[523]

O N T H E T I G E R

I N

I N D O N E S I A

(with special reference to its status and its conservation)

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Nature Conservation
and Nature Management

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CONTENTS

PREFACE

This paper has been compiled as a task for the doctoral-study (Master's-study) in the Choice-subject Nature Conservation and Nature Management, besides the study in Tropical Forestry at the Agricultural University, Wageningen, the Netherlands.

This study has been done under guidance of Prof.Dr. M.F. Mörzer Bruyns and Dr. W. Bongers of the Department of Nature Conservation and Nature Management, to whom I want to express my gratitude. Also I am grateful to Mr. A. Hoogerwerf, who has offered me a lot of information. At least I wish to thank all those persons, who has given me information about the tiger in Indonesia and who are mentioned in the introduction.

L. Treep,
Wageningen, May 1973.

2. INTRODUCTION

2.1. According to the minutes of the 40th meeting of the Survival Service Commission of the International Union for Conservation of Nature and Natural Resources (helt in Canada, September 1972) it is necessary to pay more attention to the eastern part of the tiger's range; a survey of tiger status should be promoted in these countries, where the situation is not clear.

Because no exact information is available from Indonesia, a study about the tiger in this country is important. It will give information valuable for the protection of the tiger in Indonesia.

In the framework of the World Wildlife Fund project on the survival of the tiger, now called "Operation Tiger", this study is performed to give information concerning the tiger in Indonesia, so far as is possible, based on a literature study.

Most of the data are derived from periodicals from the Netherlands Indian period as: "De Indische Jager", "De Tropische Natuur", Tectona", etc.; also some data are derived from the "Mededelingen van de Nederlandse Commissie voor Internationale Natuurbescherming" (Reports of the Netherlands Commission on International Nature Conservation). Especially the book on Nature Conservation in Indonesia called:"Udjong Kulon, the land of the last Javan rhinoceros" by A. Hoogerwerf has to be mentioned.

Next to the literature research, personal information has been collected. For this aim an appeal on tiger information was announced in the periodical "Tong-Tong" (the Hague) 15-3-1973. Also there have been some intervieuws with persons mentioned below.

2.2 List of persons, who have reacted upon the announcement in "Tong-Tong" or who gave personal verbal information.

Mrs. E. Baumer, who lived in Padang (Sumatra) for 12 year till the end of the war, now N.S.W. Australia;

Dr. A.C.V. van Bemmel, Museum for Natural History, Leiden, the Netherlands;

Mr. F. van Deventer, a planter in east Java, till 1960, now Almelo, the Netherlands;

Mr. A.A. Denninghoff-Stelling, former tiger-hunter in Sumatra, now Aalten, the Netherlands;

Jhr. H.L.A. Feith, former planter in Sumatra, now Wageningen, the Netherlands;

Mr. A. de Haak, former planter in Sumatra, now Amsterdam, the Netherlands;

*

Mr. A. Hoogerwerf, former Head of Nature Conservation and Game Affairs in Indonesia, now Bakkum (NH), the Netherlands;

Mr. G.J. Janssen, who lived also in east Java, now Arnhem, the Netherlands;

Mr. R.G. Kloër, who lived in east Java till ± 1961, now Doesburg, the Netherlands;

Ir. F.A. Langguth Oliviera, an agronomist, who lived all over the archipologo and in south-east Atjeh during 1926-1929 and 1936-1938, now Heelsum, the Netherlands;

Ir. J.A. Lasschuit, a former forestry-officer in Atjeh, Indonesia for many years, now Wageningen, the Netherlands;

Miss J.J. Lépinat, who lived in Java, now the Hague, the Netherlands;

Mrs. G.M. Moorman-de Visch Eybergen, who lived in East Java, now Amersfoort, the Netherlands;

Drs. E. Postel-Coster, an antropologist, who visited south Sumatra in 1973, Oegstgeest, the Netherlands;

Mr. J.W.G. Retel Helmrich, a former planter in Java, now Tilburg, the Netherlands;

Mr. K. Smith, who worked in Sumatra, now Islas Canaries, Spain;

Ir. A.F. Wehlburg, irrigation-expert, well-known hunter in Indonesia and the Netherlands, till 1954 in Indonesia, now Vorden, the Netherlands;

* Also a copy has been read, which is a copy of the letter sent by Mr. P. Hoffman, former lieutenant and tiger-hunter, to H.R.H., the Prince of the Netherlands, W.W.F. President.

2.3 Finally the author's experiences about Nature Conservation have not only a theoretical character. In 1970-1971 Indonesia has been visited by him for the purpose of forestry research and trips were made in Sumatra, Kalimantan (Borneo), Java and Bali.

Alas he could not pay much attention to Nature Conservation problems, because of lack of time and facilities. Nevertheless he had contact with officials of the Nature Conservation Service in Bogor and some reserves have been visited. But that time no attention was paid to the tiger.

PART A

concerning the tiger in general,
with special reference
to the
Indonesian subspecies

3 NOMENCLATURE AND SHORT DESCRIPTIONS OF THE INDONESIAN SUBSPECIES

3.1 NOMENCLATURE

Although there has been always discussion about the nomenclature of the tiger and the distinction of subspecies from the Sundanese islands (Indonesia), the following classification mentioned below has to be considered as the most correct one (Husson, quoted in Hoogerwerf 1970; Mazak 1965; Sody 1949).

Order : Carnivora Bowdich, 1821
Superfamily : Feloidea Simpson, 1931
Family : Felidae Gray , 1821
Subfamily : Pantherinae Pocock,1917
Species : Panthere tigris Linnaeus, 1758

in Indonesia 3 subspecies:

on Sumatra : 1. Panthera tigris sumatrae Pocock, 1929: Sumatran-tiger
on Java : 2. Panthera tigris sondaica Temminck, 1845: Javan-tiger
on Bali : 3. Panthera tigris balica Schwarz, 1912: Bali-tiger

Names in Indonesia:

in Javanese : Matjan-limo, Matjan-lorek or Matjan loreng, Matjan-sima
in Malayan : Harimau
in Sundanese : Mejong or Maoeng

The Sundanese people (West Java) distinguished 2 "species":

1. Mejong-lokbokar or Mejong-gede
2. Mejong-santjang

3.2 INDONESIAN SUBSPECIES (DESCRIPTIONS):

3.2.1 Sumatran-tiger

This tiger belongs to the smaller subspecies with the darkest colour like the other 2 Indonesian subspecies. The primary colour

is reddish till dark ochre; the colour of the head is brigther. The stripes are rather wide and always black. The hairs are very short (8-11 mm. long) and the mane of the males is distinctly visible (11-13 cm. long). The forelegs show a clear pattern at the inner- and backside. As sizes are mentioned in scientific literature: an old male, total length ± 253 cm. (Pocock, 1929); Poser (quoted in Mazak, 1965) found a length of 250 cm and Mazak (1965) measured a length of 223 cm. for a female at the Prague Zoo (all lengths are measured including the tail)

Table of measurements of the Sumatran tiger: see page 11.

3.2.2 Javan-tiger

This subspecies resembles the Sumatran tiger very much, but its primary colour is darker. The black stripes are often more narrow and have a closer pattern. The male has neck-, throat and brest-mane. The pattern of the forelegs is less clear than the Sumatran. Sody (1940) gives a total length of 248 cm. for a male, including tail. From the sizes of the skulls it can be concluded that both these subspecies have also the same size.

Table of measurements of the Javan-tiger: see page 12.

3.2.3 Bali-tiger

This tiger shows a darker primary colour than the Javan-tiger, and it also has less stripes. This tiger is said to be the smallest subspecies, but the animal seldom has been measured, so only a few data are available. Schwarz (quoted in Mazak, 1965) found 211. cm as total length for the skin of a female.

Table of measurements of the Bali-tiger: see page 13.

3.2.4 In 1932 Sody has given the following summary of the differences between the 3 subspecies in the Journal of the Bombay Natural History Society.
He examined the material (skins and shulls) of Mr. A. Ledeboer, who has shot, together with his brother Mr. B. Ledeboer, more than a hundred tigers in Java, Bali and Sumatra (the collection of the Ledeboers has been lost by a fire).

Table based on the research of Sody: see page 13.

Table of measurements of the Sumatran tiger based on the research of Sody (1949) (all adult animals)

Material from	Skull: greatest length in mm.	Zygomatic breadth in mm.	Sex
Atjeh	-	-	-
Deli	325	229	♂
Deli	309	206	♂
Deli	-	-	♂
Tjerinti Indragiri	345	220	♂
Djapura Indragiri	305	200	♂
Sungai Kumbang	335	230	♂
Bangkinang (S.W.C.)	326	220	♂
Sumatra's West Coast	± 290	187	-
Lampung	286	197	♂
Sumatra	-	256	-
Sumatra	297	201	♂
Bangkinang, SWC	296	206	♀
Fort de Kock	281	193	♀
Padang	271	184	♀
Padang	285	187	-
Padang Lowlands	276	178	-
Djapura, Indragiri	290	160	♀
Djambi	279	181	♀
Lahat, Palembang	290	175	-
Benkulen	271	184	♀
T. Seneng, Lumpung	-	-	♀
Lampung	282	182	♀
Sumatra	270	176	♀
Sumatra	279	181	-
Sumatra	271	179	-
Sumatra	284	195	-

Sody'2 extraction from more "popular" literature (especially hunter reports) on length (cm) including tail:

190	225, 225, 226, 228 (♀)	255 (♂)
200 (♀)	230, 230 (♂)	260, 260 (♂)
200 (♀)	230 (♀)	262, 268 (♂)
200, 200 (♂)	235 (♂)	275 (♂)
210 (♀)	236, 237 (♂)	275 (♂)
210, 211 (♀)	240, 245, 250 (♀)	280 (♂)
216 (♂)	250 (♂)	285, 310 (♂)
220 (♀)	250 (♂)	
220 (♀)	252 (♂)	

Maximum weight 130 kg (♂)

Wehlburg found as weight 104 kg (a small ♀).

Table of measurements of the Javan-tiger based on Sody's research (1949) (all adult animals)

Material from	Skull: greatest length in mm.	Zygomatic breadth in mm.	Sex
Udjong Kulon	349	246	♂
Udjong Kulon	331	228	♂
Gunung Hondje	326	221	♂
Grobogan, C. Java	328	241	-
Probolinggo, E. Java	330	241	♂
Java	316	231	♂
Java	315	220	♂
Java	322	226	♂
Java	335	234	♂
Java	318	226	♂
Java	321	213	-
Java	309	206	-
Gaol, E. Java	272	181	♀
Java	265	180	♀
Java	290	195	♀
Java	287	193	♀
Java	280	188	♀
Java	264	173	♀
Java	283	184	-
Java	290	217	-
Java	283	187	-
Java	279	190	-
Java	283	185	-

Sody's found in more "popular" literature on total length (cm) (included tail):

230 (♂)

238 (♀)

258 (♂)

260, 270 (♂)

Maximum weight: 140 kg. ♂ (a very big animal).

Table of measurements of the Bali-tiger based on Sody's research (1949) (all adult animals)

Material from	Skull: greatest length in mm.	Zygomatic breadth in mm.	Sex
Bali (WM.)	-	-	♂
Bali	254	169	♀
Bali	269	187	♀

Table based on the research of Sody:

Subspecies in Indonesia

	sumatrae (Sumatran-tiger)	sondaica (Javan-tiger)	balica (Bali-tiger)
Size	"normal"	"normal"	smaller
Primary colour of the skin	lightest	darker	darker
Colour of the innerside of the forelegs	whitish	a lighter shade of the general primary-colour	like in sondaica
Nasals	short and wide	long and narrow	long and narrow
Occipital plane	broad	narrow	narrow
Frontal line (forehead)	most flat	more vaulted	still more vaulted
Bullae	"normal"	"normal"	somewhat flatter

3.2.5 Average figures for the greatest skull lengths in mm., based on Sody's research (1949)

for Sumatra	♂ 314 (9);	♀ 280 (14)
for Java	♂ 325 (12);	♀ 279 (11)
for Bali	♂ - - ;	♀ 261 (2)

4 WORLD-DISTRIBUTION, HABITAT AND TERRITORY OF THE TIGER

4.1 WORLD-DISTRIBUTION OF THE TIGER

The tiger is considered to have survived in Mongolia, Manchuria and Corea in its most northern area and in South West Asia from the Russo-Afghan-boundary, to the north of the Hindu Koosh, south of the Caspian as far as the eastern parts of the Caucasus and the Ellbrusz mountains. From that area the tiger has spread over northern China, to south China and from there through Burma, Siam, the Malay Peninsula into the Sunda Islands (Sumatra, Java and Bali). In India the species has come from Burma, round the eastern parts of the Himalayas and westwards to Ceylon. (See also the sketch of the distribution of the tiger during the middle of the 19th century figure 1, page 16).

4.2 HABITAT

4.2.1 Habitat (general)

The wide geographical distribution of the tiger implies a great adaptability to different environmental conditions, and indeed the only requisites for its survival appear to be some form of vegetative cover, a water supply, and sufficient prey. Schaller (1967) mentions: "Most tigers remain below an altitude of ± 1.200 meter in India, but various others mention, that tigers have been seen up to ± 4.000 meter.

4.2.4 Habitat in Indonesia

In Indonesia the habitat consists predominantly of hot and humid rainforests but also of mangrove swamps in northern Sumatra (Schaller, 1967). Van Balen (1915, ± 1916) writes about the habitat: Whereever the soil is still scarecely cultivated, in the mountains, and in the plains the tiger finds its shelter and looks for prey-animals. The tiger even can hardly be driven away by human cultures, which are pressing on and the animal continues to be present in densely populated areas. In general it can be said the tiger has its habitat predominantly in plains

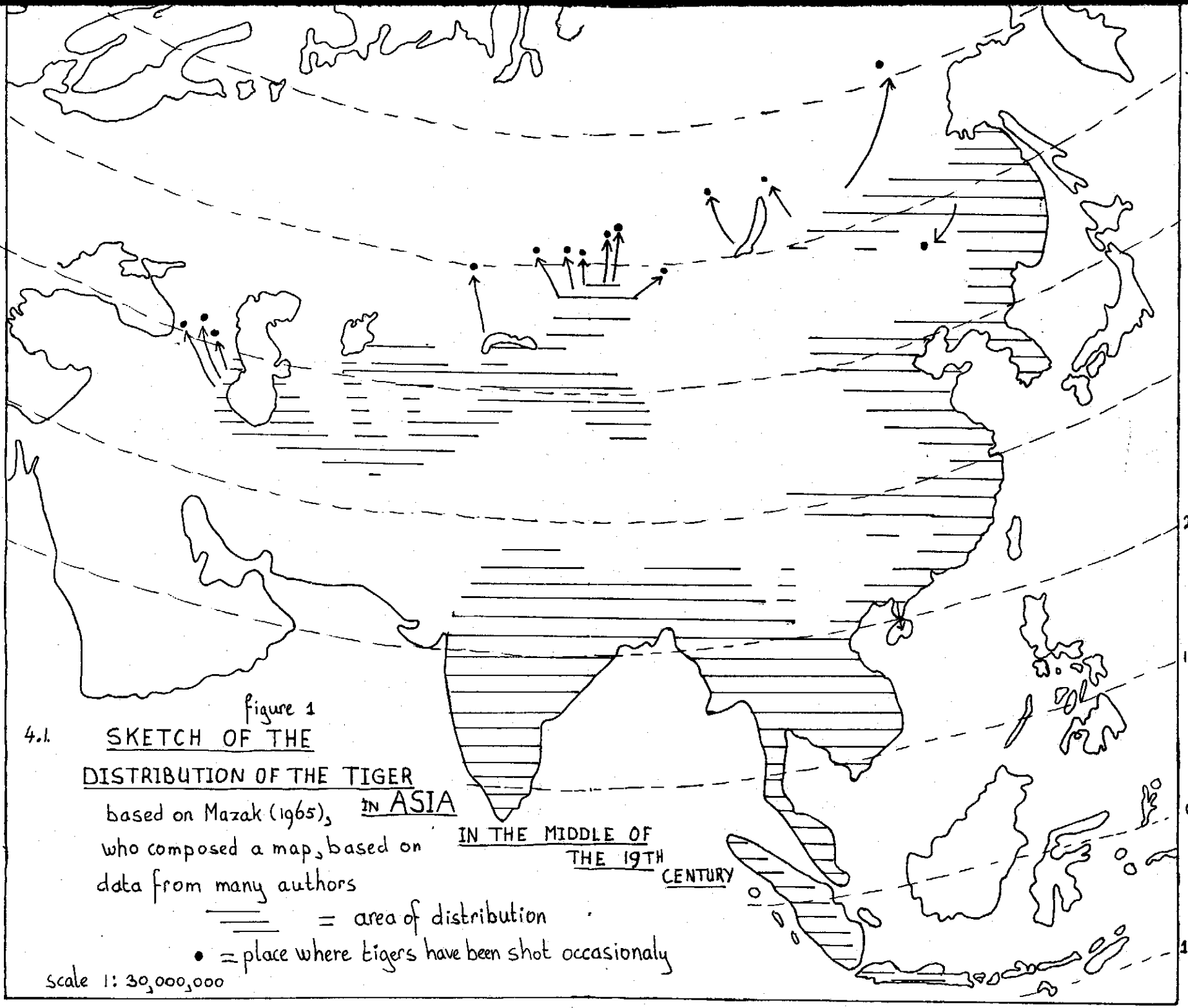


figure 1

4.1. SKETCH OF THE DISTRIBUTION OF THE TIGER IN ASIA IN THE MIDDLE OF THE 19TH CENTURY

based on Mazak (1965), who composed a map, based on data from many authors

= area of distribution

• = place where tigers have been shot occasionaly

scale 1: 30,000,000

along the riversides and especially there, where the rivers stream through a closed dark rainforest-vegetation. However, it is clear that the presence of sufficient prey-animals is an important factor for the choice of habitat.

Hoogerwerf (1970) writes about the habitat for the game reserve Udjong Kulon in Java."Although tiger spoors could be seen almost everywhere in the reserve, the presence of the species was most evident in the zone between the coast and the hilly heavily forested country of the interior, most pronouncedly in and around the game centres. As a result of the scarcity of game in the interior little was seen of tigers there".

4.3 TERRITORY

4.3.1 Territory (general)

It is hardly possible to mention general sizes about tiger territories because the size depends on the terrain-configurations, and the number of prey-animals present. About Indonesia really actual data are not available. Masak (1965) mentions that Corbett (a world-famous tiger hunter and writer of several tiger publications determined a territory of 388,500 ha, where a female man-eater lived. Schaller (1967) gives the following table, which give a good illustration of the variation in the few available data. (See page 18)

4.3.2 Territory in Indonesia

In literature exact data concerning territoria of the tiger in Indonesia are hardly available. According to Hoogerwerf (1970) in the Udjong Kulon Reserve (Java) the various tigers living in the sanctuary do not stick too persistently to a given territory, although they perhaps do prefer certain places, to which they keep returning at given intervals. So if the most ranges mentioned in the table were valid for Udjong Kulon, there woudl not be room for many resident tigers in this sanctuary (37,500 ha, ± 10 tigers living).

Table of territory-sizes (Schaller, 1967)

Appr. size (ha)	Source	Comments
388,350	Corbett, 1957	Man-eater, India
155,340	Anderson, 1954	Man-eater, India
64,725	Anderson, 1954	Man-eater, India
25,890	Anderson, 1954	Man-eater, India
<81,555	Hewett, 1938	Man-eater for eight months, India
>38,830	Lock, 1954	Man-eater for eleven months, India
2,330	Gilbert, 1889	Man-eater; spent most of time in area, India
51,780	Sanderson, 1912	Tiger in general, south India
48,410 - 64,725	Novikov, 1962	General winter range, Manchuria
29,770	Abramov, 1962	Tigress, with two large cubs, Manchuria
20,712	Baker, 1890	Cattle-eater, India
± 6,473	Schaller, 1967	Tigress with four cubs, India
6,473 - 7,767	Schaller, 1967	Male tiger, India

4.3.3 Scent

Schaller (1967) studied the scent during his research in India. The male and the female mark their territories primarly by spraying scenting urine and by making their feaces conspicious. The male tiger ejects narrow stream of scenting urine, caudally from the penis; the scent hits the vegetation 1.2 meter to 1.5 meter above the ground. The female tiger ejects wider stream of scent. The smell is very musky and can be smelled at a distance of some meters. The marking of their territory with scent is done by other cats too; it has according to Schaller (1967) the following functions:

1. it enables tigers to follow each other (trail marker)
2. it informs others that the area has been occupied
3. it communicates specific information to others using the range.

4.3.4 Claw-scraping

On the soil and on trees has probably a visual marking function of the territory too (see also 6.3.2. page 23 and 13.3. page 51).

4.3.5 Associated tigers

In Indonesia: here have been some data from Indonesia, which indicates that two or more adult tigers can operate in the same range, without any hostility, provided there will be sufficient prey-animals. In Udjong Kulon, guards saw two tigers together several times. Also there have been shot sone tigers with one bait on one night in Sumatra (Denninghoff Stelling, 1966; Wehlburg, 1937).

5 REPRODUCTION

Recently it has been put forward that the rutting-time can be in every season, but in the whole distribution area the tigers copulate mainly during wintertime and the first months of spring in its northern range. The female tigers are polyoestrous in the tropics and the male animals are polygamous. The proper mating-time does not last very long, mostly 5 to 8 days and the copulation takes place several times a day (from studies in zoological gardens, Mazak, 1965). The gestation-time lies between 95 and 110 days (data from zoological gardens too) and the number of cubs is usually 2 or 3 per litter. There have seldom been seen 4 cubs, however a litter being found in Rembang (East Java) is reported to have 4 cubs (Sody, 1941). In killed female tigers there have been found sometimes 7 embryos and in general it is assumed that tigersses eat their cubs when the litter is too numerous (see 8.4. page 32).

At birth the cubs are as big as a full-grown domestic cat, their weight is 1.300 to 1.500 grammes. They can weigh about 6 kg after 3 weeks. The cubs live together with their mother 2 à 3 years.

Sexual maturity is reached at the age of 4 - 5 years, although tigers, kept in zoological gardens, reach sexual maturity at an earlier age.

In general one tigress is assumed to bring up one young animal per year (average) in field conditions.

About the sex-ratio Schaller (1967) mentions there will be born more female than male tigers, but there is still some discussion about this matter. For Indonesia: Denninghoff-Stelling mentions an equal number males en females in Sumatra (personal communication). Hoogerwerf (1970) gives some data from Udjong Kulon: 13 tigers have been observed:

1943: 9 ♂; 2 ♀; 2?

1955: 4 ♀

Of course, these data are too limited to make any conclusion about the sex-ratio and more research is needed.

The age, the tiger can reach is unknown in Indonesia, but it

is estimated at 20 years. Mazak (1965) writes about a tiger, which is shot at an age of 30 years. In zoological gardens they can reach an age of 16 - 18 years. Under field conditions it is estimated that they can reach an age of 20 to 25 years and they have reproduction till their death.

Hoogerwerf mentions as causes for the tiger's death in Udjong Kulon:

1. The tiger is killed himself when trying to kill a big prey-animal, e.g. a banteng.
2. The tiger is killed after the fight with another tiger.
3. The tiger dies by a disease, that comes up quickly.

6 SENSES, VOCALIZATIONS AND OTHER DETAILS

6.1 SENSES

Undoubtly the hearing and the eye-sight of the tiger are excellent. The opinions about the sense of smell show a variety among the tiger-experts and the people, I talked with. Hoogerwerf says the smell is better developed than the smell of the average man. But the most important sense is the eye-sight, which is used during its nightly activities when walking in the jungle.

About feeling and touching (Hoogerwerf, 1970): "It is almost certain that the senses of feeling and touching residing in its bristling whiskers play a part in the tiger's nightly depredation".

6.2 VOCALIZATIONS

Schaller (1967) made the following division of vocalizations, studied in India.

a. Purring : a tigress, laying on her back, while her cubs climbed playfully over her, emitted a purring sound repeatedly

b. Prusten : a gentle puffing sound by expelling air in rapidly repeated jets through the nostrils (Pocock) is uttered when tigers approach each other in a friendly fashion

c. Pooking : it is a loud clear "pok", somewhat flatter in tone and lacking the resonanie of the deer call. This vocalization is most commonly elicited near a kill. The sound suggest to serve to advertise the tiger's presence and to prevent encounters

d. Grunting : this growly ur-ur-ur or bru-bru-bru sound by the tigress is used to stimulate the cubs to follow her

e. Miauwing : this is determined at some cubs only

f. Woofing : Pocock observed this woof-sound, when a cub suddently slapped another at the kill.

g. Moaning and roaring : Moaning is a vocalization of a low intensity and can be heard till 400 meter, while roaring can be heard as far as 3 kilometer during the silence of the night.
Roaring is used by the tigress to call the cubs to join her at the kill also it is used when they have a large kill, to draw attention to the food supply. They roar during the act of mating too (determined in the Moscow zoo).

h. Growling, snarling and hissing : This is done when they threat each other, and when they react to man. Growling: a steady, rolling tone, like a distant motor.

i. Coughing roar : This sound is emitted by attacking tigers, apparently an indication of anger.

About the vocalizations of the tigers in Indonesia, Hoogerwerf (1970) could not often establish their presence on the strength of vocalizations in Java. He could hear the crunching of bones during the feeding more than 20 meter away. Lasschuit told me that it was very difficult to determine the distance to the tiger from the vocalizations, which sometimes caused "surprises", when he tought the tiger further away than it was in fact (Atjeh, North Sumatra).

6.3 OTHER DETAILS

6.3.1 Scent (see also 4.3.2)

According to Schaller (1967) male and female tigers mark their range primarly by spraying scent (see also 4.3.3 page 19 and 13.3 page 51).

6.3.2 Scratching

The tiger makes scratches on the soil and on trees. Bartels and Sody (quoted in Hoogerwerf, 1972) have the opinion that the scratching on the soil is done to dispel an itch after urinating. They do not have the opinion that the tiger scratches the soil to sharpen its nails or to train its toe-muscles. Hoogerwerf often

found scratching places very close to feaces, so he concluded that in all probability the tiger does not cover its feaces by scratching. Sizes of scratching marks, determined by Hoogerwerf in Udjong Kulon: length 50-68 cm, width 25-33 cm. He saw once 10 scratching-places within a distance of several hundreds meters. It is not impossible that scratching marks on the soil are a certain kind of cummunication.

Scratching on trees: this probably can have a function to sharp the nails and to train the toe muscles; may be there is a visual function in marking the territory too. The scratching marks go sometimes rather deep into the trunks. In 1942 Hoogerwerf found scratching marks on a trunk up to 210 cm height.

Preferential scratching-trees:

in Udjong Kulon:

1. Handjah (Anthocephalus indicus)
2. Ki-pare (Glockidion sp.)

both soft woods

in East Java

1. Gintungan (Bischofia javanica)
2. sometimes Djati (Tectona grandis)

both hart-woods

Climbing: In contrast with the panther (Panthera pardus in Java and Neofelis nebulosa in Sumatra) the tiger is said not be able to climb trees. But Pieters has seen a tiger climbing to a bait, which was at a height of 6 meters in a thick tree. The height of a jump is generally 3 meter. Horizontal jumps have been observed to 6 meter by De Kanter, Sody, Schaller; Pieters (1955) even mentions a jump of 7.50 - 8 meters over a river with a deep incision.

Swimming. In general the tiger is considered to be an excellent swimmer. Various hunters as Pieters, Denninghoff Stelling, Hazewinkel have seen a tiger swimming. Pieters (1949) reported that tigers even crossed the Sunda Strait to reach some small islands, where they have been seen; they had to swim at least 4 km.

7 TRACKS, PUGMARKS AND DROPPINGS

Most of the data are derived from Hoogerwerf (1970).

7.1 TRACKS

For the Indian tiger it is made clear that a certain tiger or a tiger belonging to a particular age group in general should produce the same type of spoor. It is assumed that an old tiger is not usually in a position to place the hind foot before the impression of the fore foot, as young animals do, because the requisite suppleness is no longer possessed by such old (and stiff) individuals. (see figure 2, page 26). Overlapping pugmarks of both feet of the same flank would therefore point to very old tigers, as would be the case with in print, in which the front print lies in front of the imprint of the rear foot. But in Udjong Kulon Hoogerwerf did not succeed in distinguishing the various adult individuals from each other by their pugmarks or by determining their age on the strength of their footprints. It may be stated that different types of tracks were repeatedly established on one and the same animal during the same walk. It might be possible that certain tigers can be recognized by the way in which they move, to be read from the prints, but there is a great variability in the same animal, especially if specimen are concerned which are not of an advanced age. Certainly the way in which the feet are set on the ground is greatly influenced by the speed at which the tiger is moving, which again may depend on what heis doing: this agrees with the opinion of Champion, who perhaps studied more tiger prints than anybody else.

7.2 PUGMARKS

In the table: maximum width of the fore foot (distance between the outside of both outermost toes) as imprinted on ground like hard beach sand, in which the tiger does not sint deeper than 1-2 cm. (see page 27).

figure 2

Tiger spoor of a normal walk (backfeet before frontfeet)

free after Sody (1936)

backfoot right-side

forefoot right-side

backfoot left-side

walking direction

forefoot left-side

Maximum width of the fore foot	Frequency measured by Hoogerwerf
20 cm	1
19 cm	2
18 cm	3
17 cm	1
16 cm	4
15 cm	7
14 cm	4
13 cm	3
12 cm	2

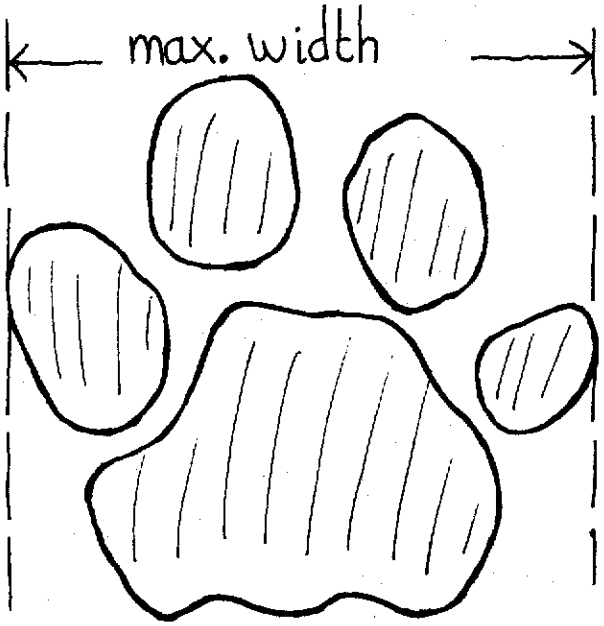
The rear paw is onviously smaller than the front foot ; the average difference in width is about 2 cm. The measurements known from the pugmarks of the continental Asian tigers do not indicate that the Javan tiger is considerably smaller. Hoogerwerf could conclude only in the most favourable case wether fully adult or younger specimen were concerned and to which sex the animals trached did belong. Nevertheless Schaller (1967) pretends he could and he gives some figures (see figure 3, page 28).
As largest gait Hoogerwerf noted 144 cm on a normal hard soil, as a part of a series of steps.

7.3 DROPPINGS

In Udjong Kulon, where Hoogerwerf studied particularly the tiger, it is impossible to estimate a local tiger population by means of the droppings found, because of the dense vegetation. In the case, when droppings were examined, they were, never covered with earth or plant-fragments as domestic-cats do. Sometimes the droppings resemble those of a dog. The droppings resembling those of the dog usually contain hairs of victims, sometimes mixed with fragments of hooves.
Hoogerwerf studied 24 dung-heaps in Java:

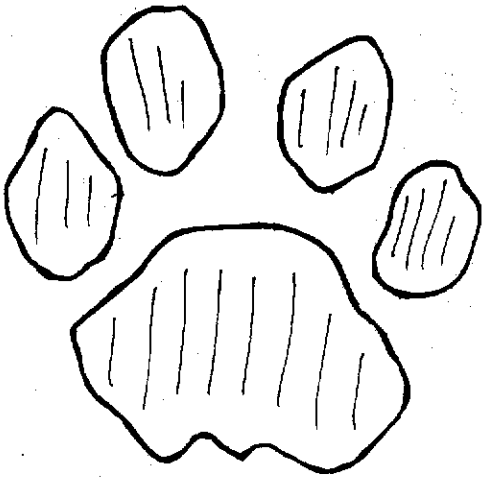
in 11 occasions hairs of deer (Cervus sp.) were found
in 7 occasions hairs of wild boar (Sus verrucosus) were found
in 2 occasions hairs of kantjils (Tragulus sp.) were found.

Figure 3 Pugmarks of the Indian tiger according to Schaller 1967



MALE TIGER

TIGER CUB



TIGRESS

Grass leaves or parts of similar plants, were never found in tiger feaces in Udjong Kulon and earth was not found too. In India Schaller (1967) found in more than 50% (355 droppings examinated) grass or earth. Banteng (Bos sondaicus) hairs have not been found for certain in tiger feaces; possibly the thick and very stiff skin of these animals is not eaten by the tiger. No hairs were found of barking deer, animals that certainly are killed regularly by tigers in Udjong Kulon. It seems obvious to suppose that these hairs were overlooked since the samples were not microscopically investigated.

8 HUNTING AND KILLING PREY-ANIMALS

8.1 COMMON

The tiger is usually hunting at night, and covers considerable distances. Ognev (quoted in Schaller, 1967) writes that the tiger walks to 100 km a day. He usually follows a fixed route in his range; often the tigerhunters wait for the tiger close to its tracks.

Depending on the tiger's age and the number of available prey-animals there are special"chance-places" inside an area with a diameter of a few to even a 40 - 50 km. According to Pieters (1955) in Indonesia it takes most a week for young animals to go around the territory and some weeks to more than a month for older tigers. Thus they pass their "chance-places" in their hunting-area with a maximum interval of a week. The older animals go around in "one-way trafic" and approach their "chance-places" always from "under the wind" (so they f.e. cannot be smelled). As prey-animal they hunt for example: Kidang (Muntiacus muntjak), deer (Cervus timorensis), sambar (Cervus unicolorequinus), Kantjil (Tragulus sp.) wild boar (Sus verrucosus), banteng (Bos sondaicus), water buffalo (Bos bubalus). Prowling at night they mainly use their eye-sight and follow their victims invisibly and noiselessly. They seem to prowl along creecks and dry beds so they can find the prey-animals near isolated drinkingplaces.

The tiger necessarily needs to be rather mobile otherwise he might be betrayed by his typical smell. Pieters (1955) writes that the tiger particularly attacks when its prey is going from a close vegetation, like a forest, to a more open area. He is of the opinion that only 1 of the 4 or 5 tigers attacks are succesfull, because the prey-animal continues running and the tiger-jump often becomes a failure. Often shot deers and wild boars had scars on their backs, caused by tiger-claws. Denninghoff Stelling puts forward, that the tiger-attack mostly is succesful (personal communication). Nainggolan (1933) writes that brids, squirrels, apes like Siamangs (Hylebates syndactylus) signalizes the coming of a tiger by a kind of alarm. Also after shooting a tiger he heard

the birds making an awful noise as if to say "all is safe, the tiger is dead". About catching monkeys (Retel Helmrich) wrote me the following. In the place, where a group of monkeys sits in a tree, the tiger comes very suddently and stands against the trunk, while emitting a short roar. In stead that they keep sitting very quietly in the tree, the monkeys become panic-stricken. Jumping from one branch to the other they set up an awful screaming. Especially if they look downwards to their ennemy, they seem to become hypnotized and they try to leave the tree, against which the tiger is standing, as soon as possible. Some monkeys now jump to the nearest tree and when they jump the tiger emits a roar; then a monkey is frightened and misses the branch, falls down and is taken by the tiger. The tiger takes its prey, goes away and the monkeys are quiet again. This special monkey-hunting by the tiger has been seen often in a rubber estate (Hevea brasiliensis) in east Java; monkey-hairs were often seen in tiger feaces too.

Tigers also eat sea-turtles, which have been turned over by wild dogs (Cuon javanicus).

There are only a few animals to which the tiger is not a very dangerous companion in the jungle like elephants, buffalos, bears, crocodiles. It is striking that in literature the opinion can be found that there will be a certain relation between the peacock and the tiger, but the value of these assertions is quite debatable.

8.2 KILLING THE LARGER PREY-ANIMAL

Concerning killing larger animals by the tiger Hoogerwerf (1970) writes: "bounding at the throat from below; chocking off the victim's breath by grasping or biting its throat from the prey's back, death though strangulation being perhaps most common; wrenching round the head from the back, as a result of which the neck is often broken and the victim may be knocked over by the tiger's jump; in the case of very large preys, it was established that a bite on one of the hindlegs just above the hock (hamstringing) seriously severed the tendon, thus rendered these victims largely helpless". The tremendous power of tigers has been established by several authors. U Tin Yin (quoted in

Hoogerwerf, 1970) relates that a gaur bull with a weight of 770 kg was dragged away. Loukashin 1938 (quoted in Mazak, 1965) put forward that a tiger can carry a weight of 120 - 170 kg in its mouth.

8.3 EATING THE PREY

The tiger eats its prey in a quiet covered place. In general, although some contradiction exists in the literature, the tiger starts eating its prey from the backside, after that he eats via the flanck, the belly and the soft parts of the back. When the prey is a big animal the head and the limbs are left; nothing is left from small animals.

8.4 THE QUANTITY OF ONE MEAL

The quantity, the tiger eats in one time, depends on its physical condition; so Baikow 1925 (quoted in Mazak, 1965) mentions 32,5 to 45 kg. Schaller (1967) mentions 24 - 26 kg at a time, while Hoogerwerf (1972) established that a big part of a banteng was eaten by a tiger in one time. The tiger probably seems to eat its own specimen too. (see 5, page 20) The man as kill is a special case and is dealt with in chapter 9, page 33.

9 THE TIGER AS MAN-EATER

In the more popular literature we can find a lot of exciting stories, in which is described the shooting of tigers, which afflicted whole regions by killing people. The reason why such a lot of stories about the shooting of man-eaters are written seems me the danger of such a task, which excites the reader. But the negative effect of all those stories can be exaggerated dangerous image the tiger will get. Under normal circumstances a tiger gives way to people and especially when the man is erect and moves his arms, so he seems bigger, the tiger disappears very quickly. But under special circumstances the tiger will attack human beings; the following factors may play a role:

a. Shortage of natural feeding in the area of distribution
b. Decreasing space, caused by the growing population
c. Wea ness of the tiger, impedes him to kill enough prey-animals.

In Indonesia the popular religion plays an important role in the relation human beings - tiger man-eater and for instance there is said"once a man-eater , always a man-eater" (see chapter10.3 too). Corbett (quoted in Mazak (1965)) mentions that young tigers, which assisted their mother in the practice of man-eating, gave up that practice when they were grown and independent.

A man-eater kills its victims mostly at day and especially when the person looks small, for instance if working in a squated position, is attacked sooner.

Some figures as illustration (see chapter 12, page 42 too).

Hazewinkel (1964): 16 people killed in South Sumatera
69 people killed by a tiger, which was called "slaugther"
more than 30 people killed by 2 tigers (Sumatra)

MeiBner (1956) : 11 people killed in the surroundings of Kampodong (Sumatra)

Once again, it has to be mentioned that in general a tiger does not kill people and this animal is more useful by killing

wild boars than harmful. The many exciting stories, which are told, about tigers, particularly in tiger regions and which are heard by myself too in Lampung (South Sumatra) are nice to listen too at the evening, but are not a reason to destroy this king of the jungle in stead of maintaining the tiger as a jungle-mate.

Part B

Concerning the tiger's status in Indonesia, with special reference to its conservation problems.

10. THE TIGER IN THE POPULAR RELIGION IN INDONESIA

10.1 GENERAL

The following annotations are derived from the book of J.C. Hazewinkel (1964), which deals with the tiger in the popular religion. The popular religion still plays an important role in the way of life of the local population and so it is certainly a reason to pay some attention to the relations between the tiger and local populations (based on the religion) which is important for the conservation of these animals.

10.2 THE TIGER IN THE ADAT

According to the adat (common law) and to Mohammedanism some remainders of the dead body of a person, who has been killed by a tiger, have to be burried, otherwise the soul of that human becomes a wanderer, who brings misfortune to his relatives and other people of his village. If a Malyan hunter kills a tiger, he is exposed to be revenge of the animal and that is the reason he doesn't like to kill a tiger. However, when a tiger has been killed, some ceremonies have to take place to reconcile the soul of the tiger. Also the belief, that the spirit of killed people migrates to tigers, plays an important role in the killing of tigers. Thus the soul of a relative can be killed by killing a tiger with all bad effects as misfortune in villages and whole regions.

Sometimes the tiger is considered to be an executer of a punishment, given by Allah. Thus when 100 people have killed by tigers in Smedang Bukit Kaba (35 km. south of Bengkulen, Sumatra) in 1951, this was seen as the revenge of Allah.

It is also characteristic that the name of the tiger, matjan or hariman seldom is pronounced (an exeption seems to be Atjeh); usually the name "striped" or "dia" which means he or she, is used.

Magic powers are described to certain parts of the tiger's body, especially when the tiger had been a man-eater.

People, who have eaten the heart and the liver become, strong, courageous and cunning. Hears of whiskers give invulnerability against bullets (a shot-tiger has to be carried with a covered head, because the people can murder somebody to obtain hears of whiskers). The genetals give sexual power. Especially the Chinese have a rich aresenal of such magic medicines.

10.3 DESCRIPTION OF THE DIFFERENT POPULAR BELEAVES

Hazewinkel (1964) gives a description of the different popular beleaves (especially for Sumatra):

a. Unconscious Lycanthropy. The people can be changed into a tiger, but there is no influence of their own will. Such people, who have been changed in a tiger are distinguishable, because they miss the gully in their upper-lips; they called "Tjindaku" which means tiger-man. People become tjindaku because of a curse or incest. A very mighty "dukun" (witchdoctor) can break this themselves.

b. Conscious Lycanthropy. "Normal" people, who are able to change in a tiger by means of magic power, thus the real weretigers.

c. Transmigration of the human's soul into a related animal like the tiger (Metempsychosis):
   1. voluntary, these tigers act mostly as protectors
   2. unvoluntary, after having been killed by tiger; liberation is only possible by killing another human being. Thus it is to "understand": "once man-eater always man-eater" (see 9, page 33).

d. Power over tigers, which is ontained by ilmu (magic power)

The tiger-dukuns (witch doctor) have power over tigers, because of their ascetic way of life (often very orthodox Mohammedan). This power is executed with the help of "pojang" the ghost, who protects a special part of the jungle; often a died legendary king or army-leader (see 11b too).

e. Shadow-tigers Nagulism. A relation exists between one man or a whole family and a tiger; the tiger acts as a protector of those family. This believe is especially present in the area north of Palembang (north Sumatra).

f. Tiger and the Islam the tiger acts as a punisher of people, who simned against Allah's law, especially this belief can be found in Atjeh.

It can be concluded that the tiger takes a special place in the popular religion, which is still strong in spite of the fact that the people are Mohammedans or Christians. Thus the local population do not like to kill tigers if they give not too much trouble in the region.

11 THE TIGER-HUNTING IN INDONESIA

It is outside the scope of this paper to deal with tiger-hunting methods in a detailed way. But because much data, used in this paper, are derived from Hunting literature and a clear relation exists between hunting and nature protection and conservation, some methods of killing the tiger are to be mentioned.

a. Hunting with bait

After local information a good place, near a track is selected and a bait has been laid down; sometimes living bait has been used too. It is important that the bait-animal lives in that area, because otherwise the tiger becomes suspicious; usually a wild boar has been used. On a distance of ± 15 meters from the bait, that has been tied up on a tree, a sitting-tree has been arranged. It is necessary to have a good vieuw from the tree on the bait, so the tiger can be shot when feeding on the bait. Formerly often a "belor" (a oil-lamp, with behind it a reflector) was used which was shining continously on the bait (Denninghoff Stelling). Also electric lamps have been used, which are switched on when the tiger is very close to the bait. The tiger does not care about lamp-light, although there are also "lamp-shy-tigers"; these tigers are mostly animals, which are not hit at other "hunting parties". In Java it is not allowed to hunt tigers with lamps. It is peculiar that Hoogerwerf (1970) mentions that tigers in Udjong Kulon do not react to baits, that were laid down, but Denninghoff Stelling points out that tigers always come to baits in Sumatra. This way of hunting have been carried out by sport- and professional hunters, especially in Sumatra; usually the skins have been sold(fl. 150,- to fl. 350,- have been paid for a tiger skin in 1933-1934 according to Denninghoff Stelling).

b. Hunting with cage-traps

In Sumatra the local population captures tigers, at least when they become a nuisance for the people, by means of cage-traps. The trap, is a room of poles (± 3.25 m. long; 0.60 m. wide and

± 1.30 m. high) with in it a living bait e.g. a goat, which was tied up at the back. When the tiger enters the trap, it sets in action a mechanism, which shuts the door. Before using the traps they were inaugurated by a dukun (a kind of witch-doctor) see also chapter 10.* Klees (1920) mentions that 9 tigers have captured in that way in Padang (west Sumatra); in onemonth even 2 tigers. Klees acted as a dukun too, to get nearer the people, by saying some Latin; this was so succesful that some days after a tiger has been already captured in his "inaugerated cage-trap".

c. Poisoning

Naiggolan (1937) gives a rather detailed description how after some failed shootings a tiger had been poisened by using a dead dog as bait. In the dog some capsules, containing each 100 mgr. strychnine, were brought and the tiger was found dead, 100 meters from the dog. Formerly poisoning of tiger has been propagated by the Dutch Government (tigers can be killed easily, by spraying pesticides on the bait, according to Van Bemmel (personal communication)), especially wild boars have been used as baits.

d. Spear-traps

The local population made spear-traps too. The spears were placed in such a way that the tiger wounded its belly so heavily it died after a while.

e. Catching

Catching by snares, attached at trees, which can be compared with the snares, which poachers use all over the world. Poaching is done by local population mostly. Also the people use traps, which shut at a touch by the tiger and mostly the tiger is fixed at its feet. The trap (covered under the soil) has to be fixed so, that the tiger cannot tear loos itself.

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* It has been published around 1914 (Tijdschrift Binn. Best. 1914) that 100 tigers have been captured with 60 cage-traps within 6 years in Sumatra!

f. Set-guns

The tiger have been shot by set-guns too. The tiger upon the bait, sets in action the riffle-trigger and the shot cracks. Sometimes the set-gun was placed in a tree and the bait attached in the tree at a height of some meters.

How far these different hunting-ways still are applied is unknown, but it is desirable that they are not used any more, because the tiger is becoming very rare. Therefore this specious is placed on the list of protected animals in Sumatra too.

12 STATUS OF FORMER POPULATION OF THE TIGER IN INDONESIA(TILL 1963)

12.1 GENERAL

It is hardly possible to give a survey of the former status of the tiger, which is based on data derived from litareature and some interviews. With the available data there can be given an impression of the population only, because it is impossible to estimate the number of tigers in a reliable way on account of the dense vegetation in Indonesia, and because the tiger is a nocturnal animal. Moreover there is done hardly any research to study the tiger in field circumstances formerly. Most of the data used, are derived from hunting literature, some letters received by the author, and some interviews.

The Zoological Museum in Bogor, Indonesia, has a big skin collection, from tigers, shot all over Indonesia. Based on this skin-collections (the places, where the tigers have been shot, are known) a sketch can drawn, which will give a good picture of the former distribution of the tiger, particularly in Java. This summer Prof. Mörzer Bruyns will ask for these data, so that a map on these data can be compiled. The available data are grouped after the islands Sumatra, Java and Bali and some sketches of the distribution have been made (see page 16).

12.2 SUMATRA

Before 1900 the number of tigers was so great, that even the number of people killed by tigers was unknown in many cases (of course the communication was very bad in those days).

Van Balen (1915-1916) put forward: The tigers were numerous in the Pasuma area, on the east-coast; in central Sumatra the tigers were such a plague that they entered the estate-houses of the planters. In Lampung they were so numerous, they came into military bivouacs.

Heynsius Viruly and Van Heurn give the following summary in 1935: Numerous in Atjeh, the Indragirian Lowlands, Lower Lubu Dalem, Sungai Litur, Batang Serangan and surroundings, Djambi and

Siak. The tiger was considered as rare till common in Palembang. In Silindung it occured mainly in Alang-Alang grassfields (Imperata-cylindrica). Although the animals were not rare, they seriously declined in number in the most densily populated area's in Sumatra. Often they were caught or killed by shooting, with case-traps, strings, tongs and bamboo spears (see also chapter 11). Generally the people considered the profit of the tiger higher because it preys on the very harmful wild boars and wild dogs (adjaks). Protection of the tiger was not thought necessary in those days (1935).

Lasschuit (personal communication) told the following about the tiger in Atjeh (1937-1954): During my numerous surveys in the jungle I saw one tiger a month at least. In Takinggon at least 3 à 5 tigers were shot each month. Many prey-animals, such as: wild boars, muntjaks or kidangs, sambars, were available. Especially at the burned places, which were covered with Alang-alang (Imperata cylindrica), water-buffalos occured, which often resisted tiger-attacks. In general the tiger was very numerous in Atjeh that period. In Lampung they were very numerous too, according to Zentgraaff (1935-1938). About Lampung, Wehlburg (personal communication) the following: in 1933-1936 every year there were 10-12 people killed by "tiger-accidents" (the population in Lampung was 250,000 - 300,000 inhabitants those days). When Wehlburg lived in Indonesia, he left the country in 1954, 5 till 6 tigers were shot each year in Lampung.

Smith (personal communication), who worked in Benkulen (1932-1940) wrote that most tracks were to be found in the lower areas, and that the animals came very close to the villages. Feith, Haak, Hazewinkel, Denninghoff Stelling (personal communications) reported that the tigers sometimes even entered the planters-estate-house, killed the dogs, and often frightened the inhabitants (see also figure 4, page 48).

12.3 JAVA

In 1747 the inconvienience for the people became so great that a premium of 10 crowns was offered for killing a tiger in Java. This was a very high amount for those days; there have been

killed only 26 tigers in Java in the period, middle of October 1746 - end of August 1747.
From 1 Sept. 1747 till 14 Jan. 1749 80 tigers have been killed in the vicinity of Batavia (Jakarta) only. In 1762 the premium was abolished. In 1820 again so many people were killed that there has been made a plan to found a "company" to destroy the tiger (suggested in the Bataviaansche Courant (Batavian Journal). In 1854 the premium on killing a tiger was fl. 22,- and sometimes raised locally a year. In Tegal only there has been paid fl. 2,000,- till fl. 3,000 for killed tigers in some years.

In 1862: 148 people killed in Java
In 1863: 131 people killed in Java (Hoogerwerf, 1970).

In 1862 the premium system existed which paid fl. 30,- for each killed tiger.

In 1907 the Kaledjetan Kampung (east of Udjong Kulon), had to be evacuated on account of a tiger plague.
For the period 1910-1940 Mr. A.J.M. Ledeboer endeavoured to kill as many tigers as possible (He killed more than hundred all over Indonesia) (Hoogerwerf, 1970).

In 1927 Mr. R.H.A. van Maarseveen shot 2 tigers in South Garut, and in 1933 4 animals in the Tjisadea-Tjilaka region (South Tjiandjur), also there have been killed 2 other tigers in that area the same year.

In 1930-1940 reports were still circulating fairly regularly in the press and in periodicalls about the occurrence of tigers in Java.

Heynsius-Viruly and Van Heurn (1935) write about the occurrence in Java: The tigers of the swampy area Mauk, still present in 1914, do not longer occur there. At the Gunung Malaba some animals still have been seen. In 1935 the tiger is still be found in the Baluran area, South Banjuwangi the Southern Mountains and in the surroundings of Banjumasand in the reserves, especially Udjong Kulon. Yearly there have been shot 2-4 tigers in the area around Tamponas. Moreover, there have been mentioned the occurrence of the tiger in South East Garut.

Miss Lépinat (personal communication) wrote me that there have been found regularly tigers in Limbangan (Bodja) in the period 1930-1938 and in 1938 tigers were seen in the teak-forests of Bantam (West-Java).

At the beginning of 1940 the population of the tiger proved to be lower. In October 1938 a tiger was caught in a trap near Tamandjaja in Bantam(a few kilometers east of Udjong Kulon). In july 1938 a tiger killed a mare and her foal man near the Tjikundjang rubber plantation 30 km north-east of Udjong Kulon and in december 1938 2 people were killed. In 1939 a tiger was shot in South Banjuwangi. In August 1940 a dead tiger was found in the Subang area (eastern West Java) and another was seen. In middle of June 1940 a tiger was killed near Tjibodak (near Bogor, West Java) and in the same year 2 were caught in South Malang. In Subang one tiger was found dead and another was seen in 1940. In 1940 and 1941 2 animals were shot and another was seen in South Bantam. In 1940 Sody did an appeal for data about the distribution of the tiger in Java, placed in the Journal of the Neth. Indian Hunters, but he received no data about the tiger (outside the animals in the reserves like Udjong Kulon) in 1941. In that time, however, there have been published several stories about tigers in the journals, but the animals mostly concerned seemed to be panthers.

Retêl Helmrich (personal communication) who worked as planter from 1924 till 1948 in Java put forward that the tiger could be found every where from the peninsula Blanbangan (east Java) to the peninsula Udjong Kulon (west Java), particularly in the closed forest on the south-coast, where sufficient bantengs, deers and wild boars were available.

Jansen (personal communication) mentioned that in 1942 in Kesilir (south east Java) a tiger, killed a banteng and dragged its kill 10 meters away. According to miss Lépinat (personal communication) there still was a tiger on an estate in Djember 1950.

Kloër (personal communication) put forward that in 1958 and 1959 5 tigers have been shot in east Java; in 1961 a tiger was seen in the estate "Kali Selogiri", 15 km. north-east of

Banjuwangi (east Java), which has been shot by an army-officer the same year (see also figure 5, page 49).

12.4 FORMER SITUATION IN THE SANCTUARY UDJONG KULON (WEST JAVA)

During the many visits paid by Hoogerwerf to the reserve in 1937-1957, many tracks were found and a tiger was seen no less than nine times. The daily reports by the guards revealed that in 1939/1940 one 2 tigers and once 3 were seen together; tigers were encountered 13 times, in 1943. Always when Hoogerwerf visited the reserve, they betrayed their presence, but he never acquired a satisfactory picture of the tiger population, living permanently or periodically in Udjong Kulon, and therefore he never proposed measures for controlling their numbers; but he never had the impression there were too many tigers in this reserve; wild boars, muntjak and deer remained numerous. It is peculiar that the tiger in Udjong Kulon hardly reacted on laid-out bait; this was nearly always was successful at tiger-hunting in Sumatra and other parts of Java. May be the tiger of Udjong Kulon were not used to human activities and became quickly suspicious (figure 6, page 57).

12.5 BALI

In 1909 tigers have been heard and pugmarks were seen in the north west (Banjui Wedan?) by Mr. Bijl de Vroe (personal communication Prof. Mörzer Bruyns).

Heynsius-Viruly and Van Heurn reported in 1935: Some tigers still occur in West Bali, which live in a very difficult situation because of the hunters coming from Java. Also in the north-west and south-west the spicious is still present.

According to Zimmerman (1938) a planter and tiger-hunter, who spent many years in Bali, 14 tigers were killed (7 by himself from 1933 till 1937). In that time the tiger was threated already by poaching and the diminishing in the forests on the north-coast of Bali.

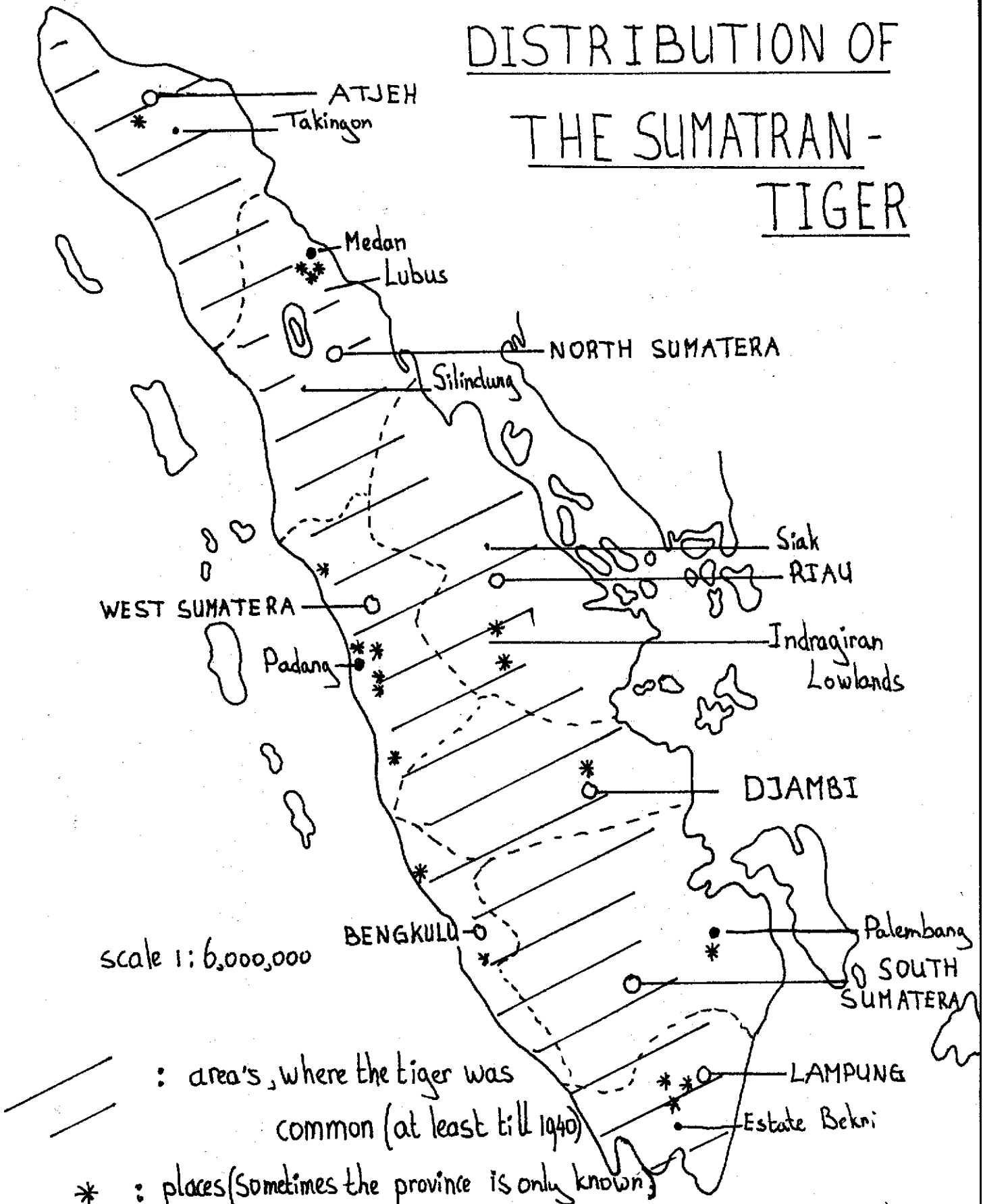
Mr. van Deventer (personal communication) told that during the second-world war 10-20 tigers have been lived in Bali, but

after the war he did not see pugmarks of the tigers anymore in north west Bali, a very dry and inaccessable region. After the second world war he also saw less prey-animals like deer, wild boar etc. in that area, during huntings than before the war.

MeiBner (1958) who spent several months (in 1957) in Bali traced rumours about the presence of the tiger, put forward that the occurrence of the tiger in Bali the last decennia is to be considered as a fairy-tale. But this assertion is obvious not true, because Mr. Ledeboer had a skin-collection, including skins from Bali-tigers till ± 1940 too (when MeiBner visited Bali, this collection was already burned).

12.6. figure 4

SKETCH OF FORMER DISTRIBUTION OF THE SUMATRAN-TIGER



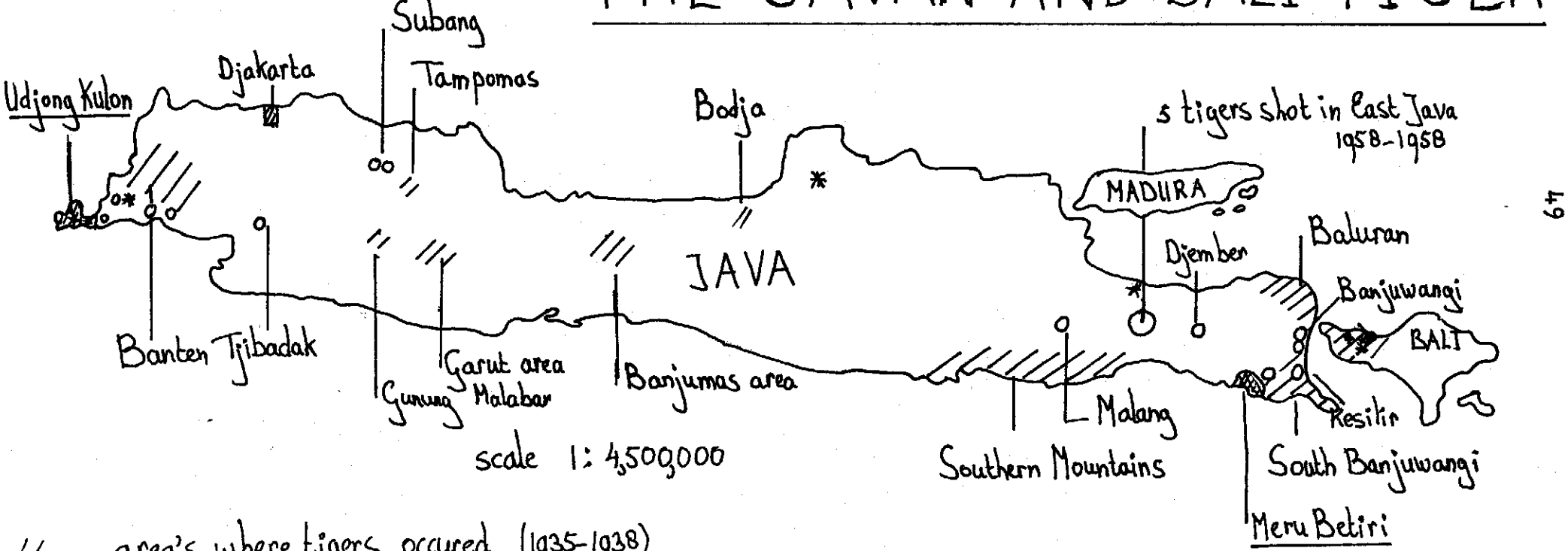
: area's, where the tiger was common (at least till 1940)

* : places (Sometimes the province is only known) from where the dead tigers came, used by Sody (1949) for his research.

--- : province boundary

12.7. figure 5

SKETCH OF FORMER DISTRIBUTION OF THE JAVAN-AND BALI-TIGER



// areas where tigers occured (1935-1938)

o places, where tigers have been caught or shot 1938-1961

* places, from where dead tigers came, used by Sody (1949) for his research (7 of the 26 places)

13 STATUS OF PRESENT POPULATION OF THE TIGER IN INDONESIA (1963-1973)

13.1 GENERAL

It is very difficult to mention particulars about the tiger's recent status based on literature and personal information especially because very few data from recent time are available. Nevertheless it is tried to give a general revieuw, based on the scarce data in the following pages.
Legal status in Indonesia: Sumatra: the tiger is placed on the list of protected animals in 1972; Java and Bali: since 1965, there is a ban on the shooting of tigers in Java and Bali and since 1970 the tiger has been placed on the list of protected animals for those islands.

13.2 SUMATRA

In general it can be said that the tiger is still rather common in Sumatra, especially in the thinly populated areas like Atjeh, Djambi and Lampung. Due to the popular belief the tiger will not be hunted by the local population if the tigers do not give too much troubles (see also chapter 12, page 42). The author of this paper, who has spent some weeks in the Wai Hanakau forest-complex (40,000 ha) for forest-inventory research in 1971, established that the tiger was numerous in that area; often tigers were seen near the camps of the forest-exploitation-firm and during walks through the jungle the tiger sometimes could be heard (The Wai Hanakau forest-complex is situated in Lampung). For Atjeh Lasschuit (personal communication), who visited this area as a guide for a FAO-expedition in 1971 determined that the tiger is still numerous there. Atjeh consists for more than 95% of hardly accessible primary forests, where prey-animals live, and where still is enough room left for the tiger. Only alongside the roads the forests are cut and the land is cultivated by the shifting cultivation system. Lasschuit puts forward that the tiger population may be greater than during the Netherlands Indian Government, because tiger-hunters from other

places came to Atjeh in that time, at the moment there are less hunting-activities. According to Drs. H.D. Rijksen, a Dutch zoologist, who performs research on the conservation of the Urong utan in the Gunung Leuser Reserve, the tiger is seen at regular times (personal communication Prof. Mörzer Bruyns).

According to Hoogerwerf, who visited Indonesia in 1971 (see 13.3 too) a clandistine hunting exists. But how many tigers are shot in Sumatra is completely unknown; when Hoogerwerf visited a skin-preparer in Bogor in 1971, this man just had prepared 7 tiger-skins from Sumatra. That shooting still occurs, is confirmed by the message sent by Drs. Postel-Coster, an antropologist, who visited Sumatra March 1973, and who established the shooting of 3 or 4 tigers by the local population, because they felt themselves threated.

In spite of the fact that a certain number of tigers still do live in Sumatra, the population seems to decrease (World Wildlife Reports) and the situation in Sumatra needs certainly more attention. At the moment many forests are exploited, several millions hectares, by foreign investors in joined ventures with Indonesian companies. These explotations open many regions, where have been hardly human activity before, and probably tigers and/or its prey-animals will be shot. In the future the tiger population decline more in these regions, so that special attention has to be paid to those areas, where forests are exploited on a big scale (see for the mentioned regions the geographical sketch chapter 12,6, page 48).

13.3 JAVA

About Java more recent reports exist only on the reserve Udjong Kulon and east Java, which are dealt which in the following pages. All the following remarks are quoted from Hoogerwerf (1970).

Udjong Kulon: P. Pfeffer (in Survival Service Commission Red Data Book, IUCN, 1966) reported about this reserve that a few individuals still were living in this reserve. L.M. Talbot wrote: "There are an estimated 10-12 in Udjong Kulon (with a possible

20-25 in all Java), to which G.C. Ruhle added in 1963." This figure has since (1960) been reduced to 9 in Udjong Kulon. Schenkel (1967) (a Swiss professor, who studies the Javan rhinoceros in Udjong Kulon) reports: Tiger is extinct in Udjong Kulon. Most probably due to pressure on a small population by hunting. Hoogerwerf (1970) does not regard this statement as plausible as long as there are no indications that poachers were after this predator, which had never been established before as far as Hoogerwerf knows. During every visit to Udjong Kulon (till 1957) the presence of one or more tigers was established by Hoogerwerf, so that it seems unlikely to Hoogerwerf that the species has now (completely) disappeared. The human population living in the neighbourhood of the reserve has in general extremely little inclination to hunt these animals as long as they do not harm life or property, and this is hardly possible in the unhabited reserve. Moreover, it has been proved in the past that precisely in Udjong Kulon it is extremely difficult to get a shot at a tiger according Hoogerwerf. About the reports of Talbot and Ruhle, Hoogerwerf put forward that is impossible to say in 1963 that the number of tigers in Udjong Kulon has been reduced to 9, since it is impossible to make an exact determination of their number.

During the long period of his regular visits to this reserve, Hoogerwerf found it impossible to inventory reliably the tiger population there. After the first two trips made to the area, covering about 50 days, Hoogerwerf did not venture to suggest any figures relating to the supply of these predators, and when - on later occasions- he changed his mind and mentioned the supposal available stock in Udjong Kulon, this was a rough guess, nothing more than a general impression based on his longterm experiences. It must be seen in this light when Hoogerwerf estimates the number of tigers permanently or periodically living in the reserve during the entire period of his investigations at not more than 15 different individuals in total and perhaps not more than 3 or 4 at the same time. This fairly low estimate is principally based on the relatively small number of spoor and feaces; this is particularly applicable to the characteristics scratchings on the

ground and claw marks on trees, which remain dearly visible for a long time and which according to Sody (1936) on the authority of Ledeboer, in certain cases may give a clearer picture of a local population than footprints do. (see also chapter 4.3.4, page 19 and chapter 6.3.2. page 23)

In the letter sent to Prof.Dr. P. Leyhausen, member of the IUCN cat specialist group, 21 July 1972, Hoogerwerf writes about the population in Udjong Kulon the following "I also do not doubt the temporary presence of tiger in the rhino reserve Udjong Kulon although Mr. Schenkel never found tracks of this predator there. Untill 1957 I regularly saw tigers and found ther tracks in this reserve, but when I was there again in November 1971 the weather was so terribly bad, that it was almost impossible to recognize footprints of this animals during the two weeks I have been there."

About the presence of the tiger in east Java Hoogerwerf was in search of the tiger in 1971. Some parts of the letter, he sent to Prof. Leyhausen are mentioned in the following: The only place where Hoogerwerf could establish with certainly the presence of one or two tigers, and where he was shown the skull of a freshly shot old female tiger was in the Meru Betiri area, a rough jungle country between Banjuwangi and Djember in east Java (see figure 7, page 57). In 1969 this area was visited by an Indonesian student for botanical survey and he estimated the number of tigers present at 12; later an officer of the Forestry Department mentioned the number of 4, however, without visiting the area.

These data formed the main reason for the Indonesian Nature Conservation Service to ask Hoogerwerf to visit Meru Betiri in order to try to ckeck these fairly favourable rumours,

On one of the first days in August 1971 Hoogerwerf spent at the Coffee Estimate Sukamade, which is situated in the Meru Batiri area, one of the native workers reported to have seen in the late afternoon, a tiger along the river, crossing the Estate. Although Hoogerwerf was very suspicious about this report, he was able to confirm this early next morning when a very distinct track was found along the river covering a fairly large distance.... Prier to this event in another part of the Estate,

other footprints have been found, however, without it being possible to say, for sure whether it was a track of the same animal or from a second one. Hoogerwerf personally has the opinion that two individuals were involved.

The manager of the Sukamade Estate, Mr. David Madikesuma, who is very preservation-minded and does not allow anybody to hunt in the area, told Hoogerwerf that one or a few tigers fairly regularly visited the Estate and surrouhdings. In the middle of 1971 Madikesuma himself saw two individuals accompanied by a young one of about 2-3 months old. In that period a female worker took to flight on the nearby sight of a tigress with a cub. Shortly after these encounters again two adult tigers were seen by the German family Siegfried, who spent some days on this Estate during a holiday-trip through Java. -----In May 1971, Mr David Madikesuma killed an old tigress on his Estate's territory-----

The measure of the skull and those of the dead body indicated that a big female was concerned which teeth were very worn and partly heavily damaged. Mr. David was forced to kill this animal because it had slaughtered 21 goats and finally attacked a man, who was severely wounded, but who recovered.

At and around the second Coffee Estate in the area, Bandit Alit, no tigers have been reported since about 1961. But in that year a Danish hunter, named Hensen or Hansen, stayed there for a couple of weeks, and he succeeded in killing a tiger on a goat and he also got a black panther there. In 1958 two men were killed along the border of this Estate by a tiger, without it being possible to trace and kill the evil-doer.

With the purpose to investigate the tiger-situation within this heavily afforested mountainous area, covering about 40,000 ha Hoogerwerf crossed the Meru Betiri complex during 16 days, travelling from place to place, passing the night in tents. During this trip full attention was paid to the presence of prey-animals such as banteng, deer, barking deer, boar, monkey, etc., and to the occurrence of competing predators, as panthers and wild dog. Banteng and deer proved to fail completely in the area and the supply of other prey-animals was not impressive, so that

after his opinion under the prevailing circumstances the Meru Betiri complex is not a suitable area to harbour preminantly harbour one or more tigers a year. Especially not when we consider the presence of several panther and an unknown number of wild dogs of which tracks have been seen. But, not withstanding all this, the said region may be considered as a very important temporary residence for one or a couple of tigers, making it worth while to be set aside as a game sanctuary, which has been done now by the Indonesian Government.

During Hoogerwerf's presence there Mr. David Hadikesuma energetically started the creation of extensive pastures on behalf of banteng deer (to be introduced from elsewhere) with the only purpose to provide the tiger with sufficient food, which is perhaps a project worth to be supported by some international organization, although for the time being it is Mr. David who carries the expenses.....

Hoogerwerf is convinced that there still are considerable more tigers in Java than the few we know from the Meru Betiri area, but it may be considered doubtful to preserve these specimens by the establishment of certain reserves, even if they could cover 50 - 75,000 ha, which seems quite impossible in todays heavily overpopulated Java. As Schaller emphasized the food-habitat of tiger covers enormous areas, which makes it extremely difficult to keep tigers in one limited locality. The regions in Java where certainly still tigers live, are almost without exception situated in the southern behalf of the island up to altitudes of about 800 m. above sealevel. There still exist many rough and heavily afforestated localities similar to Meru Betiri, or abandoned native cultivations, covered with light and heavy secondary forests, where still sufficient numbers of boar and locally barking deer, monkeys etc. live and people do rarely penetrate. But the reservation of such areas to create a safe pied-à-terre for one or a couple of these predators seems almost impossible. So far some parts from Hoogerwerf's letter, which give a rather pessimistic picture of the tiger's status in to-day's Java.

The revised sheet of the Javan-tiger in the Red Data Book

mentiones that at least 5 tigers should live in the area of the Coffee Estate Sukamade. (see for the mentioned areas the sketch, figure 7, page 57).

13.4 BALI

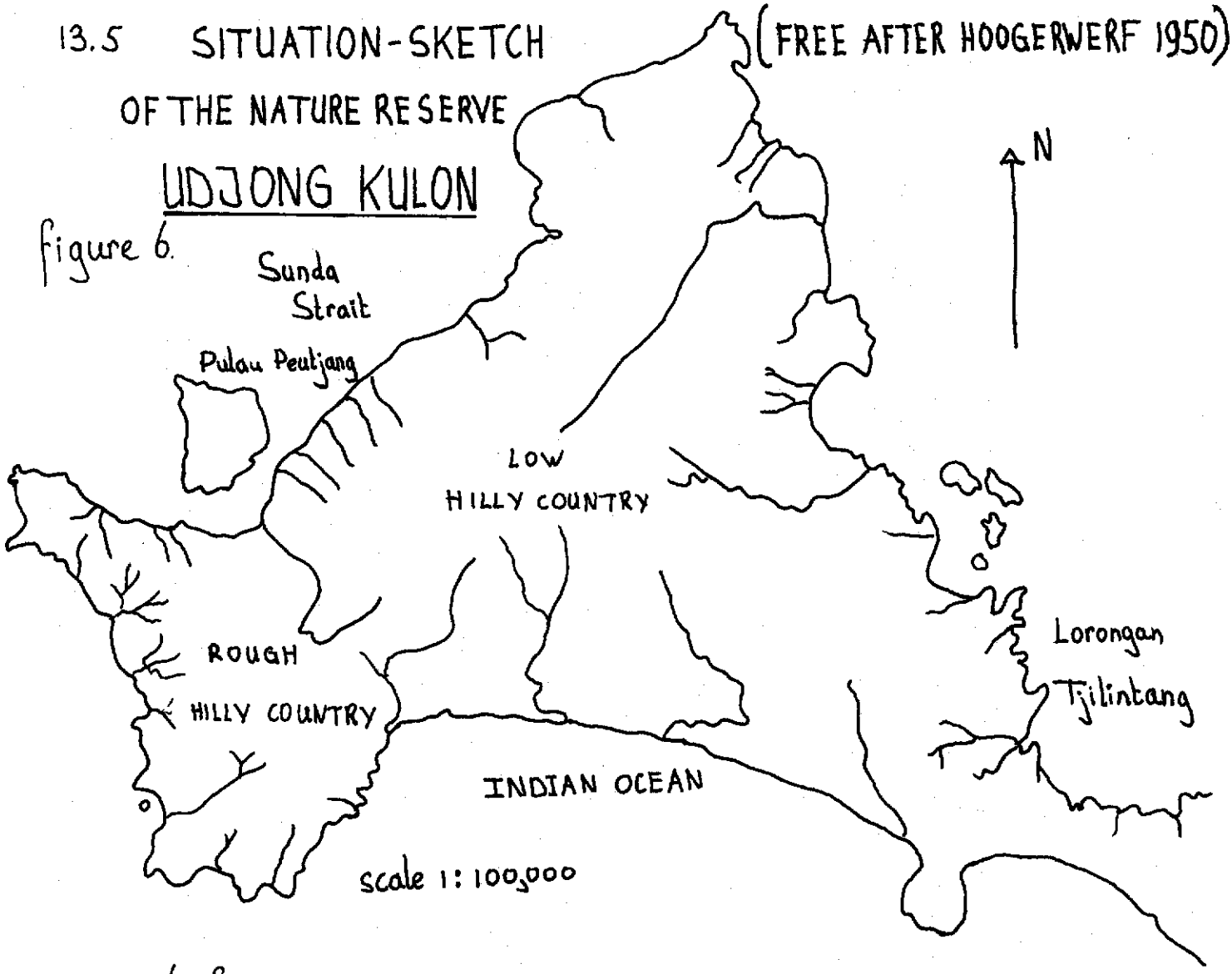
The picture for Bali is still darker than for Java. For a long time there have not been serious investigations on the occurrence of the tiger on this island and recent data are not available, so the tiger is said to become extinct in Bali. But enough hardly accesibly forests do exist on the north-west of this island, which are hardly penetrated by the people and will certainly be suitable for the tiger.

13.5 SITUATION-SKETCH OF THE NATURE RESERVE

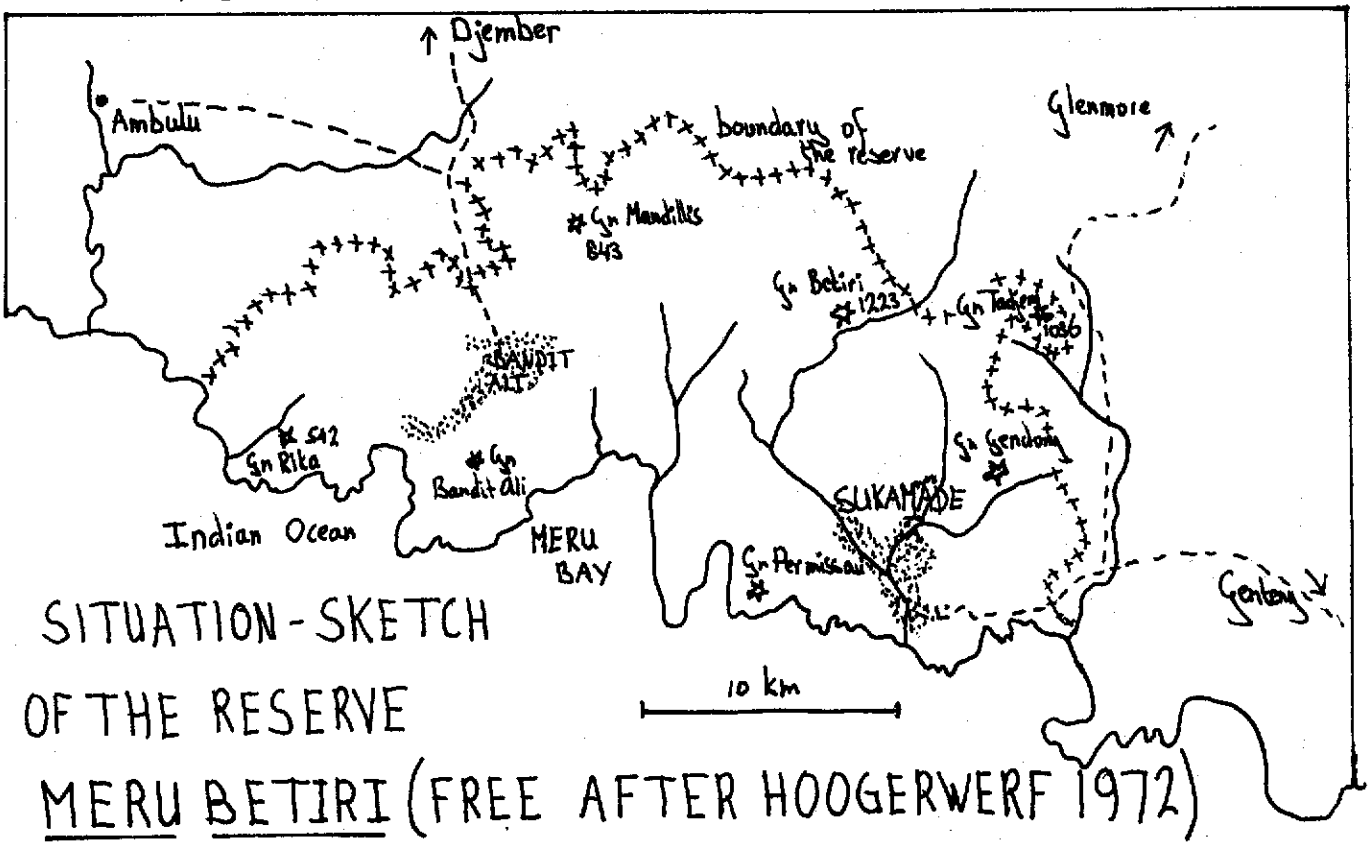
UDJONG KULON

(FREE AFTER HOOGERWERF 1950)

figure 6.



13.6 figure 7



SITUATION-SKETCH OF THE RESERVE

MERU BETIRI (FREE AFTER HOOGERWERF 1972)

14 SOME BACKGROUND INFORMATION ON NATURE CONSERVATION AND NATURE MANAGEMENT IN INDONESIA

14.1 SOME HISTORY

The history of the Nature Conservation in Indonesia has been started when the Ned erlands Indische Vereniging tot Natuurbescherming (Netherlands Indian Society for Nature Conservation) was founded by the forest official Dr. S.H. Koorders in 1912. Before that time there already existed two nature monuments. A lowland rainforest called Depot (6 ha), situated between Jakarta and Bogor, had to be maintained by means of a last will rule of 1714. Alas this forest is nearly totally destructed during the Japanese occupation. The other nature monument was a reserve, that still exists, in the mountains, north of Bogor and is called Tjibodas; it lies at an altitude of 2,000 meters and is 280 ha; it forms a part of the Kebon Raya (the Great Plant-garden) in Bogor since 1889. On account of various proposals of the Neth. Ind. Soc. for Nature Conservation, the Netherlands Indian government proclaimed several rules in 1916 which led to the foundation of 55 official nature monuments.

Especially among the forest-officials the interest in Nature Conservation increased during 1910-1940 and the forest official F.J. Appelman has to be mentioned as a wild conservation propagandist. After Koorders's death Dr. K.W. Dammerman took the lead of the Neth. Ind. Soc. for Nature Conservation and in the course of years various ordinances were proclaimed; the ordinances meant steps to improvement each time.

The most important ordinances:

1909 Ordinance on protection of wild fauna, which was replaced in 1924 by the Ordinance on animal protection and hunting, which was applied for Java and Madura, while the ordinance of 1909 was still in force for Outer Indonesia.

Moreover the Animal protection ordinance and -regulation of 1931, especially to restrict the export of animals skins and feathers;

the Forest Law Java and Madura 1932; the Hunting ordinance and -regulation Java and Madura 1940 and the Nature protection ordinance of 1941 (Dammerman, 1950)

Mentioning activities for Nature Conservation in a bird's eye vieuw, we should mention the Nederlandse Commissie voor Internationale Natuurbescherming (Netherlands Commission for International Nature Conservation), founded by Mr. P.G. van Tienhoven in 1925. This foundation is concerned with international projects, e.g. the Gunung Leuser project in Indonesia.

After the Second World War, Mr. A. Hoogerwerf became the head of the Department of Nature Conservation and Game-affairs of the Kebon Raya in Bogor till 1957 and he did his utmost to build up again the Nature Conservation in Indonesia.

14.2 PRESENT SITUATION (1965-1973)

Since the moment the Department of Nature Conservation and Game-affairs is in the organization of the Forest-service. The head is the energetic and very active Mr. Walman Sinaga. This Department has at its disposal 5 university-graduated officials, 50 middle-rank officials and 350 lower rank officials. The various Ordinances are still in force, but there are met several difficulties in the practical execution of the Ordinances. This can be understood, particularly when knowing the situation, that Indonesia, which has such an amount of troubles in the field of the elementary physical needs, hardly can spends money for Nature Conservation. Therefore, there are several projects supported by international organizations like: the World Wildlife Fund, Netherlands Foundation for the advancement of tropical research(WOTRO). These organizations can contribute little to the tremendous problems, for which the Nature Conservation in this country is placed, that extend over such enormous distances (see also chapter 15, page 62).

As an illustration some support of the World Wildlife Fund is mentioned (source: WWF yearbooks).

year	WWF-grant	project
1965-1967	$ 48,000	4 projects, most activities for Udjong Kulon (Javan rhinoceros, Rhinoceros sondaicus), vehicles, research, permanent guard
1968	$ 28,500	6 projects, most activities also for Udjong Kulon (research Prof. Schenkel) small support for Baluran (east Java)
1969	$ 17,375	3 projects, mainly for Udjong Kulon
1970-1971	$ 15,868	3 projects; Udjong Kulon and Gunung Leuser (north Sumatra)

14.3 PRESENT NATURE RESERVES

The reserves can be divided into the following categories (according to the Indonesian Nature Conservation Service):

a. Strict nature reserves
b. Animal sanctuaries
c. Bird sanctuaries
d. Nature parks
e. Other reserves: botanic, zoologic, scenic, hydro-orologic, historic, aesthetic, recreational and touristic

rare animals especially:

Javan rhinoceros and Sumatran rhinoceros (Rhinoceros sondaicus, Dicerorhinus sumatrensis
Javan tiger (Panthera tigris sondaica)
Orang utan (Simia satyrus)
Annoa (Anoa sp.)
Kommodo dragon (Varanus komodoensis)
Birds of Paradise (Paradiseidae)
Hog-deer (Babirusa babirusa)
Malayan tapir (Tapirus indicus)

Total numbers of reserves in Indonesia 122; total area more than 3 million ha.

69 reserves all categories in Java; the largest are:

Udjong Kulon (West Java)	37,500 ha
Banjuwangi Selatan (East Java)	62,000 ha
Baluran (East Java)	25,000 ha

31 reserves all categories in Sumatra; the largest are:

Gunung Leuser (North Sumatra)	416,500 ha
Sumatra Selatan I (South Sumatra)	356,800 ha
Berbak (Djambi) (Central Sumatra)	190,000 ha
Gunung Wilhelmina (North Sumatra)	200,000 ha
Way Kambas (South Sumatra)	130,000 ha

7 reserves all categories in Kalimantan (Borneo); the largest are:

Kutai (South-east Borneo)	306,000 ha
Sampit (South-east Borneo)	205,000 ha
Kotawaringin (South-east Borneo)	100,000 ha

7 reserves all categories, 3 in Bali, 3 in Nusa Tenggara; 1 in the Molluccas and 1 in Irian Raya (West Irian).

15 CONCLUSIONS, DISCUSSION AND RECOMMENDATIONS

The most important fact, which comes forward is: the tiger in Indonesia lives in very difficult circumstances. In Sumatra this predator occurs still frequently indeed, but how the number of animals has been decreasing in the course of years is totally unknown. The number of tigers, inhabiting this island is difficult to estimate. In Java the tiger, still occuring at the moment (to be hoped more than 10) live in an extremely precarious situation and probably the population will be too small to assure the survival of this Indonesian subspecies. About its occurrence in Bali no actual pronouncement can be done.

Certainly these conclusions are not new; but for all the Indonesian Government cannot give enough support to the protection of the tiger, because of the low budget, which can be spent on Nature Conservation. Although the tiger has been placed on the list of protected animals now, practically there can be hardly executed any effective protection. This does not count for the tiger only, but also for the other protected animals and plants.

The relatively few officials of the Nature Conservation Service and the Institutes, concerned with Nature Conservation, are doing their utmost, with their relative low salaries, their limited outfit and facilities under the energetic guidance of Mr. Walman Sinaga; but they should meet more support in Indonesia.

In general it can be asserted that the Indonesian People should pay more attention to Nature Conservation. Especially one might expect more interest among the higher officials of the Forest Service, who are expected to have already some interest from their professional background. During the Netherlands-Indian Government (up to 1949) too few Indonesians were members of the Netherlands Indian Society for Nature Conservation and certainly there has been spent too less efforts to make the Indonesian People conscious of the enormous nature-treasures.

On the other hand it is understandable that the Indonesian People has not so much interest in Nature Conservation. The country has such tremendous problems in the field of elementary physical needs, so that problems about the conservation of

animals and plants do not come at the first place. Thus we cannot expect sufficient contribution to Nature Conservation from Indonesia and in such situation international organizations have to come to aid.

This already happens (see chapter 13) but the help has to be extended.

The following points are worth attention and discussion:

I Concerning the protection of the tiger

More attention has to be paid to the tiger in Sumatra. To protect the tiger in Java and Bali the existing reserves have to be guarded very well and the officials of the Nature Conservation Service will have to inquire intensively after local information on the tiger and check rumours about its presence. The survival of the Javan and Bali tiger seems precarious, because there is not so much place on the very densely populated islands (Java has more than 80 mill. inhabitants on area of more than 12,5 mill. ha!). About the tiger very little is known and research has to be started, eventually in connection with other research in the field of nature conservation, to investigate the following:

a. The best inventory-way for the number of present tigers and prey-animals, by means of tracks, pugmarks, feaces, local information, scratching marks, baiting as applied in India, etc. This will be a very difficult task, because especially in Sumatra the jungle is difficult to access and the connections are very bad.
b. Preliminary inventarization of the area's, where most of the tigers are living and in which numbers
c. In which way the 4 great reserves in Sumatra (Gunung Leuser, Sumatra Selatan I, Berbak (Djambi) and Gunung Wilhelmina) can be managed to perform a good refuge for tigers, and the best way in which this reserves can be maintained
d. If necessary to proclaim special protected tiger-regions, which can become tiger-reserves later (like has been done with Meru Betiri, east Java)
e. Research on distribution and ecology of the tiger e.g. in the estate Betiri, 50 km north of Tandjung Kareng, South Sumatra,

according to a suggestion of Denninghoff Stelling.

II Concerning Nature Conservation in general

a. The Indonesian Government should pay more attention to the Nature Conservation, with all its aspects. When the Government would be more interested, it could stimulate the development of plans, which can form the start-points of big projects with international help.
So India reacted very quickly on an appeal of the World Wildlife Fund to assist governments in nature-protection projects. Stimulated by the Prime Minister Mrs. Indira Ghandi and Dr. Karan Singh, Minister of Tourism and Civil Aviation and Chairman of the Indian Board of Wildlife, a report has been drafted saving the tiger in India (the number dimished from 40,000 in 1930 to less than ± 2.000 in 1972). This report has been the basis for the foundation of 9 reserves and the starting of big international operation by the World Wildlife Fund called "Operation Tiger". If the Indonesian Government would develop Nature Conservation projects, projects like the "Operation Tiger" might be extended to Indonesia. Development of plans can be done by Indonesian experts, in cooperation with foreign experts (WWF, FAO, Universities). During an official State Visite to Indonesia in late August-early September 1971, H.R.H. The Prince of the Netherlands, WWF President, submitted a list of recommendations for conservation action to H.R. General Suharto, President of Indonesia, from which the following items are quoted:

"Having spoken to many people in your country, I have come to the conclusion that it would be an excellent idea if you personally could issue to all authorities in your beautiful country, starting with the Minister of Agriculture and ending with the local "Bupati's" a statement showing clearly your personal concern with conservation of the fauna and flora, and asking them to take all necessary measures to prohibit illegal shooting of animals in danger, and forbidding to issue consessions for cutting trees in national

reserves and forbidding all trade in animals in danger such as particularly the orang-utan. This applies particularly to Sumatra, Kalimantan and Celebes ------" (the Monthly Report, September 1971 of the World Wildlife Fund).

b. Especially attention has to be paid to the Nature Conservation in relation with the erosion-danger and the watershed management. In Java protection-forests have been suffered very seriously after cutting by the population; much research and work is needed to improve the protection-forests in an ecological way. Outside Java (e.g. Sumatra, Kilamantan (Borneo)) the over-exploitation of the rain-forests by big investors and by the shifting cultivation-system has been caused and still causes the degeneration of the vegetation, with all its aspects (e.g. lower productivity, decreasing of animal life, erosion-danger) which results into half-deserts sometimes. All the people, concerned with these problems, have to do their utmost to conservate and to improve the flora and fauna to save their country "Nature Conservation is a necessaty for the human survival in all countries".

c. There has to be investigated how the Nature Conservation can have direct economical profits

1. How the tourism in Indonesia can be stimulated by improving the accessibility of the reserves and the tourist information on the Indonesian flora and fauna.
   At the first place there has to be thought of the promoting of tourism e.g. the founding of special safari tourism; like in east Africa, at those places, which are suited for that aim.
   Interesting flora and fauna-elements can lengthen the tourist's stay. At the moment the touristic facilities are very limited and a lot of work still can be done in the touristic-sector in general.
2. Moreover, it seems to me of great interest how wild-life utilization can be applied in certain areas in Java and other islands; there will be certainly economical and ecological possibilities.

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