. At no time did the flukes break the surface. As the river was fairly muddy these flukes were never actually seen.

During the period of observation all surfacing took place along a 200 metre length of the river. At this point the river was about 15 metres in width. This section of the river was just downstream of a large pool which forms the spill-over area of an irrigation dam on the Bernam River. On a few occassions the animal actually surfaced at the edge of this pool area. At this point the Bernam River is about 140 km. from the sea.

The animal has been tentatively identified as *Orcaella brevirostris,* the Irrawaddy River Dolphin, whose known range encompasses the Bay of Bengal at one end and Borneo at the other including Java, the Straits of Malacca, and the East Coast of Peninsular Malaysia.

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SUMATRAN RHINOCEROS IN ENDAU-ROMPIN AND FUTURE

By:
Mohd. Tajuddin Bin Abdullah

ABSTRACT

The effect of logging an area inhabited by rhino disturbed its population distribution. *D. sumatrensis* does not re-establish itself in disturbed forest of Endau-Rompin. Lower Sungai Endau. Sungai Selai and Sungai Juaseh-Sungai Kemidak are three main rhino areas. These areas are easily eccessible on foot along logging roads and jungle tracks, and thus pose a great danger to rhino conservation. Regular patrols and public relation works are among the vital tools to ensure perpetual survival of the endangered species.

INTRODUCTION

The Sumatran rhinoceros is the rarest and the most threatened animal found in Endau-Rompin. Listed as one of the endangered species in the IUCN Red Data Book, the species received tremendous attention from scientists, naturalists and conservationists in the study of its ecology and behaviour.

Flynn made a three year study (1975-1977) on the ecology, behaviour and distribution of rhinos in the Endau-Rompin area under the direction of Encik Mohd Khan bin Momin Khan, Director General and Encik Louis Ratnam, Research Officer of the wildlife and National Parks Department. The objectives of the study were to determine the distribution status, movements and habitat use of the area and to collect additional information on its ecology and behaviour. Observation made on forest logging and land development in the area had shown to have lasting effects on the rhino population and habitat. The direct impact of such indiscriminate acts have reduced the contigous rhino occupied area and spliting the population into two sub-population groups in Endau-Rompin during the early development period of 1977 (Flynn, 1978).

THE STUDY AREA

Geographically, the 400 sq. km study area (Flynn, 1976), is in the region which forms the watershed between the east and the west side of the country, and is the source of four rivers; the Sungai Ulu Pukin flowing northward, the Sungai Segamat flowing westward, the Sungai Endau flowing eastward, and the Sungai Selai flowing to the south (Heaslett, 1970).

Heaslett (1970) noted that the forest cover in the region is of Lowland Dipterocarp and merges into Upper Dipterocarp Forest at the higher altitudes, but at about 1340 m., rocks and granite edge appear and there is an abrupt change to a zone of Montane Ericaceous Forest. Notable among the dipterocarp forest are the *Shorea curtisii* (Seraya) found mainly along the ridges. Generally, the undergrowth is dense. Although there is an Orang Asli settlement at Kg. Juaseh there is no evi-

dence of shifting cultivation being practised. The people collect rotan and damar from the forest but rubber tapping is their main occupation.

At the foot of the southern ridge, *south* of Gunung Besar, is the upper reaches of Sungai Selai where the Selai Camp is situated. The camp can accomodate eight persons and it is connected by a three hours-walk trail to Kepah Camp which is located on the eastern fringes of the forest.

As a whole the forest is rich in wildlife; large terrestrial mammals including elephant, tapir, pigs, tiger, barking deer, seladang, gibbons and macaque, birds and fish are present. The presence of deer has attracted poachers into the forest to hunt illegally. They also indiscriminately poisoned fish in the upper reaches of Sungai Endau, Sungai Selai, Sungai Jemai dan Sungai Kemapan, and has resulted in a drastic decrease in fish population in those rivers.

INTRODUCTION

SSC (1979) estimated a total population of between 100-150 animals in the world. About 30-50 of these are in Peninsula Malaysia, of which 10-15 animals are estimated to be living in Endau-Rompin. It is therefore the second largest rhino area compared to the estimated 40-60 in the Gunung Leuser Reserve in Sumatra (Flynn 1978).

Metcalfe (1961) estimated 10 rhinos in Johore while Hislop (1965) surprisingly recorded 0-2 rhinos. Stevens (1968) estimated 5 rhinos in the Sungai Emas and the area south of Mersing, Strien (1974) quoted Ng Poh Tip as that there were 5 rhinos in the State of Johore. Flynn (1979) concluded that there were 8 animals in the study area based on two census works in March 1977 and March 1979.

During the pre-logging period, as in February, 1976, rhinos were found over a contiguous area from Ulu Kemapan in the north to Gunung Bekok; the areas are Upper reaches of Sungai Juaseh, Sungai Kemidak, Sungai Selai, Sungai Tenang, Sungai Segamat, Sungai Pukin, Sungai Chapau, Sungai Jemai, Sungai Jekatih and Sungai Gadong and most of the Ulu Endau area, which is about 600 sq km. During the intensive logging period in May 1977, there was no sign of the animal in the Sungai Jemai, Sungai Kemapan and Sungai Pukin areas (Flynn 1978). The physical disturbances, machinery and human interference into its habitat evidently drove the animals deeper into the impenetrable forest.

Post-logging observation in early 1979 in Sungai Jemai and Sungai Pukin, showed signs of re-establishment of big terrestrial animals such as elephant (*Elephas maximus*) and tapir (*Tapirus indicus*) in the disturbed forest. However, no rhino tracks were recorded. The semi-opened forest canopy could contribute to the reason for the rhino not returning to its former rangeland.

OBSERVATION & DISCUSSIONS

A recent expedition in May, 1979, had gathered signs of rhinos in Sungai Kemapan and areas adjacent to the Segamat-Mersing District border where logging had ceased on the eastern side. The tracks of the animal measured 19.5-21.5 cm. It followed along the game trail for a distance before it suddenly disappeared. Probably it was the same animal which left a few tracks in the sandy bank of Sungai Kemapan which is about 3 km west from the point where the first track was found.

In the months of May, August and December, 1979, three sets of rhino tracks were found each measuring 20.0-21.0 cm, 20.0-22.5 cm and 18.5-19.5 cm respectively, along the areas of lower Sungai Endau (i.e. between Sungai Kemapan and Sungai Jemai). Hence, it is not fallacious to confirm the existence of at least three individuals with tracks measurements of 20.0-20.5 cm, 18.1-18.6 cm and 19.0

cm (Flynn, 1979). A number of wallows were found throughout the Sungai Selai and Sungai Selepas. Although there is an abundance of food plants, the rhinos are generally selective in their feeding habit. Plant such as *Prunus spp, Ficus spp., Diospyros spp. Lasianthus spp.* and *Macaranga spp.,* are often fed by the animals. Metcalfe (1961) had also recorded species of Ficus and Macaranqa. Fruits of cultivated and wild mangifera (macang) were also eaten. During the fruiting season in March 1979, a rhino from the Kepoh area travelled from the forest into the nearby fruit plantation to feed on mangifera fruits. The animal swallowed the whole fruit and on one occassion 10 seeds were found in the dung. Six out of the ten seeds were found to have germinated and were collected and planted near the Selai Camp. The seeds made up about 20% of the total composition of the dung 80% were of digested leaves and chewed small branches. The daily amount of food plants and fruits consumed is not known.

CONCLUSION

Hubback (1939) and Foenander (1944), were among the early authors to voice out the depleting rhino population in this country. The demand for rhino horn is closely related to the belief on the value of the horn as an aphrodisiac and also to its medicinal properties. Under the Wildlife Act of 76/1972, the rhinoceros is a totally protected animal. The penalty for shooting, killing or wounding the animals is M$3,000 or two years' imprisonment. The penalty is not strict enough to discourage poachers from killing the animal because of the higher price of the horn as compared to the M$3,000 penalty and the readily available market.

Enforcement is aimed at keeping poaching at bay but the prevailing problem is the difficulty in locating poachers, and the lack of enforcement facilities to regularly patrol the known rhino areas. At Endau-Rompin there are game rangers for the rhino management team to patrol the Kepoh, Sungai Jemai and Sungai Jasin areas periodically. However, the effectiveness of curbing encroachment of the extensive region is questionable. The forest is accessible at Kepoh, Juaseh, Sungai Jemai, Bekok and Sungai Jasin by logging road or jungle tracks. The establishment of the temporary Kepoh Camp can only check poachers on the west side where as the other three points are left to be encroached at any time. Setting up guard posts at Pukin, Bekok and Sungai Jasin and a constant patrolling of the area is essential.

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AN EXPERIMENT OF UTILISATION OF ELECTRIC FENCE AS A DETERRENT TO CROP DAMAGE BY ELEPHANTS

By:
Saharuddin Bin Anan

ABSTRACT

The electric fence was one of the methods experimented to control elephants (Elephas maximus) from damaging crops. A group of six animals were involved in the damage within the study area. Electrified wires carrying a pulse current of 5,000 volts, each pulse lasting for 0.03 milisecond were used. Damage crop figures were collected and compared before, during and after completion of fence construction. There was a reduction in both the number of damaged palm and frequency of elephant entry soon after the electric fence was put into operation.

INTRODUCTION

Though crop loss caused by wild animals are less than that due to pest and diseases, it is nevertheless serious enough to warrant preventive measures. The main wildlife species involved is the elephant (*Elephas maximus*) with young oil palm being the most significant crop damaged.

The research division of the Department of Wildlife and National Parks (*PERHILITAN*) is now experimenting on several methods to reduce the damages done by elephants. One of the methods being experimented with is the electric fence. The previous method of control was to kill the elephants. The Department (formerly called Game Department) had an annual kill of fifteen to twenty animals (Steven, 1968). After 1970, the killing of elephants was greatly reduced and research on non-lethal methods of reducing elephant damage was begun.

In 1977, a pilot study of the electric fence was carried out and the cost of the fence estimated. The first electric fence constructed was a joint projek between (PERHILITAN) and Federal Land Consolidation and Rehabilitation Authority (FELCRA). This fence was built in FELCRA Sungai Ara, Kota Tinggi, Johor. The second electric fence put up was in FELDA Kemasul and jointly financed by PERHILITAN and Federal Land Development Authority (FELDA). The materials, tools and expertise used in both projects were provided by PERHILITAN, while FELCRA and FELDA supplied the labour and the supervision.

This paper deals only with the experiment in Kemasul where there has been satisfactory monitoring and data collection. Although Sungai Ara achieved its aim the detailed results have not been well tabulated.

STUDY AREA

The study was conducted on a FELDA scheme at Kemasul, south-west of Triang about 83 km from Temerloh, Pahang. The total acreage of the scheme was 2370 hc consisting of 3 phases of 579 hc, 850.5 hc, 743.5 hc and a 179 hc village area. Phase I and II were planted with oil palm (*Elaeis quineensis*) in January 1976 but phase III was sheduled for development in 1980. The map of the phases and location of the

electric fence are shown in figure I. A total of 206,500 palm were damaged of which 82,000 palm were from Phase I and 124,500 palm were from Phase II.

Damage was apparently caused by 6 elephants, one being a lone bull measuring 18" foot diameter and a group of five other animals comprising of 2 adult males, 1 adult female and 2 young females.

Refering to the map shown the scheme is bordered on the north-east by the Pertang River. The animals can go across to feed on the oil palm in the scheme. There are a few small streams flowing through the scheme. Chemomoi River on the south meets Pertang River at the southern tip of Phase IIIB. The whole phase I and II were totally cleared and is now covered by leguminous crop. There is an old oil palm scheme to the south and a forest to the east and west. The elephants take refuge in these forest and cross the western and the eastern borders at night to feed on oil palm as well as the leguminous covering crop.

METHODS

The first portion of the electric fence was constructed on 17th. April, 1978 and completed on 21st. July, 1978. The length of the fence was 10,3000 meter. This portion of the fence was on the north-west boundary of the scheme (A to B in fig. I), was constructed on 1st. January, 1979 and was completed six months later. The average cost for both portions of the fence was $2.60 per meter. The second portion of the fence built on hilly terrain costs more than the first one.

The source of electric pulse was an energiser unit which was powered by 12 volts heavy duty wet cell battery. Both the battery and the energiser were stored in a concrete box housed in a hut. Factory treated chengal of dimensions 5 cm x 7.5 cm x 2.4 cm were used as the fence posts. They were placed 18 m to 33 m apart depending on the nature of the land. Two strands of 11 gauge high carbon galvanised 90 ton tensile wires were placed at 90 cm and 150 cm above the ground (figure 11).

With either 12 or 24 volts input, an energiser can give a voltage 5,000 volts which draws 80 — 150 miliamperes. The current flow is in pulses at the rate of 60 times per minute. Each pulse last for 0.03 milisecond.

All parts of the fence were electrified including protective wires of the fence posts. Both the horizontal and the protective wires were connected to the positive pole of the battery while the negative was grounded. An elephant could experience the electric shock if its body touched the horizontal or protective wires. The flow of current was from the energiser to the wire through the elephant body and back to the ground which was connected to the negative end of the energiser.

Records of the damage on oil palm were taken before, during and after fencing construction. After completion of the first section of the fence, reading of voltage output were taken every week with open and close circuits. Voltage output at both ends of the fence were also noted. the relationship between thunderstorms and fence operation was also observed. Data on frequency of elephant attack was collected soon after construction began in April 1978 until end of 1979.

Data on damage figures given by the scheme manager and frequency of elephant attack during and after construction was then plotted on a graph.

RESULTS

Before the construction of the electric fence there was no effective defensive measure against the elephants, the scheme lost 95,395 palm in Phases I & II. When the first section of the fence (AB) was completed, the scheme lost 47,944 palms which were mainly from phase II. This section of the fence seemed to have pro-

tected phase I. After completion of second section of the fence i.e. AC which was in June, 1979, the scheme lost 13,005 palms which was mainly palm from phase I. There were no damages in phase II till the end of 1979 because phase II had been protected by electric fence. These 13,005 palms were damaged by the same elephants entering via the forested eastern boundary of phase II which was not protected by an electric fence.

Field observation showed that the elephants knew their way into the scheme soon after the total operation of the constructed fence. Disturbed vegetation parallel to the fence, massing of tracks and elephants faeces were evidence of their entry. The effectiveness of the fence in actually preventing the animals from entering the scheme indicates that the boundries are now protected. The elephants apparently walked along the fence trying to find weaknesses to enable their entry, perhaps occassionally touching the fence line.

The damage figure of 47,944 palms from phase II were caused by elephants that had entered through the unprotected western boundary. This boundary was not fenced because it was hilly in nature and prior to the electric fence, had never been used by the elephants to gain access to the scheme. Apparently now thwarted by the fence the elephants were forced to use the difficult approach in order to feed.

After June, 1979, when the second section of the fence (AC) was completed there was no damage to phase II because the east and west boundries of phase II were now fully protected. There was no elephant entry into phase II from June until Dec. 1979.

Some slight modifications and strengthening of the fence technique was carried out after Dec. 1979 so as to ensure maximum protection (capacity). These changes were mainly to ensure good conductivity of the earthing system, to ensure good and correct fence maintenance and assurance of correct height of the fence line. All the elephants, except the lone bull, now cannot enter the scheme through the fence. The lone bull was able to cross the fence on several occassions by using his tusks, which are not conductive, to break the insulators that hold the wire to the fence post.

CONCLUSION

The electric fence is considered as a good non-lethal defensive barrier against elephants. It is mainly a psychological barrier and may not prove effective against very hungry and determined animals (Blair, Boon and Nache, 1979). However it proved extremely effective against the elephants living in the Kemasul Forest Reserve neighbouring the FELDA scheme. Unless Kemasul Forest Reserve is cleared for cultivation, it is sufficently large enough to be able to support the group on sustained basis. Logging has resulted in secondary forest and this forest with its secondary growth favour the elephants. Olivier, 1978 suggested that the home range size of elephant herds is less in secondary forest than in primary forest. Greater density of ground level vegetation due to opening canopy during logging result in greater density of available food and thus a smaller home range.

Although the electric fence at Kemasul has been very successful this should not be taken as indicative of the fences effectiveness else where. Each specific case should be studied before any decision is made on construction of electric fence around a scheme. The vital factor that should be considered is the effective feeding range left for the animals outside the scheme.

Although after completion of both section of fence at Kemasul, the frequency of elephant entry and damage were greatly reduced, a conclusion cannot be taken that the electric fence is the sole factor responsible. It should be noted that there were no more palms in the scheme at the end of 1979. While new ones were sup-

plied to the damaged areas in Nov., 1979. They were not old enough to be attractive to the elephants. A more indicative conclusion on the effectiveness of fence can only be evaluated at Kemasul at a later date.

Although a final conclusion on the effectiveness of the electric fence cannot be made at this juncture it should be noted that of all the alternatives of non-lethal defensive measure, the electric fence is considered the best. It can therefore be projected that a reduction in damage will result only if a scheme or an estate constructs a good electric fence, properly maintained and an adequate feeding range outside the scheme left for the elephants.

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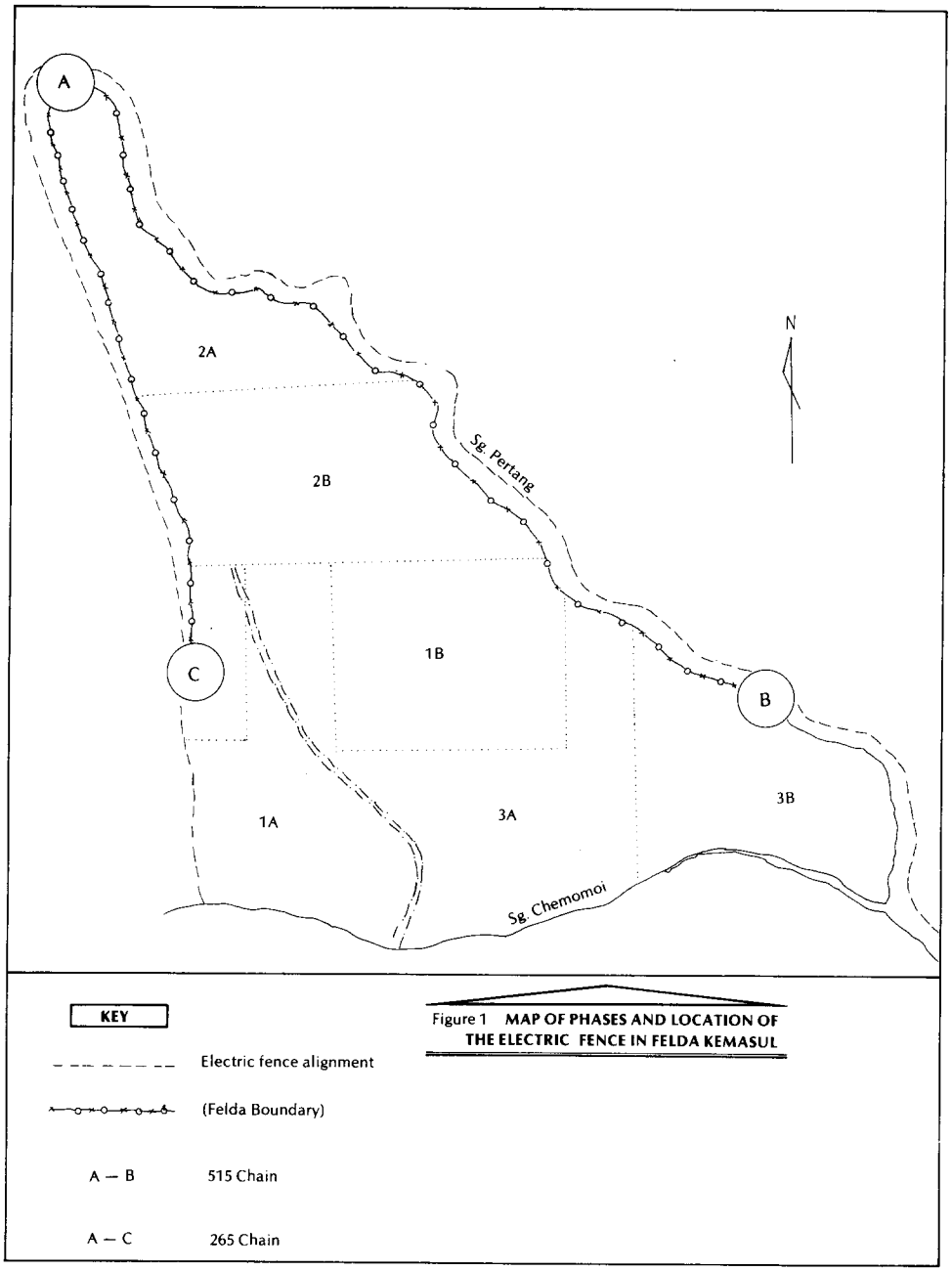

Figure 1 **MAP OF PHASES AND LOCATION OF THE ELECTRIC FENCE IN FELDA KEMASUL**

Vol. I October, 1982

PRELIMINARY OBSERVATION ON THE TRAGULIDAE AT KUALA LOMPAT

By:
Louis Clement Ratnam —

AIM: To observe the locations, movements, feeding habits and any other habits of the tragulidae found in Kuala Lompat.

BACK GROUND

The tragulidae which is also known as mouse-deer or chevrotains, are to be distinguished from the true deer (family Cerridae) by the lack of anthlers and an obomassum among the males. Instead the males of this species has enlarged cannines which protude from the lips. This family is regarded by taxonomists to be closer to the suidae (Pigs) and the Carmelidae (camels) than cerridae.

Scientifically the Malayan Tragulidae are considered to belong to two species, *Tragulus javanicus* and *Tragulus napoh.* These two species are generally similar except for size and color. There is no definite color as it varies between individuals. Harrison (1966) refer the Malayan Tragulidae as a reduction to two series. This statement underlines the taxonomic uncertainties of the situation.

The rural people including Orang Asli differentiate these three types according to body size with Napoh, Pelanduk and Kancil respectively. In Pahang, between Kancil and pelanduk, the former is reddish in color while the latter is blackish causing black color of its body. For napoh, the color is much paler compared to pelanduk and kancil.

Both species are classified as game animals and could be hunted with a license from May 1st. to May 31st. annualy. The hunting regulation required that hunting should only be carried out during the day. Hunting is made difficult by the scarcity of these animals during daytime and its speed when encountered. During the nightime, this animal would stay still or walk slowly when shone at thus making them an easy target for poachers and hunters. Besides being hunted, these animals are also trapped. Their population in the vicinity of villages are observed to be low.

STUDY AREA

The Study Area at Kuala Lompat is sited between the Sungai Krau to the east and the Sungai Lompat to the south extending about 500 metres in both direction. The forest is unlogged and primary in nature. Two forest types may be distinguished within the area, the lowland dipterocarp forest and a somewhat less defined riparan forest on the banks of the two rivers. Understorey vegetation on the banks of the Sungai Krau tends to be sparse and more open than that along the Sungai Lompat.

The entire study area is covered with mapped walking trails and is highly

suitable for observations. The initial trails were laid down by the survey department on a north-south and east-west plan in the sixties. Additional trails were added by various researchers in order to facilitate primate observations.

Although the area is primary in nature it may no longer represent a totally undisturbed primary forest. The forest to the east have been cleared in the early seventies for a rubber scheme. The effect of this upon the smaller mammals is not known. However bird netting records from about 1973 to present have shown a sharp decline in the number of birds trapped. In addition, the general level of bird songs throughout the day, particularly at dawn, has fallen considerably over the same period.

Human activity in the area too has increased when the Department's Elephant Welfare Unit made its headquarters at Kuala Lompat in 1976.

METHODS

Three different methods were used with a slightly different aim.

Plastic funnel bait trail

This was an experiment to develop a rapid passive mouse-deer censusing system.

This system consisted of setting out various types of bait, jack fruit (*Artocarpus sp*) sweet potato and leaves of *Sapentium* species. Pieces of jack fruit and sweet potato were cut into chips 50 cm. by 25 cm. These chips were secured at the base of a 5 inch plastic funnel and the funnel fixed to a wooden stake in the earth at a height of about one foot from the ground. These baits were then set in a line along the Main Trail at 50 metre intervals. The leaves of *Sapentium sp* were hung in a tightly tied bunch along side the funnel for it is known that the tragulidae have a strong preference for these leaves. These leaves were to serve as confirmation of mouse-deer for many species would eat the other bait. Only the birds would normally eat sapentium. Each morning the bait line was checked, the baits changed and baits eaten were brought back for closer examination.

Diurnal observation

Day observations were made with the assistance of 2 observers. A number of walking routes were planned utilising the existing paths such that a number of main pathways would be walked at least once a day. Smaller side paths were covered at the observors inclination. Walking observations began at 7.00 am. and continued up to 1.00 pm. They recommenced at 2.00 pm. and continued until 6.00 pm. A few recordings were made between 1.00 and 2.00 pm. but these are ignored in the tabulations. Observers were instructed to walk slowly and often stop to make observation and continue as quitely as possible. Observers were also requested to make notes on behaviour, feeding, etc. All observations were marked on the spot using a two inch aluminium disc. Each observation was given a specific number with the time and date noted on the disc and a recording sheet. Discs were placed along the path at the point nearest to where the animal was seen and its direction and distance from the animals position were noted. These discs allowed for accurate measurements and plottings to be made later when such activity would not interfere with observation.

Nocturnal observations

These observation were made by walking along trails and from a fixed platform in the forest. A beam headlight was used to spot animals by their eyeshine.

Walking was done at a very slow pace and the light beam was used as follows. First the beam was used to scan the trail directly in front of the observer and then to the right and left until a line per pendicular to the direction of the path was obtained. The beams were shone as far as the thickness of the undergrowth allowed. The observer then moved forward to the furthest point along the path previously beamed and repeated the procedure. The total number of such walks was limited because the forest is technically out of bounds from 6.00 pm. to 7.00 am. the following morning due to security reasons. Observations from the fixed platform like wise are limited. Here observations were carried out from 6.00 pm. to midnight and from 5.00 am. to 7.00 am.

RESULTS

Plastic funnel bait trial

After a two month trial period, the plastic funnel bait method was found to be an unreliable indicator. Method of setting up the bait would limit the number of animals that could take it. At the same time as part of the bait would be retained within the funnel, the teeth marks on this remnant would indicate the type of animals involved. Of a total of 22 probable mouse-deer feedings on jack fruit potato only 4 were confirmed as such by feeding upon the *Sapentium* during the same night. Teeth mark analysis proved to be unreliable as most bait points were highly attractive to ants, cockroaches, moths and rats. After the 1st week this was confirmed by checking the bait at night when these insects were found feeding on the bait.

Daytime observations

After a period of orientation to mouse-deer spotting, an average of two observers carried out a six month survey as described accumulating a total of 250 man-days of observation. Table A gives the analysis of their observations against time of day. There were a total of 109 sightings during this period.

Table A

Frequency of sighting vs. Time of Day

Time period	No. of sighting	% of total sightings
7.00 — 8.00 a.m.	31	28
8.00 — 9.00 a.m.	26	23
9.00 — 10.00 a.m.	21	19
10.00 — 11.00 a.m.	15	14
11.00 — 12.00 noon	10	9
12.00 — 1.00 p.m.	2	2
2.00 — 3.00 p.m.	1	1
3.00 — 4.00 p.m.	2	2
4.00 — 5.00 p.m.	2	2
5.00 — 6.00 p.m.	1	1

Animals were spotted all over the study area. The number of sighting on the south of the main trail and along the Sungai Lompat were greater. No animals were seen along the banks of the Sungai Krau in the sparse understorey although several spotting were made on the banks of the Sungai Lompat whose understorey is thicker. However several sightings were recorded on the trail parallel to the Sungai Krau. All of these spottings occured in the late afternoon and were of animals crossing the trail from the higher ground of the west, eastwards towards the river. All these sightings occurred during very dry periods when there had been no rain for more than two weeks and the forest floor was clearly dry.

Weather had a marked effect on mouse-deer spotting. The majority of the sightings were made during the rainy season when the forest was damp and the observer could move relatively quitely. The lowest number of sighting occured during the combination of a dry season and a heavy leaf fall. The dry leaf litter made quiet movement impossible.

Most of the sightings were of animals startled into flight. The observers attention would be drawn to a sudden scampering noise. A quick glance in the direction were sometimes followed by peering low through the undergrowth or perhaps moving forward or backwards along the trail would usually reveal a mouse-deer. The observer had between two and four seconds to make this sighting after which the noise would cease and the animal not be visible any longer.

It was also noted that this particular behaviourial response occured between 20 and 40 m from the observer. Animals which became aware of an observerat distance greater than this would proceed to walk away rapidly but very quietly. On the two occassions when animals were seen at greater than 50 m, they were seen to be moving away from the observer. Their path was not directly away from the observers position but at an angle to the radian lines. The pathway taken by the animal was crooked and wavy and in both occassions the animal apparently disappeared while within the observable distance of the observer.

When an animal becomes aware of an observer it will freeze. This was demonstrated several times when observers stopped at random and on making a move towards the side of the path they startled an animal into flight from practically under his feet. These were the only circumstances where animals were contected this close.

Thus, it is believed that there is a certain observer — animal distance which will cooked the rapid flight response. This distance is between 20 and 40 meters. Within this distance, animals are almost certain to freeze. The freezing or rapid walk away response may occur in the 20 — 40 m zone but this has not been demonstrated although it is possible and becomes probable the further one gets. It is highly unlikely that the rapid walk away response occurs within 20 metres as this is near enough to be observed at least for sometime. The freezing response should occur anywhere but this would be the most difficult to demonstrate.

Day time feeding was observed on only 3 occassions. The fruit of a wild mango (kundang), a yellow fallen leaf, and the leaves of a small shrub were each observed once.

Nocturnal observations

During torching of the trails, when one animal was spotted, great care and caution were exercised to try any spot it made and the table B shows these efforts were rewarded. A total of 44 spottings were made during a brief two week period. Animals found within a radius of 30 metres were considered one group and all sightings were of the*T. Javanicus* type.

Table B. Group size against the times seen

Group size	Observations Times Seen	Percent of total %
1 animal	4	9
2 animals	25	56
3 animals	0	0
4 animals	13	29)
5 animals	2	4.5) 33.5

Only one animal was spotted before 7.45 p.m. It was moving along slowly with its head held low. It was observed to pick up an feed on a leaf off the ground which was still green.

All other observations were made between 8.00 and 10.00 p.m. Animals when observed appeared to be in a resting position. Several were observed carrying out a chewing motion of the mouth.

Observation from the platform were considerably less rewarding. Most of these observations occured from 6.00 p.m. to about 10.00 p.m. Generally after 9.00 p.m. no animal movements were observed, several nights were spent on the platform.

There was a total of ten sightings. Eight of these were in the evening and all occured between 7.00 and 7.45 p.m. The two sightings (each 1 pair) in the morning at 5.30 a.m. and 5.50 a.m. were of animals resting within the sight of the platform. The time they moved into position is not known.

DISCUSSION

There has been no attempt to distinguish between *T. Napoh* and *I. Javanicus* in this paper. While *T. Napoh* may have been spotted, the identification is not certain and for practical purposes this study is of *T. javanicus* only. The presence *T. Napoh* in the study area has not been confirmed.

Table A indicates very strongly that the animal is not entirely crepuscular in activity. From the night observation, it would appear to become active a little before dawn and that the level of activity gradually tapers off until noon.

Afternoon actively is sporadic and animals seen were mainly moving towards Sungai Krau during appreciably dry periods and presumably in search of water.

Unfortunately it is not possible to directly correlate daylight and night observations due to the different methods of spotting used as well as the different responses of the animal.

While the data base is not large enough to be conclusive certain patterns are indicated.

Firstly the species appears to be feeding up to about 7.45 p.m. after which it goes into a post feeding rest position.

Secondly, the animal is strongly paired in nature and this is evidenced by 40 out of 44 sightings which were of pairs.

Thirdly, groups or association between pairs during the evening post feeding rest is possible as evidenced. 15 out of 40 sightings being of more than one pair. This phenomenon may also be explained by some attractive food sources in the immediate vicinity. However such food source i.e. fallen fruit was not found.

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KUALA TAHAN COMPLEX, DEVELOPMENTS, FUNCTION AND ITS FUTURE

By:
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ABSTRACT

This paper looks briefly at Taman Negara in general and Kuala Tahan Complex in particular. Its traces its history; it looks at the type and location of visitor facilities; it briefly examines the limit of Kuala Tahan as a recreation centre and finally looks at some possible areas for future recreation development.

The development of visitor facilities in a national park should be carefully planned within the concept of a National Park so as to minimise damage to the park and its natural surroundings. Sufficient visitor recreational facilities should also be provided to enable the park visitors benefit and enjoy the natural beauty of the forest.

In Taman Negara, the Department of Wildlife and National Parks Peninsula Malaysia has attempted to achieve this by siting the visitor facilities on the very edge or border of the park where and when necessary to create some facilities deeper in the park, naturally disturbed areas such as river banks, clearings and around salt-licks have been utilised. Extensive areas of the park are retained as wilderness areas and the normal visitor is not allowed into such areas. They serve primarily as a strict sanctuary for the indigenous flora and fauna of the area and as a base for scientific research.

Taman Negara itself was created in 1939 and except for areas of visitor use, the rest has remained undisturbed due to inaccessibility. Thus, the park serves the purposes of recreation, education scientific research, leisure and tourism. Tourism and recreation were not developed until two decades ago. Prior to that, the park was visited very rarely by fishing and wildlife enthusiasts. Table 1 shows how the number of visitors increased over the last two decades.

Table 1 — The number of visitors that visited Taman Negara from 1969 — 1981

Year	**No. of visitors** (person)
1969	516
1970	895
1971	1,077
1972	1,686
1973	1,254
1974	1,163
1975	1,741

Year	No. of visitors (person)
1976	2,091
1977	3,205
1978	4,305
1979	5,104
1980	5,093
1981	6,420

The Kuala Tahan Complex consists of:—

(i) Visitor accomodation and attendant facilities
(ii) High hides at Yong, Belau, Cegar Anjing, Tabing and Kumbang
(iii) Fishing lodges at Lata Berkoh, Perkai, Kenyam and Trenggan

(i) **Accomodation facilities:**

In the last ten years, this department has maintained reasonable and comfortable visitor accomodation facilities at Kuala Tahan. Originally, these facilities were all built of local materials. The roof was made from palm thatch (bertam — *Eugeisson tristis*), walls of kulit terap (Terap Hitam and Terap Nasi — *Arthocarpus scortechinii* and *Arthocarpus elasticus*) while the beams and floor were made from hand sawn hard wood (normally merbau — *Intsia palembanica* or resak — *Vatica spp.*). While these beams had a charm of their own and were the delight of many a foreigh visitor, their rough finish has made it necessary that they be replaced and today the park visitor will find all accomodation to be basically JKR designed of cement and wood with attached bathrooms and modern sanitation.

Fifteen years ago the department realised that the national park was going to become increasingly attractive to tourists both international and local and steps were taken primarily through the Malaysia plans to obtain funds for this purpose. In 1965 all accomodation was of the basic thatch and kulit terap variety. Under the First Malaysia Plan $70,000 was spent on renovation on the Old Rest House. In the Second Malaysia Plan a $500,000 allocation was utilised to put up chalets, staff quarters and one rest house. The Third Malaysia Plan was $2.779 million being utilised to further increase these facilities and to replace the kulit terap type lodges at Kenyam and Trenggan. Under the Fourth Malaysia Plan $3.85 million was allocated and utilised to build the present rest house and restaurant complex to add more chalets to the complex and to build several architecturally-designed hides at the salt-licks.

(II) **High Hides:**

These high hides are located at Yong, Belau, Cegar Anjing, Tabing and Kumbang (see map 2). With the exception of Cegar Anjing which was created recently on the edge of an old landing strip, all others are naturally occurring and have been known since the early 30's. About twenty years ago when the first trickle of visitors started coming to the park, local material was used to build small viewing platforms attached to trees overlooking the salt-licks. These platforms were like little tree houses and capable of holding about four persons in some discomfort. Fifteen years ago these were upgraded for larger sized hides with bunks where visitors could sleep part of the night at least. While this system was more comfortable, it did not result in increased viewing of wildlife. The next addition was modern sanitation. Today the architecturally-designed hide is almost a little chalet on stilts

with bunks, a large viewing window, a space for dining and sitting with sanitation located one floor below.

(iii) **Fishing loges:—**

Fishing lodges have been through an evolution, beginning as a semi-permanent camp sites through the kulit terap stage to today's JKR design two-room lodge complex with attached bathrooms, kitchen and running water.

Visitors activities in the park

(i) **Boating:—**

Two rivers within the complex that offer visitor activities, are the Tembeling and Tahan. The highlights of the Tembeling river is the Tembeling gorge with its seven rapids within Kuala Tahan and Kuala Trenggan. They are Jeram (1) Tabong (ii) Nusa (iii) Dua (iv) Abai (v) Teras (vi) Bidari (vii) Panjang. Shooting the rapids in the park boats, handled by perhaps the most skillfull river boatmen in the country, has always been the attraction of this river.

The Tahan is one of the most tranquail river streams in the park. One can drift downstream through neram galleries (Keruing Neram — *Dipterocapus oblogifolius*). The neram are huge trees which grow mainly on the bank of rivers. They branch across rivers so that they form a shaded canopy over the river.

(ii) **Fishing:—**

They can either be carried out in the Tembeling or the Tahan or its tributaries. Some of the well-known fishing grounds are at Perkai, Kenyam Kecil and Sepia where good Anglers have been known to spin for a number of game river fish such as Kelah — *Tor tambroides, Tor douronensis,* Sebarau — *Hampala macrolepidota,* Jelawat — *Leptobarbus hoeveni* and Toman — Channa spp.

(iii) **Picnicking**

There are several places along Tembeling and Tahan, but the most famous are at Lubuk Simpon and Lata Berkoh.

(iv) **Jungle trails**

There is a system of jungle trails developed around the Kuala Tahan Complex (see map 2). Some trails requiring less than two hours of slow walking while the longer trails may take a day or more. All shorter trails are well marked and regularly maintained.

(iv) **Mountain Climbing**

Visitors are given several choices. The shortest is Bukit Teresek (344m) or Bukit Guling Gendang (569 m) while the more adventurous can take on Gunung Tahan (2,187 m) (see map 2). The shortest, Bukit Teresek is a one-hour hike to the top, while it takes 5 days to climb Gunung Tahan, the highest peak in Peninsular Malaysia.

Carrying capacity of Kuala Tahan Complex

It is theoritically possible to erect a multi-storey hotel complex at Kuala Tahan

capable of housing several hundred persons at a time. But the department is conscious that this is not the way development in Taman Negara should be planned. Taman Negara offers a unique kind of experience, the value of which is greatly dependent on the ability of a visitor to enjoy, so solitude, quiet and those other conditions which will enable him to observe birds and wildlife and generally enjoy an experience far from crowded humanity. Thus, each recreation facility at the park has been carefully studied to come to some arbitrary visitor level at which this facility can be enjoyed in the circumstances elaborated above. These studies showed that there were two recreation facilities which cannot be expanded any further and are thus limiting factors. These are (i) Lata Berkoh and (ii) High Hides.

Lata Berkoh

It was felt that Lata Berkoh would lose its value if more than 30 persons were to use this picnic spot at any one time. This figure after computation means that Tahan complex accomodation should not exceed 135 persons at any given time if all visitors are to be given reasonable excess to this facility.

High Hides

Similar computation for High Hides dictates that no more than 160 persons should be allowed into Kuala Tahan if this facility is to be reasonably enjoyed.

Kuala Tahan

The present capacity of Kuala Tahan is 134 beds and is such is very close to the limit imposed by Lata Berkoh. Should more visitors be allowed into Kuala Tahan, either the quality of Lata Berkoh experience will deteriorate or some people who wish to utilise the facility will be turned away.

Future development of Taman Negara

While the standard of facilities will be upgraded, the overall capacity of Kuala Tahan will not be increased. Therefore future development of visitor facilities will take the form of Kuala Tahan type complexes in other areas of the park. The areas that have been identified so far for this purpose are in Merapoh in the western part of the park, Kuala Koh (Kelantan) in the north and Sungai Badak (Trengganu) in the east. (See map 1).

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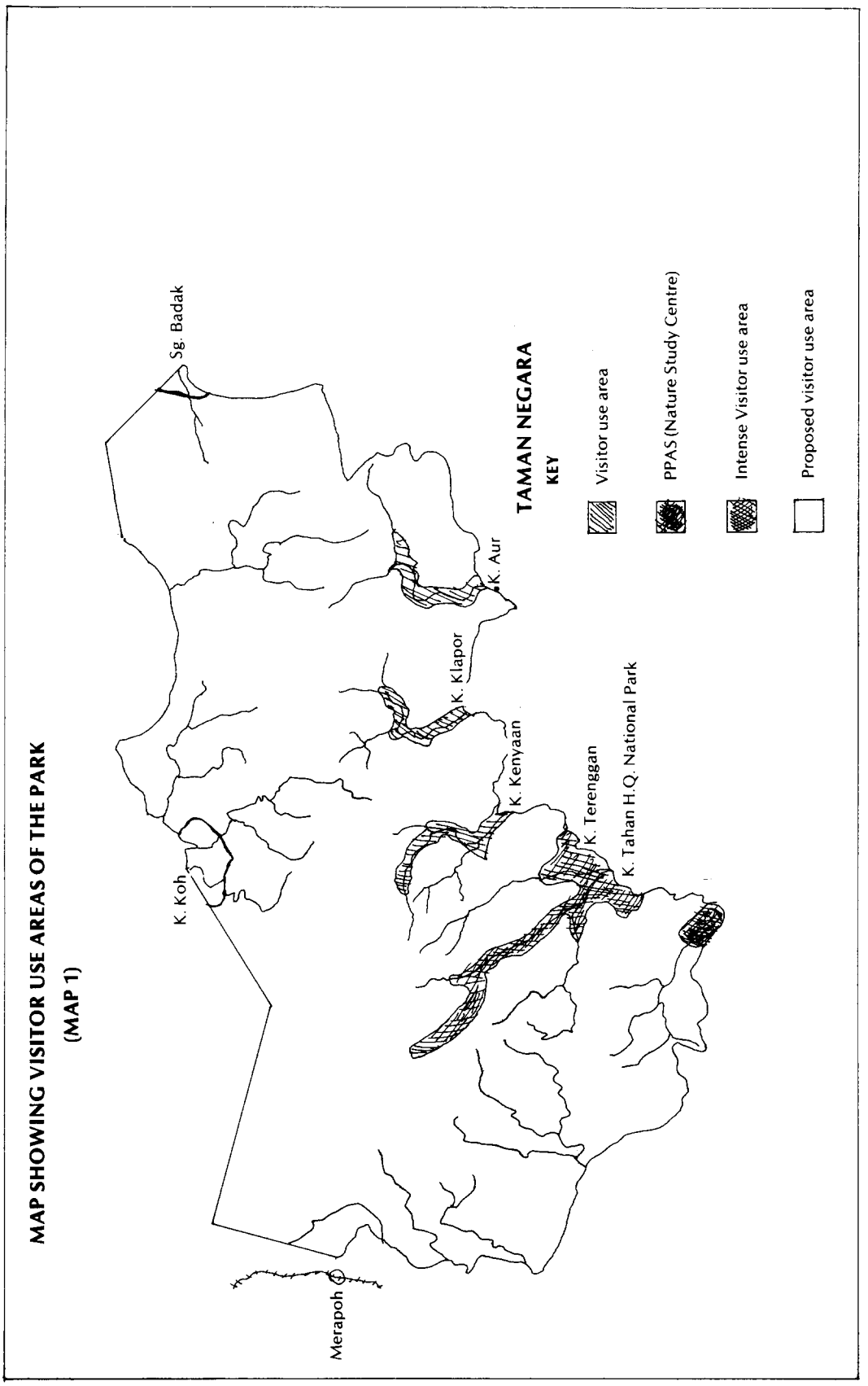
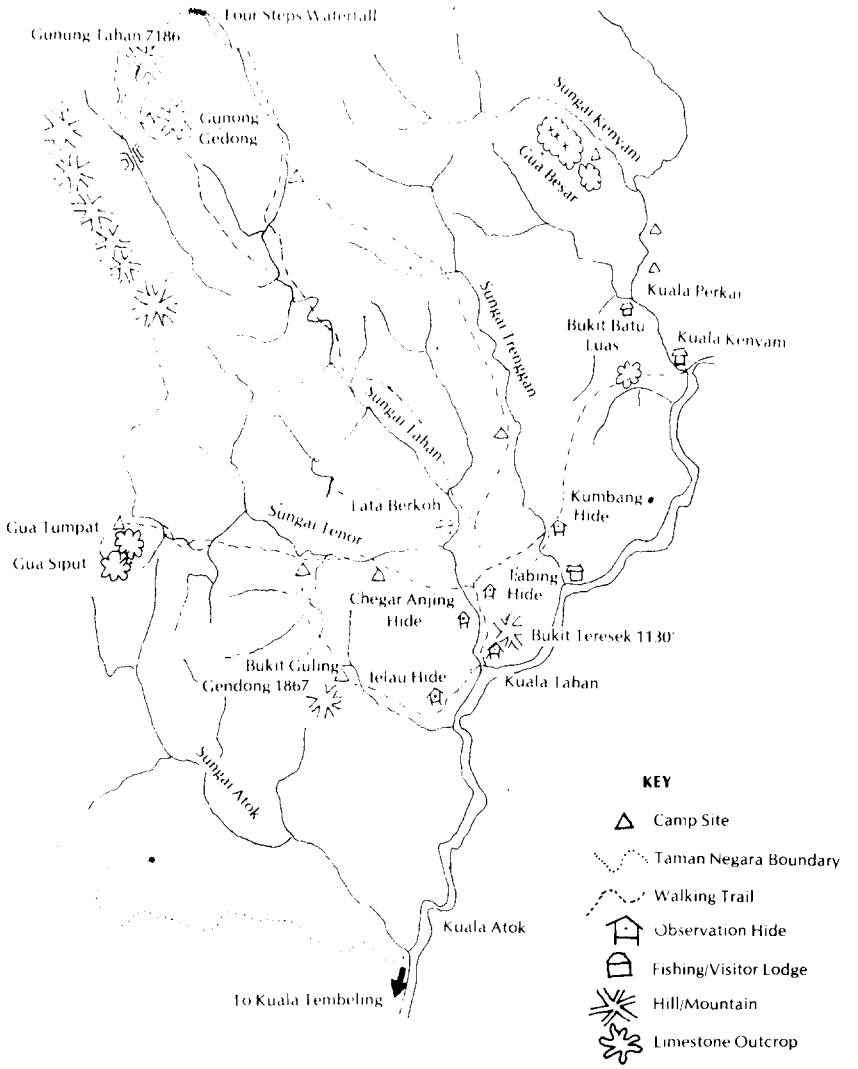

MAP SHOWING VISITOR USE AREAS OF THE PARK
(MAP 1)
TAMAN NEGARA
KEY
Visitor use area
PPAS (Nature Study Centre)
Intense Visitor use area
Proposed visitor use area
Sg. Badak
K. Aur
K. Klapor
K. Kenyaan
K. Terenggan
K. Tahan H.Q. National Park
K. Koh
Merapoh

TAMAN NEGARA VISITOR FACILITIES

(MAP 2)



OBITUARY

By:
Abdullah b. Mohd

Abdul Rahim bin Jaleh, was born in 1937 in Kampung Jaya, Kuala Krau which is about 24 miles from Temerloh. He started his service as a labourer for the Department of Wildlife and National Parks in 1963 and was placed in Kuala Lompat Post. He was appointed as a game ranger in 1969 and was transferred to Kuala Gandah Post. Here, he was given the responsibility to look after the Krau Wildlife Reserve.

He was transferred to Pekan and then to Temerloh in 1974. On 1.1.1981, he was transferred to catch and translocate an elephant herd which was in Felda Serting Hilir in Bahau. He succeeded in capturing one bull elephant in this operation. On the morning of 9th. July, 1981, and in the course of his duty, the elephant which was tied at the edge of the forest broke loose, charged at him and stepped on his chest. He died on the spot.

His deeds will be remembered and during his services he was considered as a dedicated ranger. Socially he was approachable and jovial. His departure is considered as a big loss to the department. May God bless his soul and place him amongst the righteous.