MALAYSIA

RHINO CONSERVATION ACTION PLAN

JUNE 1993

MINISTRY OF SCIENCE, TECHNOLOGY, AND ENVIRONMENT
DEPARTMENT OF WILDLIFE AND NATIONAL PARKS
PENINSULAR MALAYSIA

MINISTRY OF TOURISM AND ENVIRONMENTAL DEVELOPMENT
DEPARTMENT OF WILDLIFE
SABAH

MINISTRY OF RESOURCE PLANNING
DEPARTMENT OF FORESTRY
SARAWAK

RHINO CONSERVATION ACTION PLAN MALAYSIA

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Finally, the greatest acknowledgement mst be extended to Mohd Khan bin Momin Khan, who has provided leadership for rhino and wildlife conservation in Malaysia and indeed all of South East Asia for 30 years in his capacity as Director-General of the Department of Wildlife and National Parks (1970-1992) and as Chairman of the IUCN SSC Asian Rhino Specialist Group.

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SUMMARY - RHINO CONSERVATION ACTION PLAN - MALAYSIA

The Rhino and Their Protected Areas:

The Sumatran rhino is under serious threat of extinction in Malaysia by the end of this century due to poacher pressure and habitat degradation. Numbers of rhino have declined to low, possibly inviable levels in both the Peninsula and on the island of Borneo. Fewer than 220 rhino are estimated to survive in Malaysia: 77-130 in Peninsula; 48-68 in Sabah; and fewer than 20 in Sarawak. Distribution is fragmentary but 7 major populations areas considered the most viable have been identified for concentration of protection and management effort.

The Conservation Problems:

The fragmented distribution of rhino is impeding reproduction and impairing long-term genetic and demographic viability. The decline in numbers continues at a gradual but steady rate due to poaching and habitat encroachment. Moreover, many rhino occur in areas inadequately protected. Scientific analyses (i.e. population and habitat viability assessments (Foose et al 1993)) have indicated that populations smaller than 50 are at appreciable risk of extinction due to genetic and demographic problems.

The Rhino Action Plan:

The Rhino Action Plan consists of both *in situ* and *ex situ* components. More specifically, the major components are:

(1) *in situ* protection and management to enable survival and recovery of viable populations in the wild.
(2) Translocation of rhino in inviable situations into viable wild populations, "gene pool" sanctuaries, or captive (intensive management) facilities.
(3) Captive (intensively managed) facilities programmes for propagation and research.
(4) Creation of a "gene pool" sanctuary for propagation and research.

The Projects

Immediate and intensive action is required to arrest the decline and to reverse the trend to permit recovery of viable populations of rhino. This action will require both increased commitment of governments and more investment from the international donor community.

A total of 14 major projects have been identified that require some level of external funding.

The total cost of these projects is:	$	6,865,320
The external funds required are:	$	3,845,000
The funds already recruited (from governmental and n.g.o. sources) are:	$	3,020,320
A major proposal has been submitted to the Global Environment Facility for:	$	900,000.

MALAYSIA
RHINO CONSERVATION PLAN

SECTION A

INTRODUCTION AND BACKGROUND

JUNE 1993

SECTION A: INTRODUCTION AND BACKGROUND

1 INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION:

This action plan for conservation of the rhinoceros in Malaysia derives in part form the conservation strategy for Asian rhino species presented in the Action Plan for Asian Rhino Conservation of the IUCN Species Survival Commission (Khan 1989).

The conservation action plan for Malaysia concentrates on the survival and recovery of viable populations of the Asian two-horned or Sumatran rhino *Dicerorhinus sumatrensis*. The Asian lesser one-horned or Javan rhino *Rhinoceros unicornis* also occurred in Peninsular Malaysia but became extinct in the 1930's, with the last known individual killed in 1932. Ultimately, the Malaysian rhino conservation strategy aspires to restore this species. However, the opportunity to pursue this possibility does not seem probable for the period of this action plan.

It should be noted that these two species of rhino native to Malaysia are the rarest of rhinos. While their numbers have not declined as precipitously as the African species in recent years, the combined populations of Sumatran and Javan rhinos are less than half the number of any one of the other three species of rhino.

The Sumatran rhino is under serious threat of extinction in Malaysia by the end of this century due to poacher pressure and habitat degradation. Numbers of rhino have declined to low, possibly inviable levels in both the Peninsula and on the island of Borneo. As indicated in Table 1, fewer than 220 rhino are estimated survive in Malaysia: 77-130 in Peninsula; 48-68 in Sabah; and 10-20 in Sarawak. The distribution of these rhino is fragmented impeding reproduction and impairing viability (Figures 1 & 2). The decline continues at a gradual but steady rate due to poaching and habitat encroachment. Moreover, any rhino occur in areas inadequately protected. Scientific analyses (i.e. population and habitat viability assessments (Foose et al 1993)) have indicated that populations smaller than 50 are at appreciable risk of extinction due to genetic and demographic problems.

Immediate and intensive action is required to arrest the decline and to reverse the trend to permit recovery of viable populations of rhino. This action will require both increased commitment of governments and more investment from the international donor community.

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(4) Creation of a "gene pool" sanctuary for propagation and research.

This Action Plan will be adaptively implemented and dynamically refined as the various actions occur, as more information becomes available and as circumstances change. Techniques of population and habitat viability analysis (PHVA) and geographic information systems (GIS) will be used to facilitate the implementation and refinement process.

TABLE 1. NUMBER & DISTRIBUTION OF SUMATRAN RHINO IN MALAYSIA

Locality	Current Population	Target Population	Size of Area (km^2)	Status of Area
PENINSULA:				
Taman Negara	22 - 36	200	4,400	National Park
Endau Rompin, Pahang/Johore	10 - 25	50-75	1,000+	Propsd State Pk
Selama, Perak	10 - 15	50-75	900+	Forest Reserve
Belum, Perak	10+	50-100	1,500	Forest Reserve
Bubu Forest, Perak	2 - 3			
Kuala Belah, Kelantan	2 - 4			
Sungai Depak, Kelantan	2 - 4			
Sungai Yong, Kelantan	3 - 5			
Besut, Trengganu	3 - 5			
Krau, Pahang	1 - 2		500	
Bukit Gebok, Pahang	1 - 2			
Ulu Lepar, Pahang	1 - 2			
Ulu Atok, Pahang	1 - 2			
Sungai Dusun, Selangor	1 - 2		40	
Gunung Inas, Kedah	2 - 4			
Gunung Belumut, Johore	3 - 4		230	
Mersing Coast, Johore	3 - 5			
Subtotal - Peninsula	***77 - 130***	***400***	***~ 8,000***	
SABAH:				
Tabin	7 - 17	100	1,200	Wildlife Resrv
Danum Valley	13 - 23	100	400-1000	Prvt.Cons.Area
Other Areas	18		?	
Isolated Individuals	10			
Subtotal - Sabah	***48 - 68***	***200***	***1,500-2,000***	
SARAWAK:				
Limbang/Pulong Tau	10 - 20	100	1,000+	
Subtotal - Sarawak	***10 - 20***	***100***	***1,000+***	
TOTAL	**135 - 218**	**650-750**	**3,000-4,000**	

FIGURE 1

NUMBER AND DISTRIBUTION OF SUMATRAN RHINO
PENINSULAR MALAYSIA

Total = 77 - 130 Rhino

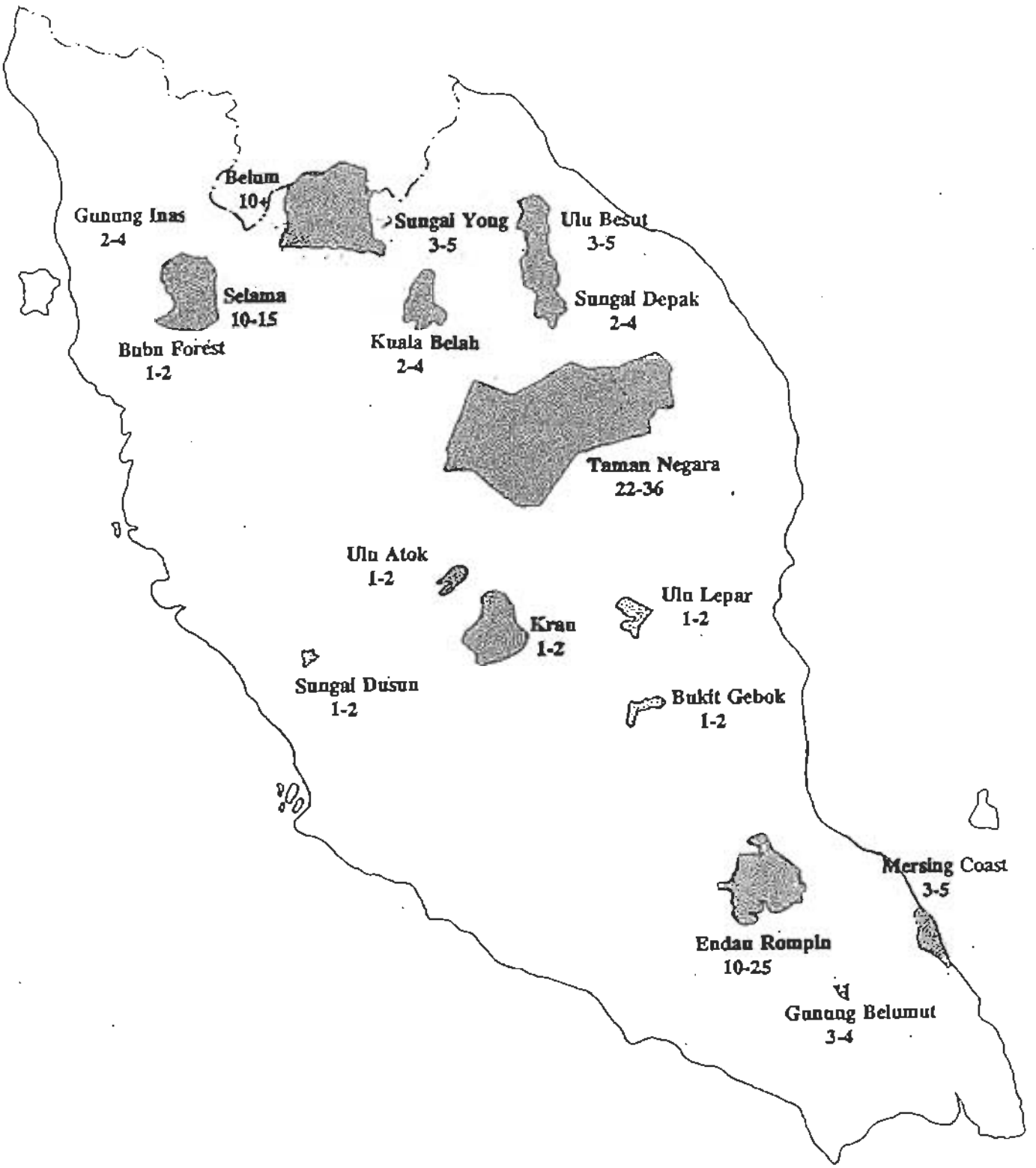
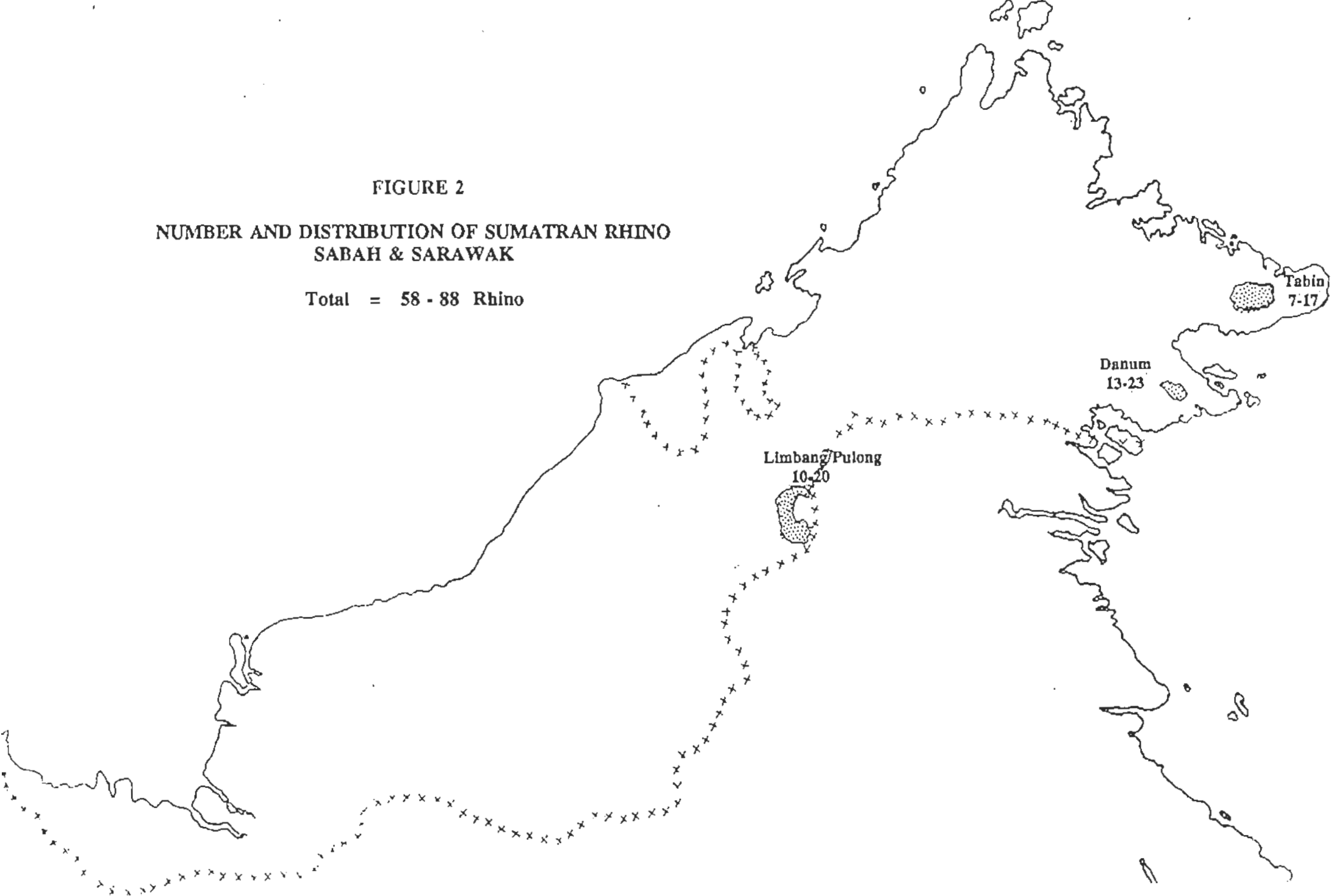


FIGURE 2

NUMBER AND DISTRIBUTION OF SUMATRAN RHINO
SABAH & SARAWAK

Total = 58 - 88 Rhino



The Action Plan encompass all of Malaysia, but is organized into separate sections for the Peninsula, Sabah, and Sarawak. Functionally, rhino conservation in Malaysia is administered under three more or less autonomous authorities: the Department of Wildlife and National Parks of the Ministry of Science, Technology, and Environment of in Peninsular (West) Malaysia; the Wildlife Department of the Ministry of Tourism and Environmental Development in Sabah,; and the Wildlife Section of the Department of Forestry in Sarawak. This division reflects the geographic separate and political histories of these three areas. Peninsular Malaysia is also known as West Malaysia; collectively Sabah and Sarawak are know as East Malaysia.

The division also corresponds to the possible taxonomic distinctness of the rhino in mainland and on the island of Borneo (Groves 1967). The mainland rhino are currently considered to be the subspecies *Dicerorhinus sumatrensis sumatrensis* while the rhino on Borneo are classified as *Dicerorhinus sumatrensis harrisoni.* This distinction is currently under scientific review, but for now both Malaysia and the Asian Rhino Specialist Group of the IUCN Species Survival Commission (SSC) have decided to conserve these geographical varieties as separate taxonomic units for conservation.

1.2 BACKGROUND

1.2.1 Peninsula

Peninsular Malaysia contains the second largest concentration of Sumatran rhinoceros. Only Sumatra in Indonesia is estimated to have more rhino. In terms of the global conservation strategy for this species, the Peninsula represents a major component and will provide the base from which, hopefully, the species can be restored to viable numbers on the Asian mainland.

1.2.2 Sabah

The State of Sabah is of particular importance in the conservation of Malays's wildlife on account of (a) its large size (73,620 sq. km.), (b) its extensive forest cover compared with Peninsular Malaysia and (c) the fact that it has a greater diversity and abundance of large mammal species than other States (Payne and Andau, 1991). Furthermore, the IUCN/SSC Asian Rhino Action Plan (Khan 1989) recognises Sabah's distinctive role in the conservation of the Sumatran rhino (*Dicerorhinus sumatrensis*) within Malaysia and provides detailed recommendations about rhino conservation and management in the State.

The Sabah State Government has recently undertaken a number of significant actions by way of acknowledging its heavy responsibilities in wildlife conservation. These include the development of a wildlife policy, the preparation of a state conservation strategy (and a mechanism for its implementation) and the radical overhaul of its conservation legislation. All these actions take account of the need for greatly strengthened protection of the State's endangered species, of which the Sumatran rhino is the foremost, acknowledging some present inadequacies.

In addition to the need to improve biodiversity conservation *per se*, there is widespread recognition that wildlife possesses significant potential for contributing to Sabah's socio-economic development, particularly via ecotourism. This "financial incentive" to improve the quality of wildlife and wild habitat protection is welcomed by the conservation community and augurs well for an intensified effort on behalf of the beleaguered rhinoceros population in the State.

The State Government has for a number of years been doing its best to conserve the rhino population and yet, in spite of these efforts, rhino numbers continue to decline, the major threat being identified as illegal hunting (Payne, 1990,b). It is thus clear that if this highly endangered large mammal is to survive in Sabah efforts to protect it have to be intensified with immediate effect. Realistically, this can only be fully achieved if the State's own resources can be reinforced with some modest technical assistance from international sources. This is not an indication of local weakness or a lack of resolve but rather endorsement of the now widely acknowledged fact that biodiversity conservation is a responsibility which often has to be shared by parties other than those who are the immediate custodians of a threatened resource.

2. POPULATION STATUS, DISTRIBUTION, AND TRENDS

2.1 Peninsular Malaysia

2.1.1 Historical Summary

In the early 1900's, the Sumatran rhino was widely distributed in Peninsular Malaysia but numbers were already observed to be low due to both legal (sport) and illegal hunting. (Stevens 1968). In the early 1960's, it was thought that only a few rhino remained and were restricted to the northern part of the Peninsula. An estimate in 1968 (Stevens 1968a) reported that the population was about 47 individuals located in Johore, Selangor, Perak, Trengganu, Kelantan, Kedah, and in the National Park. Scientific studies and professional of the rhino surveys commenced in 1965 with David Strickland's work in Sungai Dusun. From 1974-1978, an U.S. Peace Corps programme officer conducted research on the rhino in Endau Rompin National park. A Malaysia counterpart was recruited in 1977 to become the head of a Rhino Unit within the Department of Wild Life and National Parks. This Rhino Unit has continued more or less since then. It has conducted surveys and otherwise accumulated data from DWNP staff.

2.1.2 Present Status and Distribution

Based on such sources, a nationwide estimate of a maximum of 109 individuals in 16 localities (6 of which are within Taman Negara National Park) was published in 1987 (Khan 1987). The two largest populations were estimated to occur in Taman Negara and Endau Rompin. More recent surveys in 1992 in Selama Forest Reserve and in Ulu Besut (Pelagat Forest Reserve and Sungai Yong) has revealed additional small population of 10-15 and 3-5 rhino respectively. Thus, the current official total is considered to be 77-130 rhino. (Table 1).

2.1.3 Extent and Cause of Decline

Despite the increase in numbers due to improved information and perhaps some population growth (e.g. Taman Negara), loss of rhino and their habitat has continued. At least 10 rhino were known to be poached since 1985. Recently, the horn of at least 8 rhino were discovered in pharmacies in Penang and skin from another rhino was located in Johore. Surveys in areas of Endau Rompin that were inhabited by substantial numbers of rhino in the 1970's and 1980's have failed to detect any recent evidence of their continued existence. Habitat disturbance through heavy logging, rattan-collection, forest conversion (including dam construction and subsequent land inundation) have occurred in the Endau Rompin area.

2.2 Sabah

2.2.1 Historical Summary

The Sumatran rhino (*Dicerorhinus sumatrensis harrissoni*) was widespread and relatively common in North Borneo (now Sabah) at the turn of the century and the harvesting of rhino horn by native hunters was encouraged by government (Payne, 1990b). Between then and the 1970's the sub-species suffered a drastic reduction in numbers and distribution, mainly as a result of excessive hunting for its horn and other products. By the 1960's rhinos had largely disappeared from western and northern Sabah and become effectively confined to the forests of the South-eastern third of the State. However, it seems probable that the animal was always more

numerous in this segment of North Borneo an account of the greater availability of mineral salt resources, which appear to be one of its key habitat requirements (Davies and Payne, 1982).

By the late 1980's it was feared that the rhino was nearing extinction in Sabah but a statewide faunal survey conducted from 1972 to 82 showed that several small breeding populations still existed (Davies and Payne, 1982). Concern for the well being of these populations, as well as the many scattered isolated individuals led to the formation in 1985 of the Sabah Rhino and Wildlife Conservation Committee, which laid plans for a captive breeding programme at Sepilok. Its work has superseded by the newly formed Wildlife Department in 1988.

A limited survey of rhino distribution was carried out in late 1989 and early 1990 by WWF, Malaysia and concentrated mainly on previously unsurveyed rhino ranges in the Ulu Segama-Kuamut area (Payne, 1990a). Information from this survey and earlier published reports was used as the basis of the most recent review of the distribution and status of the rhino in Sabah by Payne (1990,b). This review is the source of much of the information in this section of the plan and the valuable work of Payne and his assistants is readily acknowledged.

2.2.2 Present Distribution and Status

Two areas in the south-eastern Sabah present-day range of the rhino are judged to have viable populations, with prospects of long-term survival, viz Tabin Wildlife Reserve (1,200 km2) and the reserved forests of the Ulu-Segama-Kuamut area (totalling approximately 4,000 km2). The latter includes the Danum Valley and Maliau Basin Conservation area, within the Sabah Foundation's 100-year logging concession. A further two areas may, when fully surveyed, prove to have viable populations, viz the Segaliud- Lokan/Deramakot/Tangkulap Forest Reserves and the Muruk Miau area adjacent to the East Kalimantan border.

Six other forest reserves are still thought to contain rhinos but their long-term viability is in doubt, either because the forest area is too small or on account of the limited size and composition of the pocketed rhino group. Yet more rhinos exist in unprotected forests, due for clearing for agriculture and are hence definitely doomed unless they can be translocated or brought into the captive breeding programme.

It is at present impossible to give anything like a precise estimate of numbers of rhino in Sabah (in spite of the total of 38+ for Tabin, the Dent Peninsular and Danum Valley indicated in the Asian Rhino Plan (Khan 1989). Davies and Payne (1982) estimated between 15 and 30 for the whole of Sabah but more recent surveys suggest a much higher figure would be appropriate.

In Tabin, a survey in mid-1991 produced a minimal figure of 7 animals but with a possible total of 17, depending on the type of extrapolation of actual survey results preferred. In the Danum Valley Conservation Area and surroundings a survey in September, 1992 produced an estimate of 13 to 23 rhinos in approximately 1,000 km2. An alternative interpretation of the survey data gave a figure of 9-16 rhinos in 470 km2 of protected forest. If, in addition to these estimates for the two "viable" populations, we postulate a minimum of three animals for each of the six areas of doubtful viability and at least ten "doomed" animals in other areas, a minimum of figure of 50 rhinos in Sabah would not be inappropriate. It would indeed appear likely from our present incomplete knowledge of the distribution that the total is between 50 and 100 individuals. This range could, however, prove substantially incorrect in the light of more definite data from the considerable areas at present unsurveyed. .

Apart from the alarmingly low numbers suggested by our present knowledge, the sex ratio of surviving animals gives cause for grave concern. The limited trapping of doomed individuals to date provides evidence that, at least in the central part of the species' range in Sabah, there is a high preponderance of males in the population. No mature females or young have so far been trapped (N= 6). The bias observed could, however, be a result of the trapping method used or merely reflect the true sex ratio in one particular area where most of the trapping has occurred. Payne (1990b) suggests it may result from differential killing of female rhino by hunters, who find them easier to locate than males due to their smaller home range centered around a mineral source, which is essential during pregnancy and lactation (van Strien, 1985). Among reports of rhino presence based on footprints, there are very few indicating obviously immature individuals, suggesting a low rate of reproduction. It is not possible to determine the sexes of adults from their footprints.

From the above, it is all too clear that the Sumatran rhino population in Sabah warrants a "highly endangered" rating and that serious concern for the survival of the sub-species is fully justified. Low numbers, a possibly skewed sex ratio in favour of males and little evidence of current breeding constitute the main basis of this concern. Whilst the number and distribution of population units *per se* is less critical, the fact that many of the smaller units appear to be "pocketed" and in reproductive isolation from the small number of viable groupings is a further major worry.

2.2.3. Extent and Cause of Decline

There is a view that the rhino in Borneo has been in long-term natural decline since the Pleistocene as a result of a lack of essential minerals, particularly sodium and phosphorus, which are leached from the soil by the high rainfall associated with rainforests (Cranbrook, 1986). Even if this is so, the enormous value placed on rhino horn making it a much hunted species, is undoubtedly the main cause of its drastic decline in Borneo this century. According to Bradley Martin et al. (1991) some Asian buyers are now paying as much as US $45,000 per kg. for Asian rhino horn, which is much preferred to African horn. Illegal hunting, although greatly reduced in Sabah by the species' increasing rarity and better protection, still occurs and still constitutes the major threat to the rhino's survival in the State.

In more recent decades the disturbance, loss and fragmentation of the rhino's habitat has added to its decline. Selective logging with heavy machinery temporarily disturbs the forest, alters the structure of the vegetation and greatly facilities access to remote areas of rhino habitat by hunters. These activities disturb and disperse rhino populations, disrupting reproduction. Clearance of large areas of forest for agricultural plantation results in net habitat loss and the fragmented pattern of it often leaves individuals or small groups of rhinos isolated from the mainstream population. Such pocketed animals are also frequenly vulnerable to hunting by virtue of the reduced size of their habitat, now surrounded by areas under agriculture and other human activities.

Whilst rhinos never live in monoculture plantations of crops such as oil palm or cocoa, their long-term reaction to tree plantations has yet to be assessed but it is likely that existing rhino habitat in Sabah will be subjected to this type of planting in the near future.

2.3 Sarawak

2.3.1 Historical Summary

As in Sabah, the rhino was formerly widely distributed and locally abundant throughout Sarawak. However, populations have been reduced, mostly by overexploitation, to the verge of extinction. Indeed until the late 1990's, it was believed the species had become extinct in Sarawak. A small remnant, however, has been discovered along the Limbang River in the extreme northeastern part of the State.

2.3.2 Present Status and Distribution

The only know rhino to survive in Sarawak is a remnant population in the Ulu Limbang. Estimates are very speculative but probably fewer than 20 survive. It is critical to preserve this nucleus and provide the opportunity for it to reexpand to assist in restoration of populations of this species, and perhaps the distinctive Bornean subspecies, to viable levels.

2.3.3 Extent and Causes of Decline

Overexploitation, both by poachers and by native hunters, has virtually exterminated the species from this State.

3. PROTECTED AREAS

3.1 Peninsula

3.1.1. Types of Protected Area in Peninsular Malaysia

There are 4 major types of protected areas occupied by rhino in Peninsular Malaysia: National Parks, State Parks (existing and proposed), Forest (also known as Virgin Jungle) Reserves, and Wildlife reserves.

3.1.2. Protected Areas for Rhino

3.1.2.1 Taman Negara

Taman Negara National Park is an area of 4,400 km^2 in the center of Peninsular Malaysia; almost entirely tropical forest consisting of four main types - lowland dipterocarp, hill dipterocarp, montane oak, and montane ericaceous; contains an estimated 50 Sumatran rhino; other threatened vertebrates include great argus pheasant, crested fireback pheasant, Malaysian peacock pheasant, tiger, elephant, tapir, serow; considered by many to be the best national park in South East Asia; the area has been subjected twice in the last two decades to proposals for a major dam that would have removed about 10% of the Park.

3.1.2.2 Endau Rompin

Endau Rompin is an area of 1,000+ km^2 on the western side of Peninsular Malaysia. The area contains two principal forest types - lowland mixed dipterocarp and hill formations which can be further distinguished as palm or heath forest; contains an estimated 10-25 Sumatran rhino with an ultimate carrying capacity of 100 rhino; inhabited by other threatened species including tiger, elephant, tapir, primates, etc.;

The area has been proposed as a national park but its jurisdiction is currently divided between two States, one of which (Johore) is completing gazettement and the other of which (Pahang) will initiate the process in the near future as soon as a Development and management Plan being prepared by the Malayan Nature Society is completed. This gazettement is critical since habitat degradation and poaching pressure continues. Preliminary boundaries have been demarcated for some time and encompass approximately 913 km^2 (of which 533 are in Johore and 378 are in Pahang). A 2 km no-logging buffer has been proposed around the circumference of these boundaries; if approved, the buffer would add another 294 km^2 to the park(s). Other extensions may also be proposed. It does seem that ultimately, status as a National Park would have benefits for rhino conservation.

3.1.2.3 Ulu Selama

The Ulu Selama area is encompasses both protected and protected tracts of tropical forest of considerable extent (> 1000 km^2) in the northwestern part of peninsular Malaysia. The protected part of the area is the Gunung Bintang Hijau Wildlife Reserve (900 km^2) the area contains a nucleus of 10-15 rhino and has a carrying capacity if properly gazetted of at least 100 rhino; GEF funding would provide an important incentive for official protection to be accorded to this area.

3.1.2.4 Ulu Belum

The area is located at the Malaysia-Thailand border in the north, the Perak-Kelantan border to the east, the Sungai Kenyer and Sungai Perak to the south and Temengor in the west. It is an extensive area covering approximately 290,000 ha. The area, covering the majority of the forest in Perak in the Belum Forest Reserve, approximately about 134,167 ha, is an important watershed area for the Temengor Dam and has been proposed by the DWNP as a Wildlife Reserve. The habitat is potentially an important conservation area in the northern part of peninsular. Much of the area are in the pristine state and suspected to contain large populations of Sumatran rhino (10+ minimum), elephants, seladang, tiger deer and avifauna. Previously, much of the area was under national security control and its biodiversity has yet to be documented. Brief surveys conducted by the DWNP had confirmed sightings and track records of the seladang, Sumatran rhino, serow, elephants, deer and a few species of hornbills and forest birds. Habitat and wildlife survey is necessary to ascertain the distribution and population of rhino and other species.

3.1.2.5 Other Areas

The Ulu Besut area is located in the Ulu Besut Forest Reserve and Pelagat Forest Reserve are approximately 244 km2 and 157 km2 on the northern boundary of the state of Trengganu. This is a new rhino area found in the 1992 survey. Logging has taken place in most of the areas and the surrounding lowland areas has been converted to state-owned oil palm plantations. If the habitat is threatened due to logging and crop conversion. For long-term conservation the forest is to small to maintain as sizeable and viable population.

Other areas such as Kuala Balah, Sungai Depak, Ulu Lepar, Gunung Belumut and Gunung Inas have under gone drastic changes ever since the animals were located in the areas. Most of these areas have either been logged or the surrounding lowland habitats have been converted into agriculture land. The animals have been pushed into isolated and higher elevation or into inaccessible areas. In most cases the habitats status are uncertain for long-term conservation and these animals are unprotected and exposed to poachers. These populations could be captured and relocated into protected habitats or to be used as founders for the captive breeding programs located in Sungai Dusun and Zoo Melaka.

3.2 Sabah

The two main components of Sabah's plan for the conservation of the rhino are well managed protected areas to protect the animal in the wild and a back-up captive breeding programme, to provide animals for re-stocking the free-living population, should the need arise.

3.2.1. Types of Protected Area in Sabah

There are three categories of protected area in Sabah, viz state parks, forest reserves and sanctuaries (Sale and Andau) 1992). Parks, formerly known as "National parks", are declared under the Parks Enactment, 1984 and are administered by Sabah Parks which is a parastatal organization under the Ministry of Tourism and Environmental Development. Parks status provides protection for flora, fauna and other natural features and facilities controlled use of an area by visitors and researchers. There are presently six parks, totalling 265,794 ha, including some 22,533 ha of marine parks comprised of off-shore islands. To date Sabah Parks has not developed expertise in the management of large vertebrates; no Park contains rhino or elephant.

Forest Reserves, of which there are seven classes, are declared under the Forest Enactment, 1968 and administered by the Sabah Forest Department, within the Natural Resources division of the Chief Minister's office. Three of the classes confer reasonable protection on the forest habitat but the effectiveness of protection conferred on large mammals is inadequate. These classes are a) Class I Protection Forest Reserves, totalling some 100,000 ha; b) Class VI Virgin Jungle Reserves, comprising 88,300 ha of mostly small areas of forest of scientific interest and c) Class VII Wildlife Reserves of which there are only two, Tabin and Kulamba, total 141,200 ha.

Provision exists in the Fauna Conservation Ordinance, 1963, for the creation of Bird and Game Sanctuaries in which the hunting of birds and "game" animals respectively is forbidden but with no restrictions re other species or habitat. Currently there are three bird sanctuaries, totalling 13,500 ha, administered by the Wildlife Department. Two of them are off-shore islands.

3.2.2. Protected Areas for Rhino

So far two areas containing viable rhino populations have been identified for protected area status and appropriate legal arrangements are in the process of being made.

3.2.2.1. Tabin

The first is Tabin Wildlife Reserve, an area of 1,200 km² on the Dent Peninsula east of Lahad Datu. Tabin is presently estimated to have between 7 and 17 rhinos, with evidence of breeding, in the form of sign of juveniles. It comprises mainly lowland dipterocarp forest, with some hill dipterocarp and swamp forest and is almost totally surrounded by oil palm and cocoa. The major area of Tabin is secondary forest classified under the Forest Enactment as Class VII Wildlife Reserve. There are approximately 80 km² of primary forest, consisting of a central "core area", classified as Class I Protection Forest Reserve, and several small Class VI Virgin Jungle Reserves.

While the Forest Department presently has jurisdiction over the terrain and vegetation, the management of the wild fauna is in the hands of the Wildlife Department. This divided responsibility is a far from ideal arrangement and it is planned that under the new conservation legislation (see Section 4) Tabin will be given a new status under the full control of the Wildlife Department.

Threats to the integrity of Tabin include illegal logging (now largely under control); illegal hunting, especially of meat species such as deer and banteng; some illegal cultivation around the edges of the Reserve and the occasional killing or wounding of elephants which have wandered out of the Reserve into adjacent plantations. There has been no known case of rhino poaching in the Tabin area for the past 10 years but vigilance can never be relaxed with such a highly values species.

The Wildlife Department presently has a full- time staff of 10 posted in Tabin, under the direction of a graduate Reserve Manager. Additional staff are made available by the Department for special operations such as censuses. At present all staff are based at the Reserve headquarters at Lipad, on the western boundary but there are plans to establish guard posts at vulnerable points in the south and east and, possibly later, on the northern boundary.

A 5-year management plan for Tabin is scheduled for completion at the end of 1993, with the protection of the Reserve's three large mammals rhino, elephant and banteng as its prime objective.

3.2.2.2. Danum:

Danum Valley Conservation Area is a 438 km² area of primary forest within the large logging concession of the Sabah Foundation. Legally, the area is Class II Commercial Forest Reserve but it has been voluntarily set aside for conservation by the Foundation (together with another area within their concession, the Maliau Basin). Recently the Foundation has also proposed according conservation status to a 670 km² of secondary forest adjoining the main conservation area. Both these areas contain rhino habitat and what is considered to be a viable rhino population (see Section 2 above re numbers). However, evidence of attempts at rhino poaching was recently found during a detailed survey of the area. Steps are being taken to combat this. The Conservation Unit of Sabah Foundation has a staff of 6 presently assigned to protection of the area and a system of joint patrolling with Wildlife Department staff is under discussion.

The long-term security of Danum as a high quality protected area is also under active consideration, the firm intention being to get it gazetted in an appropriate category, which provides both a strong legal status and protection management arrangements.

3.2.2.3. Other Areas:

The identification of one or more additional protected areas for rhino conservation is one of the objectives of the systematic surveys of rhino range under this management plan.

3.3 Sarawak

3.3.1. Protected Areas in Sarawak

3.3.2. Protected Areas for Rhino

3.3.2.1. Limbang/Pulong Tau

Ulu Limbang is an area of 600-1000 km² in Sarawak that is currently ungazetted but is proposed for protection; contains a nucleus of 6-15 rhino with an ultimate carrying capacity of 100 rhino if the full extent of the forest can be incorporated into a protected area. The closest protected area in Sarawak is the proposed Pulong Tau National Park. The Limbang area is adjacent to the vast Kayan Mentarang area of Kalimantan (16,000 km²) which may also still contain a few rhino and which has the potential to sustain a very large population if properly managed and protected.

3.4 Captivity

In 1984, after inception of a number of exploratory initiatives by the captive conservation community interested in this species (Foose 1983), a meeting was convened in Singapore under auspices of the IUCN SSC. It was decided at this meeting that *ex situ* programmes could and should be an integral part of the conservation strategy for this species.

Candidates for *ex situ* programmes would be limited to rhino which:

(1) were not part of populations large enough to be viable reproductively, demographically, or genetically; and/or

(2) which could not be protected with available resources.

These rhino were described as "domed", although this term has been subjected to criticism for its extremely pessimistic connotations. Subsequently, three separate but affiliated programmes to rescue "doomed" rhino and initiate captive breeding were initiated in Peninsular Malaysia, Sabah, and in Indonesia. Table 2 summarizes the captive programme to date. (Foose and Zainal 1992; Foose, 1993 in prep.)

The captive, or in better terms intensive management, programme for rhino is an important part of the conservation strategy for Malaysia. Its objectives are:

(1) to produce rhino in a secure and steady situation for eventual return to natural habitat as the opportunity and need develop. The programme

(2) to conduct research applicable to conservation of rhino both *in situ* and *ex situ*.

Malaysia considers such intensive management programmes an indispensable part of the spectrum of options and methods for rhino conservation.

3.4.1. Captive Programme in Peninsula

The first capture of rhino in Malaysia occurred in 1984 and was entirely fortuitous. Since then a total of 11 rhino (2 males and 9 females) have been captured. The great disparity in sex ration has impeded attempts to propagate the species to date. There are currently 1 male and 6 females in captivity in Peninsular Malaysia. Two females have been exported: one to Thailand where it subsequently died; another on breeding loan to Indonesia where it is currently engaging in breeding activity. One of the males (a very young animal) and 2 of the females captured and retained in Peninsular Malaysia have died. Another, adult male received from Indonesia on breeding loan in exchange for the aforementioned female also died while at Malacca Zoo. A female calf was born at Malacca. However, this animal was conceived in the wild although most of the gestation occurred at the Malacca Zoo.

The first rhino captured were placed in temporary quarters in the Malacca Zoo which is managed by the DWNP. A major captive facility for rhino was completed in 1987. It consists of 8 outside yards and inside stalls. Unfortunately, the outside yards are not interconnected by gates. At maximum capacity, this facility accommodated rhino. Currently, there are 2 females at this facility; one of them may be non-reproductive due to tumors.

In 1990, a second facility was completed within Sungai Dusun. This facility consists of a complex of 10 large (.25 ha) outside yards with inside stalls. Gates at either end of the walls separating the outside yard permit maximal flexibility in terms of configuring the paddocks for management of the rhino. There is a crush for examination of rhino and collection of scientific samples.

TABLE 2

SUMMARY - CAPTIVE PROGRAMS
SUMATRAN RHINO - 1984 TO 1992

COUNTRY	CAPTURED	BORN	IMPORTED	EXPORTED	DIED	ALIVE
P. MALAYSIA	2/9	0/1	1/0	0/2	2/2	1/6
SABAH	5/1	0/0	0/0	0/0	3/0	2/1
INDONESIA	7/11	0/0	0/1	4/7	0/1	3/4
THAILAND	0/0	0/0	0/1	0/0	0/1	0/0
U.K.	0/0	0/0	1/2	0/0	0/1	1/1
U.S.A.	0/0	0/0	2/5	0/0	0/2	2/3
TOTAL	**14/21**	**0/1**	**4/9**	**4/9**	**5/7**	**9/15**

Foose & Zainal 1992

The captive reproductive programme has been impeded by the lack of mature males. Vagaries of the rescue process have collected almost entirely females. The two males that have been captured were both immature: an infant which died shortly after capture and a male which is just now evidently maturing.

Peninsular Malaysia does intend to attempt capture of additional males (at least 2) and perhaps females (1 or 2) to constitute a satisfactory nucleus for reproduction. Peninsular Malaysia will also cooperate in the global captive programme for this species. As stated above, one preliminary exchange of rhino with Indonesia has already occurred. Further, exchanges with other regions (e.g. Sabah) have been deferred pending results of genetic research in progress on the significance of the described subspecies and obvious geographic differences. Peninsular Malaysia has been collaborating with geneticists in the United States to provide samples for these genetic investigations. The scientific staff of the DWNP has also conducted its own morphometric studies of rhino skeletal material to supplement the genetic studies. Results guiding further interchange of rhino is expected by the end of 1993.

Peninsular Malaysia has also collaborated in a number of reproductive studies which are also continuing with the objective of improving information about the biology and for the management and propagation of this species.

In addition to the more conventional methods for captive programmes, the DWNP is also proceeding with plans to experiment with intensive management within larger areas of natural habitat. Malaysia has adopted the term "gene pool" for this endeavor but the concept is very similar to the "sanctuaries" that have developed for rhino in Kenya and the "intensive protection zones (IPZs) that are now being established for rhino in Zimbabwe.

3.4.2 Captive Programme in Sabah

A captive breeding facility was established at Sepilok near Sandakan by the former Sabah Rhino and Wildlife Conservation Committee and received its first rhino, a mature male, in July, 1987. A sub-adult female was added in April, 1989, another adult male in May, 1991 and yet a further male in August, 1992. The original male succumbed to a severe stoppage of the caeco-colonic region of the gut in 1992. In addition to the three males brought into captivity at Sepilok, two others died in the process of capture, early in the programme (1987 and 1988).
Several facts are to be noted from the brief six years history of this captive breeding programme. Firstly, all animals the capture of which was attempted were doomed animals in isolated situations where they had no future possibility of contributing to the survival of the sub-species. Except for the sub-adult female, which was captured as a semi-tame animal in the vicinity of a kampung (village), all animals captured were adult males, suggesting the possibility of a skewed sex ratio in the surviving population, as already noted. Disregarding the two captive deaths, a captive group of three males and a single sexually immature female do not make an ideal breeding group and it is not surprising that no breeding has so far occurred at the project. Finally, the fact that overall 50% of the animals whose capture was attempted died, either during capture or after a period in captivity, indicates a serious flaw in the captive breeding strategy employed. It should be noted that according to the International Studbook for Sumatran Rhinoceros, (Foose and Zainal, 1992) the mean mortality in the worldwide captive breeding programme is 34%.

Facilities at Sepilok consist of night stall/individual yard facilities for a total of six animals. Four of the yards are connected to a large fenced area (2.5 ha) of natural forest in which animals are released periodically (on an individual basis at present) and allowed to feed on natural vegetation and dig their own wallows. Recently a smaller paddock has been constructed within the larger one so as to allow the behaviour of a pair of animals within it to be closely monitored, including courtship or actual mating. There is a crush for restraint of rhinos during routine or emergency examination.

At present the captive breeding project lacks a clear set of objectives and matching management programme. Before these can be drawn up more base-line information is needed on the breeding biology of the species, especially the nature of the female cycle and that of the male, if there is one. The genetic uniqueness of the sub-species harrissoni also needs to be tested, as this determines whether or not exchanging animals with other breeding projects, such as Peninsular Malaysia, is a feasible option - as a way of addressing the problem of excess males in the Sabah project, for example. More females are definitely needed in the Sabah project.

3.4.2.3. Captive Programme in Sarawak

There is no organized captive programme in Sarawak, although there are rumors that one or more animals may exist in private captivity.

4. POLICY AND LEGISLATION

4.1 Peninsula

Rhino and other species in Peninsular Malaysia are protected and managed under the Wildlife Protection Act of 1972. The primary responsibility for wildlife conservation and management resides with the Department of Wildlife and National Parks (DWNP or Perhilitan). However, as a federal system, much of the responsibility is actually implemented at the state level, both by the State Directorates of Perhilitan and by various State wildlife authorities

4.2.1 Wildlife Policy

To implement the provisions of the Wildlife Act, a Wildlife Plan for Peninsular Malaysia has been developed by the Department of Wildlife and National Parks, which has the primary responsibility for conservation in Peninsular Malaysia.

The objectives of the Plan and Perhilitan are:
(1) to conserve in perpetuity the country's wildlife
(2) to conserve and manage wildlife species with the goal of fulfilling the various needs and interests of the people
(3) to create and manage national parks, Wildlife reserves, and Wildlife Sanctuaries for the preservation and conservation of flora and fauna and heir natural habitats.

Perhilitan has adopted a strategy with 5 components to achieve it objectives:
(1) enforcing the Protection of Wildlife Act No. 76 of 1972.
(2) implementing wildlife management programmes through *in situ* and *ex situ* conservation;
(3) conducting wildlife research programmes;
(4) conducting training and conservation education programmes; and
(5) managing and developing National Parks, Wildlife Reserves, and Sanctuaries.

4.2.2 Wildlife Legislation

The main piece of legislation for wildlife conservation in Peninsular Malaysia is the Protection of Wildlife Act. Specifically for rhino, this Act is supplemented by ..... These laws render it illegal to disturb or destroy rhino or to possess rhino products. The penalties are .... Malaysia is of course a signatory to C.I.T.E.S. which it strictly enforces.

4.2 Sabah

General government policy regarding wildlife and conservation, and legislation pertaining to protection and management of wildlife fauna and flora, constitute important components of the context in which the conservation of a highly endangered species, such as the rhino, is planned. Both matters are currently receiving detailed attention of the State Government of Sabah.

While the protection of wild animals and plants is a concurrent subject (joint responsibility by Federal and State Authorities) in the Federal Constitution of Malaysia, in practice the Sabah State Government assumes responsibility for conservation of wildlife and the Federal Department of Conservation and National Parks (Perhilitan) confines its jurisdiction to Peninsular Malaysia.

4.2.1. Wildlife Policy

The Sabah Government is currently in the process of finalising a statement on wildlife policy, which sets out in broad terms the Government's intentions on conservation matters. These include the importance of conserving the States' wildlife and its habitats for the benefits of the peoples of Sabah; the special protection of endangered species; the utilization of the wildlife resource in a sustainable manner; the resolution of conflict between development projects and the need go conserve natural areas and the necessity of increased public awareness regarding conservation issues. The publication of these goals will assist in creating a public understanding of the central importance of wildlife in the development of the State, as well as providing a yardstick by which to measure the sensitivity to conservation of the wide variety of government policies and new legislation. More directly, the wildlife policy statement provides a background against which the new conservation legislation can be drafted (see below).

Much of this new delineation of wildlife policy has already been reflected in the biodiversity section of the comprehensive Sabah Conservation Strategy which was prepared with UNDP/WWF assistance in 1990-1992.

4.2.2 Wildlife Legislation

The main piece of conservation legislation at present is the Fauna Conservation Ordinance (F.C.O.), originally enacted in 1963 but subsequently amended on several occasions. This law mainly deals with the control of game hunting and the protection of animal species known to be endangered by means of schedules. The rhino is in Schedule I which affords it total legal protection. As already indicated (Section 3.1), the F.C.O. provides for Bird and Game Sanctuaries but these are not protected areas in the normally accepted sense of the animals concerned. In addition, the present F.C.O. does not provide adequate regulation of trade in wildlife or exports and import control of the type specified in CITES, of which Malaysia is a signatory. Penalties for some wildlife offenses are also inadequate.

Recognising the need for more comprehensive and up-to-date legislation, the Sabah Government is currently undertaking a major revision of the F.C.O., with the expert assistance of a U.N. Consultant in the drafting of Conservation Legislation. The new ordinance will take account of the matters mentioned above, including provision of a new category of protected area specifically aimed at providing high quality protection for endangered wildlife and their habitat. It will significantly increase the powers of the Wildlife Department in dealing with illegal hunting and trade in wildlife products and provide for appropriately stringent penalties for possession of such items as rhino horn. Unlike the present F.C.O., the revised act will cover the protection of wild plants as well as animals. It is anticipated that the new legislation will be brought into law early in 1984.

4.3 Sarawak

4.3.1. Wildlife Policy

4.3.2. Wildlife Legislation

5. WILDLIFE CONSERVATION ADMINISTRATION & RESEARCH

5.1 Peninsula

5.1.1 Department of Wildlife and National Parks

Rhino conservation in Peninsular Malaysia is the responsibility of the Department of Wildlife and National Parks (DWNP or Perhilitan). This Department was established in 19 and has long been a model of effectiveness for Asia and the world. To a great extent, this success was due to the leadership of Mohd Khan bin Momin Khan, who for 22 years (until December 1992) was the Director-General of DWNP. Mohd Khan also has served as the Chairman of the IUCN SSC Asian Rhino Specialist group since 1984.

A major focus of the DWNP has been Taman Negara, the first national Park (in Malaysia and in Asia) which was established in 1939. Taman Negara, like Perhilitan itself, has provided a model for conservation in Asia.

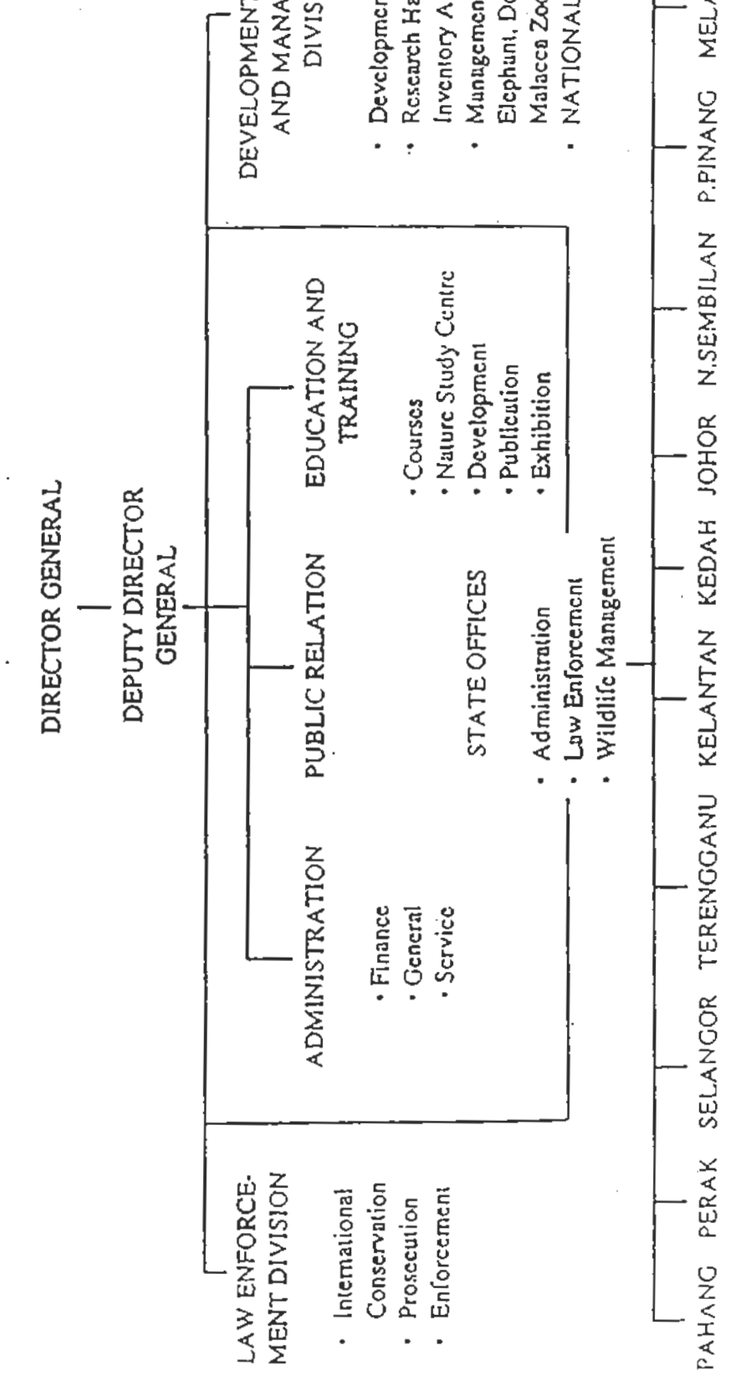
In 1990, the DWNP underwent an organizational restructuring to ensure a more systematic approach. An organizational chart of Perhilitan is provided in Figure 3. In addition to the federal office in Kuala Lumpur, each State on the Peninsula has its own State Wildlife Director. District offices are now placed in strategic locations important for wildlife management activities.

Perhilitan has a total staff of 733, of which 588 are actually wildlife rangers. The total annual operating budget of Perhilitan is approximately US $ 8 million.

Malaysia was the first nation in Asia to create a Rhino Unit, specifically for conservation of and research on the rhinoceros. This Unit was established in 1974. In response to the intensifying challenge of rhino conservation, Perhilitan is now proposing to reinforce this Rhino Unit substantially.

FIGURE 3

ORGANISATION CHART OF WILDLIFE DEPARTMENT, 1990



Within the States, there are also conservation management authorities that have responsibility for rhino conservation. Perhaps the two most important States in this regard are Pahang and Johore which among other situations jointly manage Endau Rompin, home to the second largest and most important population of rhino on the Peninsula and indeed in Mainland Asia.

5.1.2. Research and Education

The DWNP has been extremely active in both research and education. In terms of education, a major focus has been on training of conservation professionals both from Malaysia as well as throughout Asia. For the last 5 years, the DWNP has collaborated with the Smithsonian Institution in an extensive programme of wildlife conservation and management education, with courses conducted annually both at a permanent facility in Peninsula and elsewhere in Asia. Recently, specifically related to rhino, Malaysia has initiated training of wildlife staff from neighboring nations, e.g. Myanmar, in rhino survey and other conservation techniques.

Research is conducted on many species and subjects. Perhilitan has been particularly active in research on rhino both in the field (Flynn 1978, 1983; Flynn and Mohd-Tajuddin 1984, Mohd-Tajuddin 1985; Mohd-Tajuddin et al. 1989) and in captivity (Zainal et al. 1990 a & b)

5.2 Sabah

As explained in section 3.2, Sabah Parks and Sabah Forest Department are both involved in the administration of protected areas which provide protection to habitats and a variety of wildlife species. However, the main burden of protecting Sabah's wildlife falls to the Wildlife Department, in the Ministry of Tourism and Environmental Development, which is responsible for all wildlife, or wild fauna, outside of park boundaries and including that within all classes of forest reserve.

5.2.1. Wildlife Department

The Wildlife Department headquarters are in the Kota Kinabalu, the State Capital and it also maintains six District Wildlife Offices designed as West Coast (Office in Kota Kinabalu), Keningau (Sub-Office), Sandakan, Lahad Datu, Tawau and Semporna (Sub-Office).

It is also responsible for administering the two Class VII Wildlife Reserves, Kulamba and Tahin, in collaboration with the Forest Department. In addition, the Wildlife Department runs the Orang Utan Rehabilitation Centre at Sepilok, as well as the Rhino Breeding Project at the same site.

For these operations, the Department has a technical staff under a Director, consisting of officers and rangers, of 75 and a support staff (Labourers, Drivers, Office Workers) of 95. Most of the officers are graduates in one of the Biological Sciences and one is a Veterinarian. Few have formal training in the management of wildlife or protected areas. The Wildlife Department runs on an annual budget of MR6.5 million (U.S. $2.4 million approximately). Its 5-year development budget (1991-1995) totals MR16.5 million (U.S. $6 million approximately).

5.2 Research and Education

With such a modest staff, the research activities of the Wildlife Department are of necessity limited and are mainly confined to surveys and monitoring of key species such as rhino, elephant and orang-utan. None of the technical staff are allocated full-time to research but a good proportion of them have had experience and training by being attached to visiting researchers

Some research has been carried out by N.G.O.'s often in collaboration with Wildlife Department personnel. The Danum Valley Field centre, under the Sabah Foundation, also carries out some research on Wildlife, as does the Biology Faculty of the Sabah Campus of the Malaysian National University (U.K.M.). Little in- depth research has been executed to date on the ecology of large mammals, such as the rhino and elephant, although systematic censuses of these species in particular areas have been achieved.

The Wildlife Department carries out a limited amount of conservation education. One means is by talks, videos and pamphlets presented to the 80,000 visitors per year to the Sepilok Orang-Utan Centre, the majority of whom are Malaysian citizens. officers also undertaken periodic visits to schools and collages to conduct sessions on the need to protect rare animals and generate interest in wildlife generally.

There is at present no regular training programme for officers or rangers, although almost all technical personnel have participated in some form of short-term training programme either within Sabah or overseas.

5.3 Sarawak

5.3.1. Wildlife Department

Wildlife conservation in Sarawak is the responsibility of the Wildlife Division of the Department of Forestry. The central office currently consists of 4 senior wildlife officers.

5.3.2. Education and Training:

6. NGO'S/EXTERNAL ASSISTANCE

6.1 Peninsula

Rhino conservation in Peninsular Malaysia has been mostly governmental. Recently, the Malaysian Nature Society has become involved in activities that relate directly to rhino conservation. Most particularly, the Malayan Nature Society has accepted an assignment from the States of Johore and Pahang to prepare a Development and Management Plan for Endau Rompin.

6.2 Sabah

The Wildlife Department has over recent years received considerable assistance from non governmental organization (N.G.O.'s), both Malaysian and international. The World Wide Fund For Nature (WWF), Malaysia in particular has given support, particularly in the form of surveys and recommendations regarding the management of particular species or wildlife ares. The Smithsonian Institution provides a short training course for Peninsular Malaysia officers from time to time and a number of Sabah officers have attended this course. Wildlife Conservation International has provided training assistance for officers of the Department within Sabah during 1992-1993 and are also assisting with several research programmes, including the 1992 survey or rhino in Danum. The Government of Japan has provided a volunteer Veterinarian for the Sepilok Centre for the last 4 years, as well as a considerable amount of equipment for the clinic there. They have recently provided training in Japan for two Wildlife Officers.

United Nations Development programme (U.N.D.P.) has had a major input into the Department since early 1991 by providing a Senior Technical Advisor at headquarters and a management expert for Tabin. The former has provided advice and assistance on a wide range of matters including policy development, protected area needs, species management, research and management techniques and equipment and long- term planning. The Tabin expert assisted with the establishment of management in the Reserve over a 15 month period. In addition, this Project has provided a legislation consultant, currently revising the Fauna Conservation Ordinance.

A further provision of the UNDP assistance has been fellowships for limited periods of overseas training for senior officers requiring to broaden their experience in particular aspects of wildlife or protected area management. The UNDP Project has recently been extended and will be on going until September 1994.

The Wildlife Department's Tabin Operation has also benefitted from a World bank loan to the adjacent FELDA oil palm scheme, whereby money was allocated for some equipment and the construction of the Reserve headquarters building and access road.

6.3 Sarawak

MALAYSIA
RHINO CONSERVATION PLAN

SECTION B

CONSERVATION STRATEGY, POLICY AND ACTION PLAN

JUNE 1993

SECTION B: CONSERVATION STRATEGY, POLICY, & ACTION PLAN

I. CONSERVATION STRATEGY AND ACTION PLAN FOR RHINO IN MALAYSIA:

1.1 GOALS/OBJECTIVES:

The goal of the Malaysia Rhino Conservation Strategy is:

to ensure survival and recovery of viable populations of Sumatran, and perhaps eventually Javan rhino, in Malaysia.

The objectives to achieve this goal are:

(1) Provide and concentrate *in situ* protection and management on those rhino populations and the protected areas they occupy that seem large and protectable enough to have long-term viability. Currently, 7 such populations and areas have been identified:

Peninsula:	Taman Negara, Endau Rompin, Selama, Belum
Sabah:	Tabin, Danum
Sarawak:	Limbang (ultimately as part of Pulong Tau)

(2) Develop target population numbers and distribution for these populations and areas sufficient for long-term genetic and demographic viability.

It is the objective to attain these target populations by growth from current numbers over the next 20 years. With adequate protection and management of rhinos and habitats, it is expected that population growth rates of 5-7%/year will be possible; at these rates doubling times for current populations will be 10-14 years.

Peninsula:	Current Population	77-130
	Target Population	400
	Total Areas	4
Sabah:	Current Population	48-68
	Total Population	200
	Total Protected Areas	2
Sarawak:	Current Population	10-20
	Total Population	100
	Total Protected Areas	1
MALAYSIA:	**Total Population**	**650-750**
	Total Protected Areas	**7**

(3) Experiment with a "Gene Pool" Sanctuary as a means of propagating and investigating rhino in a confined but large area within the natural habitat of the species at Sungai Dusun.

This scheme is analogous to the sanctuaries in Kenya and the intensive protection zones in Zimbabwe.

(4) Continue to participate in a global captive propagation and research programme for this species with the objective of supporting *in situ* survival and recovery of viable populations.

The target population goals for the Malaysia components of this programme are:

Peninsula:	Total Population	50
Sabah/Sarawak	Total Population	50
MALAYSIA:	**Total Population**	**100**

1.2 ACTIONS

1.2.1 *In Situ* Actions

Protection and Management of Existing Wild Populations:

- **Finalize designation of major rhino protected areas and viable populations as the highest level of protection and management**
  - Peninsula:
    - Endau Rompin: Complete gazettement as first as State parks in Johore and Pahang, and ultimately as a National Park. The Malaysian Nature Society is preparing a Development and Management Plan that will guide and facilitate this gazettement. Until this can occur, all rhino and rhino habitat conservation matters will be under authority of the Rhino Conservation Coordinator at headquarters and the Deputy Coordinator based at Endau Rompin.
    - Selama: Gazette as National Park with area sufficient to accommodate 100 rhino (500-1000 km^2) by adding adjacent land in Kedah.
    - Belum: Gazette as National Park with area sufficient to accommodate 100 rhino (500-1000 km^2) by adding additional land.
  - Sabah
    - Tabin: Continue process of regazettement of new category Wildlife Reserve to provide better protection
    - Danum: Gazette in an appropriate category of protected area.
  - Sarawak:
    - Limbang: Reinforce and reconfigure Pulong Tau National park to encompass area where rhino reside and large enough to accommodate 50-100 rhino.

- **Expand and enhance the development of Rhino Units to implement the Action Plan:**

Expansion and enhancement of rhino conservation unit teams in the major protected areas is considered essential for conservation of the species. Further development of rhino conservation units will entail provision of training, equipment, and operational facilities for the rhino protection and management units in the 10 protected areas identified.

These rhino units will engage in a number of conservation activities:

* reduction of rhino poaching through direct patrols as well as the development of information networks in the local communities;
* improvement of training and morale of other protected area staff through educational activities and infrastructural support;
* follow-up on translocated rhino;
* mitigation of habitat degradation and encroachment both directly, and through
* community extension and development work in areas adjacent to the protected areas, including
  - conservation awareness programmes
  - economic incentives such as:
  - income generation through job opportunities in relation to the protected areas (conservation & ecotourism) and
  - better management of local resources
  - information networks facilitated by bonuses for data useful to anti-poaching efforts.

- **Provide for even greater coordination of, and concentration, on rhino conservation activities.**

  - Peninsular Malaysia:
    - **Appoint a Rhino Conservation Coordinator.**

      This position will have the status of senior wildlife officer, initially it could be sponsored initially by an external donor but within three years will become a budget item for the Department of Wildlife and national parks.

    - **Appoint a Rhino Unit Leader for each main protected areas and populations in Peninsula: Taman Negara, Endau Rompin, Belum, Selama.**

    - **Assign a dedicated staff of 10 rangers to this Unit operating out of Headquarters**

    - **Establish another force of 10 rangers each at the 4 main protected areas: Taman Negara, Endau Rompin, Ulu Selama, Belum**

    - **Provide equipment necessary for the function of the coordinators.**
      - 4-wheel drive vehicles to be used exclusively for this purpose.
      - Provide a 2 ton truck to transport rhino

  - **Sabah & Sarawak**

    - **Appoint a Deputy Malaysian Rhino Conservation Coordinator;**

      This position will have the status of senior wildlife officer, initially it could be sponsored initially by an external donor but within three years will become a budget item for the Department of Wildlife. It is also possible that a single Coordinator could serve both Sabah and Sarawak.

- **Develop infrastructure for protection and management of protected areas with large wild populations by construction of operational facilities that will permit resident guards to be located at strategic points throughout the protected areas:**

  Peninsula: Taman Negara
  Endau-Rompin
  Selama
  Belum
  Sabah: Tabin
  Danum
  Sarawak: Ulu Limbang/Pulong Tau

The facilities will be used as the base of operations for the rhino conservation units that are operating (Malaysia) or are being formed (Indonesia) to implement the *in situ* components of the Rhino Conservation Strategies in both countries.

- **Intensify enforcement of laws against poaching of rhino, including development of information networks.**

- **Continue basic surveys and ecological studies to improve surveillance of rhino in viable populations to locate isolated rhino for translocation.**
- **Based on information from the surveys and studies, manage habitat to enhance its suitability for rhino.**

- **Translocate Rhino in Inviable Situations Into Viable Populations, Gene Pool, or Captive (Intensive Management) Facilities.**

- **Provide staff and equipment necessary to conduct the translocation and rescue operations:**
  - **Appoint a rhino translocation/capture team leader.**
  - **Acquire a 2-ton truck to transport rhino.**

- **Conduct Population Viability Assessments and Develop a Geographic Information System (GIS) Data Base for Rhino in Malaysia.**

The action plan will need to be implemented adaptively. It will be necessary to further refine the action plan as more information becomes available and as actions develop.

This adaptive implementation and dynamic refinement will be greatly assisted by development of a Geographic Information System (G.I.S.) database for the information collected by the basic surveys and ecological studies. Adaptive implementation and dynamic refinement of the action plan will also be facilitated by population and habitat viability analyses (Seal and Foose 1989; Foose et al. 1993)..

At least 2 or 3 PHVA Workshops utilizing GIS methods will be conducted during the next 2 years: one in Peninsular Malaysia, and one or two in East Malaysia (the number will depend on whether it is decided that workshops need to be conducted separately in Sabah and Sarawak. Other training workshops and courses in effective field operations will be developed as the project is further designed.

- **Develop community awareness and development projects especially around the protected areas for rhinos; this function will be an assignment for the Rhino Units.**

1.2.2. *Ex Situ* Actions

- Further Develop Intensive Management (Captive) Centers and Programmes:

- **Improve captive facilities to facilitate rhino husbandry, reproduction, and research.**
  Peninsula: Sungai Dusun, Zoo Melaka, Sungkai
  Sabah: Sepilok, Tabin, and perhaps Lokawi

  As the intensively managed (captive population) expands it will be advisable to further distribute rhino into other facilities nationally (e.g. Zoo Negara), regionally (e.g. Singapore Zoo), and perhaps internationally.

- **Establish a breeding plan manager for the intensive management (captive) programme; because of the logistics, it will probably be advisable to have a separate manager for the Peninsula and for Sabah**
  Peninsula: Sungai Dusun, Zoo Melaka, Sungkai
  Sabah: Sepilok, Tabin, and perhaps Lokawi

- **Provide a equipment necessary to manage the captive programme effectively in both Peninsula and in Sabah/Sarawak.**

- **Immediately capture additional rhino to provide an adequate foundation reproductively, demographically, and genetically.**

  - 1-2 more male rhino are needed in Peninsular Malaysia for the facilities at Sungai Dusun; 1 male and perhaps 1 more female for Malacca Zoo. Melaka.

    If more rhino, especially females, than are need for the captive programme are collected during the rescue/capture operations they can be immediately released either into their habitat of origin or translocated into one of the large populations in an intensive protection zone or the gene pool sanctuary.

  - 1-2 more male and 3-6 females for the captive facilities at Sepilok, Tabin, and perhaps Lokawi.

- **Provide for continuous veterinary services at each intensive management (captive) facility.**
  Peninsula: Sungai Dusun, Zoo Melaka, Sungkai
  Sabah: Sepilok, Tabin, Lokawi

- **Collaborate in national, regional, and international research projects on rhino:**

  - Reproductive biology
  - Genetics & Systematics
  - Husbandry & Behavior

- **Arrange for external advisers and eonsultants to facilitate development of captive propagation and research programmes and liaise with international collaborators.**

  More specifically:
  - Arrange for an overall international programme adviser to visit Malaysia 6 times over the next 2 years; each visit would consist of 4 weeks of which time would be divided as needed between Peninsula and Sabah
  - Also arrange for the specialized consultant(s) as needed to visit for collaboration with and training of Malaysian staff.

- **Create one or more "Gene Pool" sanctuaries**

  - Peninsula
    - Enclose the highland areas of Sungai Dusun with electric fence.
    - Equip facility with radio telemetry system to maintain surveillance and facilitate research on rhino.

1.3 Regional Details of Action Plans

1.3.1 Peninsula

1.3.1.1. Introduction

The wildlife management history in Peninsular Malaysia started in 1884 with the enactment of The Straits Settlement Ordinance No.3 to protect s few bird species. Subsequently, in 1896 the state of Pahang enacted the Product of State Land which provided the licensing to hunt large game species including the rhinoceroses (Stevens 1968). In early 1960s, The plight of extremely low population size of rhinoceros and the continued illegal trade in rhinos products were highlighted by investigators such as L.M Talbot, Metcalfe and Oliver Milton. The recommendation by Milton for an establishment of a rhinoceros reserve in selangor was realised in 1964 when the Sungai Dusun reserve was established.

Since 1960s to the 1970s, the period of rapid economic development had taken a tremendous toll on some of the prime wildlife habitats in peninsula. These habitats were either totally loss to agricultural plantations, degraded by logging or wildlife reserves were degazzetted for other land use. At that time the state game departments were understaffed and lacked equipment and resources to deal with poaching problems in areas inhabited by the rhinos. The survey by Flynn and Mohd-Tajuddin (1984) have given insights on the Sumatran rhino populations and habitats in peninsula. It was recommended that habitat protection and law enforcement is necessary to protect the existing populations. Mohd-Tajuddin (1985) had also recommended the rehabilitation of degraded forests by planting of certain species of the Sumatran food plants.

In the 1980s, human disturbances and pressure on the habitats had resulted in the instances of few rhinos appearing in unnatural areas and some were subsequently being poached (Mohd-Tajuddin et al 1989). Later as the situation was not getting any better, drastic management decision was made to capture isolated animals to establish reproductive nucleus in Sungai Dusun and Zoo Melaka.

Extensive rhino and biodiversity surveys were conducted between 1992 to 1993 in Endau-Rompin, Taman Negara (Kenyir section), Selama, Ulu Besut and Ulu Muda. New populations are located in Ulu Besut and Selama which must be protected or relocated to a sanctuary or to reinforce the captive breeding program.

Captive management programs started in 1985 was carried more on an ad-hoc and need a major revamp to ensure of positive results. A team of manager advisor, consultants and reproductive biologists should be assigned to conduct research, gather information and manage the animals with proper husbandry and care in a more systematic manner.

For the last three decades, the Federal Government of Malaysia have made significant contribution in terms of financial and manpower for the conservation and management of the Sumatran rhinoceros both in situ and ex situ. However, external technical and financial assistance is required to supplement the contribution by the Government of Malaysia to effectively realise the Sumatran rhinoceros conservation results over the next decade.

1.3.1.2. Objectives

The general long-term objectives in the management of the Sumatran rhinoceros in Peninsula are;

(1) Preserve and manage the wild population in protected habitats
(2) Develop target population size of 200 rhinos in 4 major protected areas.
(3) Improve legal protection of the habitats and legislation to deal with rhino protection
(4) Organise surveys in potential rhino areas
(5) Capture and translocate of endangered rhinos into protected areas or to breeding facility
(6) Enhance reproductive work to improve knowledge and produce individuals for introduction and reintroduction.

1.3.1.3. Legislation

The Wildlife and Bird Ordinance 1955 was repealed after the gazettement of the Wildlife Protection Act 1972/76. The new act provides greater protection and have made provision for the centralization and reorganization of the wildlife departments in Peninsular Malaysia. Since then some radical changes were made to strengthen the act:

(1) the 1988 amendment to increase the penalty for possession of snare (to section 76a of the Wildlife Protection Act) is mandatory jail sentence;
(2) the amendment in 1990 to section 66 of the wildlife act 1972/76 incorporate a higher penalty from MR4,000 to MR15,000 for killing of female Sumatran rhinoceros; and the
(3) the amendment in 1991 for Schedule 1 of the Wildlife Act have incorporated from 60 local species to 292 from Appendix 1 of CITES.

The wildlife act could be further amended to include the following elements;

(1) Mandatory jail sentence for killing of rare and endangered species such as the Sumatran rhinoceros; and
(2) To increase administrative efficiency, the wildlife act should be amended certain for sections 31, 32, 104 on wildlife management issues which would empower the Director General DWNP to act swiftly and accordingly for the protection of rare and endangered species; and the establishment and gazettement of wildlife reserves and sanctuaries to be under the minister's purview.

1.3.1.4. Law Enforcement

The Rhino Units in rhino range states should be reactivated and provided with the necessary manpower, field equipment, communication, vehicle and facilities. Such fully equipped units could respond and act better in the protection and monitoring work.

1.3.1.5. Protected Areas

A thorough survey of the Taman Negara is required to ascertain the numbers and carrying capacity of the habitat. Animals captured in endangered habitats could be released in the park. Regular patrolling and monitoring of the park is necessary due to high accessibility of the area

Rhino "safe heaven" must urgently be created in Endau-Rompin, Belum and Selama to ensure the continue survival of the species. The areas could be further protected by building of guard posts, regular patrolling and monitoring.

1.3.1.6. Rhino Outside Protected Areas

Animals outside protected areas and isolated areas are vulnerable to poachers and must be safely captured. These animals must be brought into productive use by reinforcing the wild population or the captive founders at Sungai Dusun and Zoo Melaka.

1.3.1.7. Captive Propagation

To ensure the survival of the species, human intervention may be necessary in order to acquire knowledge on the reproductive biology. Additional rhino are needed to provide an adequate foundation reproductively, genetically, and demographically for the captive program. In particular, there is need for at least 2, perhaps 3, more mature males: 1-2 for Sungai Dusun and 1 for Zoo Melaka. There would also be benefit from placing another adult, reproductively sound female at Zoo Melaka. Another need is for a full time breeding program manager to guide these projects. In this regard, it is also considered most desirable to engage an international adviser for the intensive management programmes to ensure that objectives are better delineated and implementation is more consistent. Collaborative work with local and international institutions is necessary to facilitate the research and captive management work on the rhinos. Finally, there is desire to proceed with the "gene pool" experiment as soon as possible to explore its utility and applicability for rhino conservation elsewhere in Malaysia and Asia.

1.3.2 Sabah

1.3.2.1. Introduction

Sabah's population of the Bornean sub-species of Sumatran rhinoceros is in an extremely precarious situation, with low total numbers, a skewed sex ratio and many widely scattered population units in reproductive isolation from the main breeding areas. There are indications that, in addition to illegal logging disturbing rhino habitat, poaching is still active and the Wildlife Department is at present inadequately equipped to deal with these threats, both from the point of view of background legislation and a lack of manpower and equipment to patrol remote areas containing rhinos.

Clearly radical changes in the approach to rhino conservation in Sabah are needed. These must provide revised legal powers to secure a few key areas of rhino habitat and eliminate present threats from poachers and illegal loggers. Legislation must be backed up by appropriate enforcement machinery and manpower especially in reserves containing viable rhino populations.

Further, dynamic management of the wild population is needed which includes measures to remove the threat to reproduction constituted by large numbers of isolated individuals. These "doomed" animals must be precisely located, caught and translocated to secure rhino areas, where they can be integrated into the existing breeding populations. An obvious prerequisite of a translocation programme is a thorough survey of all the States' rhino habitats aimed at locating as many population units as possible and assessing their status.

In view of the highly endangered status of the sub-species, total dependence on rehabilitating the free-living population would be unwise and a captive breeding programme is indicated as a back-up measure. This needs to be based on a clear understanding of the species' breeding biology and research will be needed to elucidate this before precise management of breeding can

be planned. The feasibility of exchanging breeding animals with other captive breeding projects will depend on confirmation or otherwise of the sub-specific status of the Bornean population of Sumatran rhino.

Whilst the government of Sabah has already taken several significant initiative in managing its rhinos, some international assistance will clearly be required if an effective strategy for the species' preservation is to be implemented quickly. In the circumstances indicated, only rapid implementation of such a plan stands any chance of success. Hence the response to the requests for technical and other assistance contained in the project outlines is likely to determine the survival prospects of Sabah's few remaining rhinos.

1.3.2.2. Objectives

The Government's overall objective in the management of this endangered species is to ensure its long-term survival in the wild in Sabah.

This will be achieved by:-

(1) Improving the protection of the animal in the wild against poaching, accidental injury e.g. by snares set for other species, and contagious disease.

(2) Protecting adequate areas of rhino habitat against loss, disturbance or degradation e.g. by logging or agricultural development, by creating protecting areas such as parks or wildlife sanctuaries.

(3) Capture and removal of endangered individuals or small groups which have become isolated in places where their long-term survival cannot be guaranteed, such as areas ear-marked for alienation or agricultural development.

(4) Rehabilitation of such captured animals into other units of the wild population either by;

   (a) immediate translocation in a well protected and managed areas, such as a wildlife sanctuary which contains adequate rhino habitat - and possibly an existing rhino population, or

   (b) retaining for some time in a confined captive breeding facility while their numbers increase (by reproduction) and adequate protection of wild habitat suitable for their ultimate release is secured.

1.3.2.3. Legislation

As indicated in section 4.2.2, a radical revision of the Fauna Conservation Ordinance is presently being undertaken. From the point of view of rhino conservation it will

(1) provide the Wildlife Department overall control of a new category of protected area (probably called Wildlife Sanctuaries), including habitat. It is planned that several critical rhino areas will be allocated to this category simultaneously with the new legislation becoming law, hopefully in early 1994.

(2) facilitate the prevention of illegal logging and poaching by giving considerably increased powers to enforcement personnel in the field, such as the right to seize vehicles, along with other equipment being used by law-breakers.

(3) provide for greatly increased penalties for killing rhinos and being in possession of rhino products.

(4) increase public awareness concerning wildlife conservation generally and, in particular, focus attention on Sabah's highly threatened species of which the foremost is the rhino.

The new legislation will thus create a greatly improved context for the new management actions proposed in the Rhino Conservation Plan.

1.3.2.4. Law Enforcement

In order to ensure prompt enforcement of the new legislation and provide high quality protection for both rhino and elephant (with which the rhino shares most of its range), proposals were recently drawn up for an elephant and rhino conservation unit. Within this unit there will be a specially trained and equipped law enforcement section, consisting of three nine-man teams, each led by a Senior Ranger and under the overall direction of a wildlife officer. Each team will have its own 4 x 4 vehicle with radio communication and all uniformed members (5 per team) will carry arms as necessary. This mobile field force will operate wherever a threat to rhino or elephant is perceived and will pay particular attention to the security of Wildlife Sanctuaries containing viable rhino populations such as Tabin and Danum.

1.3.2.5 Protected Areas

As indicated in 3.2.1. above, it is planned to create Wildlife Sanctuaries under the new legislation, which will provide a secure status for viable rhino populations such as those of Tabin and Danum. (At present Tabin has "Wildlife Reserve" status under the Forest Enactment and Danum is designated a "Conservation Area" within the Sabah Foundation's logging concession but has no legal protection status). Detailed 5 year management plans are currently under preparation for both these areas and rhino conservation will be a major objective in each case. Thus it is planned that the preservation of key breeding populations, in well managed protected areas, will form the cornerstone of the conservation of the free-living rhinos. Existing stocks in these areas will be enhanced by the release of "doomed" individuals translocated from outside. Management plans will designate limited portions of the sanctuaries for visitor use, so that in due course public awareness of rhino conservation measures will be heightened, as well as some income generated for support of the work.

1.3.2.6 Rhino Outside of Protected Areas

At present the majority of rhinos live outside of protected areas, many of them as isolated or pocketed individuals, out of reproductive contact with other rhinos. The first objective here will be to get a more complete picture of the precise distribution and status of these population units by means of a survey. Based on the survey information a GIS data base will be installed and within it animals regarded as "doomed" will be clearly identified. Any newly located viable populations will also be noted and appropriate protection accorded.

The next step will be to systematically capture and translocate doomed individuals, over a 4-year period, integrating them into the viable populations in Wildlife Sanctuaries. Release locations will be carefully selected in areas of the sanctuary not currently occupied by other rhinos. The translocated individual will be encouraged to settle down in the chosen portion of habitat by being confined within a 20-25 hectare fenced enclosure for an initial 6-9 months. Modifications of this procedure will be made based on experience with initial translocations. Released animals will be monitored by radio-tracking for up to 2 years.

1.3.2.7. Captive Breeding Project

The third project outline addresses the need to rationalise the existing breeding project at Sepilok by producing a detailed management plan based on information obtained by research on the species' reproductive biology. It is proposed to do this by engaging in collaborative research with overseas scientists working on Sumatran rhino reproductive physiology, in particular the nature of the female cycle. This knowledge will enable matings to be carefully planned, with minimal risk of injury to the two individuals involved.

A further critical point in planning the captive breeding programme is whether the Bornean rhino is in fact a distinct genetic form, as its sub-specific taxonomic status implies. If this is confirmed by genetic tests then the possibility of exchanging breeding animals with other captive projects, such as that in West Malaysia, is ruled out. If, on the other hand, the Bornean rhino is genetically identical with the other races, the option of an exchange programme exists. This could, for example, help to overcome the surfeit of males in Sabah and the preponderance of captive females in West Malaysia.

1.3.3 Sarawak

1.3.3.1. Introduction

1.3.3.2. Objectives

1.3.3.3. Legislation

1.3.3.4. Law Enforcement

1.3.3.5. Protected Areas

1.3.3.6. Rhino Outside Protected Areas

1.3.3.7. Captive Propagation

2. IMPLEMENTATION OF THE STRATEGY

2.1 ACTION PLAN COMPONENT AND COST OVERVIEW

Table 3 presents an itemization of the components and costs of the Malaysia Rhino Action Plan. The Action Plan is divided into the three administrative regions for rhino conservation in the country. Costs are divided into funds already secured and monies needed from external donors. There is also a further division of the external funds needed to reflect a possible G.E.F. grant.

TABLE 3. ESTIMATED COMPONENTS AND COSTS FOR RHINOCEROS CONSERVATION ACTION PLAN IN MALAYSIA

No.	Project / Item	External Funds Needed			Internal Funds Provided		
		Initial	Recurrent/Year	Recurrent/3Year	Initial	Recurrent/Year	Recurrent/3Year
I.	Infrastructure Support for Rhino Units						
I.1	Penisular Malaysia						
	Operations:						
	Salaries for 50 Wildlife Rangers					151,200	453,600
	Field Allowances		60,000	180,000		60,000	180,000
	Facilities:						
	8 Guard Posts	400,000					
	4 Ranger Quarters	100,000					
	Office & Storage	10,000					
	Utilities and Other Infrastructure	10,000				10,000	30,000
	Equipment & Supplies						
	2 4-Wheel Drive Vehicles	40,000			25,000		
	Fuel					6,000	18,000
	Maintenance on Vehicles		2,000	6,000			
	4 Field Radio Systems	40,000					
	2 Patrol Boats	20,000					
	Camping Equipment	20,000					
	GPS and Altimeter	20,000					
	4 Personal Computers & Printers	20,000					
	Office and Field Equipment	100,000					
	Office Supplies					10,000	30,000
	Subtotal	*780,000*	*62,000*	*186,000*	*25,000*	*237,200*	*711,600*

TABLE 3 (Contd.). ESTIMATED COMPONENTS AND COSTS FOR RHINOCEROS CONSERVATION ACTION PLAN IN MALAYSIA

No.	Project / Item	External Funds Needed			Internal Funds Provided		
		Initial	Recurrent/Year	Recurrent/3Year	Initial	Recurrent/Year	Recurrent/3Year
1.	Infrastructure Support for Rhino Units						
1.2	Sarawak:						
	Activation of Pulong Tau N.P.						
	Operations:						
	Salaries for 10 Rangers					30,240	90,720
	Field Allowances		12,000	36,000		12,000	36,000
	Facilities:						
	Guard Posts	100,000					
	Quarters, Office, Storage	100,000					
	Utilities and Other Infrastructure	10,000					
	Equipment & Supplies:						
	4-Wheel Drive Vehicle	25,000					
	Fuel					3,000	9,000
	Maintenance on Vehicle		1,000	3,000			
	Patrol Boat	10,000					
	Field Radio System	10,000					
	Camping Equipment	10,000					
	GPS and Altimeter	20,000					
	1 Personal Computer and Printer	5,000					
	Office and Field Equipment	50,000					
	Office Supplies					3,000	10,000
	Subtotal	*340,000*	*13,000*	*39,000*		*48,240*	*145,720*

TABLE 3 (Contd.). ESTIMATED COMPONENTS AND COSTS FOR RHINOCEROS CONSERVATION ACTION PLAN IN MALAYSIA

No.	Project / Item	External Funds Needed			Internal Funds Provided		
		Initial	Recurrent/Year	Recurrent/3Year	Initial	Recurrent/Year	Recurrent/3Year
2.	Rhino Conservation Coordination						
2.1	Rhino Coordinator (Based in Peninsula)						
	Salary & Benefits		24,000	72,000			
	Travel		4,000	12,000			
	4-Wheel Drive Vehicle	25,000					
	Vehicle Maintenance		2,000	6,000			
	Subtotal	*25,000*	*30,000*	*90,000*			
2.2	Deputy Coordidnator (Sabak/Sarawak)						
	Salary & Benefits		12,000	36,000			
	Travel		7,000	21,000			
	4-Wheel Drive Vehicle	25,000					
	Vehicle Maintenance		2,000	6,000			
	Subtotal	*25,000*	*21,000*	*63,000*			
3	Rhino & Habitat Surveillance						
3.1	Peninsular Malaysia						
	Extensive Surveys (3 Replicates)						
	Mobilization of 60 Workers		25,000	75,000			
	Salaries					7,200	21,600
	Remote Sensing Data	20,000					
	GIS System	50,000					
	GIS Consultations & Training	20,000					
	Field Radio System	40,000					
	OPS, Altimeter, Night Vision Scopes	20,000					
	Subtotal	*150,000*	*25,000*	*75,000*		*7,200*	*21,600*

TABLE 3 (Contd.). ESTIMATED COMPONENTS AND COSTS FOR RHINOCEROS CONSERVATION ACTION PLAN IN MALAYSIA

No.	Project / Item	External Funds Needed			Internal Funds Provided		
		Initial	Recurrent/Year	Recurrent/3Year	Initial	Recurrent/Year	Recurrent/3Year
3.	Rhino & Habitat Surveillance						
3.2	Sabah						
	Extensive Surveys (4 Replicates)						
	Mobilization of Workers		33,333	100,000			
	Salaries					9,600	28,800
	Survey Equipment	50,000					
	Consultation	20,000					
	Subtotal	*70,000*	*33,333*	*100,000*		*37,000*	*111,000*
3.3	Sarawak						
	Extensive Surveys (2 Replicates)						
	Mobilization of Workers		16,666	50,000			
	Salaries					4,800	14,400
	GPS, Altimeter, Compass	20,000					
	Consultation	20,000					
	Subtotal	*40,000*	*16,666*	*50,000*		*4,800*	*14,400*
4.	PHVA/GIS Workshops/Process						
	Peninsular Malaysia	20,000					
	Sabah	20,000					
	Sarawak	20,000					
	Contingency	10,000					
	Subtotal	*70,000*					

TABLE 3 (Contd.). ESTIMATED COMPONENTS AND COSTS FOR RHINOCEROS CONSERVATION ACTION PLAN IN MALAYSIA

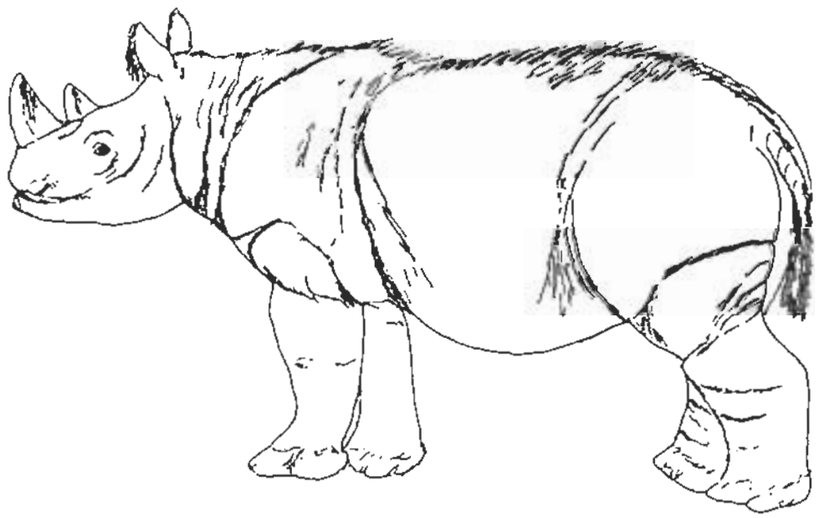
No.	Project / Item	External Funds Needed			Internal Funds Provided		
		Initial	Recurrent/Year	Recurrent/3Year	Initial	Recurrent/Year	Recurrent/3Year
5.	Capture & Translocation of Rhino						
5.1	Peninsular Malaysia						
	Rhino Capture/Translocation Leader						
	Salary & Benefits		12,000	36,000			
	Travel & Field Allowances		6,000	18,000			
	2-Ton Transport Truck/Hydraulic Arm	50,000					
	Trapping Equipment & Supplies	50,000					
	Staff Mobilization	30,000					
	Subtotal	*130,000*	*18,000*	*54,000*			
5.2	Sabah						
	Staff Costs		50,000	150,000			
	Equipment	150,000					
	Training	20,000					
	Miscellaneous			5,000			
	Subtotal	*170,000*	*50,000*	*152,000*		*80,000*	*240,000*
6.	Intensive Management Program						
6.1	Peninsular Malaysia						
6.1.1.	International Program Adviser						
	Salary & Benefits		9,000	27,000			
	Travel/Per Diem		10,000	30,000			
	Subtotal		*19,000*	*57,000*			

TABLE 3 (Contd.). ESTIMATED COMPONENTS AND COSTS FOR RHINOCEROS CONSERVATION ACTION PLAN IN MALAYSIA

No.	Project / Item	External Funds Needed			Internal Funds Provided		
		Initial	Recurrent/Year	Recurrent/3Year	Initial	Recurrent/Year	Recurrent/3Year
6.	Intensive Management Program						
6.1	Peninsular Malaysia						
6.1.2	Captive propagation & Research						
	Breeding Program Manager						
	Salary & Benefits		15,000	45,000			
	Field Allowances & Travel		6,000	18,000			
	Reproductive Biology Consultations		12,000	36,000			
	Full-Time Veterinarian		12,000	36,000			
	Travel for Malaysians		7,000	21,000			
	Basic Facilities at Zoo Melaka				300,000		
	Basic Facilties at Sungai Dusun				900,000		
	Improvement & Maintenance of Facilities	50,000					
	Quarters for Consultants & Specialists	100,000					
	Utilities & Other Infrastructure	90,000				10,000	30,000
	Equipment & Supplies:						
	Light Pick-Up Truck	30,000					
	Vehicle Maintenance		2,000	6,000			
	Ultrasonic Scanner/ AVR	20,000					
	Video Camera & Accessories	5,000					
	Laboratory Equipment & Supplies	50,000					
	Electronic Scale	5,000					
	Other Equipment & Supplies	50,000				4,000	12,000
	Personal Computer & Printer	10,000					
	Subtotal	*410,000*	*54,000*	*162,000*	*1,200,000*	*14,000*	*42,000*

TABLE 3 (Contd.). ESTIMATED COMPONENTS AND COSTS FOR RHINOCEROS CONSERVATION ACTION PLAN IN MALAYSIA

No.	Project / Item	External Funds Needed			Internal Funds Provided		
		Initial	Recurrent/Year	Recurrent/3Year	Initial	Recurrent/Year	Recurrent/3Year
6.	Intensive Management Program						
6.1	Peninsular Malaysia						
6.1.3	Gene Pool Project						
	Electric Fence for Sungai Dusun	350,000					
	4-Wheel Drive Vehicle	25,000					
	Vehicle Maintenance		2,000	6,000			
	Fuel					3,000	9,000
	Telemetry Equipment	20,000					
	Subtotal	*395,000*	*2,000*	*6,000*		*3,000*	*9,000*
6.2.	Sabah						
6.2.1	Captive Propagation & Research						
	Basic Facilities: Sepilok & Tabin				500,000		
	Staff Cost		24,000	72,000			
	Equipment	78,000					
	Training & Education	56,000					
	Subtotal	*134,000*	*24,000*	*72,000*	*500,000*		
7.	GRAND TOTAL	**2,739,000**	**368,000**	**1,106,000**	**1,725,000**	**431,440**	**1,295,320**



2.2 TIMETABLE

2.2.1. Peninsular Malaysia

2.2.1.1. Plan Phasing

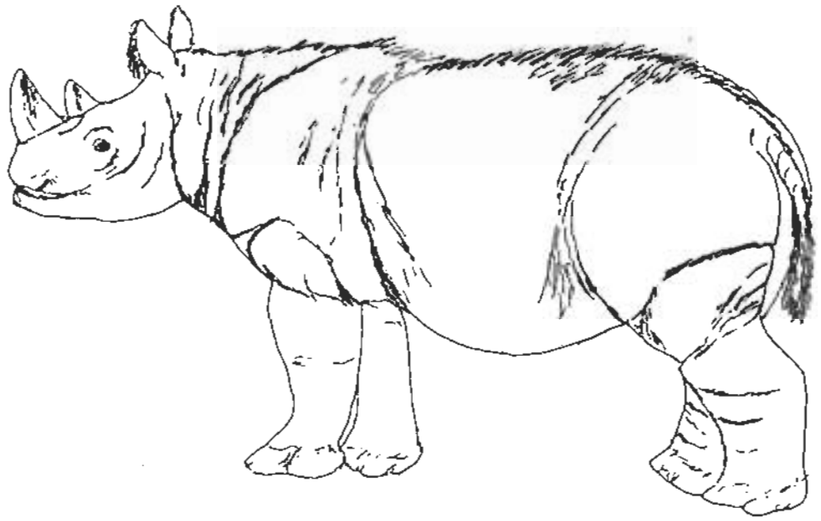
The Timetable for implementing the Rhino Action Plan in Peninsular Malaysia is presented in Table 4. Since the DWNP has the basic organisational set up of the wildlife program, in situ and ex situ management work should begin concurrently in 1994. This plan will be phased over a three year period with the first year for the infrastructural set up and purchases of all essential equipment.

Rhino surveys will be conducted in Taman Negara, Belum and the mountain range in the central part of peninsular. All the rhino and biodiversity survey data will be gathered by the existing Data Base Unit for storage, manipulation and retrieval. Monthly data from the rhino units doing the patrolling and monitoring work will update the existing rhino distribution information.

Some of the animals from unprotected areas would be captured after the present captive facilities are renovated to meet certain requirements for the reproductive biology work. At the same time, electric fencing would be erected on the highlands to accommodate about 10 animals in the enclosed natural habitat.

2.2.1.2. Review

The Director General DWNP is responsible to monitor the implementation and progress of the action plan. A progress report will be in terms of an annual report to be submitted by the Rhino Coordinator, Breeding Program Manager, International Program Adviser, Reproductive Consultants, Rhino Capture Leaders and the leaders of the rhino units. This report will reviewed by a committee comprising the Director General, sponsors and leaders involved in the project.



2.2 TIMETABLE

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TABLE 4 - TIME FRAME AND PHASING - RHINO ACTION PLAN - PENINSULA

ACTIVITY	1994	1995	1996
Minor amendment of the Wildlife Protection Act 1972/76	----------		
Gazettement of Endau-Rompin, Selama and Belum		----------	
Rhino conservation coordination	----------	----------	----------
Rhino survey	----------	----------	
Patrolling and monitoring	----------	----------	----------
GIS data base		----------	----------
Translocation of rhinos from unprotected habitats		----------	----------
Gene pool		----------	----------
Captive breeding research	----------	----------	----------
International consultation and advise	----------	----------	----------
Program review	- - -		

2.2.2. Sabah

2.2.2.1 Plan Phasing

The timetable for implementation of the Rhino Action Plan in Sabah is presented in Table 5. The planned time frame of the Rhino Conservation Plan is shown in the table below. From the table it can be seen that the planned activities fall into three phases. Phase I, lasting for 1 year only, consists of activities which are preparatory to Phase II, the most important of these being completion of the legislation revision.

In Phase II, of 2 years duration, the main thrust of the Plan takes place, with activities in all plan components. By the end of this phase (planned at end 1995) the survival of the Sumatran rhino in Sabah should be substantially secured, assuming there are no major hold ups in any of the activities.

Phase III, of 4 years' duration, accommodates completion of the capture & translocation of doomed rhinos and general consolidation of other aspects of the Plan.

2.2.2.2 Review

The progress of this plan should be reviewed on a regular basis, certainly annually. It is recommended that there be a major review of progress at the end of each phase. If there are any unfinished actions at the end of a particular phase, reasons for delay or non-implementation should be sought and a revised action re-scheduled into the next phase of the Plan. The Wildlife Department will bear the prime responsibility for this Plan monitoring process, assisted by outside technical expertise where appropriate. The ultimate measure of success of the Plan will be the long-term survival of the Sumatran rhino, in the wild, in Sabah.

2.2.3. Sarawak

2.2.3.1. Plan Phasing

2.2.2.2. Review

TABLE 5. TIME FRAME AND PHASING OF RHINO PLAN - SABAH

ACTIVITY	93	94	95	96	97	98	99
1. Complete revised draft of legislation	-----						
2. New legislation passed into law		----					
3. Wildlife Sanctuaries (for rhino) created		----					
4. Elephant/rhino conservation unit created		-------					
5. Survey of rhino range in Sabah		----------					
6. Population/status study of Tabin, Danum		----------					
7. Set up rhino data base		---------					
8. Translocation of "doomed" rhinos		----------					
9. Monitoring of released rhinos		----------					
10. Captive research on reproductive biology		----------					
11. Determination of genetic status		-------					
12. Completion of captive breeding plan		--------					
	PHASE I	PHASE II		PHASE III			
	Preparation	Main Action		Follow through action/consolidation			

3. MALAYSIAN PLAN AND THE GLOBAL RHINO CONSERVATION STRATEGY

As recognized by the recent UNEP/CITES initiatives and the intensifying IUCN and WWF programmes, there is a global crisis for conservation of rhino. All five species are threatened with extinction.

Fewer than 12,000 rhino of all kinds survive on the planet. The situation is even more severe when it is observed that half of these 12,000 rhino are of the southern white rhino (*Ceratotherium simum*), which is currently the most secure but still very vulnerable species. Recently, the decline has been most spectacular for the African black rhino (*Diceros bicornis*), whose population (now 2,500) has decreased 95% in the last 20 years and perhaps 30% in the last 3 years. It is, however, fortunate that relatively secure and reproductively prosperous nuclei of both black and white rhino exist in a few natural sanctuaries in the wild and in captivity outside Africa.

By comparison, the two species of South East Asian rhino (*Dicerorhinus sumatrensis*, the Sumatran, and *Rhinoceros sondaicus*, the Javan) are the rarest of rhinos and among the most threatened of mammals in the world. Fewer than 1,000 Sumatran rhino survive, distributed over at least 35 localities in Indonesia and Malaysia. Fewer than 100 Javan rhino exist, mostly in a single protected area in Indonesia with a remnant recently rediscovered in Vietnam.

These two species have not declined as drastically in recent years as the African black rhino, but their situation is more precarious for at least 3 reasons:
(1) Numbers are already very low and there has been an appreciable increase in poaching with major episodes occurring in both Indonesia and Malaysia over the last two years;
(2) Significant intensification of habitat loss, which unlike the situation in Africa, is at least as serious a threat as poaching to the South East Asian rhino species. Human encroachment is severe in the 3 major Sumatran rhino protected areas in Indonesia and has eliminated at least two habitats outside protected areas. Recent reports indicate a very disturbing reduction of one of the main protected areas in Malaysia;
(3) Lack of secure or propagating nuclei in natural sanctuaries or captive facilities. The captive population of Sumatran rhino is not yet reproducing reliably; there are no Javan rhino in captivity and current plans do not include an *ex situ* programme for this species in the near future.
These pressures have been in progress for many years but have now developed to the point of being an **"emergency"** in South East Asia, of equal urgency to, albeit with less publicity than, the crisis in Africa.

In response to this situation, a conservation strategy has been formulated over the last eight years as information and analysis of the populations and habitats for these rhino species has improved. This strategy has evolved over the last decade as a collaborative effort of the conservation authorities in range states and the Asian Rhino Specialist Group of the Species Survival Commission (SSC) of the IUCN. The range state conservation authorities are: Indonesia (PHPA); Malaysia (DNPWM in Peninsular Malaysia, the Wildlife Department in Sabah, and the Forest Department in Sarawak). The conservation strategy is documented in the Action Plan of the Asian Rhino Specialist Group of the IUCN Species Survival Commission with support of UNEP and the derivative documents that include the Global Heritage Species programme Prototype Action Plan for Sumatran Rhino and various national plans (e.g. the Indonesian Rhino Conservation Strategy, the Peninsular Malaysia Rhino Action Plan, the Sabah Rhino Conservation Plan.)

Summary of the Conservation Strategy:

The conservation strategy and action plan for Asian Rhino provides for survival and recovery of viable populations of the rhino. Toward these goals, the strategy integrates *in situ* and *ex situ* components, governmental and non-governmental partners, and traditional and non-traditional methods. The strategy entails a diversified approach that includes: wild population protection, sanctuary management, captive propagation, and ultimately gene bank technologies. The strategy also employs the rhinos as umbrella and flagship species to conserve ecosystems of which they are an integral part. More specifically, major components of the strategy are:

(1) Survival or Recovery of Viable Populations of the Rhino.

This strategy is based on preliminary population and habitat viability analyses (PHVAs). These analyses use models to consider demographic and genetic characteristics of the population as well as current and projected conditions in the habitat with the objective of: (1) assessing the risks, both deterministic and stochastic (random) to survival and recovery of the population and (2) evaluating various management options or scenarios.

Based on these analyses, explicit and indeed quantitative recommendations for the conservation of the species are generated. Its goal is the recovery of rhino populations to target levels that have been established through population viability analyses:

Sumatran Rhino:

Sumatra:	1000 rhino in 3 protected areas
Borneo:	700-1000 rhino in 5 protected areas (2 in Kalimantan; 2 in Sabah; 1 in Sarawak);
Mainland:	1000 rhino (600 in peninsular Malaysia; 200 in Thailand; 200 in Burma) in 7 protected areas (3 in Peninsular Malaysia; 2 in Thailand; 2 in Burma)

Javan Rhino:

Java:	100 rhino in Ujung Kulon with improved protection and management.
Elsewhere:	Another 1,900 Javan rhino re-established in 9-19 protected areas (each capable of sustaining at least 100 rhino) within the historic range of the species.

Population and habitat viability analyses will continue to adaptively refine the action plans for the rhino strategy. These PHVAs will generate more explicit assessment of risk and recommendations for action. In particular, further PHVAs for the Sumatran rhino in both Indonesia and Malaysia will permit optimal placement of the infrastructure to be provided by this project. The PHVAs will be enhanced by Geographic Information System (GIS) techniques developing on the database and methodology already being developed as a collaborative venture by PHPA, the IUCN SSC (through its Captive Breeding Specialist Group specializing in Small Population Management), and the Minnesota Zoological Garden.

(2) Protection and Management of the Sumatran and Javan rhino as Species and as Components of their Ecosystems.

While an emergency exists for the survival of the two species of rhino, the conservation strategy for them also emphasizes their role as flagship and umbrella species for their ecosystems.
The term flagship species is well established in conservation parlance. The term umbrella species is not as much used. There is a useful distinction between the terms that is related to the

emerging science of viable population biology. Flagship species is best used as a marketing term to designate those charismatic species that can attract support for conservation of their ecosystems. Umbrella species is best used as an ecological term to indicate species for which the habitat required to sustain viable populations (defined in terms of genetic and demographic factors) is so large that it will encompass appreciable parts of the natural ecosystem inhabited by the umbrella species.

The two species of South East Asian rhino are both umbrella and flagship species. The population viability analyses used to assist formulation of the conservation strategy for the rhino has recommended that priority be accorded to protected areas that can accommodate a population of 100 rhino, preferably more. Moreover, the strategy recommends that the recovery programme aspire to total target populations of 2000 to 3000 to be restored in the wild for each species and significant subspecies of Sumatran and Javan rhino. Ecological studies indicate that each Sumatran rhino require on the average 5-10 km^2 of tropical forest habitat. Hence, objectives for the priority protected areas will be around 1000 km^2 at a minimum and the overall objectives will if achieved help conserve 40-60,000 km^2 of tropical forest ecosystems in South East Asia.

Protection and management of this amount of habitat to accommodate viable populations of rhino will also benefit many other threatened species including orang utan, tiger, elephant, and thousands of other taxa. The activities of the rhino units and the application of their infrastructure can be used for protection and management of other species in the rhino's ecosystem.

Collectively, these protected areas represent approximately 32,000 km^2 of tropical forest. These areas are extremely rich in biodiversity that has much insurance, information, use, existence, and bequest value. The known or estimated numbers of species include: 1500+ plants; 200+ reptiles; 500+ birds; 200+ mammals. Over 100 species of the animals are considered threatened by the IUCN Red Data List. These major rhino protected areas are also vital watersheds for their regions and hence have immediate-use value for local human populations.

(3) Prioritization of Protected Areas for Conservation Activities.

A major recommendation is to concentrate field efforts on wild populations and protected areas that were sufficiently large and protectable to be viable (i.e. demographically secure and genetically diverse) over the long-term. The strategy recognizes 9 major wild populations of and protected areas for Sumatran rhino and 1 major population and protected area for the Javan rhino. These areas are to receive priority in terms of field efforts and resources. Rhino outside these larger populations and areas are recommended for *ex situ* actions, i.e. careful translocation and captive propagation.

(4) Improved Protection and Management of the 10 Major Populations and Protected Areas.

Critical to the *in situ* component of the rhino conservation strategy is the development of special rhino units that possess the equipment and training:

- to provide improved protection and management of rhino and their habitats and
- to serve as extension agents to promote community development and involvement in the conservation activities.

The core of such a rhino unit already exists in Malaysia but must be expanded to have resident extensions in each of the major protected areas. The rhino units are being formed in Indonesia.

(5) Professional Training within the Range States:

Implicit in the formation of the rhino units, is the need for more training in wildlife population and protected area management. Such programmes will be continued and expanded as part of the strategy

(6) Capacity Development in Local Communities

In addition to traditional protection and management actions for the *in situ* population, this prototype plan also includes components relating to local community problems and involvement in rhino conservation and their habitats, including:

- public awareness and educational campaigns nationally and locally;
- economic incentive and development programmes;
- networks for local citizens to provide information useful to protection and management of the rhino and areas.

(7) Development of More Intensively Protected and Managed in situ Zones, "Sanctuaries".

A sanctuary is a natural or artificially enclosed tract within a protected area in which a high density of rhino is developed as a propagating nuclei to repopulate other protected areas. This method is sort of a hybrid between *in situ* and *ex situ* areas and could be a prime site for translocation of rhino rescued from inviable situations. The goal of the strategy is

Sumatran rhino:

Sumatra: 3 sanctuaries each containing 50 rhino.
Borneo: 3 sanctuaries each containing 25-50 rhino.
Mainland: 3 sanctuaries each containing 25-50 rhino.

Javan Rhino:

Analogous sanctuary goals have not yet been formulated for the Javan rhino.

(8) Development of captive populations in support of the in situ efforts.

Ultimately, the goal of the captive programmes is to develop target populations of 150 for each valid subspecies/e.s.u. of Sumatran rhino.

Rhino for the sanctuaries or captivity will be individuals that are not in viable situations in the wild, i.e. they are not part of populations sufficiently large or feasibly protectable. Some such rhino may also be translocated into the major protected areas. The *ex situ* efforts utilize captive facilities that can be either zoos or special centers which may be constructed in or near protected areas but which would entail more intensive management than the sanctuaries described above.

Rescue operations and captive propagation programmes have been initiated in both Indonesia and Malaysia involving also the United States and United Kingdom.
Although attempts to develop a captive programme have been in progress for eight years, propagation has been difficult due in part to a dearth of mature males and in part to problems with management. Intensified efforts are now commencing to improve captive management and husbandry. Moreover, greater development of captive facilities and programmes in or near natural habitat is expected to enhance reproductive performance.

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An e.s.u. is an evolutionarily significant unit, basically a subspecies that has been validated by modern science as sufficiently distinct to be conserved as a separate entity; currently there are 3 subspecies of Sumatran rhino described but research continues to investigate if they represent e.s.u.'s. Eventually, a captive programme is also recommended for the Javan rhino but not until efforts at improving the situation in Ujung Kulon and establishing a second *in situ* population have been accomplished.

The risks of intensive management procedures such as translocation and captivity are appreciated. Extensive protocols have already been developed for these more intensive and interventive measures involving capture, translocation, and captivity. They are documented in the Indonesian Rhino Conservation Strategy. Protocols will be adaptively refined as the strategy is implemented.

The global captive conservation community is an important partner in the coalition developing the rhino conservation strategies. A major involvement of the zoo community is naturally the captive propagation programmes. The *ex situ* components of the strategy are receiving considerable support from the captive conservation community and more is projected. Currently the involvement of the captive community is under review and reorganization is probable to improve their contribution to both *ex situ* and especially *in situ* efforts. Indeed, the captive community has already initiated long-term support for the *in situ* components of the rhino conservation strategy through an innovative adopt-a-park concept.
The first programme has been developed by the Minnesota Zoological Garden for Ujung Kulon National Park, the protected area for the last appreciable population of Javan Rhino in Indonesia. Proposals are being developed for similar "adopt-a-park" programmes for the Sumatran rhino protected areas in Sumatra and in Malaysia.

The strategy also includes a component to develop the use of germplasm techniques and reproductive technology to enhance the propagation and preservation programmes for the two rhino species. These programmes are being developed collaboratively by the captive community and conservation authorities in Indonesia and Malaysia

(9) Reduction of Trade in Rhino Horn

Efforts are required at international, national, and local levels to reduce the trade in rhino horn and thus the poaching pressure on rhino. Particularly important are the capacity development programmes in local communities which can help stop the trade at its source.

(10) Explicit Delineation of Methods and Estimates of their Costs to Achieve the Biological Objectives of the Strategy.

Total start-up ("initial") costs requiring external funds to implement the strategy for Sumatran and Javan rhino in Indonesia and Malaysia have been estimated at approximately US $ 10 million over the next 3 years: US $ 5 million each by Malaysia and Indonesia.

A funding plan to provide for the initial and recurrent costs is required, as acknowledged in the documents cited earlier. The funding plan must incorporate support from the range states and contributions from external donors. The proposed GEF (discussed below) project would provide catalytic technical and financial support to initiate full implementation of the conservation strategy and will develop focus a funding plan for its long-term sustainability.

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SECTION C: PROJECT OUTLINES

1 INTRODUCTION AND OVERVIEW

1.1 General

A total of 14 project proposals are presented for Malaysia: 3 for the country as a whole, 6 for Peninsular Malaysia, 3 for Sabah, 2 for Sarawak.

The 14 projects with their total costs, funds raised, and funds needed are:

Title of Project	Total Costs	Funds Needed	Funds Raised
Infrastructure Support for Rhino Units - Malaysia	1,702,600	966,000	736,600
Activation/Extension of Pulong Tau N.P. for Rhino	524,720	379,000	145,720
Rhino Conservation Coordination - Malaysia	115,000	115,000	0
Deputy Rhino Conservation Coordinator	88,000	88,000	0
Rhino & Habitat Surveillance - Peninsular Malaysia	246,600	225,000	21,600
Rhino & Habitat Surveillance - Sarawak	104,400	90,000	14,400
Rhino Survey - Sabah	281,000	170,000	111,000
Rhino PHVA/GIS Workshops - Malaysia	70,000	70,000	0
Capture and Translocation of Rhino - Peninsula	184,000	184,000	0
Capture and Translocation of Rhino - Sabah	562,000	322,000	240,000
Intensive (Captive) Management - Peninsula	1,814,000	572,000	1,242,000
Gene Pool Project- Peninsular Malaysia	410,000	401,000	9,000
Captive Propagation Programme - Sabah	706,000	206,000	500,000
International Adviser-Intensive Management Programme	57,000	57,000	0
TOTAL (US $)	6,865,320	3,845,000	3,020,320

These 14 proposals are presented for consideration by donors both as free-standing and as possible co-financing of a G.E.F. grant.

1.2 Particular Comments By Malaysia Region on the Project Proposals

1.2.1. Peninsula

Six of the 14 projects relate entirely to rhino conservation activities in Peninsular Malaysia. Three others relate in part to the Peninsula.

1.2.2 Sabah

The objectives and general scheme of Sabah's rhino conservation plan are outlined in Section B. The three projects detailed in this section form an integral part of the plan. All three require only partial funding from external sources, as a major portion of their activities and resources will be funded by the Wildlife Department. Two of the projects (Translocation and Captive Breeding) have already commenced operations on a limited basis but the additional inputs are required if they are to make the desired impact on the overall effort to ensure the rhino's survival in Sabah. Similarly, the survey project is essential as a foundation to the other two projects and in order to obtain baseline information that will enable fine tuning of the conservation plan.

The projects seeking funding are:

Title	Project Type	Budget (U.S.$) Total	Needed
Sabah Rhino Survey	Survey	355,000	170,000
Translocation Rhino	Rescue/Restocking	985,000	325,000
Captive Breeding	Research/ Management Planning	417,000	184,000

1.2.3. Sarawak

Two of the project proposals relate to rhino conservation in Sarawak. Two of the others relate in part to Sarawak.

1.3 GEF Proposal:

A major proposal has already been submitted to the Global Environment Facility (G.E.F.) for partial and seminal support of the Malaysian Rhino Conservation Programme. This proposal is in collaboration with Indonesia. Activities of the GEF project will be equally distributed between Indonesia and Malaysia. The GEF project will contribute to these various components of the diversified strategy in adaptive response to the different needs in the various range states as the strategy is implemented. The details of relative allocations will be determined as the design of the project continues.

The major objectives of the G.E.F. Project would be:

* Provision of the means to implement actions that will ensure survival and recovery of viable rhino populations in the wild, largely through *in situ* protection and management, but enhanced by *ex situ* techniques.
* Contribution to conservation of the entire biodiversity-rich ecosystems inhabited by the rhino by facilitating protection and managing the large areas required for viable populations of rhino.
* Support for the further development, implementation, and coordination of the strategy.
* Facilitation of a model coalition of government and NGO partners to implement this conservation strategy that can be used for other taxa elsewhere.

This project will require 3 years during which the overall strategy will be further refined, additional funding mobilized and a plan to ensure long-term financial sustainability developed.

The GEF project would enable initiation of full implementation of the rhino conservation strategy and action plan. The GEF project will encompass a number of activities that reflect the diversified components of the strategy, reflect the different needs of the range states, and could include:

* Establishment (in Indonesia) or enhancement (in Malaysia) of rhino conservation unit teams in the major protected areas for the species, including:
  - Provision of training of the rhino units for their various activities, including anti-poaching measures and map-linked (GIS) surveillance of rhino populations.
  - Provision of infrastructural support for the rhino units for protection, management, training community and eco-development programmes.
* Conduct of PHVAs and development of GIS databases for further refinement of the strategy.
* Transfer of *ex situ* technology
* Coordinate implementation of the strategy
* Development of a funding plan to ensure the long-term sustainability of the conservation strategy.

Although the emphasis of this project will be on *in situ* protection and management, technical assistance will be provided for various *ex situ* activities in the range states when needed to support the *in situ* efforts. Particular attention will be directed to development of the rhino sanctuaries and to captive propagation and research centers in the range states that are developed within the major protected areas on which the *in situ* efforts will concentrate.

Finally, the project will develop a funding plan to provide both for the full monies required for the initial costs of implementing the project and for its long-term sustainability. The plan will attempt to incorporate funds from both governmental (both range and non-range states) and non-governmental sources (e.g., NGOs, corporations, the global captive community).

The UNEP Conference on Rhinoceros Range and Consumer States and Donors to be conducted in Nairobi during June 1993 is the first step in a major drive to seek additional funding. The proposed GEF funds of US$ 2 million could be expected to catalyze additional funds at the UNEP Conferences for Rhinoceros Range and Consumer States and Donors. Some of these costs can be, and are already being, covered by governments of the range states supplemented by NGOs. A tentative, simple budget for allocation of the funds.

- Operational facilities and equipment for rhino units
  (4 major protected areas)
  Gunung Leuser National Park
  Kerinci Seblat National Park
  Barisan Selatan National Park
  Ujung Kulon National Park
- Support to establish position of Rhino Desk Officer
- Training for Rhino Units
- PHVA/GIS - 1 Workshop
- Community Relations/Development
- Horn Trade Activities, especially Information Networks
- Facilities and technical assistance for sanctuary and captive programmes.

Peninsular Malaysia US $ 600,000

- Operational facilities and equipment for rhino units
  (3 major protected areas)
  Endau Rompin Reserve
  Taman Negara National Park
  Ulu Selama
- PHVA/GIS - 1 Workshop
- Community Relations/Development
- Horn Trade Activities, especially Information Networks
- Facilities and technical assistance for sanctuary and captive programmes.

Sabah US $ 200,000

- Operational facilities and equipment for rhino units,
  esp. for translocation of rhino into protected areas:
  (2 major protected areas)
  Tabin Reserve
  Danum Valley
- PHVA/GIS - 1 Workshop .
- Training for Rhino Units
- Horn Trade Activities, especially Information Networks
- Facilities and technical assistance for sanctuary and captive programmes.

Sarawak US $ 100,000

- Operational facilities and equipment for rhino units,
  esp. for translocation of rhino into protected areas:
  (1 major protected areas)
  Ulu Limbang
- PHVA/GIS - 1 Workshop
- Community Relations/Development

IUCN Asian Rhino Specialist Group US $ 200,000

- Technical Coordination/Facilitation of Project &
  Further Development of Strategy & Funding Plan

TOTAL **US $ 2,000,000**

2. PROJECT OUTLINES:

REFER TO ENSUING PAGES.

Project Title: INFRASTRUCTURE SUPPORT FOR RHINO UNITS - PENINSULAR MALAYSIA

Database Project No. **Date last update:** 5 June 1993

Region: South East Asia **Country:** Malaysia

Summary Information

Project Status: On-going Fund Raising States: Part

Project Objective: 1. Habitat and population protection;

Project Activities: 1. Regular patrolling and monitoring 2. Update report 3.

Funding Start Date: 1 January 1993 End Date: 31 December 1996 Further phases: Most likely

Population directly affected: Peninsular Malaysia Approximate Numbers: 60-130

Budget Information

Total Budget: 1,702,600 **Original Currency:** Malaysian ringgit **Exchange Rate Used:** USD1 = MR2.5

Budget Breakdown according to UNEP standardization

Yr 1: 1,104,200 Yr 2: 299,200 Yr 3: 299,200
Yr 4: Yr 5:

Technical Assistance: Infrastructure:
Monitoring & Research: Local Development:
Staff Costs: Recurrent Costs:
Education: Project Management:

Fund Raising Information:-

Total funds raised: 736,600 Funds raised for current year:
Total funds needed: 966,000 Funds needed for current year:

Origin of funds - Organization: Government of Malaysia Amount:
Organization: Amount:
Organization: Amount:

Organization through which funds are being channelled: Department of Wildlife and National Parks
Future donor interest:
Donors actually approached:

Organizations and People Involved with the Project

Govt/Local agency executing project: Address:
Project Administrator: Director General, DWNP Address: Department of Wildlife and National Parks
Project Executant: Rhino Coordinator Address: Km 10, Jalan Cheras, 56100 Kuala Lumpur
Project Originator: Address: Malaysia
Collaborating Bodies: AsRSG, IRF,

INFRASTRUCTURE SUPPORT FOR RHINO UNITS - MALAYSIA

Background: Since 1974 Rhino Units were established in Taman Negara and the states of Kelantan, Trengganu, Pahang, Johore, Perak and Selangor. A few dedicated rangers had been assigned to conduct monitoring and patrolling work in areas known to have rhinoceros. As the department expanded to work vigorously on other endangered species and increase the enforcement work, some of the rhino units were unofficially spared to accommodate the other management functions.

The AsRSG (1989) has emphasis that the protection of the Sumatran rhinoceros habitat and population is a matter of highest priority. Basic facilities are necessary to complement the on-going population monitoring in Selama and Endau-Rompin. Infrastructure support is also required in Taman Negara and Belum. This proposal is an attempt to revive and revitalize the existence of these units on a permanent basis.

Objectives: 1. Regular patrolling and monitoring as an effort to arrest poaching and habitat encroachment. 2. Provide updated reports with data base to be stored and transferred electronically.

Activities: 1. The DWNP will commit a team of 10 experienced and dedicated men in each area to patrol and monitor the Sumatran rhinoceros population in Endau-Rompin, Taman Negara, Selama and Belum; 2. Building of guard posts, quarters, office, storage, infrastructure and utilities; 3. Purchase of vehicles, computers and field equipment.

Output: 1. Better protection for the Sumatran rhinoceros; 2. Continue report on the current habitat and population status; 3. Provide a geographically referenced data of the habitat and the Sumatran rhinoceros population.

Progress to date: Reports by Flynn (1983) Flynn, Mohd Tajuddin (1985) and Mohd Tajuddin (1983, 1984) are based on the surveys and monitoring work carried out by authors and the Rhino Units between 1974 until 1981. Members of the existing Rhino Units in Johore and Perak provided great hands-on experience to other junior officers and rangers in the recent wildlife inventories in Endau-Rompin, Selama, Taman Negara (Kenyir), Besut and Ulu Muda.

Project Title: EXTENSION OF PULONG TAU NATIONAL PARK - SARAWAK

Database Project No. | Date last update: 5 June 1993

Region: South East Asia | Country: Malaysia

Summary Information

Project Status: Proposal | Fund Raising Status: Part

Project Objective: *in situ* management

Project Activities: 1. Institutional support | 2. | 3.

Funding Start Date: 1 January 1994 | End Date: 31 December 1996 | Further phases: Most likely

Population directly affected: Sarawak, Malaysia | Approximate Numbers: 10-20

Budget Information

Total Budget: 524,720 | Original Currency: Malaysian Ringgit | Exchange Rate Used: USD1 = MR2.5

Budget Breakdown according to UNEP standardization

Yr 1: 402,240 | Yr 2: 61,240 | Yr 3: 61,240
Yr 4: | Yr 5:

Technical Assistance: | Infrastructure:
Monitoring & Research: | Local Development:
Staff Costs: | Recurrent Costs:
Education: | Project Management:

Fund Raising Information:-

Total funds raised: 145,720 | Funds raised for current year:
Total funds needed: 379,000 | Funds needed for current year:

Origin of funds - Organization: | Amount:
Organization: | Amount:
Organization: | Amount:

Organization through which funds are being channelled: Government of Malaysia
Future donor interest:
Donors actually approached:

Organizations and People Involved with the Project

Govt/Local agency executing project: | Address:
Project Administrator: Wildlife Director | Address: Ibu Pejabat Jabatan Perhutanan
Project Executant: Wildlife Director | Address: Bangunan Wisma Sumber Alam
Project Originator: | Address: Jalan Stadium, Petra Jaya
Collaborating Bodies: AsRSG, IRF | Address: 93660, Kuching, Sarawak

ACTIVATION OF PULONG TAU NATIONAL PARK FOR RHINO - SARAWAK

Background: The Sumatran rhino was considered extinct in Sarawak until a remnant was rediscovered in the Ulu Limbang area in the northeastern part of the country.

Objectives: To protect the last know population of rhino in Sarawak with a view to employing them to expand to viable levels and repopulate their former range. Critical to this objective will be the extension and activation of Pulong Tau National Park to encompass the area in Limbang currently occupied by rhino and to contain enough area to accommodate a viable population of rhino (at least 100 animals).

Activities: Activities will include surveys of the area to improve information on the number and distribution of the rhino, efforts to expand Pulong tau National park and activate it as an effectively protected area, deployment of staff and development of infrastructure to protect and manage rhino in the Park.

Outputs: A report on the status of the rhino, a proposal for further development of the area as a National park.

Progress to date: The Forest Department in sarawak has been providing protection for the rhino but more resources and effort are need to really secure the area and enable recovery of the rhino population to viable levels.

Project Title: RHINO CONSERVATION COORDINATOR - MALAYSIA

Database Project No. **Date last update:** 5 June 1993

Region: South East Asia **Country:** Malaysia

Summary Information

Project Status: Proposal **Fund Raising Status:** Full

Project Objective: Coordination of in-situ programmes

Project Activities: 1. In-situ rhinoceros management 2. 3.

Funding Start Date: 1 January 1994 End Date: 31 December 1996 Further phases: Most likely

Population directly affected: Peninsular Malaysia Approximate Numbers: 80-130

Budget Information

Total Budget: 115,000 **Original Currency:** Malaysian Ringgit **Exchange Rate Used:** USD1 - MR2.5

Budget Breakdown according to UNEP standardization

Yr 1: 55,000 Yr 2: 30,000 Yr 3: 30,000
Yr 4: Yr 5:

Technical Assistance: Infrastructure:
Monitoring & Research: Local Development:
Staff Costs: Recurrent Costs:
Education: Project Management:

Fund Raising Information:-

Total funds raised: Funds raised for current year:
Total funds needed: 115,000 Funds needed for current year:

Origin of funds - Organization: Amount:
Organization: Amount:
Organization: Amount:

Organization through which funds are being channelled: Department of Wildlife and National Parks
Future donor interest:
Donors actually approached:

Organizations and People Involved with the Project

Govt/Local agency executing project: Address:
Project Administrator: Director General Address: Department of Wildlife and National Parks
Project Executant: Rhino Coordinator Address: Km 10, Jalan Cheras, 56100
Project Originator: Address: Kuala Lumpur, Malaysia
Collaborating Bodies: AsRSG, IRF

Project Title: DEPUTY RHINO CONSERVATION COORDINATOR (SABAH/SARAWAK)

Database Project No. | Date last update: 5 June 1993

Region: South East Asia | Country: Malaysia

Summary Information

Project Status: Proposal | Fund Raising Status: Full

Project Objective: Coordination of *in situ* programmes

Project Activities: 1. *in situ* rhino management | 2. | 3.

Funding Start Date: 1 January 1994 | End Date: 31 December 1996 | Further phases: Most likely

Population directly affected: Sabah and Sarawak | Approximate Numbers: 60-90

Budget Information

Total Budget: 82,000 | Original Currency: Malaysian ringgit | Exchange Rate Used: USD1 = MR2.5

Budget Breakdown according to UNEP standardization

Yr 1: 26,000 | Yr 2: 21,000 | Yr 3: 21,000
Yr 4: | Yr 5:

Technical Assistance: | Infrastructure:
Monitoring & Research: | Local Development:
Staff Costs: | Recurrent Costs:
Education: | Project Management:

Fund Raising Information:-

Total funds raised: | Funds raised for current year:
Total funds needed: 82,000 | Funds needed for current year:

Origin of funds - Organization: | Amount:
Organization: | Amount:
Organization: | Amount:

Organization through which funds are being channelled: Wildlife Director
Future donor interest:
Donors actually approached:

Organizations and People Involved with the Project

Govt/Local agency executing project: | Address:
Project Administrator: Wildlife Director | Address: Sabah Wildlife Department
Project Executant: Deputy Rhino Coordinator | Address: 5th Floor Block B,
Project Originator: | Address: Wisma Muis, 88400 Kota Kinabalu
Collaborating Bodies: AsRSG, IRF | Address: Sabah, Malaysia

RHINO CONSERVATION COORDINATION - MALAYSIA
COORDINATOR & DEPUTY COORDINATOR

Background: In 1977 a junior wildlife officer was assigned to plan, execute, supervise and coordinate the Sumatran rhinoceros field work. In 1985, there was an urgent need to rescue animals found in isolated and dangerous habitats. However, the limitations of staff in the Department of Wildlife and National Parks (DWNP) has required that the Rhino Officer also be engaged in many other management and research projects. Hence, over the last several years, the *in-situ* management work was carried out either on an ad-hoc basis or being completely controlled by the State directors. The lack of coordination might be a reason for animals being recently poached in Johore and Trengganu.

Objectives: Proper execution and coordination of *in-situ* action plan and programmes

Activities: Execute, coordinate and supervise programmes to conduct patrol, monitoring and surveys in rhinoceros habitats. It is proposed that the main coordinator will be based in Peninsular Malaysia but that a Deputy Coordinator be appointed to assist with coverage in the East Malaysian States of Sabah and Sarawak.

Output: 1. Better coordination and supervision of in-situ management activities; 2. Current information on the status of habitat and population in Malaysia 2. Information will be compiled into a scientific rhinoceros status report.

Progress to date: Designation of an Officer at Perhilitan (DWNP). This function needs to be expanded and provided with external support until the post can be permanently added to the Department. Coordination is carried out by a wildlife management officer with approval from the state directors.

Project Title: RHINO AND HABITAT SURVEILLANCE - PENINSULAR MALAYSIA

Database Project No.

Date last update: 5 June 1993

Region: South East Asia

Country: Malaysia

Summary Information

Project Status: On-going

Fund Raising Status: Part

Project Objective: Survey potential populations

Project Activities: 1. Survey 2. GIS 3.

Funding Start Date: 1 January 1994 End Date: 31 December 1996 Further phases: Most likely

Population directly affected: Peninsular Malaysia Approximate Numbers: 80-130

Budget Information

Total Budget: 246,600 **Original Currency:** Malaysian Ringgit **Exchange Rate Used:** USD1 = MR2.5

Budget Breakdown according to UNEP standardization

Yr 1: 182,200 Yr 2: 32,200 Yr 3: 32,2000
Yr 4: Yr 5:

Technical Assistance:
Monitoring & Research:
Staff Costs:
Education:

Infrastructure:
Local Development:
Recurrent Costs:
Project Management:

Fund Raising Information:-

Total funds raised: 21,600
Total funds needed: 225,000

Funds raised for current year:
Funds needed for current year:

Origin of funds - Organization: Government of Malaysia Amount:
Organization: Amount:
Organization: Amount:

Organization through which funds are being channelled: Department of Wildlife and National Parks
Future donor interest:
Donors actually approached:

Organizations and People Involved with the Project

Govt/Local agency executing project:
Project Administrator: Director General
Project Executant: Rhino Coordinator
Project Originator:
Collaborating Bodies: AsRSG, IRF

Address:
Address: Department of Wildlife and National Parks
Address: Km 10, Jalan Cheras
Address: 56100 Kuala Lumpur, Malaysia

RHINO AND HABITAT SURVEYANCE

Background: The Asian Rhino Specialist Group AsRSG (1989) has recommended that regular surveillance and surveys be carried out to determine population viability, the habitat carrying capacity and requirements for the rhinos.

The Sumatran rhinoceros can also be designated as an umbrella species (Foose 19??) to provide protection to the biodiversity in an area. Thus during the rhinoceros survey, other vital information on the biodiversity of the area can be gathered for resource planning and management purposes. Surveys on a regular basis could provide enormous data on population distribution, trend and dynamics.

Objectives: 1. Complete survey of potential Sumatran rhinoceros habitats; 2. Examine population distribution and estimate the numbers; 3. Provide vital information on habitat biodiversity for the GIS.

Activities: 1. Surveys of potential habitats to be carried out by all Rhino Units under the leadership of a the Rhino Unit Coordinator; 2. Purchase of equipment to increase survey accuracy; 3. Purchase of computer and GIS accessories .

Output: 1. Gather GIS data base; 2. Provide access on user-pay basis data base; 3. Publish reports and maps incorporating vital information on the population and distribution in the area. Progress to date : Between 1992-1993, inventories had been carried out in Endau-Rompin, Selama, Taman Negara (Kenyir), Besut and Ulu Muda. Information on the rhinoceros and biodiversity have been stored in a data base. However, the lack of basic GIS facilities has hindered further utilization of the data for resource mapping.

Project Title: RHINO AND HABITAT SURVEILLANCE - SARAWAK

Database Project No. | **Date last update:** 5 June 1993

Region: South East Asia | **Country:** Malaysia

Summary Information

Project Status: Proposal | Fund Raising Status: Part

Project Objective: *in situ* management

Project Activities: 1. Survey | 2. | 3.

Funding Start Date: 1 January 1994 | End Date: 31 December 1996 | Further phases: Most likely

Population directly affected: Sarawak, Malaysia | Approximate Numbers: 10-20

Budget Information

Total Budget: 104,400 | **Original Currency:** Malaysian Ringgit | **Exchange Rate Used:** USD1 = MR2.5

Budget Breakdown according to UNEP standardization

Yr 1: 61,466 | Yr 2: 21,466 | Yr 3: 21,466
Yr 4: | Yr 5:

Technical Assistance:
Monitoring & Research:
Staff Costs:
Education:
Infrastructure:
Local Development:
Recurrent Costs:
Project Management:

Fund Raising Information:-

Total funds raised: 14,400
Total funds needed: 90,000
Funds raised for current year:
Funds needed for current year:

Origin of funds - Organization: Government — Amount:
Organization: — Amount:
Organization: — Amount:

Organization through which funds are being channelled: Wildlife Director
Future donor interest:
Donors actually approached:

Organizations and People Involved with the Project

Govt/Local agency executing project:
Project Administrator: Wildlife Director — Address:
Project Executant: Wildlife Director — Address: Ibu Pejabat, Pejabat Perhutanan
Project Originator: — Address: Bangunan Wisma Sumber Alam
Collaborating Bodies: AsRSG, IRF — Address: Jalan Stadium, 93660, Kuching, Sarawak

Project Title: RHINO AND HABITAT SURVEILLANCE - SABAH

Database Project No. | **Date last update:** 17 March 1993

Region: South East Asia | **Country:** Malaysia

Summary Information

Project Status: Proposal | Fund Raising Status: Part

Project Objective: To survey rhino range in eastern and central Sabah in order to establish locations of remaining population and identify doomed individuals for translocation

Project Activities: 1. Survey | 2. | 3.

Funding Start Date: 1 October 1993 | End Date: 30 September 1995 | Further phases: Unknown at present

Rhino population directly affected: Sabah | Approximate Numbers: 50-70

Budget Information

Total Budget: US$355,000 | **Original Currency:** Malaysian Ringgit | **Exchange Rate Used:** USD1 = MR2.5

Budget Breakdown according to UNEP standardization

Yr 1: $210,000 | Yr 2: $145,000 | Yr 3:
Yr 4: | Yr 5:

Technical Assistance: 60,000
Monitoring & Research: 30,000
Staff Costs: 40,000
Education: -
Equipment: 60,000
Infrastructure: 20,000
Local Development: -
Recurrent Costs: 100,000
Project Management: 25,000
Contingency Provision: 5,000

Fund Raising Information:-

Total funds raised: $185,000
Total funds needed: $170,000
Funds raised for current year: 1993-1994, $ 90,000
Funds needed for current year: $120,000

Origin of funds - Organization: Government — Amount: 185,000
Organization: — Amount:
Organization: — Amount:

Organization through which funds are being channelled: Sabah Wildlife Department
Future donor interest:
Donors actually approached:

Organizations and People Involved with the Project

Govt/Local agency executing project: — Address: Sabah Wildlife Department
Project Administrator: Wildlife Director — Address: 5th Floor, Block B, Wisma
Project Executant: Technical consultant — Address: Mois, 88400 Kota Kinabalu
Project Originator: Dr J.B. Sale — Address: Sabah
Collaborating Bodies:

RHINO SURVEY - SABAH

Background: There are many forests within the whole range of rhino in Sabah which Payne (1990) recommends be surveyed in order to complete our understanding of rhino distribution and status within the state. With such a narrow population base (100-200), it is vital that, as far as possible, all groups and isolated individuals are located as a basis for detailed conservation planning. It is also desirable that detailed studies of the age-sex composition and reproductive status of the two supposedly viable populations are undertaken in order to determine the recovery potential of the Sabah population.

Objectives: 1. To complete a survey of all potential rhino habitat in Sabah with a view to locating, as far as possible, all population units and 2. to examine the population composition and reproductive status of the Tabin and Danum populations.

Activities: 1. Field teams, under the leadership of an international consultant, will survey all unsurveyed areas with rhino potential and record results in a GIS data base. 2. A post-graduate student (preferably Malaysian) will study population parameters of the Tabin and Danum rhinos using radio-location and individual identification techniques.

Outputs: 1. A geographically referenced data base of the Sabah rhino population identifying "doomed" individuals and 2. A detailed report on age/sex composition, and reproductive status of the Tabin and Danum rhino population, with recommendations for future management.

Progress to date: A WWF report on distribution and status (Payne, 1990) did not represent a complete coverage of rhino habitats in Sabah and listed areas still requiring detailed survey. Censuses of Tabin and Danum (1991 and 1992) produced a total estimate for each area but no data on population composition or reproductive status.

Project Title: PHVA/GIS WORKSHOP - MALAYSIA

Database Project No. | **Date last update:**

Region: South East Asia | **Country:** Malaysia

Summary Information

Project Status: Proposal | Fund Raising Status: Full

Project Objective: Dissemination of information

Project Activities: 1. Workshop | 2. | 3.

Funding Start Date: 1 January 1994 | End Date: 31 December 1996 | Further phases: Most likely

Population directly affected: Malaysia | Approximate Numbers: 135-230

Budget Information

Total Budget: 70,000 | **Original Currency:** Malaysian Ringgit | **Exchange Rate Used:** USD1 : MR2.5

Budget Breakdown according to UNEP standardization

Yr 1: 20,000 | Yr 2: 25,000 | Yr 3: 25,000
Yr 4: | Yr 5:

Technical Assistance: | Infrastructure:
Monitoring & Research: | Local Development:
Staff Costs: | Recurrent Costs:
Education: | Project Management:

Fund Raising Information:-

Total funds raised: | Funds raised for current year:
Total funds needed: 70,000 | Funds needed for current year:

Origin of funds - Organization: | Amount:
Organization: | Amount:
Organization: | Amount:

Organization through which funds are being channelled: Chairman of the Asian Rhino Specialist Group
Future donor interest:
Donors actually approached:

Organizations and People Involved with the Project

Govt/Local agency executing project: | Address:
Project Administrator: Chairman AsRSG | Address:
Project Executant: Executive Secretary AsRSG | Address:
Project Originator: | Address:
Collaborating Bodies: AsRSG, IRF

PHVA/GIS WORKSHOPS FOR SUMATRAN RHINO

Background: Population and habitat viability analyses have evolved as a very useful tool in developing and refining conservation strategies and action plans. The PHVA process has been developed in the IUCN SSC by the Captive Breeding Specialist Group (which really is broader than its name implies considering problems in management of small populations whether wild or captive) in collaboration with the various Taxon-Specific Specialist Groups of the SSC. The PHVA process has evolved over the last 5 years and has been successfully applied to many species including the Javan Rhino and the Black Rhino (in Kenya). Recently the PHVA process has been enhanced to include linkage to geographic information systems (G.I.S.).

Objectives: Conduct workshops on the PHVA and GIS on the Sumatran rhinoceros.

Activities: 1. Organize PHVA/GIS workshops in Peninsular, Sabah and Sarawak; 2. Gather data from GIS and incorporate in the PHVA

Output: 1. Better assessment of the extinction processes operating on rhino populations and habitat. 2. Exploration of consequences of various management and non-management actions on survival and recovery (i.e. long-term viability) of the Sumatran rhino. requirements 3. Better compilation of published and unpublished information on rhino populations and habitats and guidance on further data to collect. 4. Initiation of a map-linked (G.I.S.) data base for the Sumatran rhino. 5. Improvement of the conservation strategy and action plans for Sumatran rhino. 6. Dissemination of information among biologists, managers and administrators involved in the rhinoceros conservation.

Progress to date: PHVA on the Javan rhinoceros in Bogor in 1989; preliminary PHVA analysis of the Sumatran rhino 1990-92; PHVA on the Kenya black rhino 1990; and preparations for a PHVA on the Indian rhinoceros in December 1993.

Project Title: CAPTURE AND TRANSLOCATION OF SUMATRAN RHINOCEROS - PENINSULAR MALAYSIA

Database Project No. | Date last update: 5 June 1993

Region: South East Asia | Country: Malaysia

Summary Information

Project Status: Proposal | Fund Raising Status: Full

Project Objective: *in situ* and *ex situ* management

Project Activities: 1. Rescue 2. Translocation and reintroduction 3.

Funding Start Date: 1 January 1994 | End Date: 31 December 1996 | Further phases: Most likely

Population directly affected: Peninsular Malaysia | Approximate Numbers: 80-130

Budget Information

Total Budget: 184,000 | Original Currency: Malaysian Ringgit | Exchange Rate Used: USD1 = MR2.5

Budget Breakdown according to UNEP standardization

Yr 1: 148,000 Yr 2: 18,000 Yr 3: 18,000
Yr 4: Yr 5:

Technical Assistance: | Infrastructure:
Monitoring & Research: | Local Development:
Staff Costs: | Recurrent Costs:
Education: | Project Management:

Fund Raising Information:-

Total funds raised: | Funds raised for current year:
Total funds needed: 184,000 | Funds needed for current year:

Origin of funds - Organization: | Amount:
Organization: | Amount:
Organization: | Amount:

Organization through which funds are being channelled: Department of Wildlife and National Parks

Future donor interest:
Donors actually approached:

Organizations and People Involved with the Project

Govt/Local agency executing project: | Address:
Project Administrator: Director General | Address: Department of Wildlife and National Parks
Project Executant: Rhino Coordinator | Address: Km 10, Jalan Cheras, 56100
Project Originator: | Address: Kuala Lumpur, Malaysia
Collaborating Bodies: AsRSG, IRF

CAPTURE AND TRANSLOCATION OF SUMATRAN RHINOCEROS - PENINSULAR MALAYSIA

Background: A early as 1976, the DWNP had attempted to capture a Sumatran rhinoceros for research purpose. Later in 1984, an attempt was made to capture an animal found in a clear fell forest. In 1985, in a serious attempt to capture live animals, the DWNP had set up a ad-hoc group to properly plan and devise ways to safely capture the Sumatran rhinoceros for captive propagation. Pitfall traps were successfully used to capture rhinoceros in Johor, Pahang and Selangor.

Mohd Tajuddin et al (1989) estimate that at least 9 rhino were killed by poachers between 1975 and 1989. Isolated animals are known to have been poached in Johore (4 animals in 1986) and Trengganu (an animal in 1991). There is also evidence of attempts to snare the animals elsewhere. Recently, rhino horns and skin had been confiscated in medicine shops and for witch doctor in Johor, Penang, Perak and Kedah.

Objectives: Capture isolated animals for relocation to protected habitats or captive breeding facilities in Sungai Dusun and Zoo Melaka.

Activities: 1. Purchase of equipment and vehicles; Locating sites suitable for setting of traps; 3. Construction of transport crates and pitfall traps; 4. Daily inspection of the traps; 5. Translocation of captured individuals to protected habitat or captive facilities; 6. Post-capture care and husbandry prior to the relocation.

Output: 1. Captured isolated individuals could reinforce the populations in the protected habitats; 2. Provide founder animals for captive breeding programme; 3. Released animal could be radio-collared to provide information on movement pattern and habitat use; 4. Biological data on captured individuals.

Progress to date: 1. There are 1.6 animals in captivity based in Sungai Dusun and Zoo Melaka facilities; 2. A wild bred animal was born in captivity in 1987 at Zoo Melaka; 3. Reports Mohd Tajuddin et al (1989) and Zainal et al (1990).

Project Title: CAPTURE AND TRANSLOCATION OF RHINOCEROS - SABAH

Database Project No.

Date last update: 17 March 1993

Region: South East Asia

Country: Malaysia

Summary Information

Project Status: Proposal

Fund Raising Status: PART

Project Objective: To capture as many as possible of rhinoceros shown (by previous survey) to be doomed and translocate them to suitable wildlife sanctuaries with good protection.

Project Activities: 1. Rescue 2. Reintroduction and restocking 3.

Funding Start Date: 1 January 1993 **End Date:** 31 December 1995 **Further phases:** Likely

Rhino population directly affected: Sabah **Approximate Numbers:** 100-200

Budget Information

Total Budget: US$985,000 **Original Currency:** Malaysian Ringgit **Exchange Rate Used:** USD1 = MR2.5

Budget Breakdown according to UNEP standardization

Yr 1: $347,500 Yr 2: $227,500 Yr 3: $202,500
Yr 4: $207,500 Yr 5:

Technical Assistance: 50,000
Monitoring & Research: 30,000
Staff Costs: 150,000
Education: -
Equipment: 150,000

Infrastructure: 25,000
Local Development: -
Recurrent Costs: 400,000
Project Management: 50,000

Contingency Provision: 10,000

Fund Raising Information:-

Total funds raised: $660,000
Total funds needed: $325,000

Funds raised for current year: $N.A.
Funds needed for current year:

Origin of funds - Organization: Government Amount: $660,000
Organization: of Sabah Amount:
Organization: Amount:

Organization through which funds are being channelled: Sabah Wildlife Department
Future donor interest:
Donors actually approached:

Organizations and People Involved with the Project

Govt/Local agency executing project: Address: Sabah Wildlife Department
Project Administrator: Wildlife Director Address: 5th Floor, Block B, Wisma Muis , 88400
Project Executant: Technical consultant Address: Kota Kinabalu, Sabah, Malaysia.
Project Originator: Dr J.B. Sale Address:
Collaborating Bodies:

TRANSLOCATION OF DOOMED RHINOS - SABAH

Background: There is an urgent need to ensure the survival of isolated individuals located by the survey project. The aim is to capture these "doomed" animals and move them to the safety of well protected reserves, such as Tabin, that already have a small rhino population and adequate habitat for additional animals. High quality protection should ensure that translocated individuals become integrated into existing breeding populations whose genetic base will thus be strengthened.

Objectives: To ensure the survival of doomed isolated individuals by translocating them to well protected areas with viable populations of rhino and facilitating their integration into those populations.

Activities: Capture involves constructing pitfall traps in the range of a doomed rhino and waiting for it to be trapped. It is then transported by truck to a stockade, within a previously prepared fenced enclosure, in the selected reserve. After some weeks and appropriate health checks, the animal will be fitted with a radio collar and released into the 20 ha enclosure. Regular monitoring of its activities within the enclosure will follow. Once the animal is judged to have settled down (possibly after 6-9 months), the enclosure fence will be removed allowing it access to the wider area of the reserve. Regular monitoring by radio-location will continue for up to 2 years.

Outputs: The result will be greatly improved survival prospects for a large proportion of presently doomed rhinos. Depleted populations in protected reserves will be improved by re-stocking and addition to their gene pools, thus enhancing their viability.

Progress to date: Experimental trapping was carried out in 1992 and one animal was successfully captured (and is being held at the Sepilok). A 20 ha enclosure (4-wire electric fence) and stockade is currently nearing completion in Tabin Wildlife reserve, on an experimental basis. Experimentation is also in progress on a suitable design of radio collar for the Sumatran rhino.

Project Title: INTENSIVE MANAGEMENT PROGRAMME (CAPTIVE PROPAGATION & RESEARCH) - PENINSULA

Database Project No. **Date last update:** 5 June 1993

Region: South East Asia **Country:** Malaysia

Summary Information

Project Status: On-going **Fund Raising Status:** Part

Project Objective: *ex situ* management programmes

Project Activities: 1. Captive management 2. Research 3.

Funding Start Date: 1 January 1994 **End Date:** 31 December 1996 **Further phases:** Most likely

Population directly affected: Peninsular Malaysia **Approximate Numbers:** 80-130

Budget Information

Total Budget: 1,814,000 **Original Currency:** Malaysian Ringgit **Exchange Rate Used:** USD 1 = MR2.5

Budget Breakdown according to UNEP standardization

Yr 1: 478,000 Yr 2: 68,000 Yr 3: 68,000
Yr 4: Yr 5:

Technical Assistance: Infrastructure:
Monitoring & Research: Local Development:
Staff Costs: Recurrent Costs:
Education: Project Management:

Fund Raising Information:-

Total funds raised: 1,242,000 Funds raised for current year:
Total funds needed: 572,000 Funds needed for current year:

Origin of funds - Organization: Government of Malaysia Amount:
Organization: Amount:
Organization: Amount:

Organization through which funds are being channelled: Department of Wildlife and National Parks
Future donor interest:
Donors actually approached:

Organizations and People Involved with the Project

Govt/Local agency executing project: Address:
Project Administrator: Director General Address: Department of Wildlife and National Parks
Project Executant: Breeding Programme Manager Address: Km 10, Jalan Cheras,
Project Originator: Address: 56100 Kuala Lumpur, Malaysia
Collaborating Bodies: AsRSG, IRF

INTENSIVE MANAGEMENT PROGRAMME - PENINSULAR MALAYSIA

Background: In 1984, a female was captured by villagers in an oil palm plantation. Presently, there are seven animals held in captivity in Sungai Dusun and Zoo Melaka. Intensive captive breeding work could not be carried out because of lack of trained reproductive biologists and biological knowledge on the species.

Local expertise must be urgently developed in collaboration with local and international institutions.

Objectives: 1. Propagate the Sumatran rhinoceros; 2. Provide basic equipment for reproductive biology work and research; 3. Experiments on RIA and oestrus detection method. 4. Gather information on morphology, physiology, veterinary care and husbandry.

Activities: 1. Purchase of laboratory, office, computers, vehicles; 2. Upgrading of present facilities; 3. Develop or modify reproductive techniques and conduct experimentation; 4. Constant monitoring of captive individuals.

Output: 1. Produce rhinoceros for reintroduction; 2. Better coordination of fund raising, research and development activities at the international, regional and national levels; 3. Develop techniques and gather information on breeding biology of sumatran rhinoceros; 4. Scientific reports and research protocols.

Progress to date: 1. Basic captive facilities, office, laboratory, storage and quarters have been constructed in Sungai Dusun and Zoo Melaka; 2. Reports by Zainal et al (1990) on the veterinary care and husbandry of the species

Project Title: GENE POOL PROJECT

Database Project No. **Date last update:** 5 June 1993

Region: South East Asia **Country:** Malaysia

Summary Information

Project Status: On-going **Fund Raising Status:** Part

Project Objective: *ex situ* management

Project Activities: 1. Research and management 2. 3.

Funding Start Date: 1 January 1994 **End Date:** 31 December 1996 **Further phases:** Most likely

Population directly affected: Peninsular Malaysia **Approximate Numbers:** 80-130, maybe more

Budget Information

Total Budget: 410,000 **Original Currency:** Malaysian Ringgit **Exchange Rate Used:** USD1 = MR2.5

Budget Breakdown according to UNEP standardization

Yr 1: 400,000 Yr 2: 5,000 Yr 3: 5,000
Yr 4: Yr 5:

Technical Assistance: Infrastructure:
Monitoring & Research: Local Development:
Staff Costs: Recurrent Costs:
Education: Project Management:

Fund Raising Information:-

Total funds raised: 9,000 Funds raised for current year:
Total funds needed: 401,000 Funds needed for current year:

Origin of funds - Organization: Amount:
Organization: Amount:
Organization: Amount:

Organization through which funds are being channelled: Department of Wildlife and National Parks
Future donor interest:
Donors actually approached:

Organizations and People Involved with the Project

Govt/Local agency executing project: Address:
Project Administrator: Director General Address: Department of Wildlife and National Parks
Project Executant: Reproduction Programme Manager Address: Km 10, Jalan Cheras
Project Originator: Address: 56100 Kuala Lumpur, Malaysia
Collaborating Bodies: AsRSG, IRF

GENE POOL PROJECT - PENINSULAR MALAYSIA

Background: Based on the success of the Kenya rhino sanctuaries, the Garamba northern white rhino experience, and the model of the tamarau "gene pool" in the Philippines, there have been plans since 1984 to experiment with a contained (by fences) but capacious area within the natural habitat for rhino in Sungai Dusun. It is believed this such an area would provide an that would maximize propagation by permitting the animals to continue natural ecology and behavior, but under conditions providing very close surveillance, protection, and management. This management would include some control over the mating choices of individuals for genetic and demographic regulation. Sungai Dusun was selected because it has been a known refuge for Sumatran rhino for many years, but is considered too small to be a sanctuary capable of maintaining a viable population in genetic and demographic terms without intensive management.

Objectives: 1. To provide an optimal environment for propagation of rhino within their natural habitat but under intensive surveillance, protection and management. 2. To emulate the propagation and security success of similar contained *in situ* areas for rhino in Africa, e.g. the Kenya rhino sanctuaries.

Activities: The activities would consist of developing fenced areas of different, predetermined configurations as extensions of the existing captive facility at Sungai Dusun. These fenced areas would then be used as arenas for propagation as well as areas for more intensive study of the natural ecology and behavior of the rhino. Telemetry will be employed to facilitate observation of the animals.

Outputs: Outputs will include increased reproduction of rhino, better knowledge of their ecology and behavior, and a model for similar experiments elsewhere in Malaysia and Asia.

Progress to date: An elaborate captive facility has been constructed as the center from which this gene pool can be developed as an evolving extension. Rhino (to date a male and 4 females) have been capture, many of them from the Sungai Dusun area.

Project Title: CAPTIVE PROPAGATION AND RESEARCH - SABAH

Database Project No. **Date last update:** 17 March 1993

Region: South East Asia **Country:** Malaysia

Summary Information

Project Status: Proposal Fund Raising Status: PART

Project Objective: To design breeding plan for Sepilok captive rhinoceros based on confirmed genetic status and knowledge of breeding biology.

Project Activities: 1. Research 2. Captive management: 3.

Funding Start Date: 1 January 1994 End Date: 31 December 1995 Further phases: Likely

Rhino population directly affected: Sabah Approximate Numbers: 50-70

Budget Information

Total Budget: US$417,000 **Original Currency:** Malaysian Ringgit **Exchange Rate Used:** USD1 = MR2.5

Budget Breakdown according to UNEP standardization

Yr 1: $274,000 Yr 2: $143,000 Yr 3:
Yr 4: Yr 5:

Technical Assistance: 30,000
Monitoring & Research: 20,000
Staff Costs: 66,000
Training: 20,000
Education: 36,000
Equipment: 78,000
Infrastructure: 72,000
Local Development: -
Recurrent Costs: 50,000
Miscellaneous: 15,000
Project Management: 25,000
Contingency Provision: 5,000

Fund Raising Information:-

Total funds raised: $233,000
Total funds needed: $184,000

Funds raised for current year: $N.A.
Funds needed for current year:

Origin of funds - Organization: Government Amount: $233,000
Organization: of Sabah Amount:
Organization: Amount:

Organization through which funds are being channelled: Sabah Wildlife Department
Future donor interest:
Donors actually approached:

Organizations and People Involved with the Project

Govt/Local agency executing project: Address: Sabah Wildlife Department
Project Administrator: Wildlife Director Address: 5th Floor, Block B, Wisma Muis , 88400
Project Executant: Technical consultant Address: Kota Kinabalu, Sabah, Malaysia.
Project Originator: Dr J.B. Sale Address:
Collaborating Bodies:

CAPTIVE BREEDING - SABAH

Background: Sabah's captive breeding project at Sepilok, which began in 1988, presently has 2 males and 1 female but no breeding has so far been attempted, mainly due to a lack of knowledge of the species' reproductive biology on which to base management procedure. Strategy also depends on confirmation or otherwise of the distinct genetic status of the Borneo sub-species (harrissoni).

Objectives: 1. To design a management plan for the Sepilok captive breeding centre which is based on a greater understanding of the species' breeding biology and genetic status and 2. to obtain information for the plan by participating in collaborative research on Sumatran rhino reproduction.

Activities: Further material for genetic examination (hair, blood, etc.) will be submitted to experts as necessary to enable determination of the genetic status of the Sabah rhinos.

In collaboration with research overseas, the Sepilok animals will be used in a study of the reproductive biology of Sumatran rhino, including the female breeding cycle and fertility in the male. This will entail regular collection of specimens (blood, urine, etc.) for analysis in the laboratory, as well as systematic behavioural observations.

Outputs: Both bodies of research information indicated above will form the basis of a detailed management plan for the Sepilok rhinos, aimed at getting them to breed in captivity.

Progress to date: Physical facilities for a breeding programme have been constructed at Sepilok and three animals (2 male; 1 female) are already habituated to captivity. Staff have been trained in caring for the rhinos in captivity and some experience in health care also gained.

Project Title: INTENSIVE MANAGEMENT PROGRAMME - INTERNATIONAL PROGRAMME ADVISER

Database Project No. **Date last update: 5 June 1993**

Region: South East Asia **Country: Malaysia**

Summary Information

Project Status: Proposal Fund Raising Status: PART

Project Objective: *ex situ* management

Project Activities: 1. Coordinate captive management and research internationally 2. Fund raising 3.

Funding Start Date: 1 January 1993 End Date: 31 December 1996 Further phases: Unknown at present

Rhino population directly affected: Malaysia Approximate Numbers: 135-230

Budget Information

Total Budget: US$76,000 **Original Currency: Malaysian Ringgit** **Exchange Rate Used: USD1 = MR2.5**

Budget Breakdown according to UNEP standardization

Yr 1: $19,000 Yr 2: $19,000 Yr 3: 19,000
Yr 4: Yr 5:

Technical Assistance:	Infrastructure:
Monitoring & Research:	Local Development:
Staff Costs:	Recurrent Costs:
Education:	Project Management:
Equipment:	Contingency Provision:

Fund Raising Information:-

Total funds raised: Funds raised for current year:
Total funds needed: 76,000 Funds needed for current year:

Origin of funds -	Organization: Government of Malaysia	Amount:
	Organization:	Amount:
	Organization:	Amount:

Organization through which funds are being channelled: Department of Wildlife and National Parks
Future donor interest:
Donors actually approached:

Organizations and People Involved with the Project

Govt/Local agency executing project:	Address:
Project Administrator: Director General	Address: Department of Wildlife and National Parks
Project Executant: International Programme Adviser	Address: Km 10 Jalan Cheras
Project Originator:	Address: 56100 Kuala Lumpur, Malaysia
Collaborating Bodies: AsRSG, IRF	

INTERNATIONAL ADVISER FOR INTENSIVE MANAGEMENT programme

Background: The intensive management programmes have been in progress since 1984. There has been progress, but has been uneven. The programmes in both Peninsular Malaysia and in Sabah are limited by lack of consistency and clarity of objectives. An external adviser can provide the catalysis, expertise, and encouragement to place these programmes on a clearer, more consistent course.

Objectives: 1. To assist in establishing viable and feasible objectives for the intensive management programmes. 2. Facilitating consistent implementation of theses programmes toward achievement of the objectives. 3. Transfer of intensive management technology. 4. Coordination of the many collaborative relationships that are occurring and need to occur for Malaysia to become an integral part of the global captive programme for this species.

Activities: Advice and consultation on implementation of the intensive management programme. The programme adviser will visit Malaysia 2 or 3 times per year for the next 3 years for 3-4 weeks each time to collaborate with Malaysian colleagues on further development of these programmes.

Output: Improved performance and productivity in the intensive management programme.

Progress to date: A number of persons have been usefully but irregularly advising both Peninsular Malaysia and Sabah on their intensive management programmes. Hence, there is a foundation of both professional and personal relationships and experience on which to develop this more concerted effort.

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NAMES AND ADDRESSES OF CONTACT PERSONS IN MALAYSIA

DEPARTMENT OF WILDLIFE AND NATIONAL PARKS - PENINSULAR MALAYSIA

Musa bin Nordin
Acting Director General
Department of Wildlife and National Parks
KM 10 Jalan Cheras
Kuala Lumpur 56100
MALAYSIA
Tel: 60-3-9052872
Fax: 60-3-9052873

Jasmi Abdul
Director of Research, Management, and Training
Department of Wildlife and National Parks
KM 10 Jalan Cheras
Kuala Lumpur 56100
MALAYSIA
Tel: 60-3-9052872
Fax: 60-3-9052873

Mohd-Tajuddin Abdullah
Department of Wildlife and National Parks
KM 10 Jalan Cheras
Kuala Lumpur 56100
MALAYSIA
Tel: 60-3-9052872
Fax: 60-3-9052873

Zainal Zahari Zainuddin
Zoo Melaka
Air Keroh
Malacca, MALAYSIA
Tel: 60-6-324053
Fax: 60-6-325859

Mohd-Samsuddin Mohd Suri
Project Leader
Rhino Breeding Center
44010 Kuala Kubu Baru
Sungai Dusun, Selangor
MALAYSIA
Tel: 60-11-334326 or 60-3-9052872 (via DWNP Headquarters)
Fax: 60-905-2873 (via DWNP Headquarters)

DEPARTMENT OF WILDLIFE - SABAH

Patrick Mahedi Andau
Director
Department of Wildlife
7th Floor, Sabah Bank Tower
Wisma Tun Fuad Stephens
88330 Kota Kinabalu. Sabah
MALAYSIA
Tel: 60-88-211645 or 60-88-239423
Fax: 60-88-222476

Laurentius Ambu
Department of Wildlife
7th Floor, Sabah Bank Tower
Wisma Tun Fuad Stephens
88330 Kota Kinabalu. Sabah
MALAYSIA
Tel: 60-88-211645 or 60-88-239423
Fax: 60-88-222476

John Sale
UNDP Technical Adviser
Department of Wildlife
7th Floor, Sabah Bank Tower
Wisma Tun Fuad Stephens
88330 Kota Kinabalu. Sabah
MALAYSIA
Tel: 60-88-211645 or 60-88-239423
Fax: 60-88-222476

DEPARTMENT OF FORESTRY - SARAWAK

Datuk Chai Chiu Liang Leo
Forestry Department
Fifth Floor, Wisma Sumber Alam
Putra Jaya, Jalan Stadium 93660
Kuching, Sarawak
MALAYSIA
Tel: 60-82-443773
Fax: 60-82-441337

Abang Haji Kassim bin Abang Morshidi
Forestry Department
Fifth Floor, Wisma Sumber Alam
Putra Jaya, Jalan Stadium 93660
Kuching, Sarawak
MALAYSIA
Tel: 60-82-441948
Fax: 60-82-441337

MALAYAN NATURE SOCIETY

Tungku Mohd Nazim Tungku Yacob
Zoo Negara
Kuala Lumpur
MALAYSIA
Tel: 60-3-4083422
Fax: 60-3-4075375

IUCN SSC ASIAN RHINO SPECIALIST GROUP

Mohd Khan bin Momin Khan
Forestry Department, ITTO Unit
Fifth Floor, Wisma Sumber Alam
Putra Jaya, Jalan Stadium 93660
Kuching, Sarawak
MALAYSIA
Tel: 60-82-445105
Fax: 60-82-445639