# DISPLACEMENT OF ASIAN ELEPHANTS *ELEPHAS MAXIMUS*, SUMTRAN RHINOCEROSES *DICERORHINUS SUMATRENSIS* AND MALAYAN TAPIRS *TAPIRUS INDICUS* IN PENINSULAR MALAYSIA

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**Abstract :-**This paper presents the findings on the trend of displacement of three species, namely Asian elephant (*Elephas maximus*), Sumatran rhinoceros (*Dicerorhinus sumatrensis*) and Malayan tapir (*Tapirus indicus*). Data were obtained from the Department of Wildlife and National Parks, the local zoos and reports from the general public. There is a strong correlation between home range and species displaced. The correlation by states indicated that more displacement of elephants occur in states with a larger percentage of forest reserves, wildlife reserves or forest. Two trends were observed in the displacement of large mammals in Peninsular Malaysia. The first trend indicated that displacement of large mammals is related to its size and its home range. The second trend of displacement showed an increase in the number of displaced animals, reaching a peak followed by a decrease. Habitat loss is the main reason for displacement of animals. Few recommendations were made to overcome this problem

**Key Words:-Displacement- *Elephas maximus* –*Dicerorhinus sumatrensis*- *Tapirus indicus* – fragmentation-habitat loss**

***Abstrak:-*** *Data pemindahan gajah Asia, badak Sumatera dan tapir diperolehi dari Jabatan Perlindungan Hidupan Liar dan Taman Negara, zooo tempatan dan lapuran orang awam. Terdapat korelasi yang kukuh diantara kawasan lingkaran dan spesies yang terpindah. Lebih banyak pemindahan gajah Asia berlaku didalam negeri – negeri yang mempunyai reseb hutan, reseb hidupan liar dan hutan yang luas. Perbadingan antara pemindahan dan tahun menunjukkan korelasi yang kukuh diantara badak Sumatera dan gajah Asia. tinggi. Pemindahan spesies besar adalah berkaitan dengan saiznya dan kawasan lingkaran. Peningkatan pemindahan spesies akan mencapai nilai tertinggi dan seterusnya diikuti dengan penurunan. Kehilangan habitat melalui pembukaan dan perpecahan hutan adalah punca utama pemindahan hidupan liar. Beberapa cadangan diberi untuk mengatasi masalah ini.*

## INTRODUCTION

Home range is an area covered by an animal in its day-to-day activity (Gopal, 1993). It may include several territories, apart from areas used for other activities such as roaming and foraging. Under normal condition, a larger species would need to eat more food and in general, they would require a bigger home range (Krebs & Davies, 1993). The estimated home range of the Asian elephant is 167km" (Hassan & Udadin, 1985). In the Sumatran rhinoceros and the Malayan tapir, the estimated home range sizes are 15 to 30km" and 13 km$^2$, respectively (Williams, 1978; van Strien, 1985). Habitat reduction directly reduces the food source of an area although in some instances, food source or young saplings are more abundant in a secondary forest as compared to a primary forest. Similarly, habitat fragmentation would result in a break in a home range of some species. These disturbances of a habitat can result in a species being displaced out of its home range either directly by reduction of the habitat or indirectly by human encroachment. This displacement of a species would be from a natural habitat into one that is unnatural including plantation, villages, logging areas, roads and highways. In the Asian elephants, conflict with humans arise when crops and plantations are being raided by the elephants for food due to restriction of their feeding areas. Similarly, the establishment of oil palm plantation provides an excellent alternative for the Asian

elephant and resulted in these crops being raided (Hassan &Udadin, 1985).

Over the past two decades, land conversion from forest to agriculture and development has been dramatic enough to cause a number of species to be displaced. The rapid clearing of lowland forest for agriculture purposes and timber has resulted in massive losses of wildlife habitat. This is because the lowland forest is most fertile, very rich in timber tree and wildlife (Mohd Khan, 1982).

This study was done to establish a trend of displacement of Asian elephant (*Elephas maximus*), Sumatran rhinoceros (*Dicerorhinus sumatrensis*) and Malayan tapir (*Tapirus indicus*) in Peninsular Malaysia over the past 25 years. The paper describes displacement of animals as those individuals that are forced out of their natural habitat into an unnatural habitat by deforestation or encroachments or individuals that are attracted out of the natural habitat by food source. The unnatural habitat would include villages, plantations, orchards and logged areas.

## MATERIALS AND METHODS

Data of the three displaced species (Asian elephant, Sumatran rhinoceros and Malayan tapir) were obtained from the Department of Wildlife and National Parks (DWNP), the local zoos and reports from the general public. These also include animals that were poached outside their natural habitat and those that were rescued or captured and subsequently translocated into zoos or into forest and wildlife reserves. Due to their large sizes, poached individuals outside their natural habitat were easily detected. A statistical analysis was done to determine the correlation between each species by years and states and their trend of displacement. An assumption was also made on the current estimates of Asian elephants, Malayan tapir and Sumatran rhinoceros in Peninsular Malaysia and compared against their home range sizes and displacement.

## RESULTS

Based on the current estimated populations of Malayan tapir (3500 individuals), Sumatran rhinoceros (50 individuals) and Asian elephants (2000 individuals), their home ranges of 13 $km^2$, 23 $km^2$, 167 $km^2$ respectively and total displacement, it was found that there is a strong correlation between home range and species displaced (0.998 at p=0.038).

The total number of displaced Asian elephants for the past 25 years (1975 - 1999) were 455 animals. The number increased gradually during the period 1975 – 1979, from 29 to 45 animals in 1980 – 1984. This is followed by a sharp increase to 140 animals in 1985 – 1989 and reaching a peak of 155 animals in 1990 – 1994, before decreasing to 88 animals between the periods 1995 – 1999 (Figure 1).

The first report of a Sumatran rhinoceros being displaced was in 1975. Irregular displacements of Sumatran rhinoceros were reported from the periods 1980 – 1999, ranging from 2 – 18 individuals in each of the five-year period. A sharp increase in the number of Sumatran rhinoceros displaced occurred from the period 1980 – 1984, from 2 to 18 animals during the period 1985 – 1989. This is followed by a sharp decrease to three animals each during the periods from 1990 – 1994 and 1995 - 1999 (Figure 2). The total number of displaced Sumatran rhinoceros from 1975 – 1999 was 27 animals.

The displacement of Malayan tapir was first reported in the year 1991. The total displaced Malayan tapirs for the periods 1991 – 1999 were 28 animals. Six animals were displaced from the period 1990 –1994 followed by a sharp increase of 22 animals from 1995 – 1999 (Figure 2).

The annual rate of displacement for the Asian elephant from 1975 – 1999 is 18.2±12.7 animals. This is followed by 3.1±3.1 animals per year for the Malayan tapir over a period of nine years. The Sumatran rhinoceros has the lowest displacement rate of 1.6±1.9 animals per year over a 16 years period.

Comparing by the years and the displacement, a strong positive correlation (0.478) was observed between the Asian elephant and Sumatran rhinoceros. However, the correlation between the Asian elephant and Malayan tapir and between the Sumatran rhinoceros and Malayan tapir are weak, 0.175 and -0.021 respectively.

Over the period of 25 years (1975 – 1999), 510 animals (455 Asian elephants, 27 Sumatran rhinoceros and 28 Malayan tapirs) were displaced. The displacement of animals was highest in Pahang with a total of 196 animals of which 190 were Asian elephants, followed by Perak (104 animals), Johor (102 animals) and Terengganu (69 animals). The least number of animals displaced was in the state of Kedah (one animal). It should also be noted that Johor has the highest number of displaced Sumatran rhinoceros and Malayan tapir with a total of 12 and nine animals, respectively (Table 1). There is a strong correlation

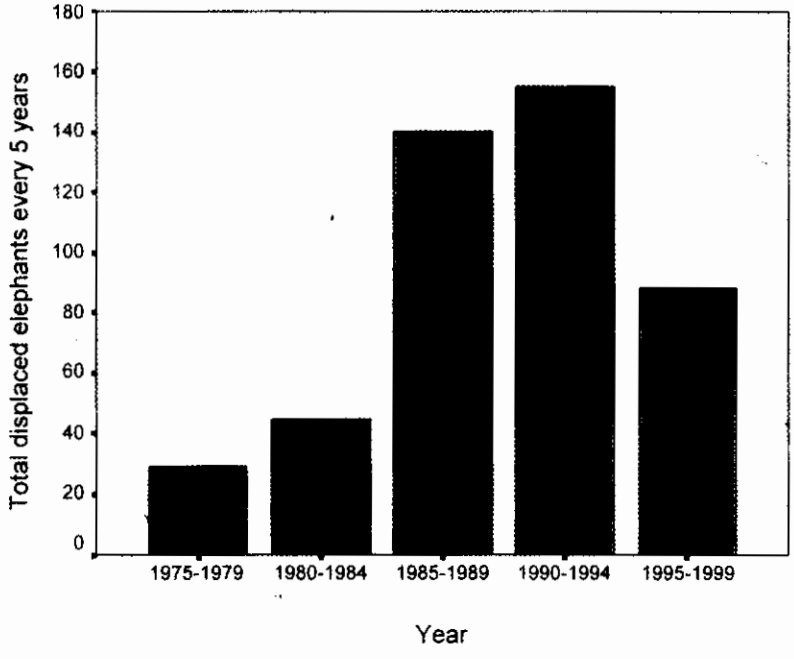


**Figure 1.** Displacement of elephants from 1975 - 1999 in Peninsular Malaysia

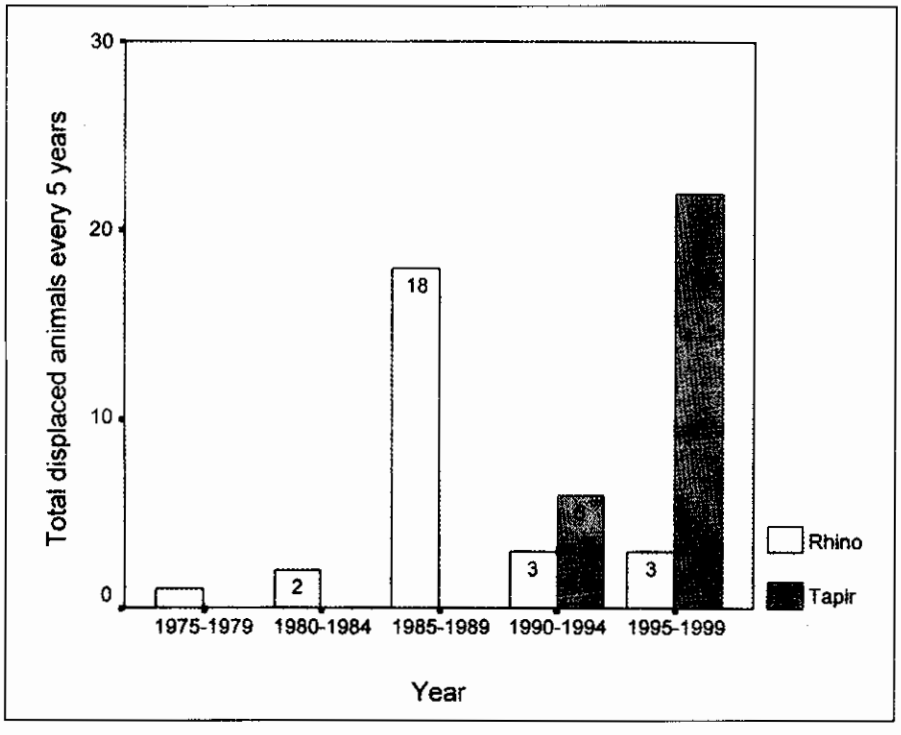


**Figure 2.** Displacement of the Sumatran rhinoceros and Malayan tapir from 1975 - 1999 in Peninsular Malaysia

**Table 1.** Displaced animals according to states in Peninsular Malaysia from 1975 - 1999

| State | Asian Elephant | Sumatran Rhinoceros | Malayan Tapir | Total |
|---|---|---|---|---|
| Pahang | 190 | 2 | 4 | 196 |
| Perak | 95 | 3 | 6 | 104 |
| Terengganu | 67 | 0 | 2 | 69 |
| Johor | 81 | 12 | 9 | 102 |
| Selangor | 12 | 7 | 3 | 22 |
| Negeri Sembilan | 4 | 0 | 2 | 6 |
| Perlis | 3 | 0 | 0 | 3 |
| Kelantan | 1 | 3 | 0 | 4 |
| Melaka | 1 | 0 | 2 | 3 |
| Kedah | 1 | 0 | 0 | 1 |
| **Total** | **455** | **27** | **28** | **508** |

**Table 2.** Declared terrestrial Protected Areas in Peninsular Malaysia

| State | Peninsular | Total Forested Area | | Wildlife Reserve | | | |
|---|---|---|---|---|---|---|---|
| | Area (km²) | ha | % | FD | | DWNP | |
| | | | | Total area (ha) | % of state | Total area (ha) | % of state |
| Johor | 18 986 | 550 715 | 29.0 | 48 795 | 2.6 | 159 195 | 8.4 |
| Kedah | 9 426 | 350 281 | 37.2 | | | 2 | 0.0 |
| Kelantan | 14 943 | 1 027 736 | 68.8 | 108 783 | 7.3 | 80 377 | 5.4 |
| Melaka | 1 650 | 8 931 | 5.4 | | | 82 | 0.0 |
| Negeri Sembilan | 6 643 | 216 727 | 32.6 | | | | |
| Penang | 1 031 | 7 516 | 7.3 | | | | |
| Pahang | 35 965 | 2 113 210 | 58.8 | 361 130 | 10.0 | 394 588 | 11.0 |
| Perak | 21 005 | 1 044 140 | 49.7 | 7 413 | 0.4 | 3 167 | 0.2 |
| Perlis | 795 | 7 110 | 8.9 | 68 | 0.1 | 68 | 0.1 |
| Selangor | 7 956 | 181 961 | 22.9 | 7 644 | 1.0 | 10 428 | 1.3 |
| Terengganu | 12 955 | 735 220 | 56.8 | 77 507 | 6.0 | 103 083 | 8.0 |
| Kuala Lumpur | 244 | 1.0 | | | | 423 | 1.7 |
| **Total** | **131 599** | **6 243 801** | **47.4** | **611 340** | **4.6** | **751 413** | **36.1** |

Abbreviations:
FD - Forest Department
DWNP - Department of Wildlife and National Parks
Source: Anon (1996)

between states with a displacement of Malayan tapirs and those where the Asian elephant (0.632 at $p = 0.027$) and Sumatran rhinoceros (0.787 at $p=0.002$) are displaced.

The correlation by states indicated that more displacement of elephants occur in states with a larger percentage of forest reserves (0.667 at $p=0.018$), wildlife reserves (0.744 at $p=0.006$) or forest (0.872 at $p=0.000$).

## DISCUSSION

Two trends were observed in the displacement of large mammals in Peninsular Malaysia. The first trend indicated that displacement of large mammals is related to its size and its home range. This trend is shown with the displacement of the Asian elephant in 1975, followed by the Sumatran rhinoceros in 1984 and the Malayan tapir in 1990. The reason for this trend is that a bigger animal has a bigger home range and thus, covers a larger

area (Krebbs & Davies, 1993). The probability of a species losing its habitat due to land conversion is highest in one with a larger home range. This is reflected in the total number of Asian elephants displaced (455 animals) being larger than the Sumatran rhinoceros (27 animals) and the Malayan tapir (28 animals). In addition to it being the largest species and having the largest home range, the Asian elephant is known to be a social species. In Peninsular Malaysia, the Asian elephants were reported to exist in small herds within their distribution limits (Mohd Khan, 1985). This factor further increases the size of their home range depending on the herd size.

The second trend of displacement showed an increase in the number of displaced animals, reaching a peak followed by a decrease. This is seen in the Asian elephant and Sumatran rhinoceros. The Malayan tapir's pattern of displacement is predicted to follow in the coming years. The decrease in the number of displaced animals after the peak could be related to the availability of adequate habitat to support the remaining animals in the wild. However, the possibility of localised extinction is equally high.

Habitat loss is the main reason for displacement of animals. By 1990, in Peninsular Malaysia, records indicate that native forest covers 62, 363 $km^2$ or 47.4% of the total land area. This figure has declined as much as 7.6% or 10 028 $km^2$ from the year 1974. Most of this forestland has been converted to oil palm plantation, rubber estates, urban areas and mixed horticulture farms (DOA, 1995). However, habitat loss is not only through the opening up of forest but also through degradation and fragmentation of the forest. Logging and plantation roads enhance accessibility for human encroachment into the animal's habitat. The buffer zone between man and animal is steadily being reduced.

Kelantan has the highest proportion of forest cover (68%) in its state (Table 2) and a low development pressure. This explains the low number of displaced animals in this region. Pahang, Perak and Johor have the highest number of displaced animals and the most extensive oil palm and rubber plantation. The decline of forest cover has been most evident in Pahang, Johor and Terengganu where it has been matched with an increase in oil palm plantation. The total area of oil palm plantation has expanded most in Johor compared to the rest of the states in Peninsular Malaysia (Anon., 1996). This may explain of why Johor has the highest number of displaced Sumatran rhinoceros and Malayan tapir. During the period 1933-1993, a total of 369,076ha were designated as Protected Areas. However, in 1941-1993, a total of 56.6% of this, were degazetted leaving 159, 95ha. Degazettment have flourished mainly in the year 1975 and between 1988 and 1990, where a large proportion has been converted to FELDA settlements (Anon., 1996). States including Penang (7,516ha forested area), Perlis (7,110ha forested area) and the Federal Territory (254ha forested area) do not have the large mammals to be displaced due to its small size of forested areas. However, Kedah with a fairly large forested area of 350,281ha had the least number of large mammals displaced (1 elephant). This could be due to the signs of rampant poaching observed in the survey of Ulu Muda, in 1989 (DWNP, 1989). In addition, unreported cases of culling/poaching by the locals and immigrants occurred within the state.

Displaced animals are usually confused animals, seeking to establish another home range or using their old home range that has been converted agriculture land. In the process, some individuals are at risk of being poached, snared or run down by automobile. Subsequently, these snared animals (mainly elephants and tapirs) are sent to zoos and DWNP breeding centres. In addition, the Sumatran rhinoceros that were reported displaced and in threaten areas were also captured by DWNP for the captive-breeding program. During the past 25 years, 455 Asian elephants were displaced and 22.6% or 103 individuals died. The mortality during capture was 41% and due to post – capture stress and injuries was 26%. A total of 28% were shot dead while the remaining 5% were found dead, mainly from poisoning. A total of 27 Sumatran rhinoceros individuals were displaced, of which 37% were poached, 41% rescued by DWNP and 22% with unknown status. Displaced animals that are rescued were taken to Melaka Zoo and the Sumatran Rhinoceros Conservation Centres, Selangor. Post capture mortality amounted to 36%, although this mainly occurred in the 1980's. The displaced Sumatran rhinoceros are easy targets for poachers as they frequently used established trails for long periods. All Sumatran rhinoceros displaced in Johor between the periods 1988 - 1989, were poached. It was observed that Sumatran rhinoceros are more sensitive to any form of disturbances and are more easily forced out of a forest. In the Sungai Dusun Wildlife Reserve and the adjacent forest reserve, all 6 – 7 individual Sumatran rhinoceros were displaced between the periods 1986 – 1988. This is closely related to the extensive deforestation and development around the region. The Sumatran rhinoceros are poached for their valuable horn, skin and hooves.

It is concluded that there is a very clear trend of displacement of species from the larger to the smaller individuals. The current displacement of the Malayan tapir follows the same trend, observed in the Asian elephants and Sumatran rhinoceros as indicated by the strong positive correlation between the two latter species. Similar trends of displacement are expected to occur in smaller species including the Malayan tiger (*Panthera tigris*), Malayan sunbear (*Helarctus malayanus*) and the Black panther (*Panthera pardus*). An indication of how many viable wildlife habitats remains, may be estimated by looking at where large animals still exist. The rationale is that if the biggest animal (umbrella species) still survive within a region, then there is still enough wilderness left to support most of the smaller inhabitants of the ecosystem, as smaller species generally requires less range (Anon., 1996). However, if the development trend in this country remains unchanged, there may not be enough forest left to support our wildlife in the coming years. There would be a time when there are no animals displaced because there are no more left in their natural habitat, to be displaced. This is seen clearly with the Sumatran rhinoceros and the same will be seen with the Malayan tapir.

It is essential that measures are taken to reduce the displacement of animals. Forest and wildlife reserves should be protected and increased in number and size. Small unviable wildlife reserve in prime areas within the capital city could be traded for areas in the vicinity of other larger wildlife reserves. Currently, a proposal have been submitted by DWNP to the state government to replace the portion of Sungai Bukit Putih Wildlife Reserve in the Federal Territory, taken up for development, with the forest adjacent to the Sungai Dusun Wildlife Reserve. There must always be a balance between development and conservation to sustain the rich biodiversity of Peninsular Malaysia. It is necessary to stop fragmenting indigenous forests and provide green corridors to connect them to larger, more viable forest. In addition, land conversion must also be thoroughly examined in the future. This is to ensure the future of viable population of many species; especially those that live in solitude like the Sumatran rhinoceros and Malayan tapir are secured.

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