

# SUMATRAN ELEPHAN DATABASE

A Preliminary Report (DRAFT)

prepared by

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## Introduction

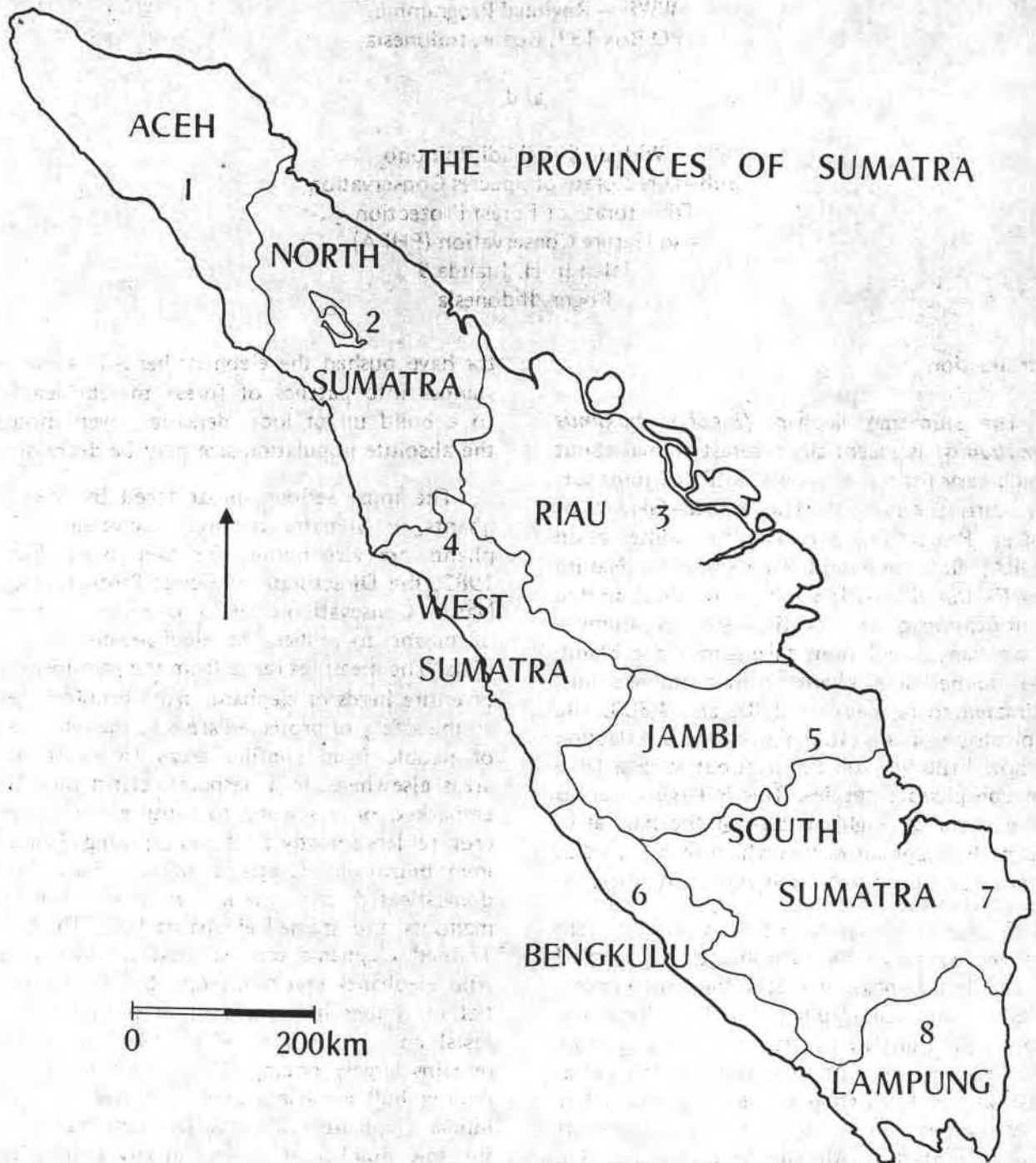
The Sumatran elephant (*Elephas maximus sumatranus*) is essentially a forest animal about which very little was known until the joint surveys carried out by the Directorate-General of Forest Protection and Nature Conservation (PHPA) and the World Wide Fund for Nature (WWF) in 1984–1986 which resulted in the identification of the location, size and number of elephant populations throughout the island. The number of elephants in Sumatra was thus estimated to be between 2,800 and 4,800. The imprecision of the estimates itself is a reflection of how little we still know about such a large and conspicuous species. This is largely due to the dense and tangled nature of the habitat in which the elephant occurs which makes studies on population enumeration extremely difficult.

This preliminary report is based on field experience and on the assessment of published information. In most instances, the field workers have extrapolated elephant numbers from the number of animals reported to be present in an area and the size of the area itself. As any extrapolation is only as good as the data on which it is based, these estimates must be considered at best as tentative. All the accounts available suggest a downward trend for the Sumatran elephant. Changes in land-use patterns in Sumatra

have pushed the elephant herds in some instances into patches of forest thereby leading to a build up of local densities, even though the absolute population size may be decreasing.

The most serious threat faced by the elephants in Sumatra is forest conversion. Elephants are also hunted for their ivory. Since 1982, the Directorate of Forest Protection and Nature Conservation (PHPA) have used a variety of means to reduce the elephant-human conflicts. The measures range from the translocation of entire herds of elephants from problem areas to the safety of protected areas to the relocation of people from conflict areas to much safer areas elsewhere. In a desperate effort they also embarked on a scheme to capture the chronic crop raiders (mostly adult males) using chemical immobilization. Captured animals have been domesticated and trained with the help of mahouts and trained elephants from Thailand. Trained elephants can be used to drive away wild elephants that raid crops. But their potential in timber industry (within production forests) and nature-oriented tourism in Sumatra remains largely untapped. The capture of crop raiding bull elephants alone will not solve the human-elephants conflicts in Sumatra. Given the low number of tuskers in any population, their removal from vulnerable populations may have adverse genetic effects as well.

MAP 1



## Sumatra : an overview

Located between latitudes 6°N and 6°S, the island of Sumatra, with a land area of 473,606 km<sup>2</sup> is the second largest island in the Indonesian archipelago. It is about 1,700 km long and together with its satellite islands accounts for almost 25% of the total land area of Indonesia. For administrative purposes, the island is divided into eight provinces viz., Aceh, North Sumatra, West Sumatra, Riau, Jambi, South Sumatra, Bengkulu and Lampung. It's topography is dominated by the chain of volcanic mountains – the Bukit Barisan – that runs along the western part of the island. It contains the island's highest mountain – Mt. Kerinci (3,805m). The coastal

belt along the west is narrow in contrast to the extensive alluvial plains in the eastern lowlands. The central parts of Sumatra contain Indonesia's biggest deposits of oil and natural gas (Scholz, 1983). The island of Sumatra, representing the western reach of the Sunda Shelf, was connected to the Asian mainland during the drier periods of the Pleistocene epoch (MacKinnon & Artha, 1982), which made it possible for many of the typical Asian species of fauna and flora to spread into the island. The Sumatran elephant (*Elephas maximus sumatranus*) is the subspecies of the Asian elephant that extended its range into Sumatra when the island was still connected to the Asian mainland.

Table 1. Administrative Areas of Sumatra

Province	Area (km <sup>2</sup> )	Capital	% of total area of Indonesia
1. Aceh	55,392	Banda Aceh	2.88
2. North Sumatra	70,787	Medan	3.69
3. Riau	94,562	Pakanbaru	4.93
4. West Sumatra	49,778	Padang	2.59
5. Jambi	44,924	Jambi	2.34
6. Bengkulu	21,168	Bengkulu	1.10
7. South Sumatra	103,688	Palembang	5.40
8. Lampung	33,307	Tanjungkarang	1.74
Sumatra	473,606		24.67

Source : Anon (1982)

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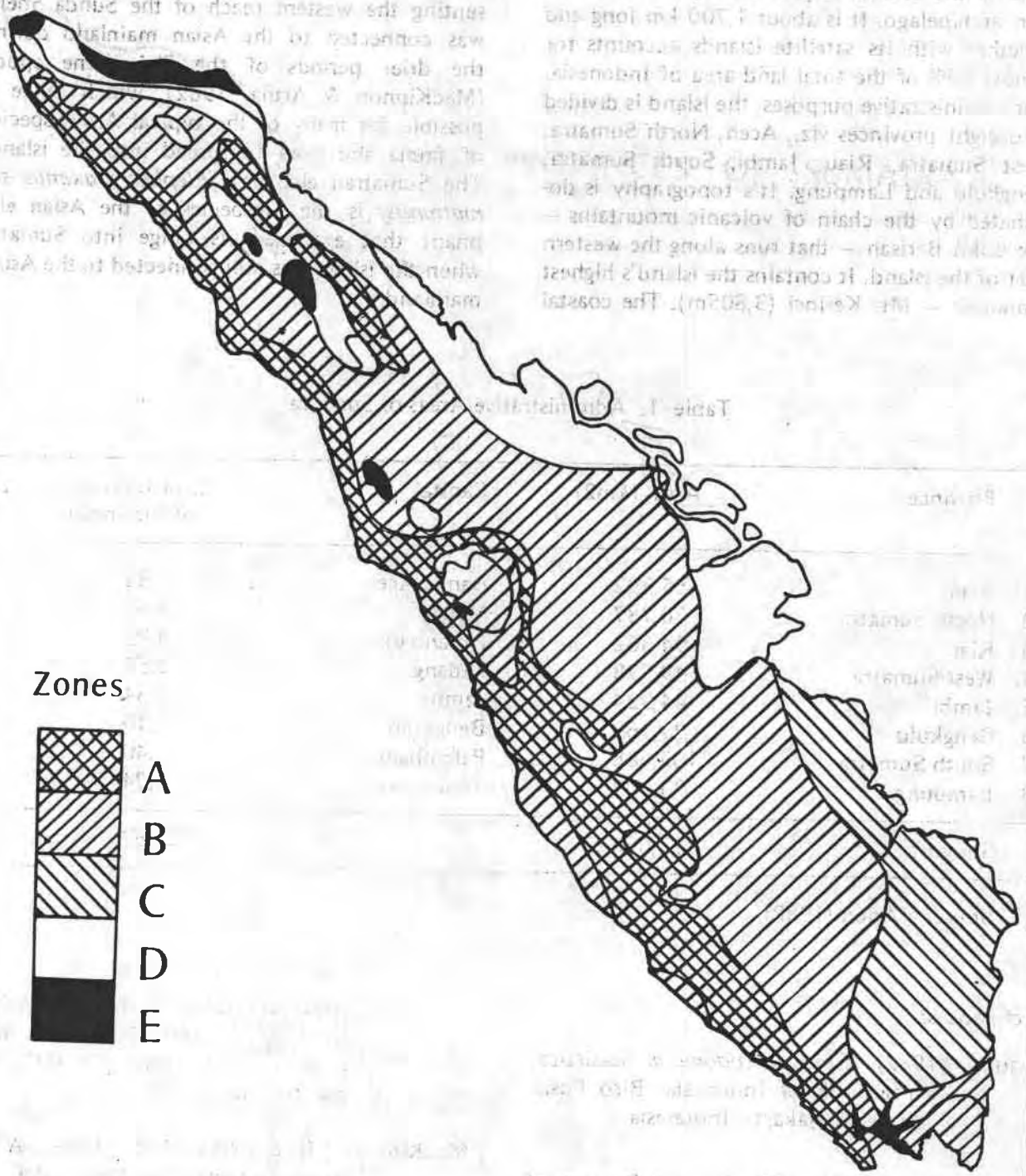
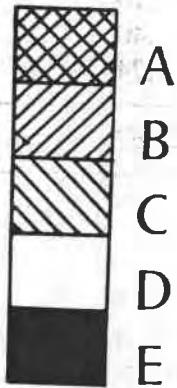
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# MAP 2

## CLIMATIC ZONES

Zones



**Climate: rainfall**

Given the location, Sumatra has a rainy equatorial climate characterised by high and extremely constant temperature throughout the year and high rainfall. The amount of rainfall varies from over 6,000 mm per year in the west to less than 1,500 mm per year in some of the northern parts of the island (e.g. the north coast of Aceh province). The rainfall is affected by the topography especially the Barisan range of mountains that runs along the spine of Sumatra. According to Scholz (1983), increasing rainfall intensity results in larger run-off, a relative decrease of water availability for plant growth, and an increased threat of soil erosion.

In general, the western coast is characterised by high rainfall through much of the year (10–11 months). This corresponds to the Zone A in the System of classification according to Oldeman *et al.* (1979). The pattern of rainfall is dif-

ferent in the extreme northern and southern parts of Sumatra: while the northern tip of Aceh follows the typical Asiatic type of climate with a pronounced dry season in February, the south has the typical Java pattern of rainfall characterised by a single pronounced dry season in July (Whitten *et al.*, 1984).

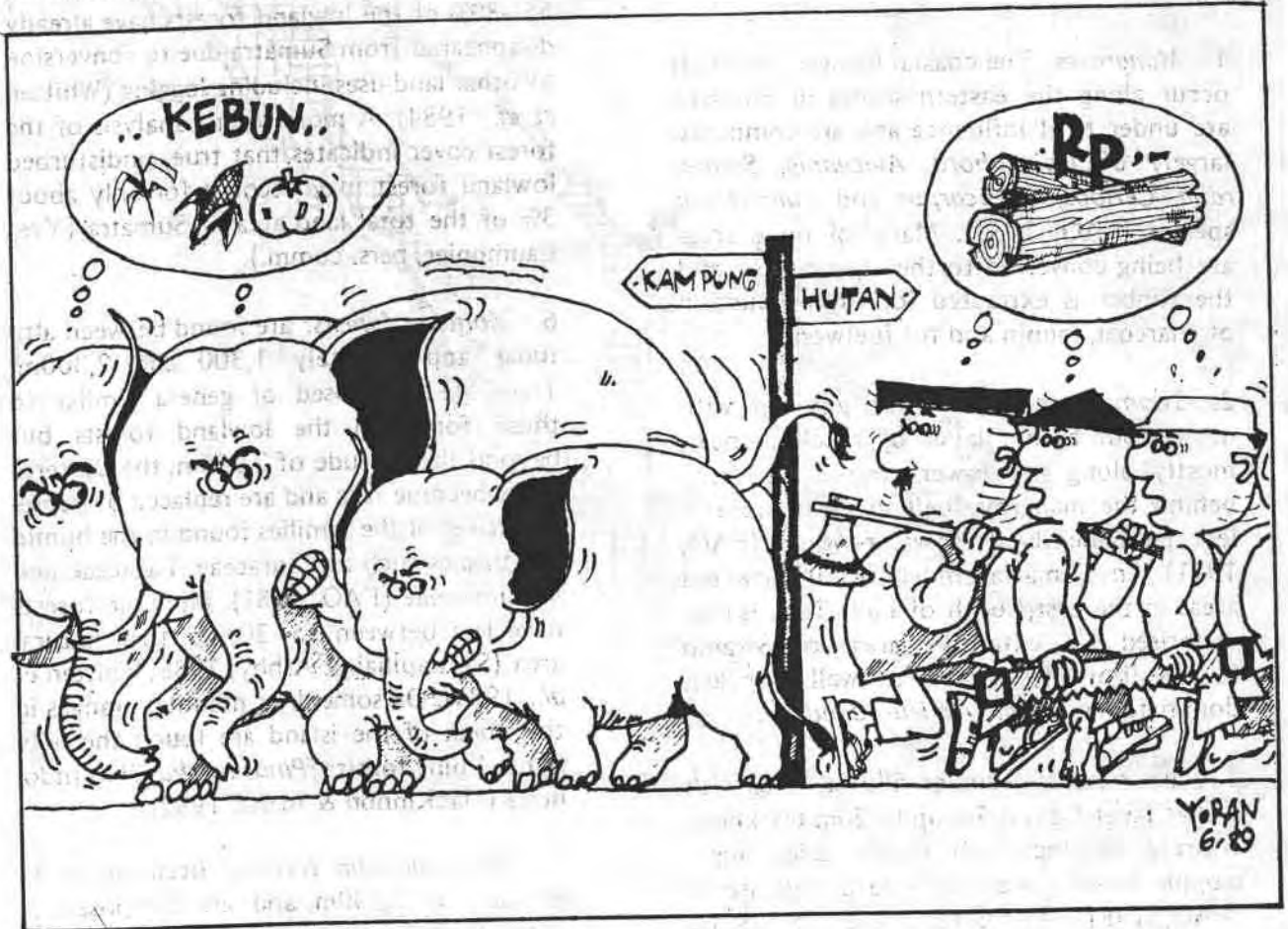
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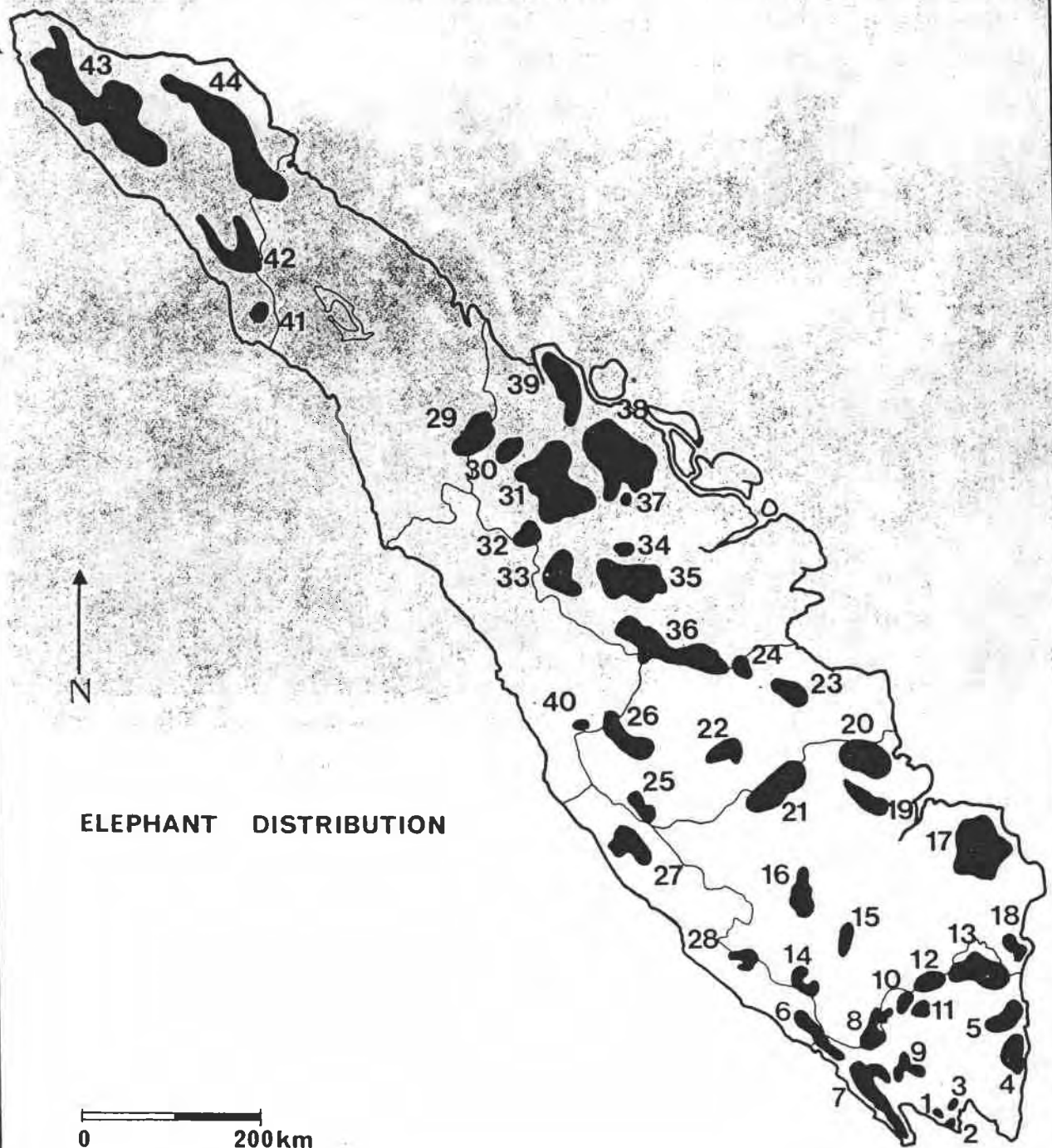


MAP 4



*Anti-poaching squad inspecting poached elephant  
Tsavo West, Kenya  
Photo: WWF/Martin Bijleveld*

MAP 4



**Elephant Distribution:**

The Sumatran elephant occurs in discrete populations, 44 of which have been identified (Blouch & Haryanto, 1984; Blouch & Simbolon, 1985).

Table 2 Minimum and maximum number of elephants

Province	no. of populations	minimum	maximum
1. Aceh	4	600	850
2. North Sumatra	—	—	—
3. Riau	11	1100	1700
4. West Sumatra	1	few	few
5. Jambi	5	200	500
6. Bengkulu	3	100	200
7. South Sumatra	8	250	650
8. Lampung	12	550	900
Total	44	2,800+	4,800

Source: Blouch & Haryanto (1984)  
Blouch & Simbolon (1985)

It is quite likely that the lower estimate of 2,800 is more realistic given the current impact of man on elephant habitats. One of the earliest estimates of elephant number in Sumatra was that of van Heurn (1929) who, on the basis of the amount of ivory that was shipped out of the island, calculated the number of elephants at that time to be about 3,600. This estimate was based on a crude density value of 1 elephant per 132 km<sup>2</sup>. van Heurn was quite familiar with Sumatran wildlife and so his estimate for that period could be considered realistic. If this is so, during the past five decades, the number of elephants might have declined by about 22%.

The province of Riau accounts for the largest number of elephants (40%), while Lam-

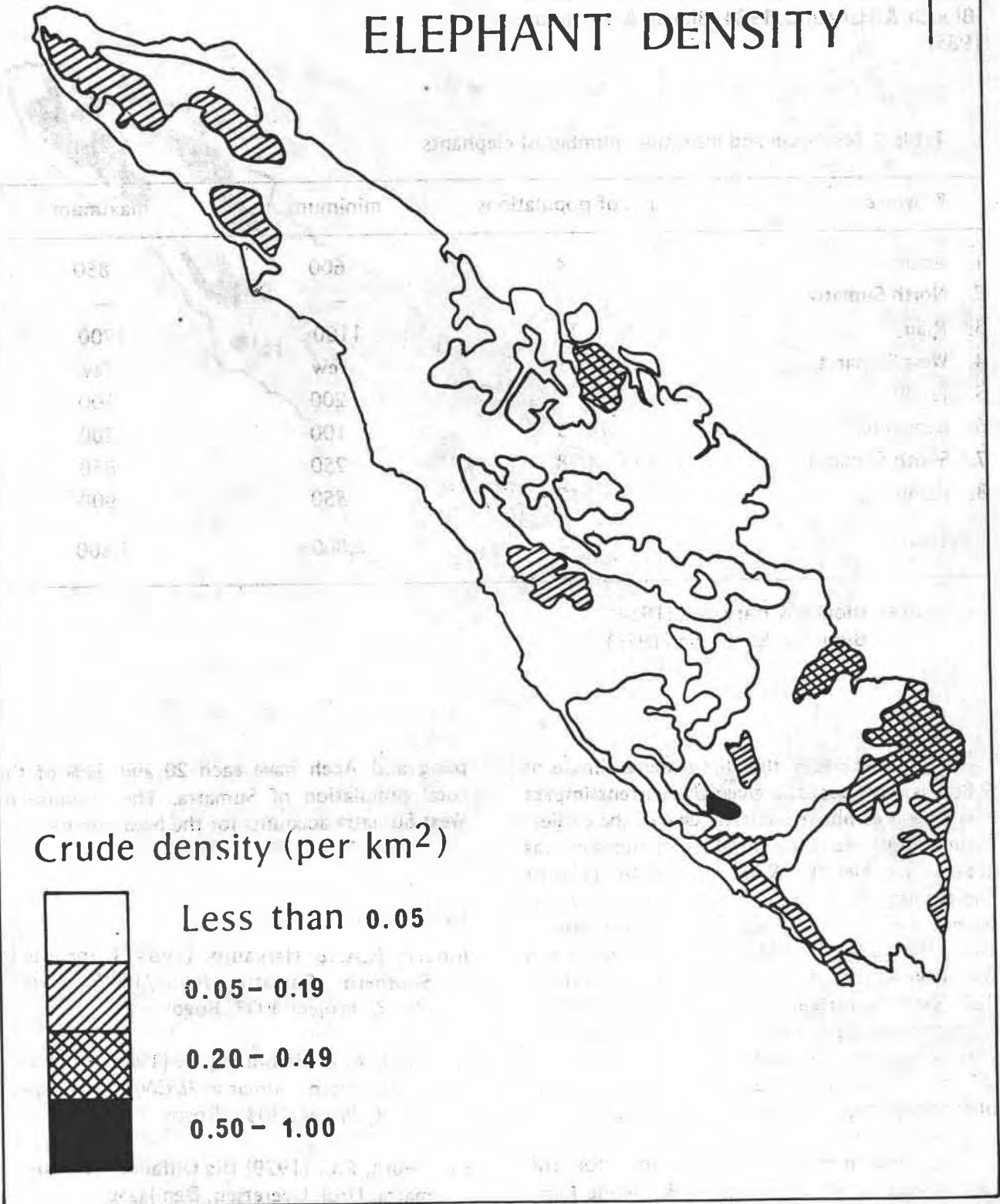
pung and Aceh have each 20 and 21% of the total population of Sumatra. The province of West Sumatra accounts for the least number.

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MAP 5

# ELEPHANT DENSITY



**Elephant Density:**

Except in few cases, no reliable data were available for the estimation of average crude density of the elephant in Sumatra. On the basis of available information however, the density ranges between 0.01/km<sup>2</sup> and 0.50/km<sup>2</sup>. The lower values from the large conservation areas such as Gunung Leuser and Kerinci-Seblat National Parks may be regarded as being more indicative of the overall average crude density of the elephant in Sumatra. In the case of the Padang-Sugihan Game Reserve, the observed density of 0.33/km<sup>2</sup> is artificial as a group of about 242 elephants were translocated into the area

(750 km<sup>2</sup>) in 1982 (MacKinnon & Setiono, 1983). The high density value (0.50/km<sup>2</sup>) for the population in Tunggal Buta could well be an over estimate as it refers to the maximum number the area was likely to harbour. However, higher density values of 0.55/km<sup>2</sup> are not uncommon at times in the Padang-Sugihan Nature Reserve (Nash, 1987).

In many areas, especially in the provinces of Lampung and Riau, a number of elephant populations have become further disturbed, fragmented since the surveys of Blouch & Haryanto (1984) and Blouch & Simbolon (1985).

Table 3 Average crude density of elephant in Sumatra

locality	area (km <sup>2</sup> )	no. elephants	density (/km <sup>2</sup> )
1 Way Kambas NP	1,235	200	0.16#
2 Gunung Betung	60	10	0.17*
3 Way Terusan	840	60	0.07*
4 Barisan Sel. NP	3,568	100	0.03*
5 Gunung Raya	400	50	0.13*
6 Block 46	210	50	0.23*
7 Tunggal Buta	100	50	0.50*
8 Subanjeriji	650	25	0.04*
9 Padang Sugihan	750	250	0.33*
10 Lebong Hitam	3,000	250	0.08*
11 Bentayan	190	50	0.26*
12 Kerinci-Seblat	9,144	100	0.01*
13 Torgamba	1,000	150	0.15**
14 Buntan	80	17	0.21**
15 Siak Kecil	1,000	150	0.15**
16 Gunung Leuser	8,080	75	0.01**
17 Singkil	650	50	0.08**
18 West Aceh	1,800	250	0.14**

Source: # Santiapillai, C. & Suprahman, H. (1986)

\* Blouch, R.A. & Haryanto (1984)

\*\* Blouch, R.A. & Simbolon, K. (1985)

@ MacKinnon, J. & Setiono, D. (1983)

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### Protected Areas:

There is considerable confusion about the number and extent of the protected areas in Sumatra. According to the classification of Sumardja *et al.*, (1984), the Protected areas in Sumatra refer to the following categories: —

1. National Parks (Taman Nasional): large relatively undisturbed areas of outstanding natural value with high conservation importance, high recreation potential, of easy access to visitors and clearly of benefit to the region.
2. Nature Reserves (Cagar Alam): generally small, undisturbed fragile habitats of high conservation importance, unique natural sites, homes of particular rare species, etc. Areas requiring strict protection.
3. Game Reserves (Suaka Margasatwa): generally medium or large areas of relatively undisturbed stable habitats of moderate to high conservation importance.
4. Recreation Parks (Taman Wisata): small natural or landscaped area or site of attractive or interesting aspect of easy access for visitors where conservation value is low or not threatened by visitor activities and recreation oriented management.
5. Hunting Reserves (Taman Buru): medium or large-sized natural or semi-natural habitats with game hunting potential, i.e. large enough populations of permitted game species (pigs, deer, wild cattle, fish etc) where demand for hunting facilities exists and of easy access to would-be hunters. Such

reserves should be of low conservation importance or have conservation values that are not threatened by hunting/fishing activities.

6. Protection Forest (Hutan Lindung): medium to large areas of natural or planted forested land on steep, high, erodible, rain-washed lands where forest cover is essential to protect important catchment areas and prevent landslips and erosion but where conservation priorities are not so high as to justify reserve status.

According to MacKinnon & Artha (1982) the total area set aside at that time for conservation in Sumatra (taking into consideration only those areas that are more than 50 km<sup>2</sup> in size) was approximately 61,723 km<sup>2</sup> or about 13% of the land area of Sumatra (Table 4). The Directorate-General of Forest Protection and Nature Conservation (PHPA) in the meantime appear to have increased the area under conservation (Table 5). Their latest statistics indicate that the protected areas in Sumatra cover a total of 99,377.20 km<sup>2</sup> (Table 5) and thus account for about 21% of the land area of the island.

Despite such an impressive record of establishing a net work of protected areas, the PHPA lacks the money, material and trained manpower to effectively protect many of these so-called "Protected Areas" in Sumatra. This is especially so in the province of Riau where areas set aside for nature conservation have been encroached upon by man and so are being threatened.

The 22 Protected Areas (marked with an \* in Table 4) that are known to have elephants comprise a total of 42,299 km<sup>2</sup> and therefore account for about 9% of the land area of Sumatra.

MAP 6

# PROTECTED AREAS

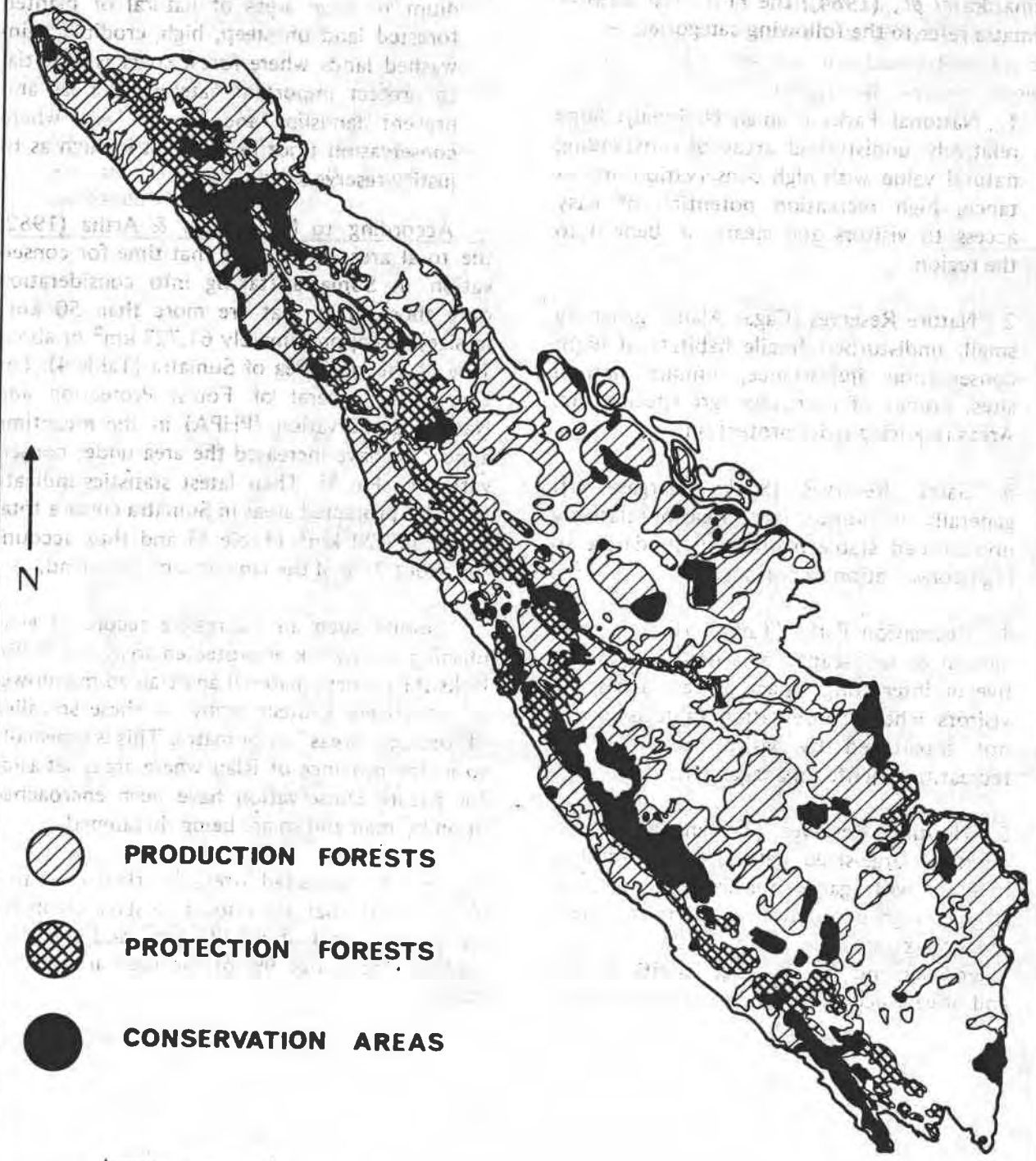


Table 4. Number, category and extent of the Protected Areas in Sumatra

Province	Protected area (Category)	Extent (km <sup>2</sup> )
Aceh	Gunung Leuser* (NP)	10,000
	Lingga Isaq* (HR)	800
	Kuala Langsa (PF)	70
	Jantho* (PF)	80
	Gn. Selawah Agam (PF)	120
	Kuala Jambu (PF)	100
	Singkil Barat* (PF)	650
North Sumatra	Dolok Surungan (GR)	228
	Gading Langkat (GR)	157
	Padang Lawas (PF)	687
	Sibolga (PF)	200
	Dolok Sembelin* (PF)	339
	Dolok Sepirok (PF)	69
	Lau Tapus (PF)	80
Riau	Kermutan (NR)	1,750
	Seberida* (PF)	1,200
	Bukit Baling-Baling (PF)	1,460
	Peranap* (PF)	1,200
	Siak Kecil* (PF)	1,000
	Pantai Cermin (PF)	150
	Giam Duri (PF)	400
	Buaya Bukit Batu (PF)	180
	Air Sawan* (PF)	1,400
	Bakau Muara Kampar (PF)	700
Bakau Selat Dumai (PF)	600	
West Sumatra	Kerinci-Seblat* (NP)	14,846
	Lembah Anai* (PF)	1,195
	Gn. Singgalang (PF)	96
	Gn. Merapi (PF)	96
	Gn. Sulasithalang (PF)	61
	Bukit Sebelah* (PF)	228
	Bajang Air Tarusan* (PF)	818
	Kambang/Lubuk Niur* (PF)	1,000
	Gn. Sago/Malintang (PF)	51
Jambi	Berbak (GR)	1,900
	Bukit Besar (PF)	2,000
	Singkati Kahidupan (PF)	50
Bengkulu	Barisan Selatan I* (NP)	660
	Semidang Bukit Kabu (HR)	153
	Taba Penanjung (PF)	100
	Bukit Raja Mendara (PF)	771

Table 5. Extent of Protected Areas in Sumatra

Province	Conservation area (ha)	Protection Forest (ha)
Aceh	678,100	1,051,400
North Sumatra	276,540	1,391,100
Riau	146,100	741,800
West Sumatra	281,165.20	1,206,600
Jambi	263,001	1,147,500
Bengkulu	180,483	465,500
South Sumatra	529,433	774,700
Lampung	489,300	315,000
<b>Total</b>	<b>2,844,122.20 ha</b> <b>28,441 km<sup>2</sup></b>	<b>7,093,600 ha</b> <b>70,936 km<sup>2</sup></b>
<b>%</b>	<b>6.0</b>	<b>14.9</b>

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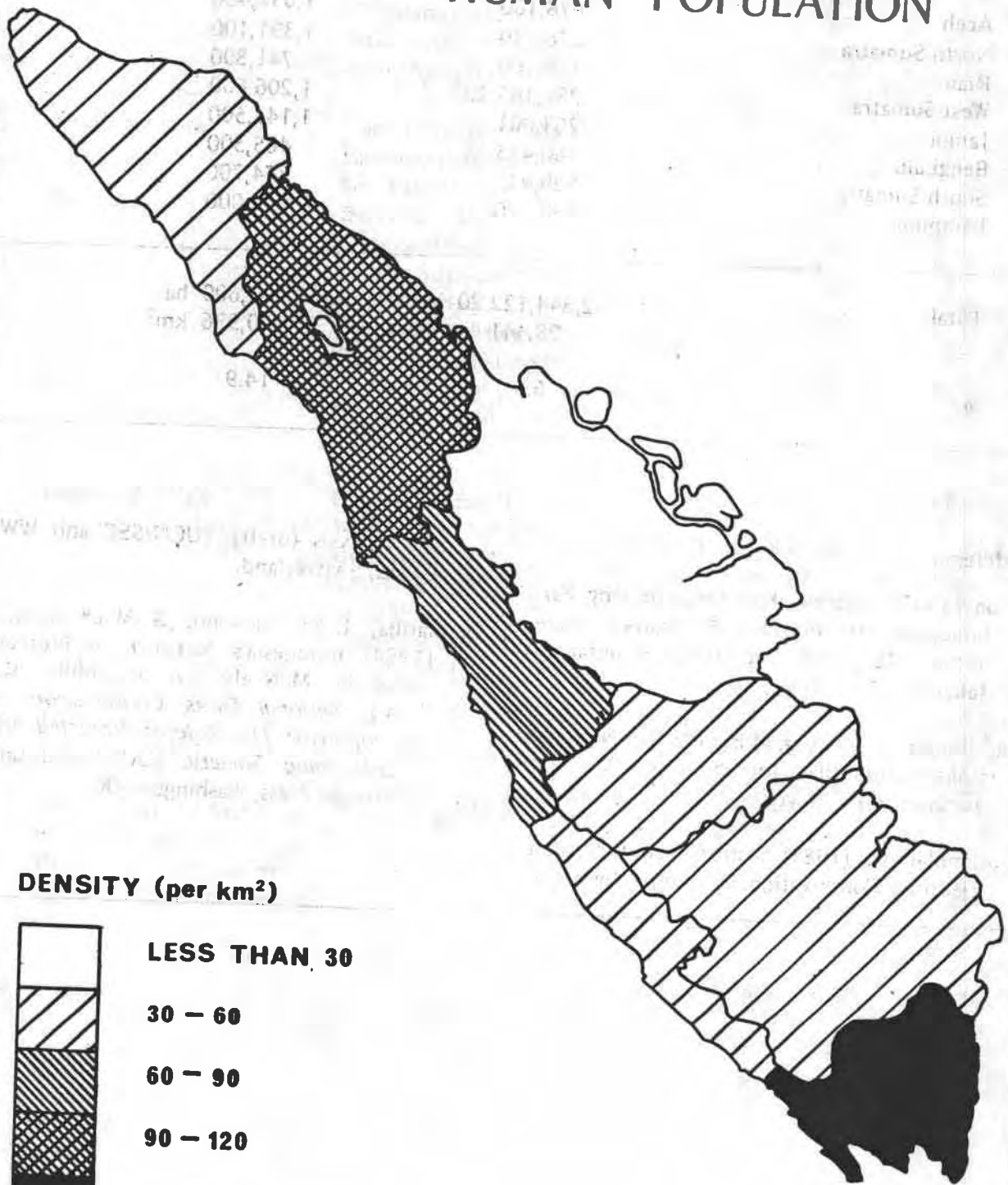
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MAP 7

# HUMAN POPULATION



### Human Population

Sumatra is the second largest island in the Indonesia archipelago. In the past, despite its strategic location along historically important sea trading routes, the generally poor soil conditions in the island has always discouraged extensive human settlements (GOI/IIED, 1985). In 1930, when Java had a population of 42 million, Sumatra was estimated to have had only 6 million people (Loeb, 1972). Since then however, the population has increased more than five-fold and is growing at an annual rate of 3.3%, through a combination of new birth and the

arrival each year of thousands of transmigrants from the over crowded islands of Java, Bali and Madura (MacKinnon & Arthà, 1982).

In 1980, Sumatra had a human population of 28 million (Biro Pusat Statistik, 1981). This gave an average density of about 58 people per km<sup>2</sup>. The population growth was rapid (82%) between 1961 and 1980 at an average yearly increase of about 3.1% (Scholz, 1983). In 1986, the population was estimated at about 33 million (Table 5).

Table 6. Human population statistics (year 1986)

Province	area (km <sup>2</sup> )	population	density	rate of growth
Aceh	55,392	2,999,900	47/km <sup>2</sup>	2.73
North Sumatra	70,786	9,452,000	118/km <sup>2</sup>	2.41
Riau	94,562	2,513,400	26/km <sup>2</sup>	2.90
West Sumatra	49,778	3,779,600	68/km <sup>2</sup>	2.02
Jambi	44,924	1,755,300	32/km <sup>2</sup>	3.88
Bengkulu	21,168	946,900	36/km <sup>2</sup>	4.19
South Sumatra	103,688	6,089,700	45/km <sup>2</sup>	3.14
Lampung	33,307	6,089,700	139/km <sup>2</sup>	5.58
Total		32,959,900		

Source: Anon (1986)

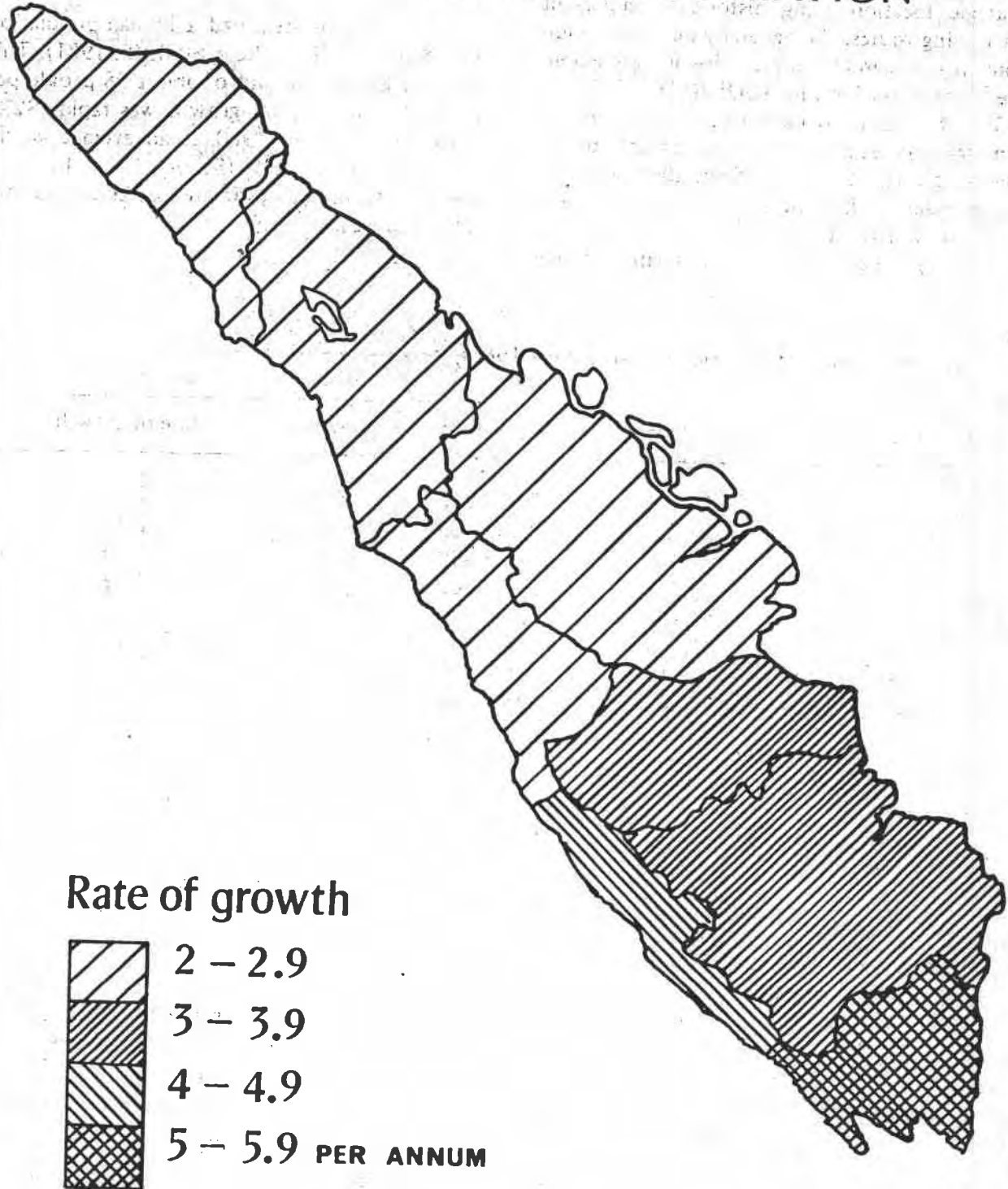
The largest relative increase in human population was in the province of Lampung where the population increased by 177% between 1961 and 1980 (Scholz, 1983). The same pattern was seen subsequently in Lampung largely as a result of the influx of the transmigrants from the over crowded islands of Java, Madura and Bali. Today, transmigrants account for almost 80% of the total population of Lampung.

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MAP 7b

# HUMAN POPULATION



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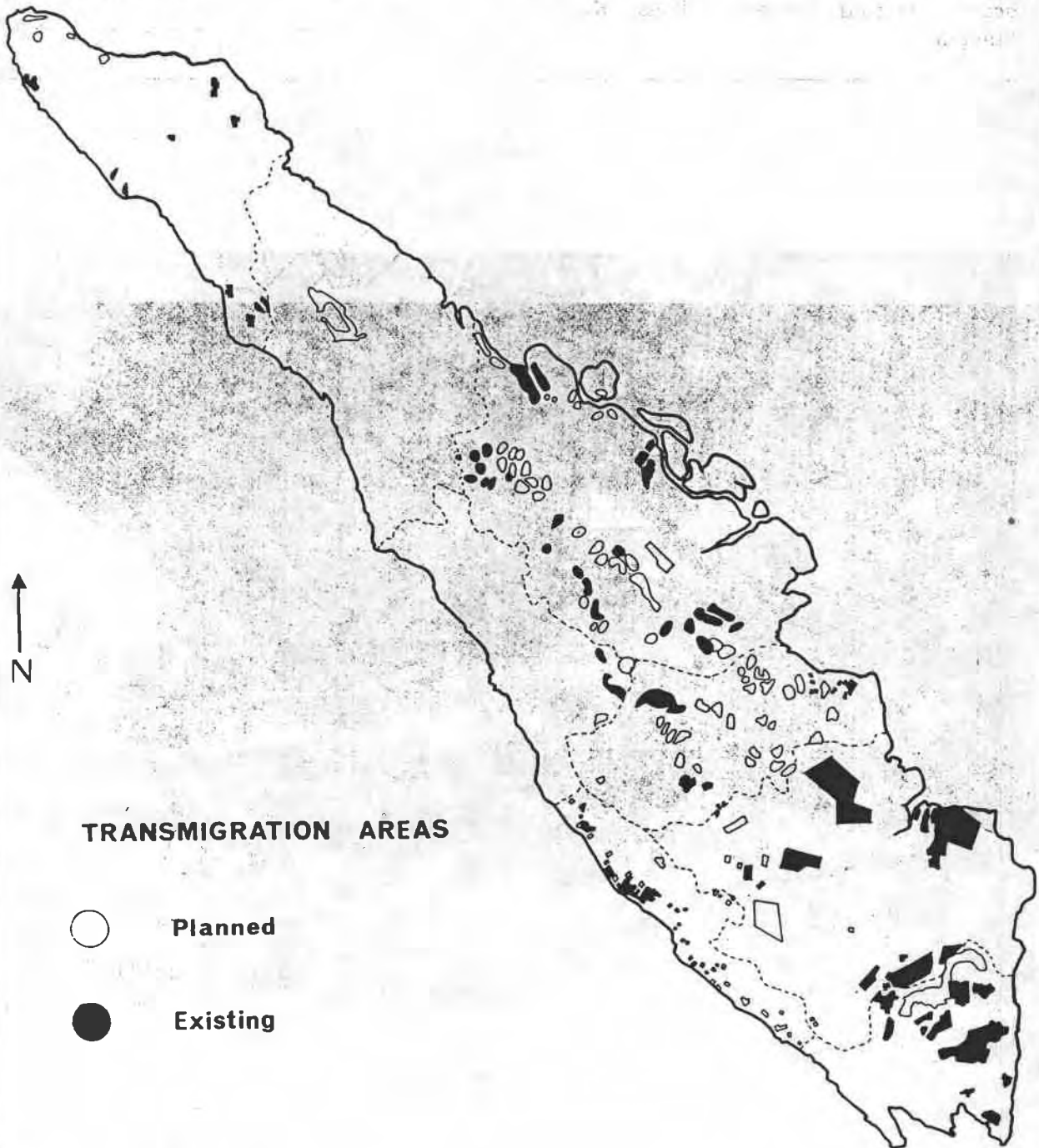
*A group of Sudanese customs officials inspect an illegal shipment of 333 tusks.*

*South Sudan*

*Photo: WWF/P.M. Snider*

MAP 8

# TRANSMIGRATION



**TRANSMIGRATION AREAS**



**Planned**



**Existing**

0 200km

**Transmigration:**

In Sumatra one of the factors that determine the present day distribution and number of elephants in the wild is the demographic imbalance of Indonesia's human population. The Republic of Indonesia with a population of more than 170 million is the fifth most populous nation in the world. Since historic times, the island of Java has supported high human populations made possible by the tradition of intensive cultivation brought about by the presence of rich volcanic soils. Today, the so called Inner-islands of Java, Bali and Madura which constitute only about 7% of the total land area of Indonesia support more than 64% of the population (GOI/IIED, 1985). Over 100 million people live in Java alone.

The significance of these demographic facts cannot be overstated. In an effort to relieve the population pressure from the already overcrowded islands of Java, Bali and Madura, the Government of Indonesia has been re-settling the landless poor to such less densely populated Outer islands as Sumatra, Kalimantan, Sulawesi and Irian Jaya. Human migration within and between areas of Indonesia is not a new phenomenon, dating back to much earlier times than the present-day Government sponsored transmigration programmes (Raffles, 1817). Since 1905, about 2.5 million people have been resettled in this manner (Whitten *et al.*, 1987). In addition to the Government-assisted settlers, twice as many unassisted people reach these outer islands through land hunger and poverty. In the third five-year development plan (Repelita III, 1979–1984), about 366,000 families, or nearly 1.5 million people were settled under the sponsored programme.

Of the 563,100 sponsored families that were moved from the Inner islands between 1950 and 1984, 66% reached Sumatra, the highest number (Whitten *et al.*, 1987). Between 1979 and 1984 (Repelita III), Sumatra received a total of 227,065 families (or about 1,135,325 people) under the Government's sponsored transmigration programme. According to the

Ministry of Transmigration, between 1984 April when the Repelita IV began and May 1986, a total of 189,960 families were moved to Sumatra (about 78,511 families were moved under the fully sponsored programme while 5,905 families were settled on partially assisted programmes and an additional 105,544 families had moved spontaneously).

The consequence of such re-settlement programmes is that Sumatra has become almost exhausted as far as such provinces as Lampung, Bengkulu, West Sumatra, North Sumatra and Aceh are concerned. Much of the mis-use of land is the result of these 'shifted cultivators' whose inappropriate agricultural practices have been responsible for much forest destruction. The result is that over large areas of these provinces, the forest has been replaced by the coarse grass, *Imperata cylindrica* which is not utilized by elephants except during the early stages of its growth following fire or burn. Transmigration programmes carried out without due attention to the soil may provide the basis for much destruction of tropical rainforest in the years to come.

The fragile nature of the soils in Sumatra have always discouraged extensive human settlement in the historic past. The ecological fragility of the land and the ignorance of the newcomers from urban areas with their inappropriate farming techniques will mean that more and more land will be needed for their subsistence: this land can come only from the forests (GOI/IIED, 1985). Herein lies the danger from uncontrolled resettlement programmes. It has been suggested that total land cleared as a result of the transmigration programme may be five times that originally planned for clearance (Ross, 1984). Current rates of deforestation (ie. the conversion of primary forest to other land uses) vary from 0.5 to 1.5 million hectares per year.

Much of Sumatra's rich lowland forests have been converted to other land-uses and so it is debatable whether there are any blocks of forest

remaining that could support viable populations of large mammals in the long-term (Whitten *et al.*, 1987). It must however be recognized that a substantial part of the home range of the elephants in Sumatra overlap with land set aside for forestry and human settlement programmes. Therefore management of elephants should not be limited to just conservation areas alone but must extend to peripheral areas as well.

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## SUMMARY OF THE STATUS OF ELEPHANT IN EACH PROVINCE

The extent of the forest cover in Sumatra is estimated to be about 30 million ha (64% of the land area). Large tracts of tropical rain forest still occur in the provinces of Aceh in the north, Riau in the east and Bengkulu in the south (Fig. 91). Swamp forest are found mainly along the eastern coast in the provinces of Riau, Jambi and South Sumatra. These areas form the major habitats of the Sumatran elephant. In the past, when much of the island was covered with rain forest, the elephant would have been widely distributed but at lower densities. But today, the extraction of timber and the practice of shifting cultivation have produced large areas of secondary forests that can support elephants at much higher densities. But the frequency with which elephants can utilize these productive secondary forest habitats depends on the amount of human disturbance. Elephants are known to avoid roads and villages and areas where there is regular hunting (Barner & Jensen, 1986).

As much of these secondary forest blocks are surrounded by either human settlements or plantations of oil palm, rubber etc., elephants also raid crops and often come into conflict with man. Many crop raiding elephants have been either shot by irate farmers or captured for domestication and training by the Directorate of Forest Protection and Nature Conservation (PHPA). In almost all instances, crop damage is caused by the activities of solitary bulls. Therefore removal of these bull elephants from small populations would seriously undermine the reproductive performance of the herds. Herein lies the danger of indiscriminate capture of crop-raiders.

Timber extraction, if carried out selectively could benefit the elephant and other wildlife. However, the danger to the elephant comes from the opening up of the hitherto inaccessible forests through the construction of logging roads whereby illegal settlers and poachers make their way deep into the forests. Already, the elephant has disappeared from many areas in Sumatra.

It is a matter of time before other areas in Sumatra too become depleted of their elephant herds.

### ACEH :

Forest cover in Aceh is estimated to be about 32.8 million ha (59%). Elephants are widely distributed over much of the province up to an altitude of 2,000 m. However, the establishment of large scale plantations of oil palm and rubber along the eastern coast had eliminated the elephant. Much of the forest on lands below 1,500 m has been set aside for future expansion of the plantations. Aceh is known to have about 800 elephants in four populations (Blouch & Simbolon, 1985). The human density in Aceh is about 47 per km<sup>2</sup> which is high for rain forest situation. Here the elephants are under threat from a gradual decline in the area available to them as their habitats are replaced by oil palm and rubber estates. Elephant crop damage on these plantations are also on the increase.

### NORTH SUMATRA :

Elephants have been almost completely eliminated from North Sumatra by a combination of high human population density (118 per km<sup>2</sup>) and conversion of forests to oil palm and rubber estates. The decline in elephants has been dramatic and fast. In 1880, elephants were numerous in Dili near Medan (the provincial capital). Dili was developed by the Dutch to grow tobacco first. As a result of the conversion of the forests, by 1890 the elephants were known only from the interior. By 1929, they were totally eliminated (van Heurn, 1929).

### RIAU :

With 65.4 million ha of forest (estimated) area, Riau supports the largest number of elephants (between 1,100 and 1,700) in 11 populations (Blouch & Simbolon, 1985). But Riau is undergoing development so fast that much of the elephants habitat has already become fragmented or destroyed. Despite the fact that Riau supports

MAP 9a

# SUMATRA FOREST COVER



0 Km 250

the largest number of elephants in Sumatra, there is still not a single reserve set aside for their conservation. The only reserve — Kermutan Baru — has no herds of elephants. Much of Riau is flat and so the elephants do not have even a refuge in the hills to go to when development activities invade their traditional habitats. Already conflicts between transmigrants and elephants have become serious and complex. Much of the coastal forests where elephants occur are being cleared to make way for oil palm or for oil explorations. Dense smoke from the burning peat swamp forests is a constant reminder of the forest conversion. The PHPA in an effort to mitigate the escalating human-elephant conflicts has embarked on the capture of chronic crop raiding elephants with the view to domesticating them and subsequently using them in forestry and tourism. The observed mortality among the captured elephants has been high 37% (Santiapillai & Widodo, 1989). Loss of elephants is mainly due to poor veterinary care and management under captivity.

#### WEST SUMATRA :

About 59% of the province is under forest cover but there is only one known elephant population at Sinkingjang where less than 50 animals are thought to occur (Blouch & Simbolon, 1985). These animals represent the herds that roam around the northern slopes of Mt. Kerinci. These animals too are known to raid the coffee plantations that was established along their traditional migratory routes.

#### JAMBI :

Forest cover in Jambi is estimated to be about 26.1 million ha (58%). In all between 200–500 elephants are known to occur in Jambi. Elephants are known from the Tungkal area and Mendahara Ulu. These animals are also known to move across the provincial border into Riau along the Tiga Puluh hills. About a hundred elephants were recorded in the proposed Nature Reserve, Seberida (Santiapillai & Rauf, 1989) as those entering from Tungkal area. Smaller populations are also known from

the western side of Jambi near the Kerinci-Seblat National Park boundary. The long term survival of the elephants in Jambi is bleak since as in Riau there are no reserves set aside for the conservation of the elephant.

#### BENGGKULU :

With an estimated forest cover of 10,670 km<sup>2</sup>, about half the province is forested. Only three populations of elephants have been recorded here with the total number being in the range of between 100–200 (Blouch & Haryanto, 1984). Much attention has been directed in the recent past toward exploiting the province's species rich but fast dwindling lowland forests which have been the stronghold of the elephants. There are at least 4 officially approved forest concessionaries extracting timber from an area of about 3,000 km<sup>2</sup> (Anon, 1987). Conversion of lowland forest to monoculture plantations such as cocoa and for the establishment of transmigration schemes have reduced substantially the habitat once available for the elephant and other wildlife especially in the northern part of the province in the Ipuh and Muko-Muko areas. Deforestation was largely responsible for the floods in 1988 in the province which destroyed the goods and chattels of several hundreds of people. Elephants are also known to have been hunted for the ivory in Bengkulu.

#### SOUTH SUMATRA :

According to the statistics of the Forestry Department the South Sumatra province has a forest cover of 41,790 km<sup>2</sup> the reby accounting for about 40% of the land area. However, a reference to the latest forest coevr map (Fig. 9a) indicates very clearly that of all the provinces in Sumatra, South Sumatra and Lampung provinces have the worst forest cover. Large scale clearance of forests for timber and for the establishment of human settlements are identified as the most serious threat to the eight known populations of elephants whose number is estimated between 250–650 (Blouch & Haryanto, 1984). The Padang-Sugihan Nature Reserve (75,000 ha) was established especially to accommodate the 232 elephants that were

**MAP 9b**

the western side of Jambai near the Kerinci Seblat National Park boundary. The long term survival of the elephants in this area as in Riau there are no reserves set aside for the conservation of the elephant.

BENKULU :

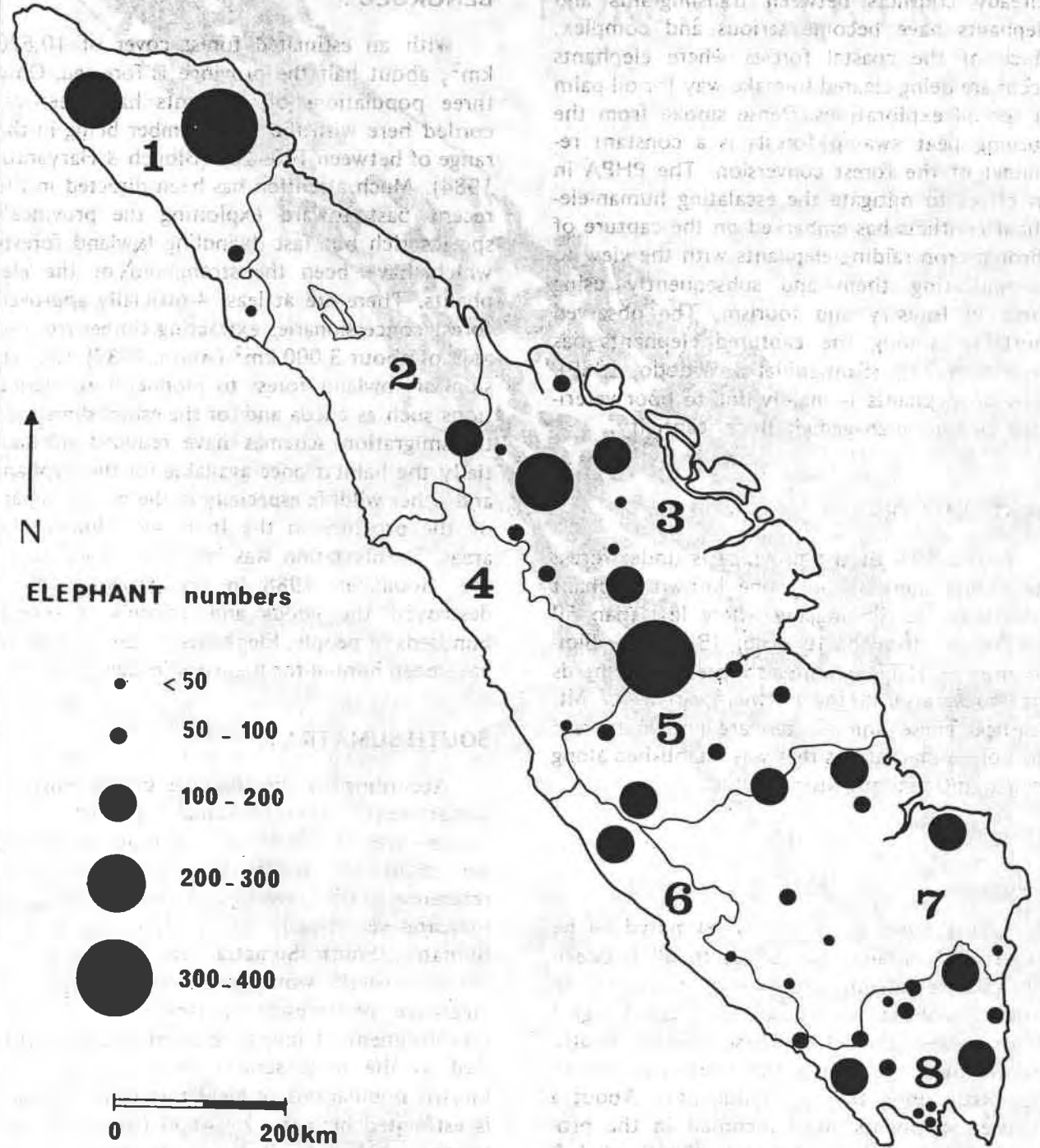
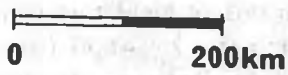
with an estimated forest cover of 10,000 km<sup>2</sup> about half the original forest cover. Three populations of elephants are recorded here with a population range of between 100 and 200. Much of the forest has been cleared for rubber plantations and oil palm. The forest has been fragmented and the elephants are forced to move towards forest reserves. There is a small elephant reserve in the north of the island.

the largest number of elephants in Sumatra, there is still not a single reserve set aside for their conservation. The only reserve - Kerinci Seblat - has no herds of elephants. Much of Riau is flat and so the elephants do not have to cross hills to go to when development activities invade their traditional habitats. already conflicts between transmigration and elephants have become serious and complex. Much of the forest forest where elephants occur are being cleared for oil palm or for the expansion of rubber estates from the around forest reserves. There is a constant pressure of forest conversion. The PMA in the effort to mitigate the escalating human-elephant conflicts has concentrated on the capture of elephants from raiding elephants with the view to reducing their numbers and subsequently their raiding activities. The capture of elephants is a very slow process and the capture of elephants is a very slow process and the capture of elephants is a very slow process.



**ELEPHANT numbers**

- < 50
- 50 - 100
- 100 - 200
- 200 - 300
- 300 - 400



driven into it in 1982 from their former habitat that was converted to sugar cane plantation. The elephants exist at an average density of 0.33/km<sup>2</sup> which is one of the highest densities recorded in South-east Asia. Predictably, elephants have begun moving out of this confined area their crops. The nearby large peat swamp production forest of Lebong Hitam (300,000 ha) set aside as a possible bolt hole for the excess elephants, was partly destroyed by fire in 1988 in which about 10,000 ha of forest was lost. Besides elephants continue to be poached for their ivory. At least 10 tuskers were shot in this region in 1988.

#### LAMPUNG :

In 1984, Lampung with an area of 33,307 km<sup>2</sup> had a forest cover of 12,440 km<sup>2</sup> (about 37%). By 1987 however, the forest cover dwindled further to 17%. Forests were cleared largely to make way for the establishment of human settlements. The largest increase in the human population occurred in Lampung between 1961 and 1980, when the numbers increased from 1.6 to 4.6 million (Scholz, 1983). Of all the species of wildlife, it is the elephant that has borne the brunt of such extensive and rapid deforestation in Lampung. Blouch & Haryanto (1984) estimated the total number of elephants to be between 550–900 distributed in 12 populations. Today both the size and number of the estimated populations have declined. Two herds of elephants (totalling between 40–70 animals) were driven into the Way Kambas Game Reserve (1,200 km<sup>2</sup>) to resolve the growing elephant-human conflicts. But the current management of the elephants in this prime elephant reserve (one of the last remaining lowland habitats) leaves much to be desired. In an effort to train the crop raiding elephants to be used in forestry and tourism, an elephant training school was established in 1984. But to date, there has been no serious attempt to use any of the 40 or so trained elephants in forestry within such *production forests* as Pine, Teak or Eucalyptus in Indonesia. Instead, trained elephants are simply being used to amuse visitors by kicking foot ball. At least 9 elephants were captured from within the Way Kambas Game Reserve in 1989. These

do not augur well for the long-term survival of the elephants in Lampung. In the ultimate analysis, if Indonesia truly wants elephants in the wild, then it must protect those it already has. The future of the elephant in Indonesia depends on the correct choices the Directorate of Forest Protection and Nature Conservation (PHPA) makes now while there is still time. Protection in the final analysis is easier, cheaper and more likely to be successful than captive breeding and re-introductions which are difficult, expensive and likely to fail.

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**Current Elephant-Human Conflicts:**

Prior to about 1900 when agricultural settlements in Sumatra first led to a substantial degree of deforestation, most of the island was covered in primary forest. Presumably up to that time, although its population density might have been low, the elephant was more or less continuously distributed throughout the whole area. Less than a century later, the elephant is discontinuously distributed. Human population growth and agricultural expansion have almost eliminated the elephant from two of the provinces in Sumatra, viz., North Sumatra and West Sumatra. Today the disruptive forces that squeezed the elephant out of these provinces are beginning to threaten the species in other provinces as well.

Given the preference of the elephant to the lowland forests, its strong hold had been the province of Riau. But it is here that large scale development programmes are posing a serious threat to the long-term survival of the elephant. The problem is further compounded by the lack of well managed protected areas that could offer a refuge (Blouch & Simbolon, 1985). Many of the so called protected areas are being encroached upon by man. In Bengkulu province, large scale clearance of the extremely rich lowland forests that used to be inhabited by elephant are being converted to monoculture plantations. Lampung has experienced some of the worst elephant problems owing to the rapid conversion of forests to agricultural holdings and human settlements.

Many of the elephant migratory paths extended from the mountains into the lowlands and vice versa (Groeneveldt, 1938). All this had

to change by the turn of the century, when increasing human population and increasing agricultural land-use not only reduced the elephant habitat but more seriously, blocked out certain channels of response such as emigration and dispersion (Santiapillai, 1989). In extreme cases, the elephant herds have become "pocketed" into isolated patches of habitat that are surrounded by a landscape dominated by man (Olivier, 1980). Such pocketed herds have no long-term future in the wild (Seidensticker, 1984).

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