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Draft

Vietnam

Reconnaissance of physical and biological resources

J.A. Dijkshoorn

Annex

Draft VN 2000.01

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Annex

Annex I

Figure 1

Base 80471 (543744) 12-85

Figure 2

ADMINISTRATIVE BOUNDARIES MAP OF S.R VIETNAM

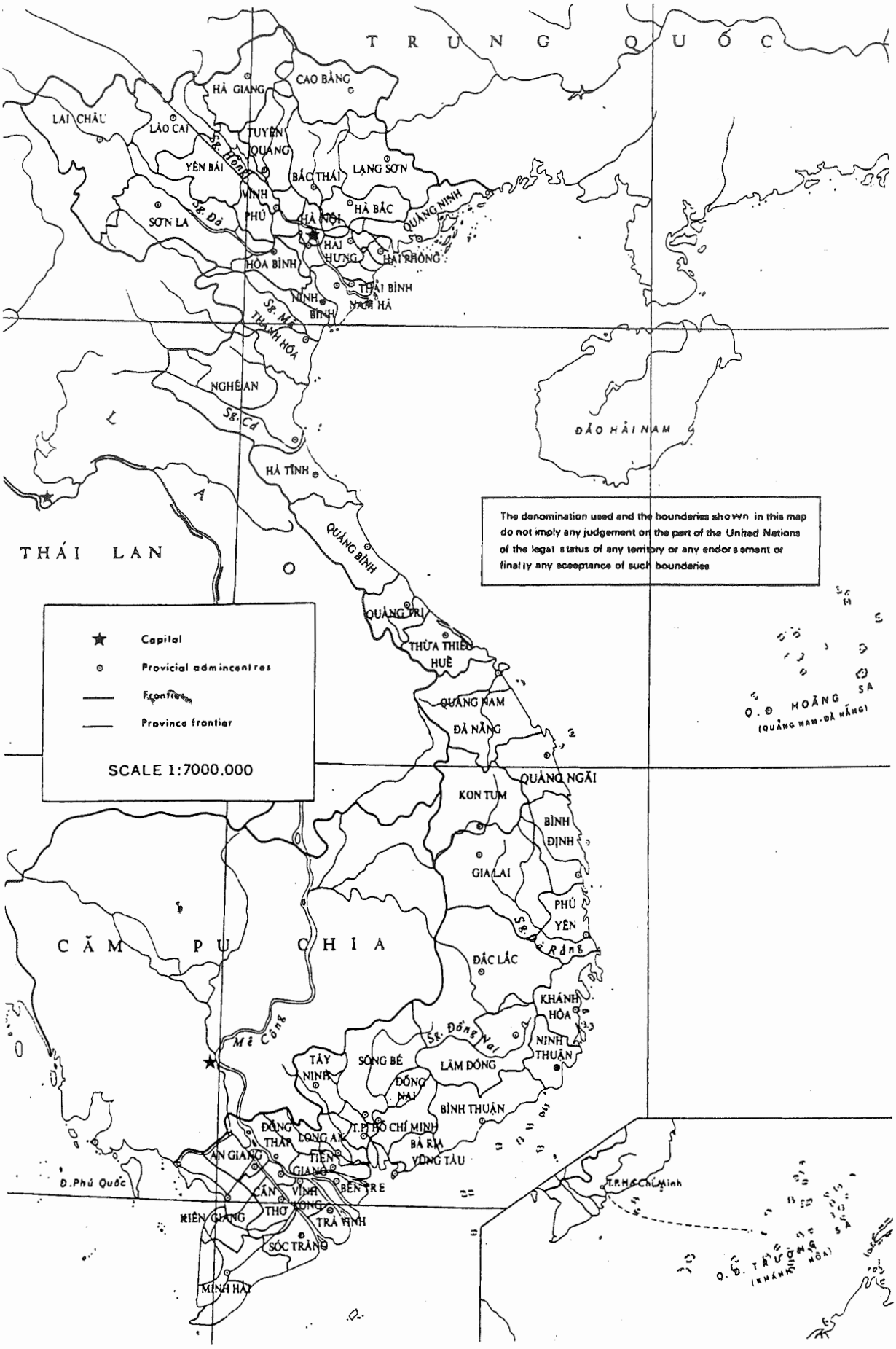
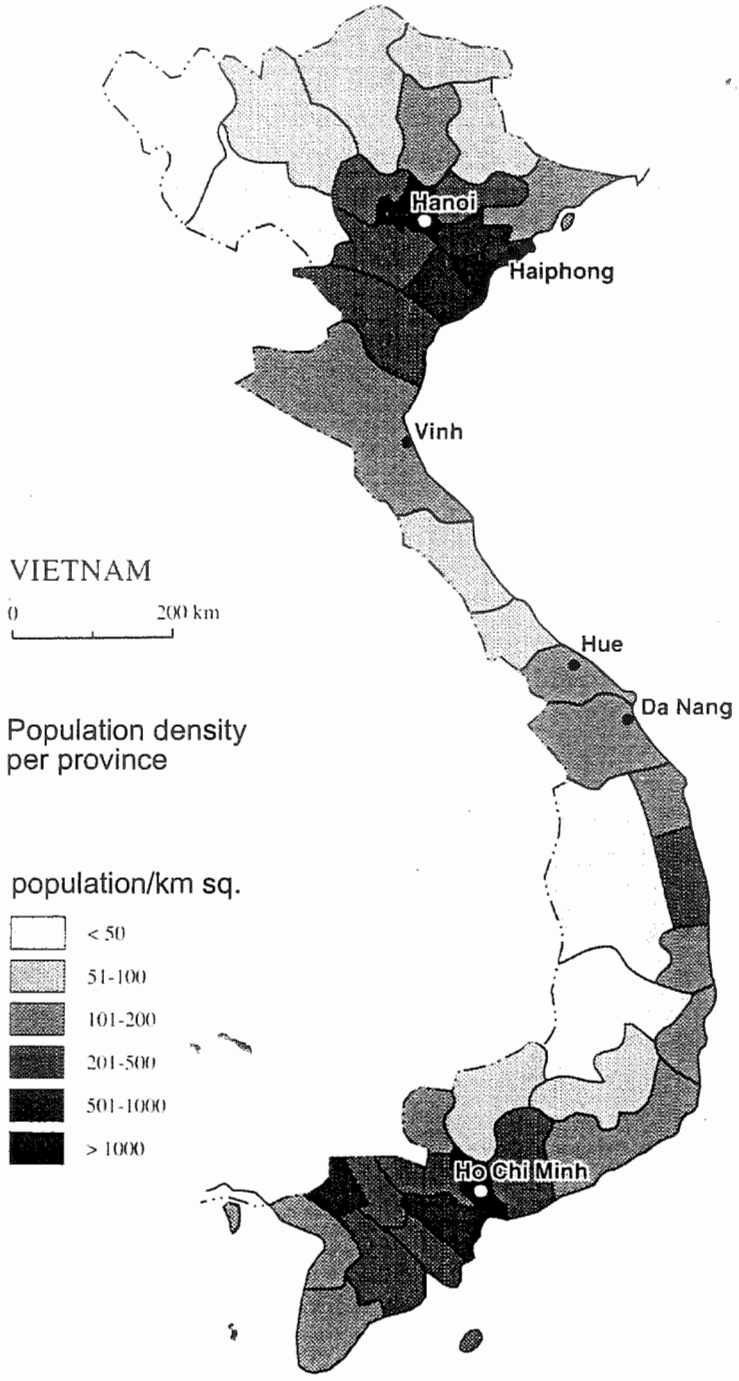
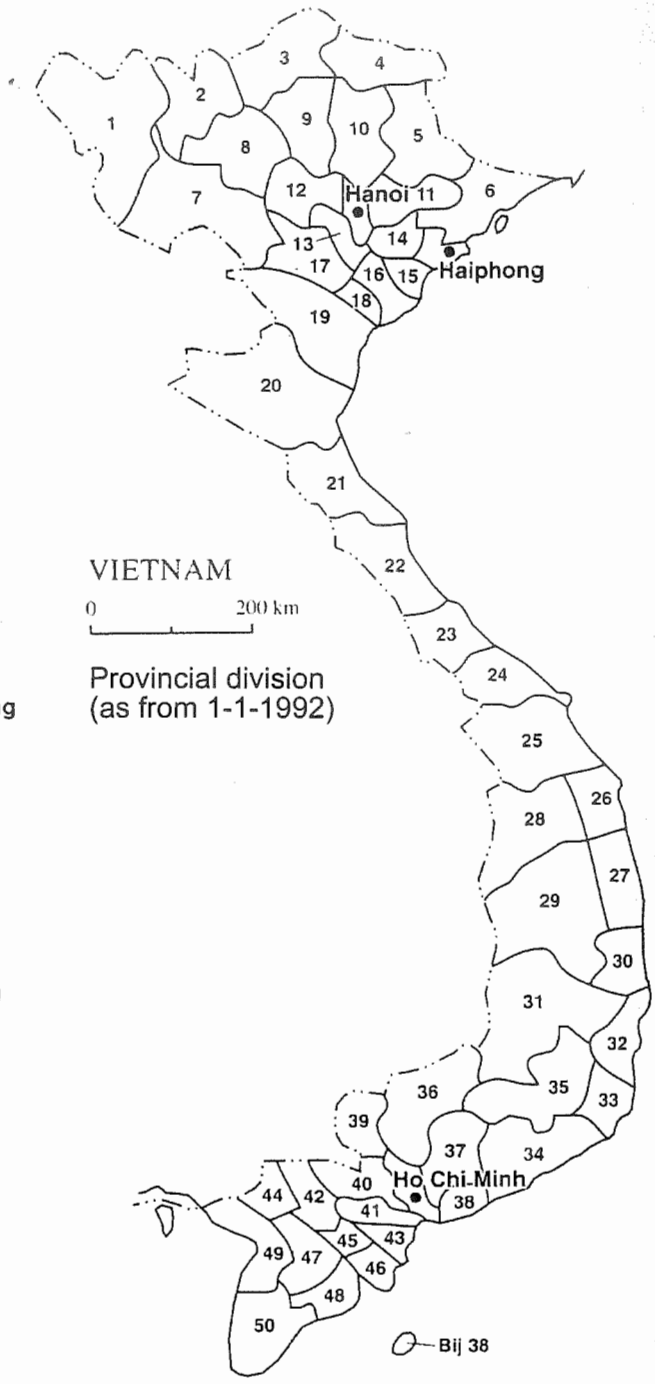


Figure 3

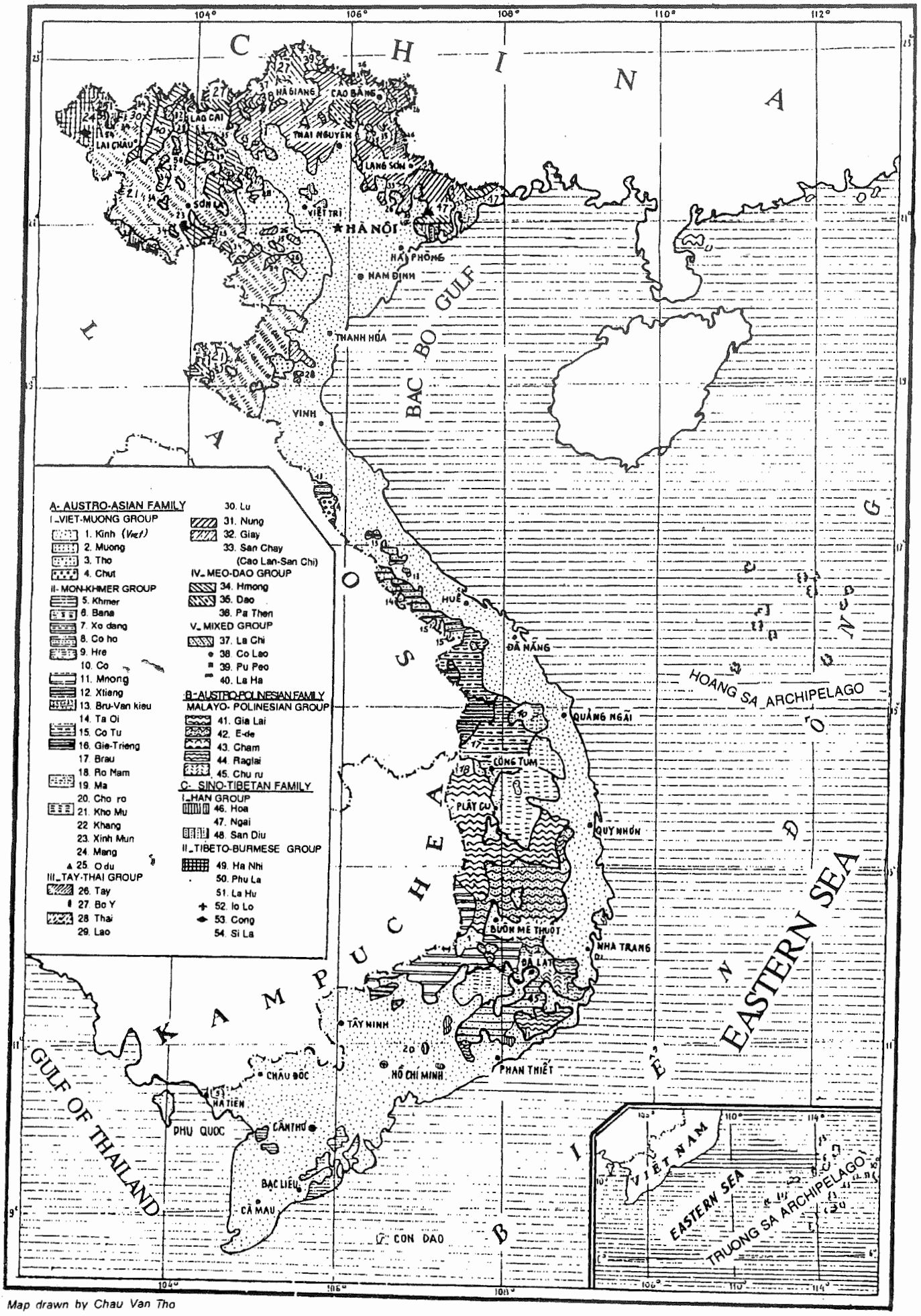




Provincial division from 1-1-1992	Provinces				
Autonomous areas	1 Lai Chau	10 Bac Thai	21 Ha Tinh	30 Phu Yen	40 Long An
	2 Lao Cai	11 Ha Bac	22 Quang Binh	31 Dac Lac	41 Tien Giang
Hanoi	3 Ha Giang	12 Vinh Phu	23 Quang Tri	32 Khanh Hoa	42 Dong Thap
Haiphong	4 Cao Bang	13 Ha Tay	24 Thua Thien Hue	33 Ninh Thuan	43 Ben Tre
Ho Chi Minh-stad	5 Lang Son	14 Hai Hung	25 Quang Nam Da Nang	34 Binh Thuan	44 An Giang
	6 Quang Ninh	15 Thai Binh	26 Quang Ngai	35 Lam Dong	45 Vinh Long
	7 Son La	16 Nam Ha	27 Binh Dinh	36 Song Be	46 Tra Vinh
	8 Yen Bai	17 Hoa Binh	28 Kon Tum	37 Dong Nai	47 Can Tho
	9 Tuyen Quang	18 Ninh Binh	29 Gia Lai	38 Ba Ria Vung Tau	48 Soc Trang
		19 Thanh Hoa		39 Tay Ninh	49 Kien Giang
		20 Nghe An			50 Minh Hai

Figure 4

ETHNO - LINGUISTICAL MAP OF VIETNAM



Map drawn by Chau Van Tho

Figure 5

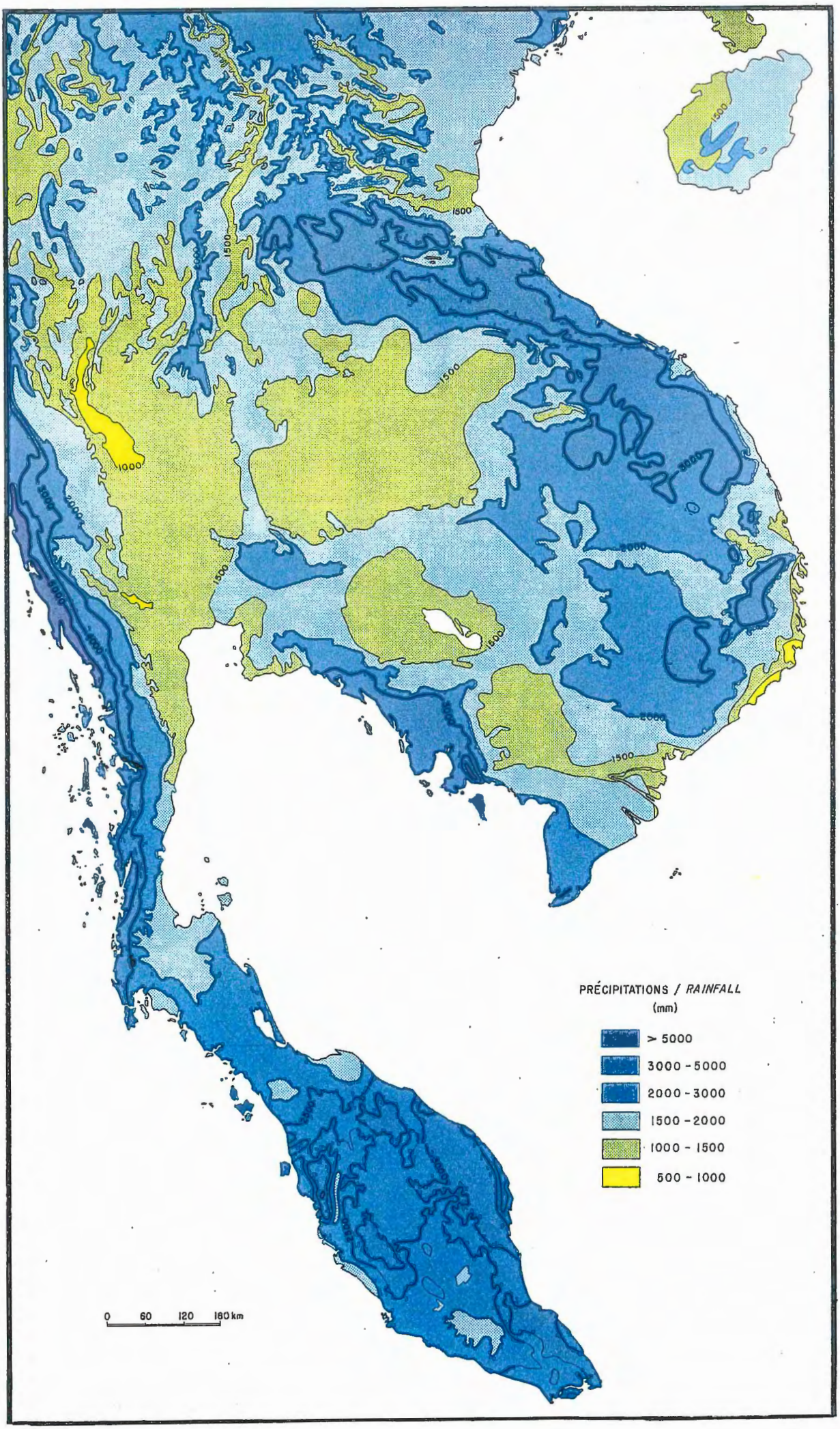

PRÉCIPITATIONS / RAINFALL
(mm)
> 5000
3000 - 5000
2000 - 3000
1500 - 2000
1000 - 1500
500 - 1000
0 60 120 180 km

Figure 6

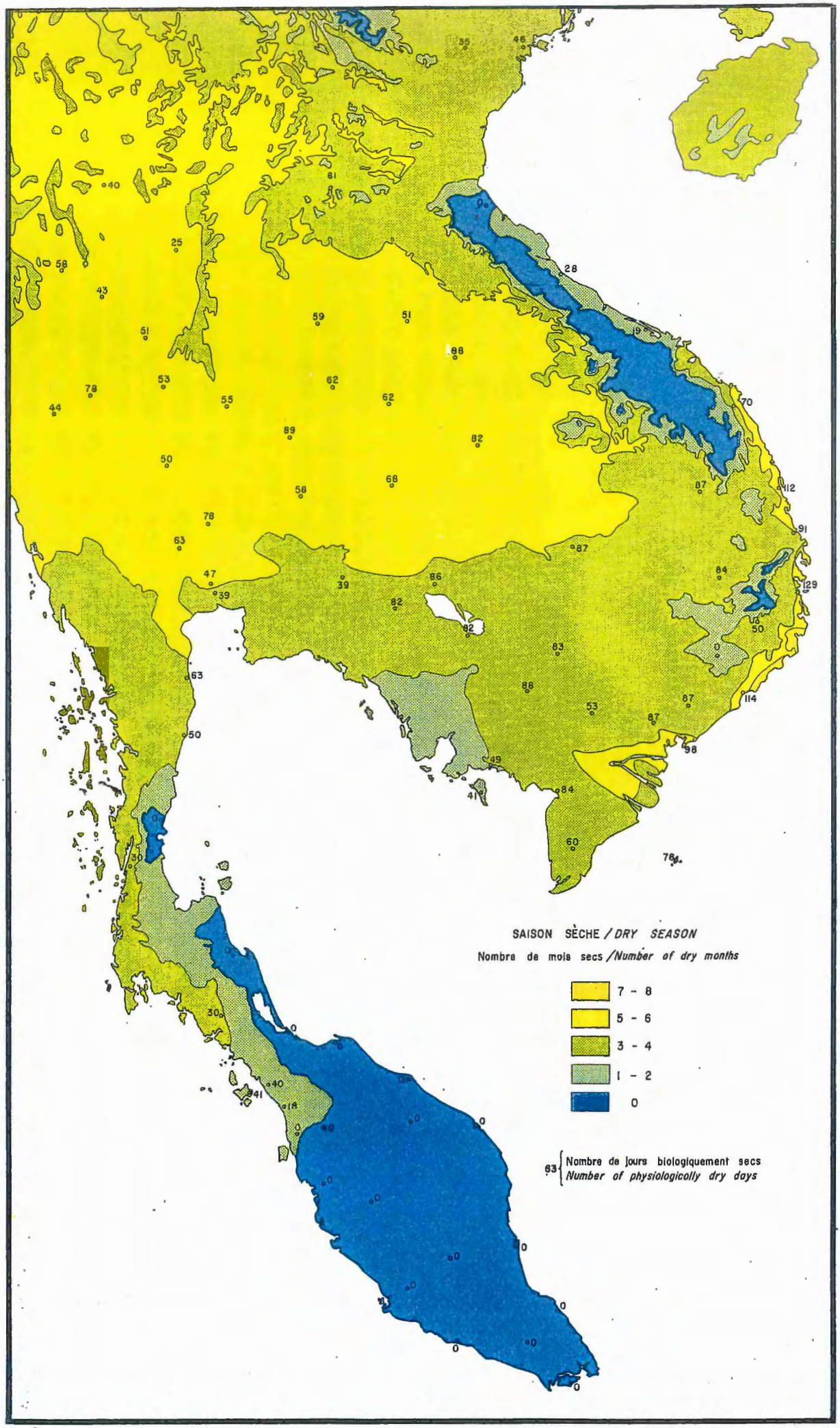
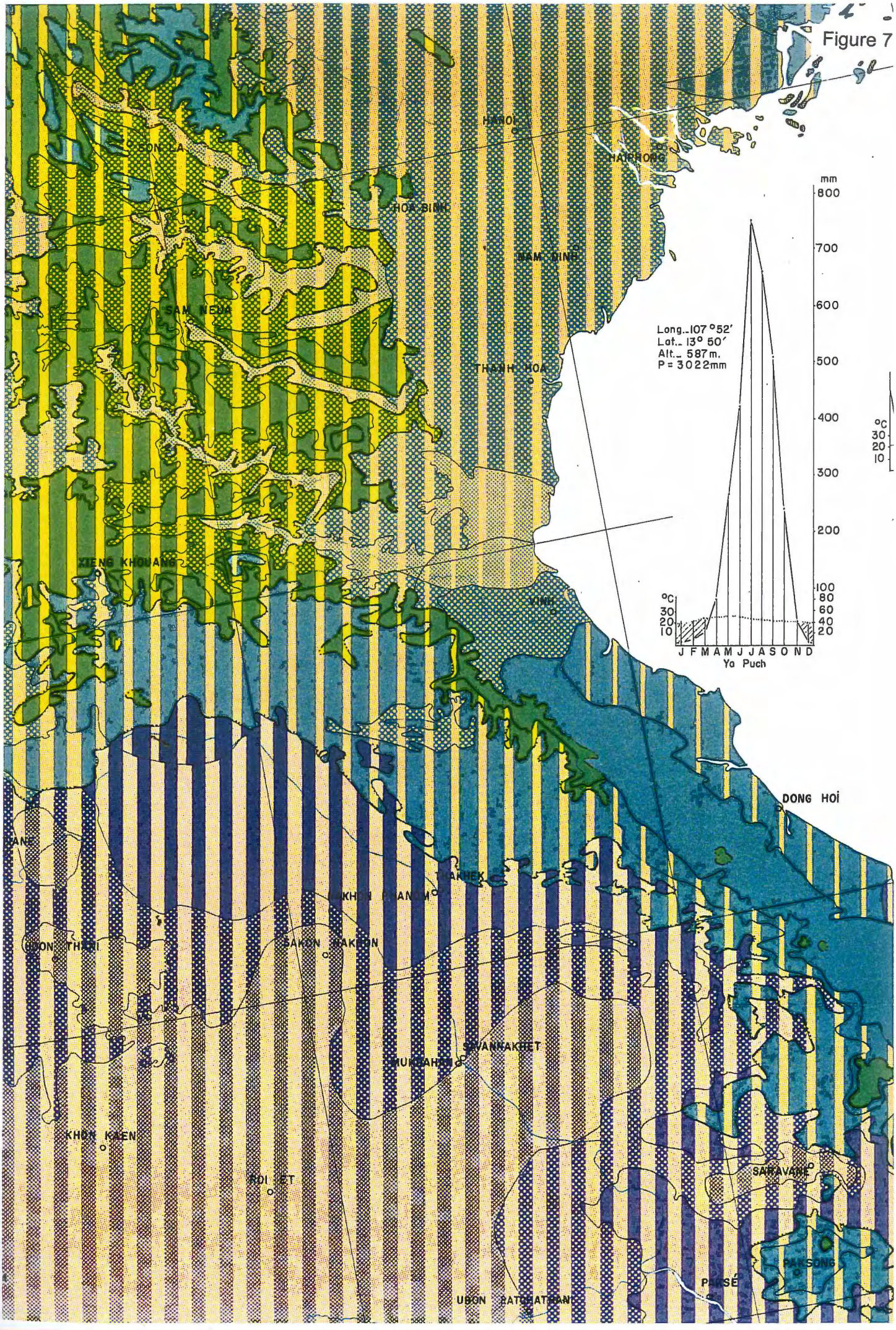

SAISON SÈCHE / DRY SEASON
Nombre de mois secs / Number of dry months
7 - 8
5 - 6
3 - 4
1 - 2
0
Nombre de jours biologiquement secs
Number of physiologicolly dry days

Figure 7


HANOI
HAIPHONG
HOA BINH
NAM DINH
SAM NEUA
THANH HOA
Long.. 107°52'
Lat.. 13° 50'
Alt.. 587m.
P = 3022mm
mm
800
700
600
500
400
300
200
100
80
60
40
20
°C
30
20
10
J F M A M J J A S O N D
Ya Puch
XIENG KHOUANG
VINH
DONG HOI
THAKHEK
SAKON NAKHON
SAVANNAKHET
KHON KAEN
SARAVANE
PAKSONG
PAKSE
UBON RATCHATHANI

LEGENDE / *LEGEND*

Précipitations *Rainfall* mm	Température du mois le plus froid supérieure à 0°C *Temperature of the coldest month superior to 0°C*				Nombre de mois secs *Number of dry months*
	t > 20°	15° < t < 20°	10° < t < 15°	0° < t < 10°	
500 < P < 1000					7 - 8 5 - 6
1000 < P < 1500					5 - 6 3 - 4 1 - 2
1500 < P < 2000					5 - 6 3 - 4 1 - 2 0
P > 2000					5 - 6 3 - 4 1 - 2 0

BIOCLIMATS SUPPLÉMENTAIRES DISTINGUÉS EN MALAISIE

SUPPLEMENTARY BIOCLIMATES DISTINGUISHED IN MALAYA

	P > 2000	1-2 m.s.	t > 20°
	2500 < P < 3000	0 m.s.	t > 20°
	P > 3000	0 m.s.	t > 20°

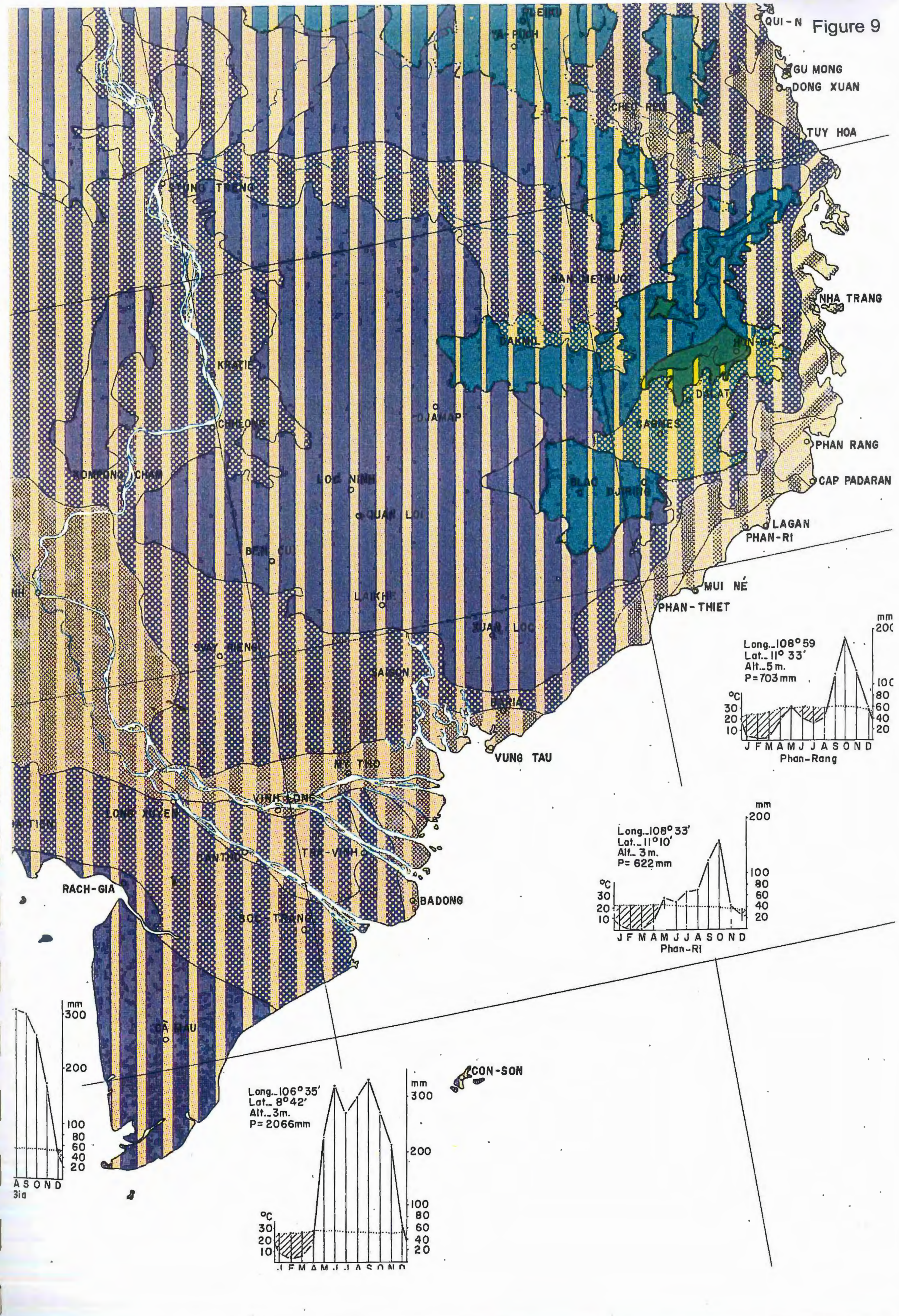
Les climats à deux saisons sèches sont représentés par des bandes obliques.
Climates with two dry seasons are shown by oblique stripes.

Courbe 10°C pour le mois le plus froid
Temperature curve 10°C for the coldest month

Courbe 15°C pour le mois le plus froid
Temperature curve 15°C for the coldest month

Courbe 20°C pour le mois le plus froid
Temperature curve 20°C for the coldest month

Figure 9



QUI-N
GU MONG
DONG XUAN
TUY HOA
NHA TRANG
PHAN RANG
CAP PADARAN
LAGAN
PHAN-RI
MUI NÉ
PHAN-THIET
VUNG TAU
BADONG
RACH-GIA
CON-SON
DALAT
SAIGON
MY THO
VINH LONG
XUAN LOC
LOC NINH
QUAN LOI
BEN CUI
LAI KHE
SVAY RIENG
KRATIE
CHHLONG
DJAMAP
DAKMIL
BAN ME THUOT
BLAO
DJIRING
TRA-VINH
CA MAU
Long. 108° 59
Lat. 11° 33'
Alt. 5 m.
P=703 mm
Phan-Rang
Long. 108° 33'
Lat. 11° 10'
Alt. 3 m.
P= 622 mm
Phan-Ri
Long. 106° 35'
Lat. 8° 42'
Alt. 3m.
P= 2066mm

Figure 10 in color

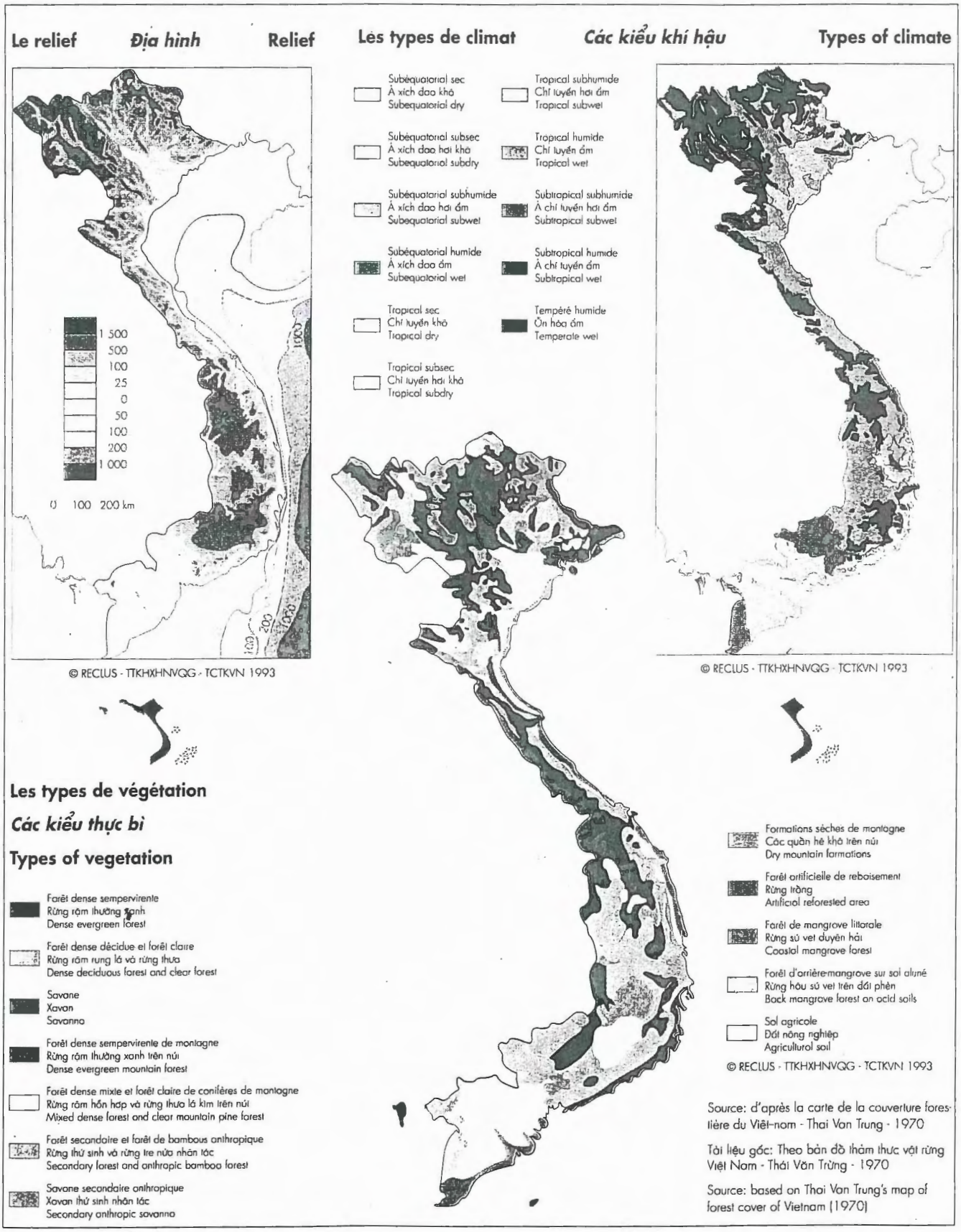
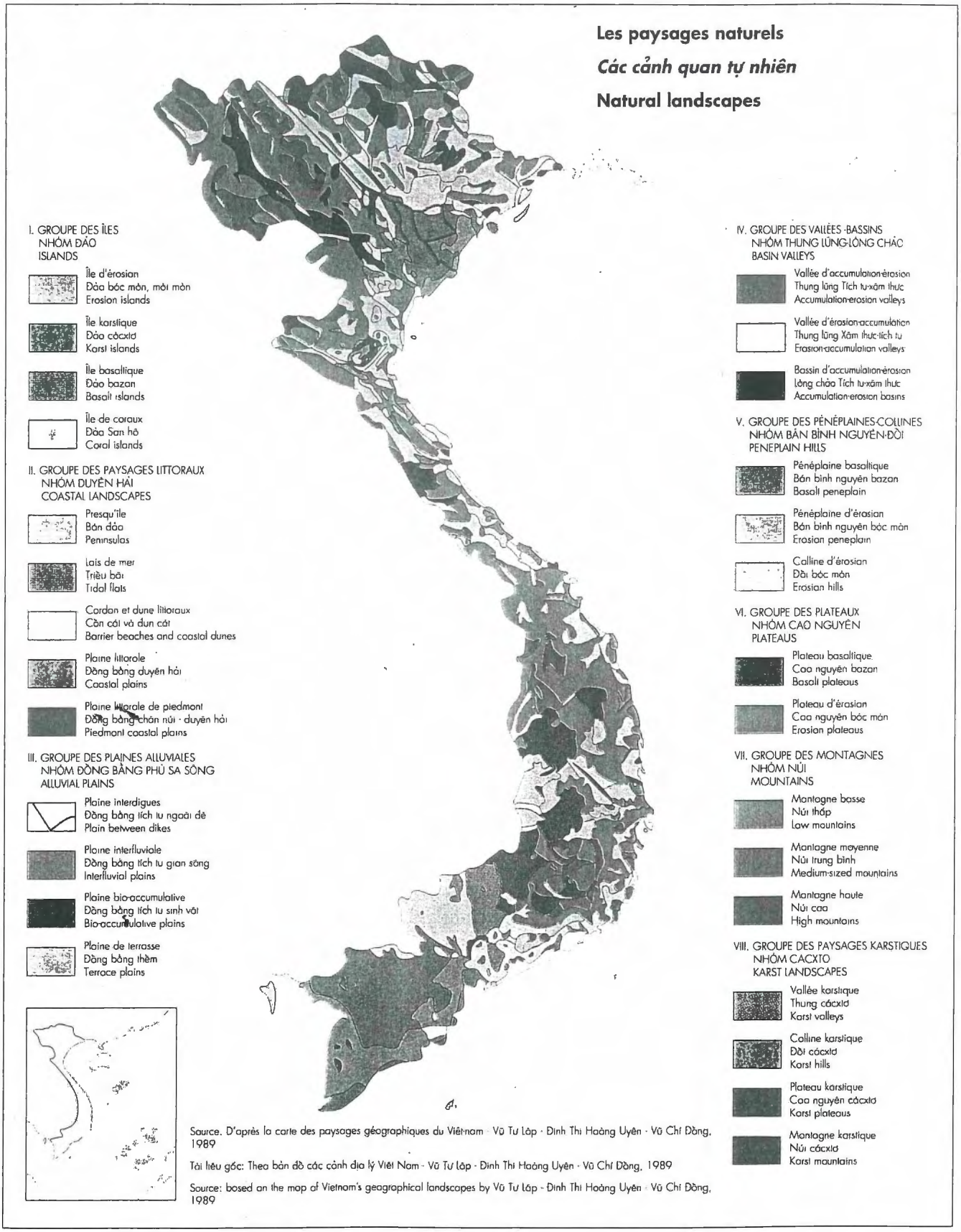


Figure 11 in color



Source. D'après la carte des paysages géographiques du Viêt-nam - Vũ Tự Lập - Đinh Thị Hoàng Uyên - Vũ Chí Đồng, 1989

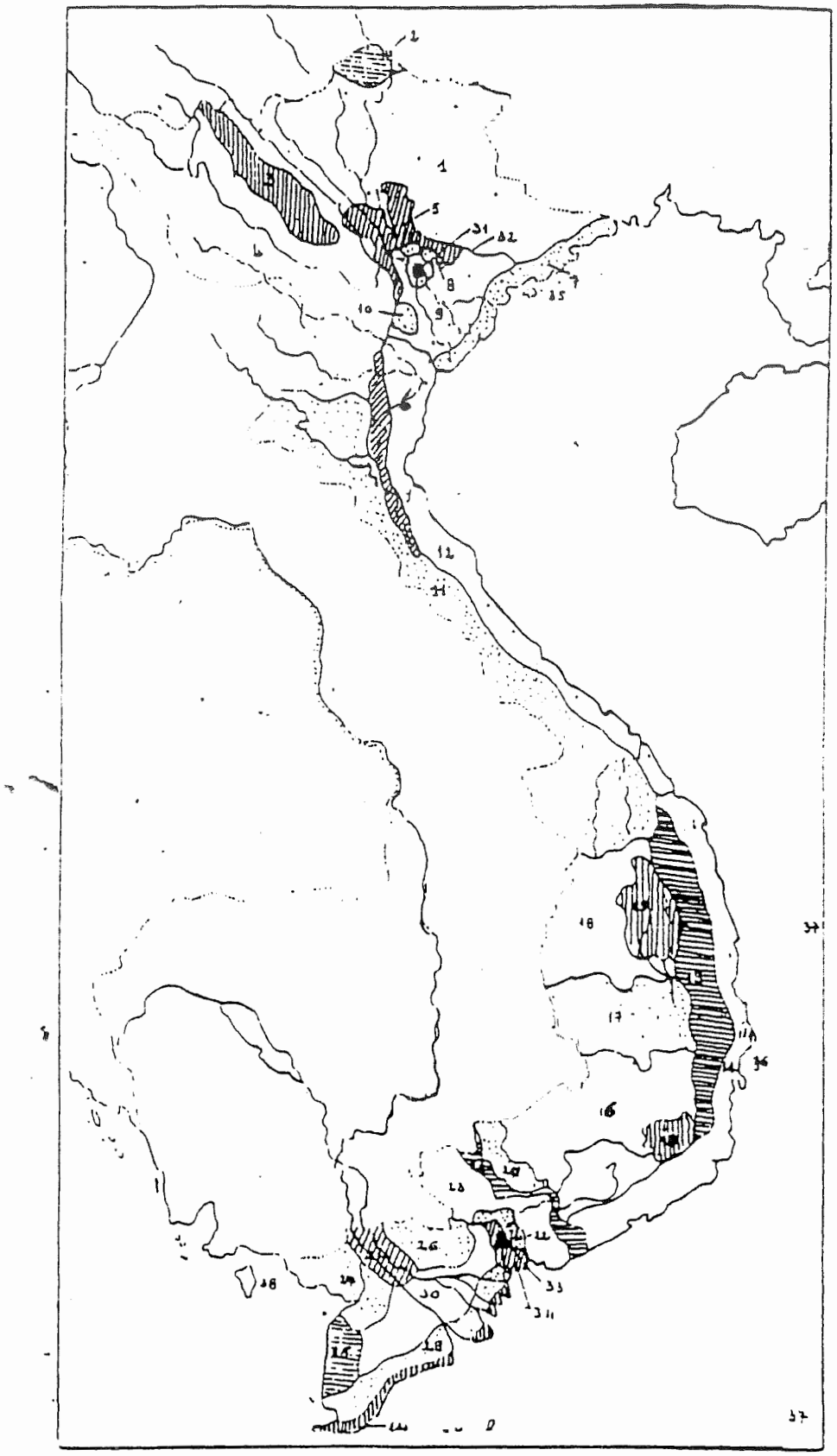
Tài liệu gốc: Theo bản đồ các cảnh địa lý Việt Nam - Vũ Tự Lập - Đinh Thị Hoàng Uyên - Vũ Chí Đồng, 1989

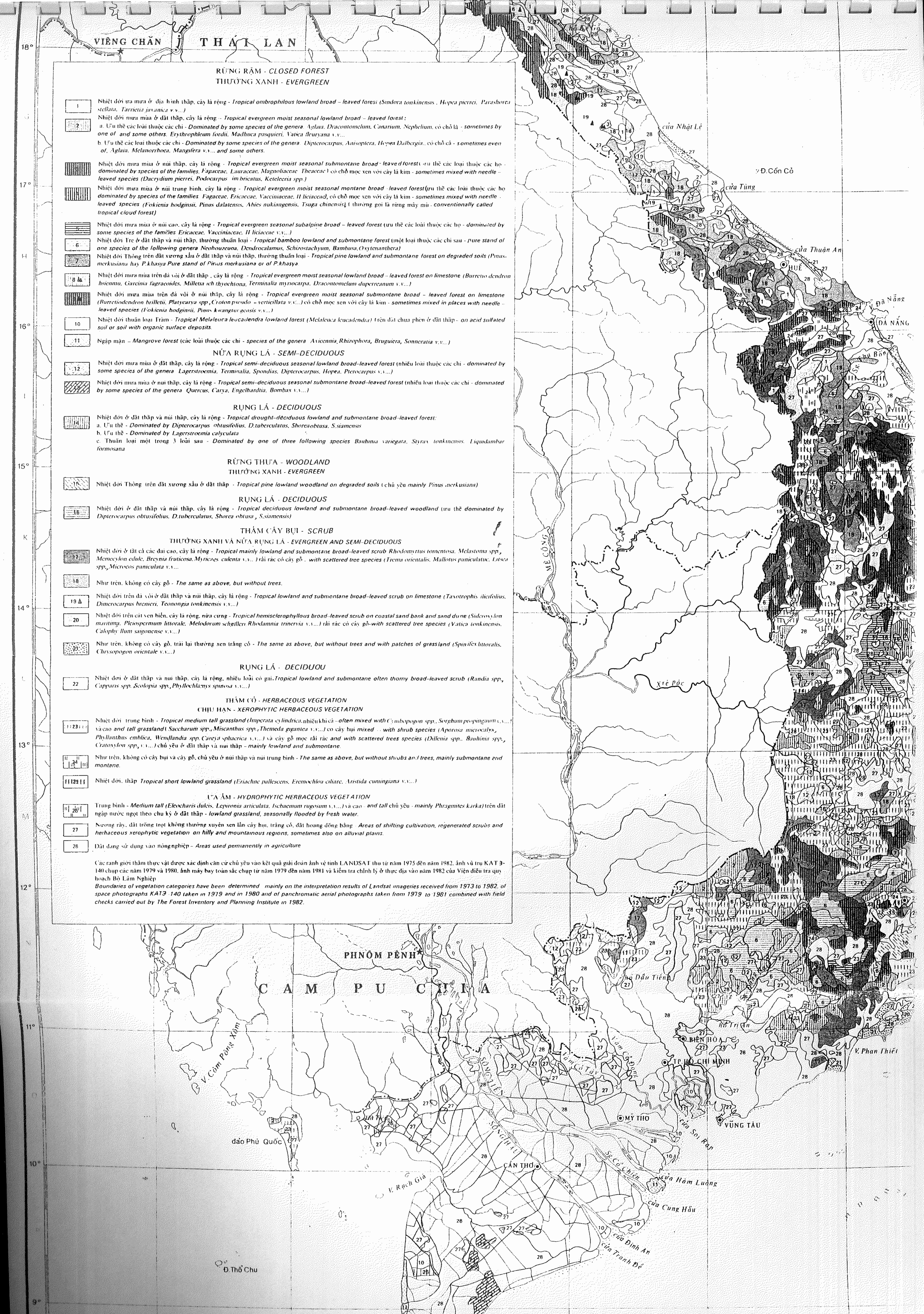
Source: bosed on the map of Vietnam's geographical landscapes by Vũ Tự Lập - Đinh Thị Hoàng Uyên - Vũ Chí Đồng, 1989

Figure 12

DIVISION DU VIETNAM EN RÉGIONS ET ZONES ÉCOLOGIQUES

(LES CHIFFRES SE RAPPORTENT AU TEXTE).





RỪNG RẬM - *CLOSED FOREST*

THƯỜNG XANH - *EVERGREEN*

1 — Nhiệt đới ưa mưa ở địa hình thấp, cây lá rộng - *Tropical ombrophilous lowland broad – leaved forest* (Sindora tonkinensis, Hopea pierrei, Parashorea stellata, Tarrietia javanica v.v...)

2 — Nhiệt đới mưa mùa ở đất thấp, cây lá rộng - *Tropical evergreen moist seasonal lowland broad – leaved forest:*
a. Ưu thế các loài thuộc các chi - *Dominated by some species of the genera* Aglaia, Dracontomelum, Canarium, Nephelium, có chỗ là - *sometimes by one of and some others.* Erythrophleum fordii, Madhuca pasquieri, Vatica fleuryana v.v...
b. Ưu thế các loài thuộc các chi - *Dominated by some species of the genera* Dipterocarpus, Anisoptera, Hopea Dalbergia., có chỗ cả - *sometimes even of*, Aglaia, Melanorrhoea, Mangifera v.v... *and some others.*

3 — Nhiệt đới mưa mùa ở núi thấp, cây lá rộng - *Tropical evergreen moist seasonal submontane broad - leaved forest* (ưu thế các loài thuộc các họ - *dominated by species of the families* Fagaceae, Lauraceae, Magnoliaceae Theaceae) có chỗ mọc xen với cây lá kim - *sometimes mixed with needle - leaved species* (Dacrydium pierrei, Podocarpus imbricatus, Keteleeria spp.)

4 — Nhiệt đới mưa mùa ở núi trung bình, cây lá rộng - *Tropical evergreen moist seasonal montane broad -leaved forest* (ưu thế các loài thuộc các họ *dominated by species of the families* Fagaceae, Ericaceae, Vacciniaceae, Illiciaceae), có chỗ mọc xen với cây lá kim - *sometimes mixed with needle - leaved species* (Fokienia hodginsii, Pinus dalatensis, Abies nukiangensis, Tsuga chinensis) (thường gọi là rừng mây mù - *conventionally called tropical cloud forest*)

5 — Nhiệt đới mưa mùa ở núi cao, cây lá rộng - *Tropical evergreen seasonal subalpine broad – leaved forest* (ưu thế các loài thuộc các họ - *dominated by some species of the families* Ericaceae, Vacciniaceae, Illiciaceae v.v...)

6 — Nhiệt đới Tre ở đất thấp và núi thấp, thường thuần loại - *Tropical bamboo lowland and submontane forest* (một loại thuộc các chi sau - *pure stand of one species of the following genera* Neohouzeuoa, Dendrocalamus, Schizostachyum, Bambusa, Oxytenanthera)

7 — Nhiệt đới Thông trên đất xương xẩu ở đất thấp và núi thấp, thường thuần loại - *Tropical pine lowland and submontane forest on degraded soils* (Pinus merkusiana hay P.khasya *Pure stand of* Pinus merkusiana *or of* P.khasya

8 — Nhiệt đới mưa mùa trên đá vôi ở đất thấp, cây lá rộng - *Tropical evergreen moist seasonal lowland broad – leaved forest on limestone* (Burretiodendron hsienmu, Garcinia fagraeoides, Milletia ichthyochtona, Terminalia myriocarpa, Dracontomelum duperreanum v.v...)

9 — Nhiệt đới mưa mùa trên đá vôi ở núi thấp, cây lá rộng - *Tropical evergreen moist seasonal submontane broad – leaved forest on limestone* (Burretiodendron brilletii, Platycarya spp, Croton pseudo – verticillata v.v...) có chỗ mọc xen với cây lá kim - *sometimes mixed in places with needle - leaved species* (Fokienia hodginsii, Pinus kwangtungensis v.v...)

10 — Nhiệt đới thuần loại Tràm - *Tropical Melaleuca leucadendra lowland forest* (Melaleuca leucadendra) trên đất chua phèn ở đất thấp - *on acid sulfated soil or soil with organic surface deposits.*

11 — Ngập mặn – *Mangrove forest* (các loài thuộc các chi - *species of the genera* Avicennia, Rhizophora, Bruguiera, Sonneratia v.v...)

NỬA RỤNG LÁ - *SEMI-DECIDUOUS*

12 — Nhiệt đới mưa mùa ở đất thấp, cây lá rộng - *Tropical semi-deciduous seasonal lowland broad-leaved forest* (nhiều loài thuộc các chi - *dominated by some species of the genera* Lagerstroemia, Terminalia, Spondias, Dipterocarpus, Hopea, Pterocarpus v.v...)

13 — Nhiệt đới mưa mùa ở núi thấp, cây lá rộng - *Tropical semi-deciduous seasonal submontane broad-leaved forest* (nhiều loài thuộc các chi - *dominated by some species of the genera* Quercus, Carya, Engelhardtia, Bombax v.v...)

RỤNG LÁ - *DECIDUOUS*

14 — Nhiệt đới ở đất thấp và núi thấp, cây lá rộng - *Tropical drought-deciduous lowland and submontane broad-leaved forest:*
a. Ưu thế - *Dominated by* Dipterocarpus obtusifolius, D.tuberculatus, Shorea obtusa, S.siamensis
b. Ưu thế - *Dominated by* Lagerstroemia calyculata
c. Thuần loại một trong 3 loài sau - *Dominated by one of three following species* Bauhinia variegata, Styrax tonkinensis, Liquidambar formosana

RỪNG THƯA - *WOODLAND*

THƯỜNG XANH - *EVERGREEN*

15 — Nhiệt đới Thông trên đất xương xẩu ở đất thấp - *Tropical pine lowland woodland on degraded soils* (chủ yếu *mainly* Pinus merkusiana)

RỤNG LÁ - *DECIDUOUS*

16 — Nhiệt đới ở đất thấp và núi thấp, cây lá rộng - *Tropical deciduous lowland and submontane broad-leaved woodland* (ưu thế *dominated by* Dipterocarpus obtusifolius, D.tuberculatus, Shorea obtusa, S.siamensis)

THẢM CÂY BỤI - *SCRUB*

THƯỜNG XANH VÀ NỬA RỤNG LÁ - *EVERGREEN AND SEMI-DECIDUOUS*

17 — Nhiệt đới ở tất cả các đai cao, cây lá rộng - *Tropical mainly lowland and submontane broad-leaved scrub* Rhodomyrtus tomentosa, Melastoma spp., Memecylon edule, Breynia fruticosa, Myrica esculenta v.v...) rải rác có cây gỗ - *with scattered tree species* (Trema orientalis, Mallotus paniculatus, Litsea spp., Microcos paniculata v.v...

18 — Như trên, không có cây gỗ - *The same as above, but without trees.*

19 — Nhiệt đới trên đá vôi ở đất thấp và núi thấp, cây lá rộng - *Tropical lowland and submontane broad-leaved scrub on limestone* (Taxotrophis ilicifolius, Dimerocarpus brenieri, Teonongia tonkinensis v.v...)

20 — Nhiệt đới trên cát ven biển, cây lá rộng, nửa cứng - *Tropical hemisclerophyllous broad-leaved scrub on coastal sand bank and sand dune* (Sideroxylon maritima, Pleiospermum littorale, Melodorum schefferi Rhodamnia trinervia v.v...) rải rác có cây gỗ-*with scattered tree species* (Vatica tonkinensis, Calophyllum saigonense v.v...)

21 — Như trên, không có cây gỗ, trái lại thường xen trảng cỏ - *The same as above, but without trees and with patches of grassland* (Spinifex littoralis, Chrysopogon orientale v.v...)

RỤNG LÁ - *DECIDUOU*

22 — Nhiệt đới ở đất thấp và núi thấp, cây lá rộng, nhiều loài có gai. *Tropical lowland and submontane often thorny broad-leaved scrub* (Randia spp., Capparis spp. Scolopia spp., Phyllochlamys spinosa v.v...)

THẢM CỎ - *HERBACEOUS VEGETATION*

CHỊU HẠN - *XEROPHYTIC HERBACEOUS VEGETATION*

23 — Nhiệt đới trung bình - *Tropical medium tall grassland* (Imperata cylindrica, nhiều khi cả - *often mixed with* Cymbopogon spp., Sorghum propinquum v.v...) và cao *and tall grassland* (Saccharum spp., Miscanthus spp., Themeda gigantea v.v...) có cây bụi *mixed with shrub species* (Aporosa microcalyx, Phyllanthus emblica, Wendlandia spp. Careya sphaerica v.v...) và cây gỗ mọc rải rác *and with scattered trees species* (Dillenia spp., Bauhinia spp., Cratoxylon spp., v.v...) chủ yếu ở đất thấp và núi thấp - *mainly lowland and submontane.*

24 — Như trên, không có cây bụi và cây gỗ, chủ yếu ở núi thấp và núi trung bình - *The same as above, but without shrubs and trees, mainly submontane and montane.*

25 — Nhiệt đới, thấp *Tropical short lowland grassland* (Eriachne pallescens, Eremochloa ciliare, Aristida cumingiana v.v...)

ƯA ẨM - *HYDROPHYTIC HERBACEOUS VEGETATION*

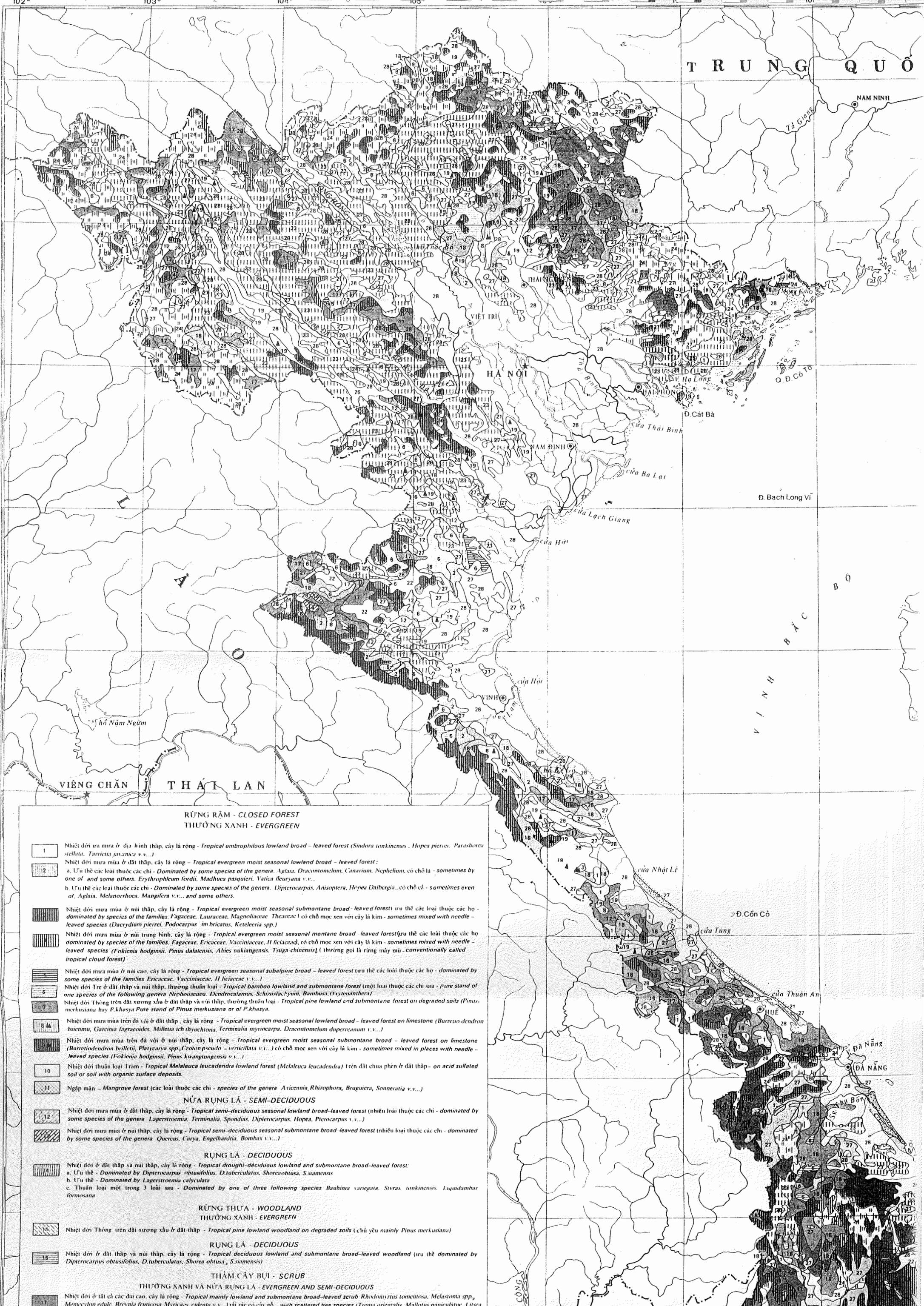
26 — Trung bình - *Medium tall* (Eleocharis dulcis, Lepironia articulata, Ischaemum rugosum v.v...) và cao - *and tall* chủ yếu - *mainly* Phragmites karka) trên đất ngập nước ngọt theo chu kỳ ở đất thấp - *lowland grassland, seasonally flooded by fresh water.*

27 — Nương rẫy, đất trồng trọt không thường xuyên xen lẫn cây bụi, trảng cỏ, đất hoang đồng bằng - *Areas of shifting cultivation, regenerated scrubs and herbaceous xerophytic vegetation on hilly and mountainous regions, sometimes also on alluvial plains.*

28 — Đất đang sử dụng vào nông nghiệp - *Areas used permanently in agriculture*

Các ranh giới thảm thực vật được xác định căn cứ chủ yếu vào kết quả giải đoán ảnh vệ tinh LANDSAT thu từ năm 1975 đến năm 1982, ảnh vũ trụ KATЭ-140 chụp các năm 1979 và 1980, ảnh máy bay toàn sắc chụp từ năm 1979 đến năm 1981 và kiểm tra chỉnh lý ở thực địa vào năm 1982 của Viện điều tra quy hoạch Bộ Lâm Nghiệp

Boundaries of vegetation categories have been determined mainly on the interpretation results of Landsat imageries received from 1973 to 1982, of space photographs KATЭ 140 taken in 1979 and in 1980 and of panchromatic aerial photographs taken from 1979 to 1981 combined with field checks carried out by The Forest Inventory and Planning Institute in 1982.


TRUNG QUỐ
NAM NINH
Tả Giang
HÀ NỘI
VIỆT TRÌ
HẢI PHÒNG
V. Hạ Long
Q.Đ.Cô Tô
Đ.Cát Bà
NAM ĐỊNH
Đ. Bạch Long Vĩ
cửa Thái Bình
cửa Ba Lạt
cửa Lạch Giang
cửa Hới
VINH
cửa Hội
hồ Nậm Ngừm
VIÊNG CHĂN
THÁI LAN
cửa Nhật Lệ
Đ.Cồn Cỏ
cửa Tùng
cửa Thuận An
HUẾ
ĐÀ NẴNG
VỊNH BẮC BỘ
LÀO
RỪNG RẬM - CLOSED FOREST
THƯỜNG XANH - EVERGREEN
1 Nhiệt đới ưa mưa ở địa hình thấp, cây lá rộng - Tropical ombrophilous lowland broad – leaved forest (Sindora tonkinensis , Hopea pierrei, Parashorea stellata, Tarrietia javanica v.v...)
2 Nhiệt đới mưa mùa ở đất thấp, cây lá rộng – Tropical evergreen moist seasonal lowland broad – leaved forest :
a. Ưu thế các loài thuộc các chi - Dominated by some species of the genera. Aglaia, Dracontomelum, Canarium, Nephelium, có chỗ là - sometimes by one of and some others. Erythrophleum fordii, Madhuca pasquieri, Vatica fleuryana v.v...
b. Ưu thế các loài thuộc các chi - Dominated by some species of the genera. Dipterocarpus, Anisoptera, Hopea Dalbergia , có chỗ cả - sometimes even of. Aglaia, Melanorrhoea, Mangifera v.v... and some others.
Nhiệt đới mưa mùa ở núi thấp, cây lá rộng - Tropical evergreen moist seasonal submontane broad - leaved forest(ưu thế các loài thuộc các họ - dominated by species of the families, Fagaceae, Lauraceae, Magnoliaceae Theaceae) có chỗ mọc xen với cây lá kim - sometimes mixed with needle – leaved species (Dacrydium pierrei, Podocarpus imbricatus, Keteleeria spp.)
Nhiệt đới mưa mùa ở núi trung bình, cây lá rộng - Tropical evergreen moist seasonal montane broad - leaved forest(ưu thế các loài thuộc các họ dominated by species of the families, Fagaceae, Ericaceae, Vacciniaceae, Theaceae), có chỗ mọc xen với cây lá kim - sometimes mixed with needle – leaved species (Fokienia hodginsii, Pinus dalatensis, Abies nukiangensis, Tsuga chinensis), (thường gọi là rừng mây mù - conventionally called tropical cloud forest)
5 Nhiệt đới mưa mùa ở núi cao, cây lá rộng - Tropical evergreen seasonal subalpine broad – leaved forest (ưu thế các loài thuộc các họ - dominated by some species of the families Ericaceae, Vacciniaceae, Theaceae v.v...)
6 Nhiệt đới Tre ở đất thấp và núi thấp, thường thuần loại - Tropical bamboo lowland and submontane forest (một loài thuộc các chi sau - pure stand of one species of the following genera Neohouzeoua, Dendrocalamus, Schizostachyum, Bambusa, Oxytenanthera)
7 Nhiệt đới Thông trên đất xương xẩu ở đất thấp và núi thấp, thường thuần loại - Tropical pine lowland and submontane forest on degraded soils (Pinus-merkusiana hay P.khasya Pure stand of Pinus merkusiana or of P.khasya.
8 Nhiệt đới mưa mùa trên đá vôi ở đất thấp , cây lá rộng - Tropical evergreen moist seasonal lowland broad – leaved forest on limestone (Burretio dendron hsienmu, Garcinia fagraeoides, Milletia ichthyochtona, Terminalia myriocarpa, Dracontomelum duperreanum v.v...)
Nhiệt đới mưa mùa trên đá vôi ở núi thấp, cây lá rộng - Tropical evergreen moist seasonal submontane broad – leaved forest on limestone (Burretiodendron brilletii, Platycarya spp.,Croton pseudo – verticillata v.v...) có chỗ mọc xen với cây lá kim - sometimes mixed in places with needle – leaved species (Fokienia hodginsii, Pinus kwangtungensis v.v...)
10 Nhiệt đới thuần loại Tràm - Tropical Melaleuca leucadendra lowland forest (Melaleuca leucadendra) trên đất chua phèn ở đất thấp – on acid sulfated soil or soil with organic surface deposits.
11 Ngập mặn – Mangrove forest (các loài thuộc các chi - species of the genera Avicennia, Rhizophora, Bruguiera, Sonneratia v.v...)
NỬA RỤNG LÁ - SEMI-DECIDUOUS
12 Nhiệt đới mưa mùa ở đất thấp, cây lá rộng - Tropical semi-deciduous seasonal lowland broad-leaved forest (nhiều loài thuộc các chi - dominated by some species of the genera Lagerstroemia, Terminalia, Spondias, Dipterocarpus, Hopea, Pterocarpus v.v...)
Nhiệt đới mưa mùa ở núi thấp, cây lá rộng - Tropical semi-deciduous seasonal submontane broad-leaved forest (nhiều loài thuộc các chi - dominated by some species of the genera Quercus, Carya, Engelhardtia, Bombax v.v...)
RỤNG LÁ - DECIDUOUS
14 Nhiệt đới ở đất thấp và núi thấp, cây lá rộng - Tropical drought-deciduous lowland and submontane broad-leaved forest:
a. Ưu thế - Dominated by Dipterocarpus obtusifolius, D.tuberculatus, Shorea obtusa, S.siamensis
b. Ưu thế - Dominated by Lagerstroemia calyculata
c. Thuần loại một trong 3 loài sau - Dominated by one of three following species Bauhinia variegata, Styrax tonkinensis, Liquidambar formosana
RỪNG THƯA - WOODLAND
THƯỜNG XANH - EVERGREEN
15 Nhiệt đới Thông trên đất xương xẩu ở đất thấp - Tropical pine lowland woodland on degraded soils (chủ yếu mainly Pinus merkusiana)
RỤNG LÁ - DECIDUOUS
16 Nhiệt đới ở đất thấp và núi thấp, cây lá rộng - Tropical deciduous lowland and submontane broad-leaved woodland (ưu thế dominated by Dipterocarpus obtusifolius, D.tuberculatus, Shorea obtusa , S.siamensis)
THẢM CÂY BỤI - SCRUB
THƯỜNG XANH VÀ NỬA RỤNG LÁ - EVERGREEN AND SEMI-DECIDUOUS
17 Nhiệt đới ở tất cả các đai cao, cây lá rộng - Tropical mainly lowland and submontane broad-leaved scrub Rhodomyrtus tomentosa, Melastoma spp., Memecylon edule, Breynia fruticosa, Myricaes culenta v.v...) rải rác có cây gỗ - with scattered tree species (Trema orientalis, Mallotus paniculatus, Litsea sp., Micropon paniculata v.v...)

m… Mangrove … các loài t… chi - sp… of the gen… …icennia, R… …ora, Brugu… …onneratia

RỤN… SEMI… …UOU…

…dới mưa mùa ở đất thấp, cây lá rộng - *Tropical semi–deciduous seasonal lowland broad–leaved forest* (nhiều loài thuộc các chi - *dominated by* *species of the genera Lagerstroemia, Terminalia, Spondias, Dipterocarpus, Hopea, Pterocarpus* v.v...)

…dới mưa mùa ở núi thấp, cây lá rộng - *Tropical semi–deciduous seasonal submontane broad–leaved forest* (nhiều loài thuộc các chi - *dominated* …me *species of the genera Quercus, Carya, Engelhardtia, Bombax* v.v...)

RỤNG LÁ - *DECIDUOUS*

…dới ở đất thấp và núi thấp, cây lá rộng - *Tropical drought–deciduous lowland and submontane broad–leaved forest:*

…thế - *Dominated by Dipterocarpus obtusifolius, D.tuberculatus, Shoreaobtusa, S.siamensis*

…thế - *Dominated by Lagerstroemia calyculata*

…uần loại một trong 3 loài sau - *Dominated by one of three following species Bauhinia variegata, Styrax tonkinensis, Liquidambar* …sana

RỪNG THƯA - *WOODLAND*

THƯỜNG XANH - *EVERGREEN*

…dới Thông trên đất xương xẩu ở đất thấp - *Tropical pine lowland woodland on degraded soils* (chủ yếu *mainly Pinus merkusiana*)

RỤNG LÁ - *DECIDUOUS*

…dới ở đất thấp và núi thấp, cây lá rộng - *Tropical deciduous lowland and submontane broad–leaved woodland* (ưu thế *dominated by* …rocarpus obtusifolius, D.tuberculatus, Shorea obtusa, S.siamensis)

THẢM CÂY BỤI - *SCRUB*

THƯỜNG XANH VÀ NỬA RỤNG LÁ - *EVERGREEN AND SEMI–DECIDUOUS*

…dới ở tất cả các đai cao, cây lá rộng - *Tropical mainly lowland and submontane broad–leaved scrub Rhodomyrtus tomentosa, Melastoma spp.,* …cylon edule, Breynia fruticosa, Myricaes culenta v.v...) rải rác có cây gỗ - *with scattered tree species* (*Trema orientalis, Mallotus paniculatus, Litsea* …*Microcos paniculata* v.v...

…rên, không có cây gỗ - *The same as above, but without trees.*

…dới trên đá vôi ở đất thấp và núi thấp, cây lá rộng - *Tropical lowland and submontane broad–leaved scrub on limestone* (*Taxotrophis ilicifolius,* …*ocarpus brenieri, Teonongia tonkinensis* v.v...)

…dới trên cát ven biển, cây lá rộng, nửa cứng - *Tropical hemisclerophyllous broad–leaved scrub on coastal sand bank and sand dune* (*Sideroxylon* …ma, *Pleiospermum littorale, Melodorum schefferi, Rhodamnia trinervia* v.v...) rải rác có cây gỗ-*with scattered tree species* (*Vatica tonkinensis,* …*hyllum saigonense* v.v...)

…ren, không có cây gỗ, trái lại thường xen trảng cỏ - *The same as above, but without trees and with patches of grassland* (*Spinifex littoralis,* …*opogon orientale* v.v...)

RỤNG LÁ - *DECIDUOU*

…dới ở đất thấp và núi thấp, cây lá rộng, nhiều loài có gai. *Tropical lowland and submontane often thorny broad–leaved scrub* (*Randia spp.,* …*ris spp. Scolopia spp., Phyllochlamys spinosa* v.v...)

THẢM CỎ - *HERBACEOUS VEGETATION*

CHỊU HẠN - *XEROPHYTIC HERBACEOUS VEGETATION*

…dới, trung bình - *Tropical medium tall grassland* (*Imperata cylindrica*, nhiều khi cả - *often mixed with Cymbopogon spp., Sorghum propinquum* v.v...) … *and tall grassland* (*Saccharum spp., Miscanthus spp., Themeda gigantea* v.v...) có cây bụi *mixed* - *with shrub species* (*Aporosa microcalyx,* …*nthus emblica, Wendlandia spp. Careya sphaerica* v.v...) và cây gỗ mọc rải rác *and with scattered trees species* (*Dillenia spp., Bauhinia spp.,* …*xylon spp.,* v.v...) chủ yếu ở đất thấp và núi thấp - *mainly lowland and submontane.*

…rên, không có cây bụi và cây gỗ, chủ yếu ở núi thấp và núi trung bình - *The same as above, but without shrubs and trees, mainly submontane and* …*ne.*

…dới, thấp *Tropical short lowland grassland* (*Eriachne pallescens, Eremochloa ciliare, Aristida cumingiana* v.v...)

…ƯA ẨM - *HYDROPHYTIC HERBACEOUS VEGETATION*

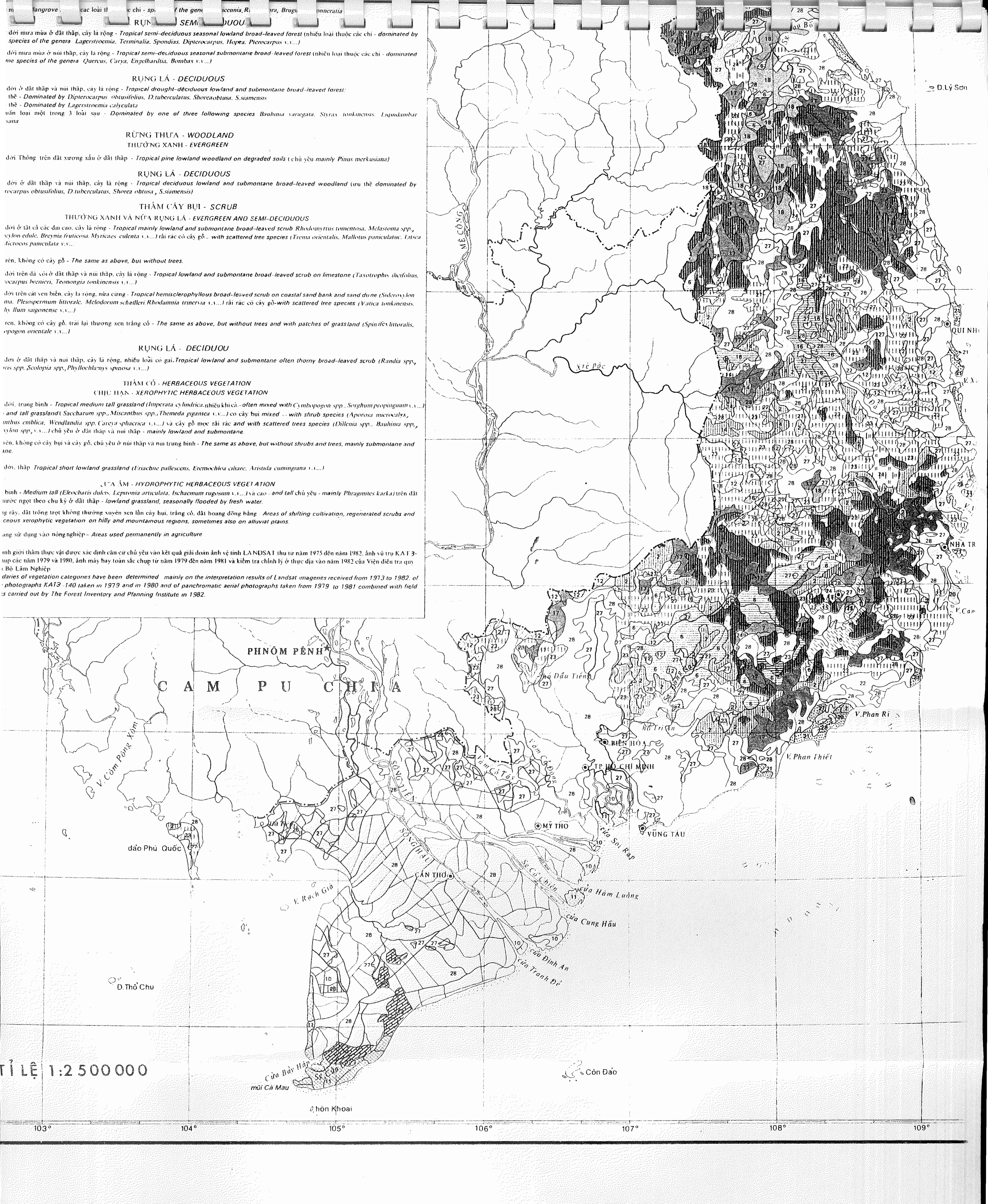
…bình - *Medium tall* (*Eleocharis dulcis, Lepironia articulata, Ischaemum rugosum* v.v...) và cao - *and tall* chủ yếu - *mainly Phragmites karka*) trên đất …nước ngọt theo chu kỳ ở đất thấp - *lowland grassland, seasonally flooded by fresh water.*

…ng rẫy, đất trồng trọt không thường xuyên xen lẫn cây bụi, trảng cỏ, đất hoang đồng bằng - *Areas of shifting cultivation, regenerated scrubs and* …*ceous xerophytic vegetation on hilly and mountainous regions, sometimes also on alluvial plains.*

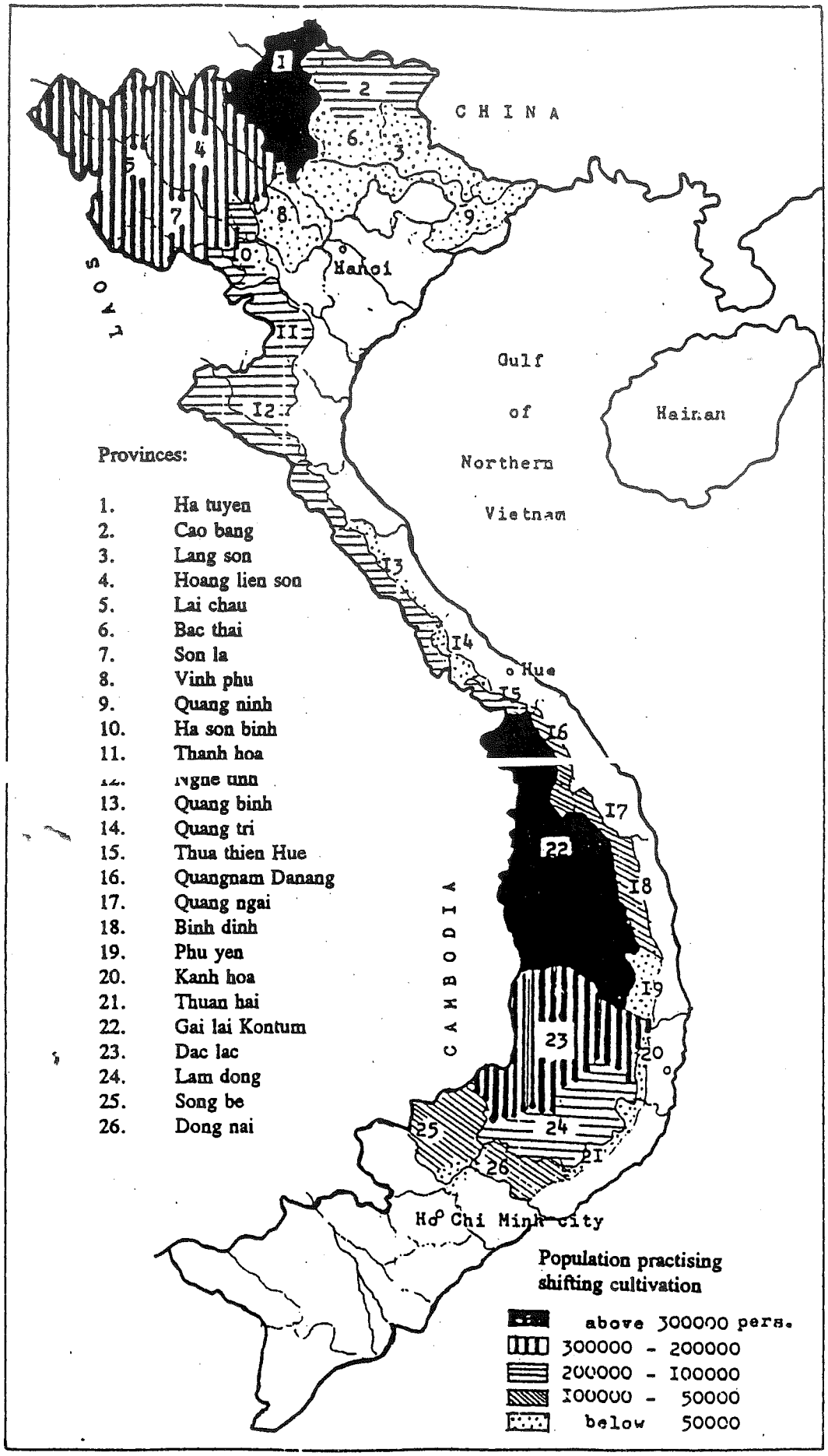
…ang sử dụng vào nông nghiệp - *Areas used permanently in agriculture*

…ranh giới thảm thực vật được xác định căn cứ chủ yếu vào kết quả giải đoán ảnh vệ tinh LANDSAT thu từ năm 1975 đến năm 1982, ảnh vũ trụ KATЭ-… …hụp các năm 1979 và 1980, ảnh máy bay toàn sắc chụp từ năm 1979 đến năm 1981 và kiểm tra chỉnh lý ở thực địa vào năm 1982 của Viện điều tra quy… … Bộ Lâm Nghiệp

…daries of vegetation categories have been determined mainly on the interpretation results of Landsat imageries received from 1973 to 1982, of *…photographs KATЭ-140 taken in 1979 and in 1980 and of panchromatic aerial photographs taken from 1979 to 1981 combined with field* *…s carried out by The Forest Inventory and Planning Institute in 1982.*



TỈ LỆ 1:2 500 000



Shifting cultivation in Vietnam (mainland)
(compiled by Nguyen Tu Siem, 1991)

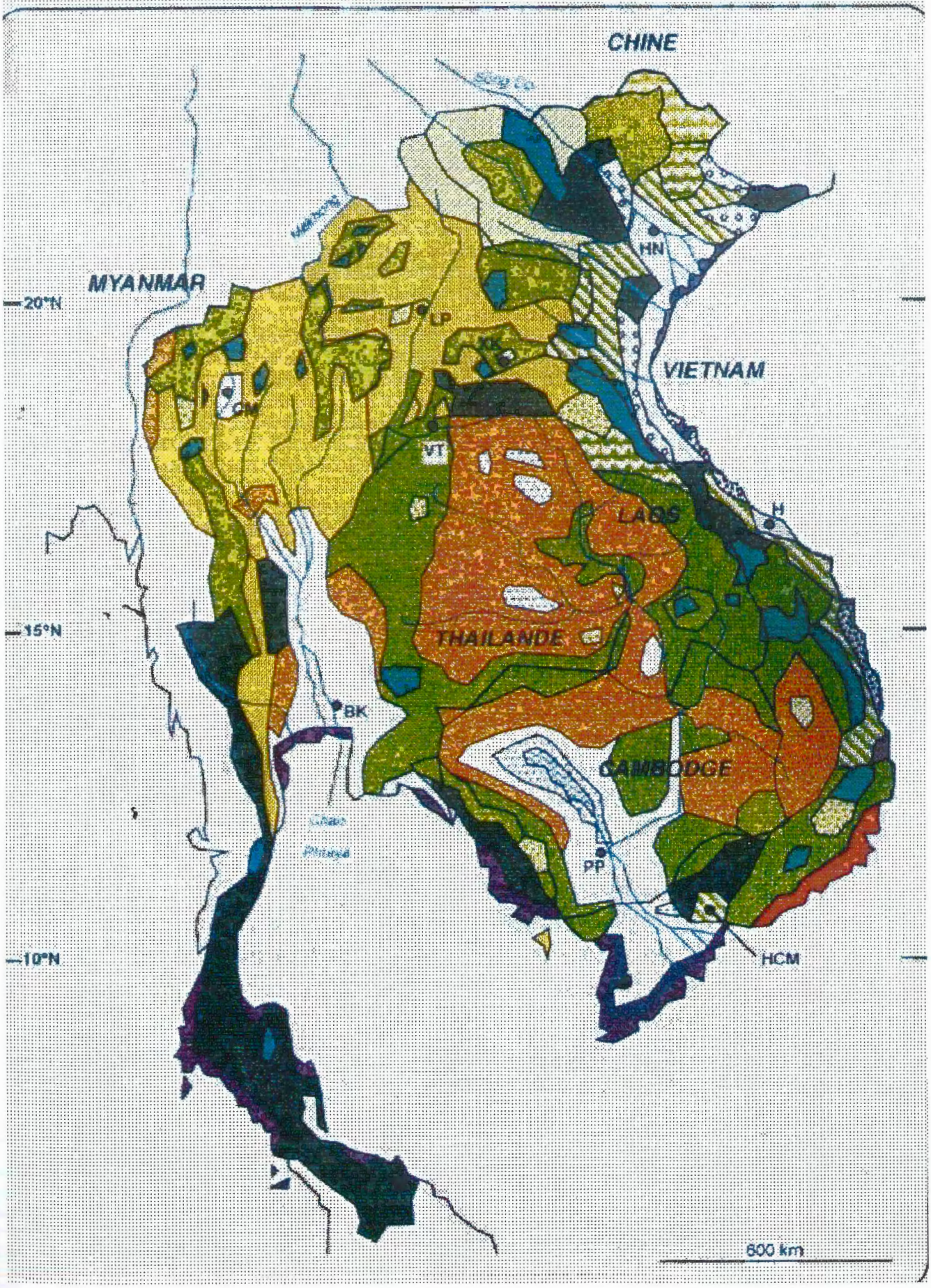
LÉGENDE DE LA CARTE DES PRINCIPAUX TYPES DE VÉGÉTATION

1 Mangrove
2 Arrière-mangrove
3 Formations tourbeuses côtières
4 Formations d'eau douce
5 Rizières et autres cultures
6 Forêts denses sempervirentes de basse altitude
7 Forêts denses semi-sempervirentes de basse altitude
8 Forêts sur calcaires au-dessous de 1 000 m
9 Formations secondaires et savanes de basse altitude
10 Forêts mixtes décidues
11 Forêts claires décidues à Diptérocarpacées
12 Formations sèches du Sud Vietnam
13 Plantations de Casuarina ou Acacia sur sables littoraux
14 Plantations d'Eucalyptus ou de Pinus
15 Forêts denses sempervirentes de montagne
16 Forêts clairsemées de montagne
17 Forêts sur calcaires de montagne
18 Formations secondaires et savanes de montagne
19 Forêts de Pinus de montagne

Villes : HN = Hanôi, H = Huê, HCM = Hôchiminh Ville ;
PP = Phnom Penh ; LP = Luang Phrabang,
VT = Ventiane, XK = Xieng Khouang ;
BK = Bangkok, CM = Chiang Mai

Figure 15

CARTE SCHÉMATIQUE DES PRINCIPAUX TYPES DE VÉGÉTATION DE LA PÉNINSULE INDOCHINOISE



Ha Giang
Nui Pia Hoac
Ba Be
Fan Si Pan Mt (3143m)
Muong Cha
Nui Hoang Lien
Khu dao Thac Ba
Nam Dun
Ho Nui Coc
Nui Tam Dao
Chay
Hong
Da
(or
Duong
HANOI
Red
Mong Cai
Nui Yen Tu
Haiphong
Cat Ba
Sop Cop
Xuan Nha
Cuc Phuong
Ma
Thanh Hoa
Bu Huong
Ben En
(2440m)
Thanh Thuy
Vinh
Vu Quang
Giang
Dong Phong Nha
Quang Tri
Hue
Bach Ma Hai Van
Bana Nui Chua
Ngoc Linh
Ngoc Linh Mt (2598m)
Mom Ray
Kong Cha Rang
Kon Kai Kinh
Kontum
Ha Giao
Plateau
Qui Nhon
Da Rang
Suoi Trai
Dea Ca Hon Ron
Yok Don
Chu Yang Sinh
Ho Lac
Nam Lung
Bu Gia Map
Nha Trang
Lo Ge Sa Mat
Nui Ba
Thuong Da Nhim
Tay Bai Cat Tien
Phan Rang
Duong Minh Chau
Nam Bai Cat Tien
Nui Dai Binh
Tay Ninh
Dong Nai
Saigon
Ho Chi Minh City (Saigon)
Mekong
Binh Chan Phuoc Buu
Dao Phu Quoc
Vinh Long
Mouths of the Mekong

CHINA
GULF OF TONGKING
HAINAN (CHINA)
SOUTH CHINA SEA
CAMBODIA
THAILAND
LAOS

22°N
20°N
18°N
16°N
14°N
12°N
10°N
102°E

N

Map 28.1 Vietnam

Rain Forests
- lowland
- montane*
- mangrove

Monsoon Forests
- lowland
- montane*

Conservation areas †
- existing
- proposed

Non Forest

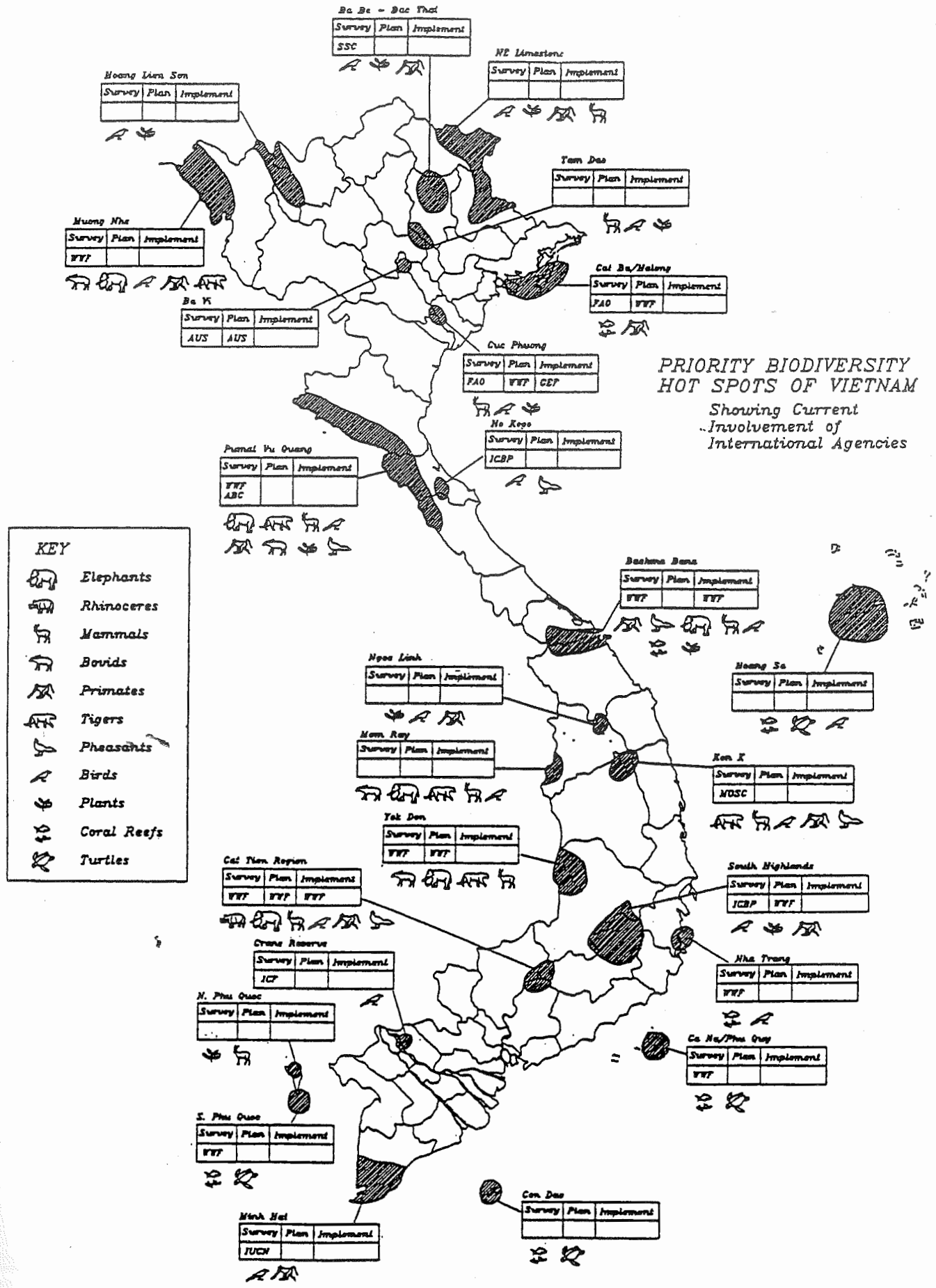
*Higher than 914m (3000')

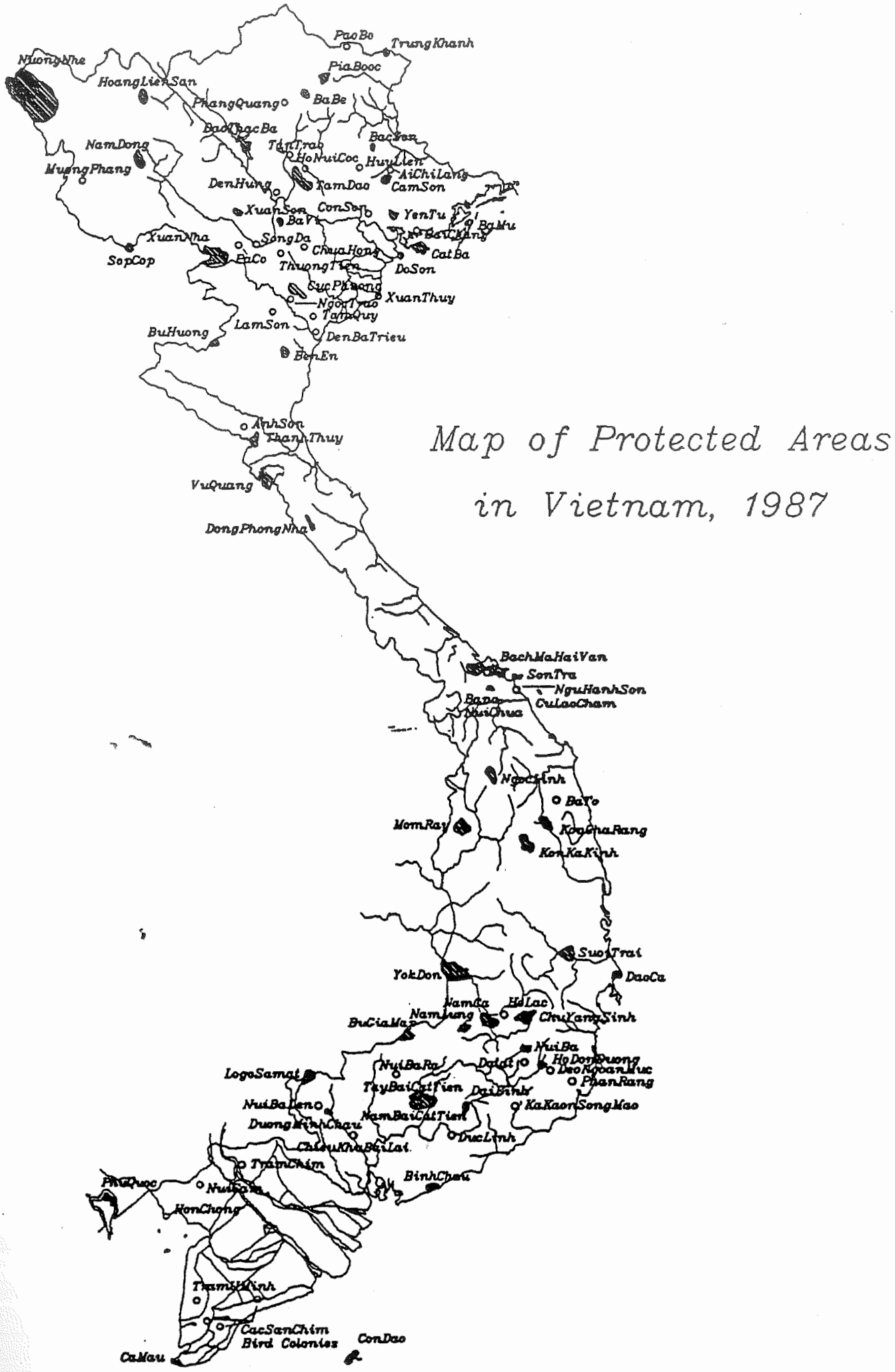
† Only areas of or over 50sq.km are mapped

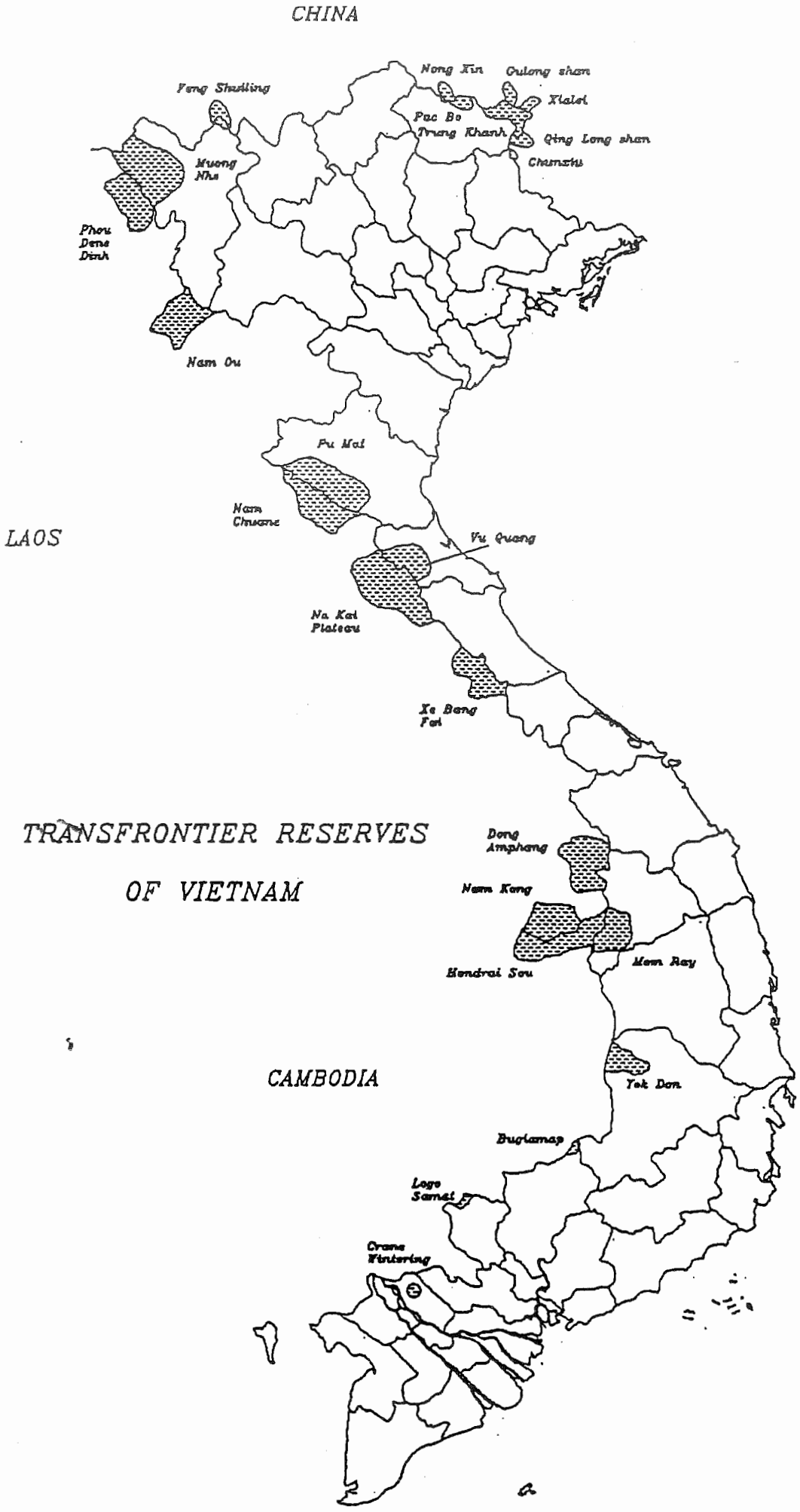
1:4,000,000

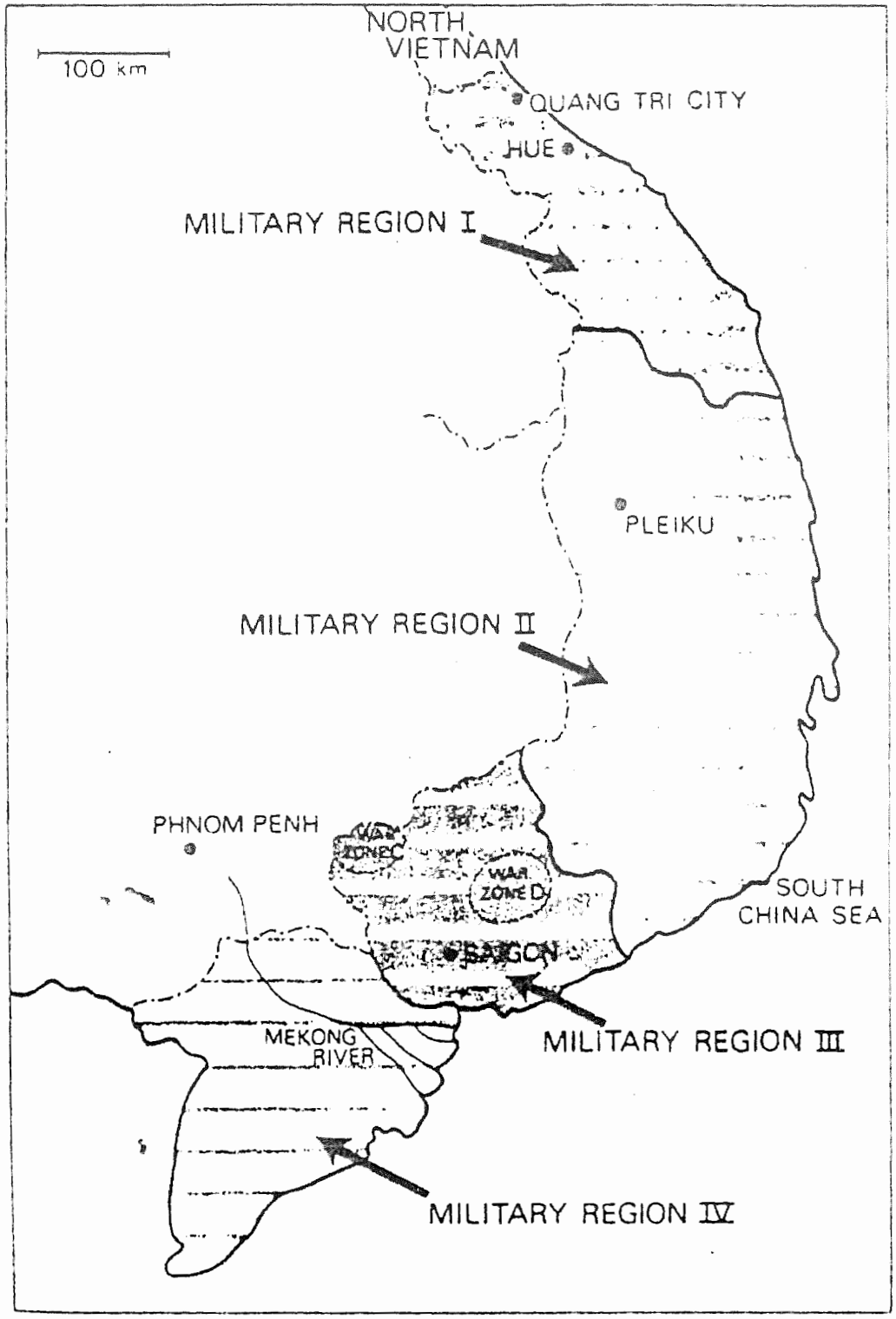
0 50 100 150 kilometres

Figure 16

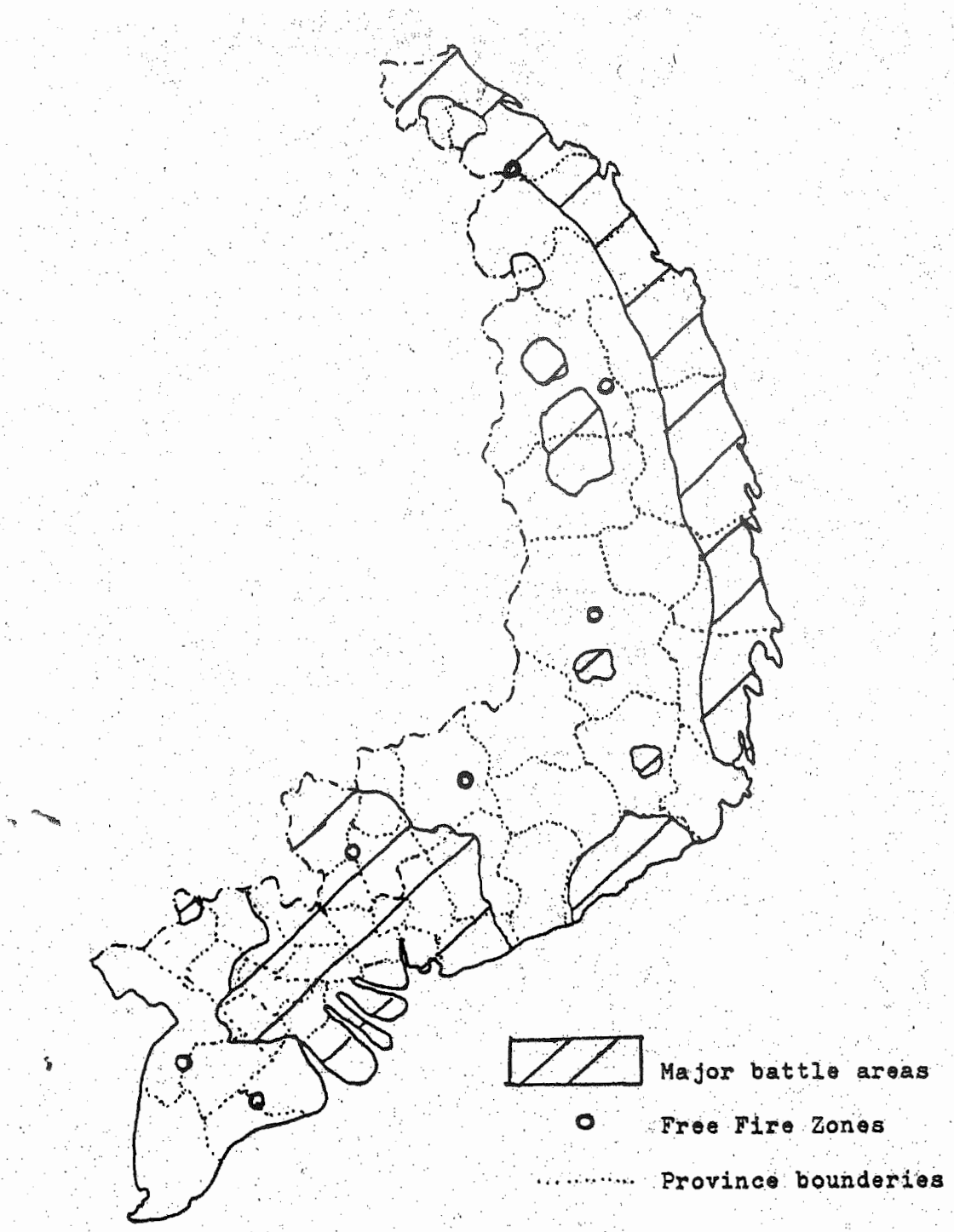

PRIORITY BIODIVERSITY HOT SPOTS OF VIETNAM
Showing Current Involvement of International Agencies
KEY
Elephants
Rhinoceres
Mammals
Bovids
Primates
Tigers
Pheasants
Birds
Plants
Coral Reefs
Turtles
Ba Be - Bac Thai
Survey | Plan | Implement
SSC
NE Limestone
Survey | Plan | Implement
Hoang Lien Son
Survey | Plan | Implement
Tam Dao
Survey | Plan | Implement
Muong Nhe
Survey | Plan | Implement
WWF
Cat Ba/Halong
Survey | Plan | Implement
FAO | WWF
Ba Vi
Survey | Plan | Implement
AUS | AUS
Cuc Phuong
Survey | Plan | Implement
FAO | WWF | GEF
Ke Go
Survey | Plan | Implement
ICBP
Pianat Vu Quang
Survey | Plan | Implement
WWF ABC
Bachma Base
Survey | Plan | Implement
WWF | WWF
Ngoc Linh
Survey | Plan | Implement
Hoang Su
Survey | Plan | Implement
Mom Ray
Survey | Plan | Implement
Kon K
Survey | Plan | Implement
MOSC
Yok Don
Survey | Plan | Implement
WWF | WWF
Cat Tien Region
Survey | Plan | Implement
WWF | WWF | WWF
South Highlands
Survey | Plan | Implement
ICBP | WWF
Crane Reserve
Survey | Plan | Implement
ICF
Nha Trang
Survey | Plan | Implement
WWF
N. Phu Quoc
Survey | Plan | Implement
Ca Na/Phu Quy
Survey | Plan | Implement
WWF
S. Phu Quoc
Survey | Plan | Implement
WWF
Con Dao
Survey | Plan | Implement
Minh Hai
Survey | Plan | Implement
IUCN


Map of Protected Areas
in Vietnam, 1987
PaoBo
TrungKhanh
MuongNhe
PiaBooc
HoangLienSan
PhangQuang
BaBe
BaoThacBa
NamDong
MuongPhang
DenHung
XamDao
CamSon
BacSon
HuuLien
AiChiLang
XuanSon
ConSon
YenTu
BaVi
XuanNha
SopCop
SongDa
BaCo
ChuaHang
CatBa
ThuongTien
DoSon
XuanThuy
BuHuong
LamSon
DenBaTrieu
BenEn
AnhSon
ThanhThuy
VuQuang
DongPhongNha
BachMaHaiVan
SonTra
NguHanhSon
CuLaoCham
NgocLinh
BaTo
MomRay
KonChaRang
KonKaKinh
SuoiTrai
YokDon
DaoCa
NamCa
HoLac
NamLung
BuCiaMap
NuiBa
NuiBaRa
DaLat
HoDonDuong
DeoKyGanMuc
PhanRang
LogoSamat
TayBaiCatTien
DaiBinh
KaKaonSongMao
NuiBaDen
NamBaiCatTien
DuongMinhChau
DucLinh
ChauKhaBaiLai
TranChim
BinhChau
PhuQuoc
NuiDaBa
HonChong
TramChim
CacSanChim
Bird Colonies
ConDao
CaMau


CHINA
Nong Kin
Gulong shan
Feng Shuiling
Xialei
Pac Bo
Trung Khanh
Qing Long shan
Chunxiu
Muong Nhe
Phou Dene Dinh
Nam Ou
Pu Mat
Nam Chuane
LAOS
Vu Quang
Na Kai Plateau
Xe Bang Fai
TRANSFRONTIER RESERVES
OF VIETNAM
Dong Amphang
Nam Kong
Hendrai Sou
Mem Ray
CAMBODIA
Yok Don
Buglamap
Lago Samat
Crane Wintering

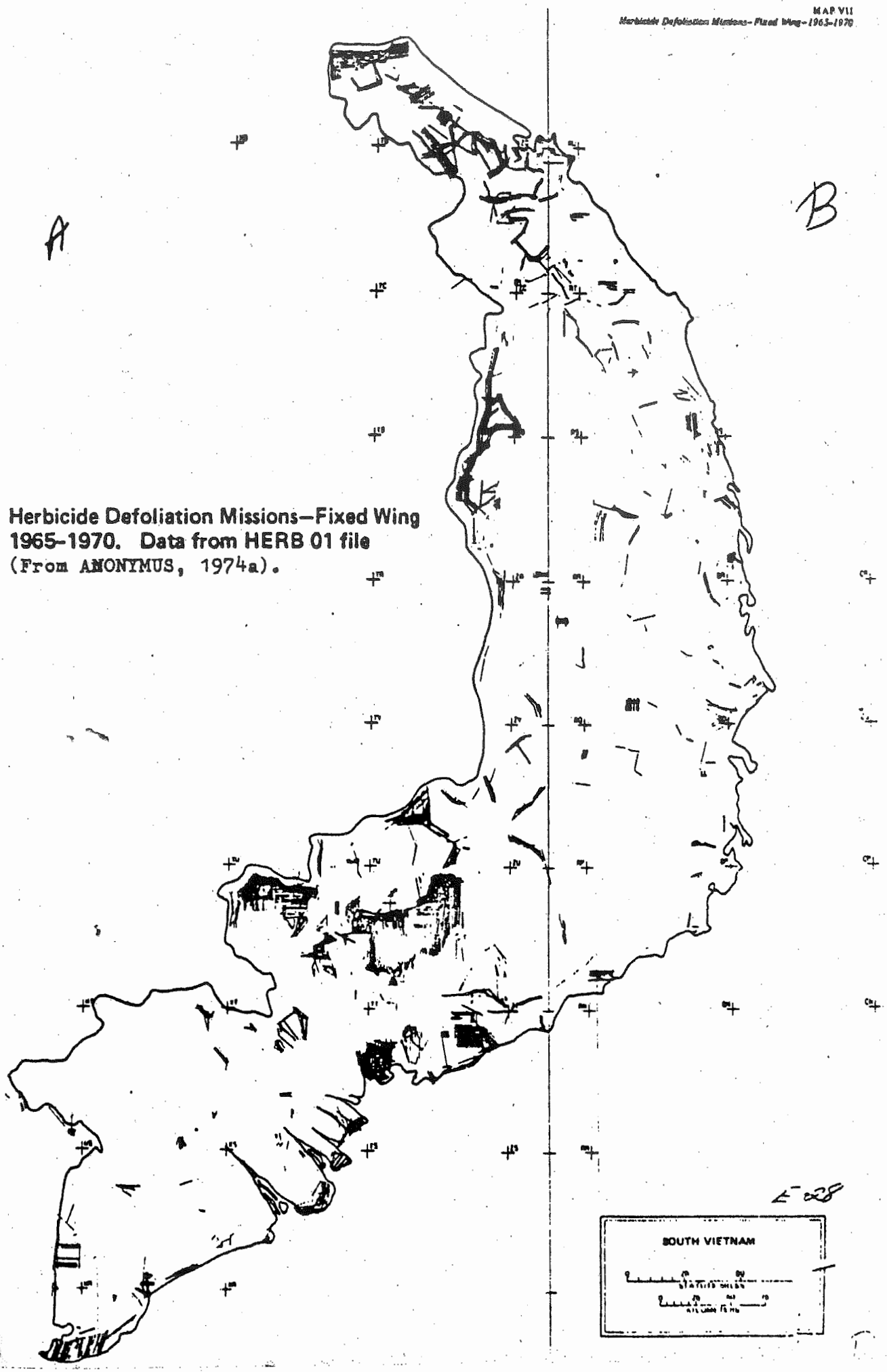


Map of South Vietnam showing military zones and degree of destruction during the second Indochina War. (after WESTING, 1975).



This map shows areas of major battles and also depicts free fire zones in South Vietnam (after WEISBERG, 1970).

. **Craterization** in Indochina (from WEISBERG,1970).



Herbicide Defoliation Missions—Fixed Wing 1965-1970. Data from HERB 01 file (From ANONYMUS, 1974a).

Annex II

Table 1. Changes in the provincial structure after 1996. Some provinces are split up in two new provinces. Numbers between brackets refer to the provinces in **AnnexI, figure 3**

Province before 1996	**Provinces after 1996**
Bac Thai (10)	Bac Can
	Thai Nguyen
Ha Bac (11)	Bac Giang
	Bac Ninh
Hai Hung (14)	Hai Duong
	Hung Yen
Minh Hai (50)	Bac Lieu
	Ca Mau
Nam Ha (16)	Ha Nam
	Nam Dinh
Quang Nam (25)	Da Nang
	Quang Nam
Song Be (36)	Binh Duong
	Binh Phuoc
Vinh Phu (12)	Phu Tho
	Vinh Phuc

Table 2. Very tentative correlation between the Vietnamese soil legend of upland soils and FAO/Unesco (1994) soil map

Vietnamese Legend	**FAO/Unesco tentative correlation**
Fq	Acrisols, possibly Arenosols for sandy soils
Fs	Acrisols and Lixisols
Fv	Luvisols (Chromic subgroup)
Fk	Lixisols and possibly Luvisols
Fa	Ferralsols
FHa	Ferralsols (Humic subgroup)
FHv	?
FHs	Acrisols/ Lixisols (Humic subgroup)
FHq	Acrisols (Humic subgroup)
HA	?

In the new WRB (1998) part of the humic subgroups will probably fall in the Umbrisols.

Table 3. Ecological regions and zones (legend of Annex I, figure 12)

Ecological regions	Ecological zones
I. Northern mountains and northern central part	1. Northeastern mountains
	2. Highlands of Dong Van
	3. High mountains between the Song Hong and the Song Da.
	4. Northwestern mountains
II. Middle (hilly) northern region and northern central part	5. Middle (hilly) northern region
	6. Middle (hilly) region north of the central part
III. Northern plain	7. Coastal plain
	8. Northern inundated depression
	9. Alluvial plain
	10. Southern inundated depression
IV. Center	11. Mountains and hills of the northwestern central part
	12. Plain of the northern central part
	13. Mountains and hills of the southwestern central part
	14. Plain of the southern central part
V. Central Highlands	15. High mountains of the northern central highlands
	16. Southern central highlands
	17. Central part of the central highlands
	18. Northern central highlands
	19. High mountains of southern central highlands
VI. Southeastern part	20. Hills higher than 200 m.
	21. Eastern part with soils on basalt
	22. Recent alluvial plain
	23. Old alluvial plain
VII. Southern plain	24. Inundated coastal forest
	25. Cajapute forest of U Minh (Malaleuca cajaputi)
	26. Jonc's plain
	27. Square of Long Xuyen
	28. Depression between Tien and Hau rivers
	29. Salt effected plain
	30. Central plain
VIII. Hanoi City	31. In the city
	32. In the surroundings

IX. Ho Chi Minh City	33. In the city
	34. In the surroundings
X. Coastal and ocean islands	35. Islands of the northern Gulf
	36. Islands of central coast
	37. Islands of Hoang Sa and Truong Sa
	38. Island of Phu Quoc

Table 1 Comparison between the number of species in Viet Nam and the world

Taxa	Number of species in Viet Nam (SV)	Number of species in the World (SW)	SV/SW (%)
Mammals	265	4,000	6.8
Birds	800	9,040	8.8
Reptiles	180	6,300	2.9
Amphibians	80	4,184	2.0
Fishes	2,470	19,000	13.0
Plants	7,000*	220,000	3.2
Mean percentage of global biodiversity			6.2

* estimated to be 12,000

Table 2. Nationally threatened species in Viet Nam

Taxa/Category	Endangered	Vulnerable	Threatened	Rare	Indeterminate	Total
Mammals	30	23	1	24	-	78
Birds	14	6	32	31	-	83
Reptiles/Amphibia	8	19	16	11	-	54
Fish	6	24	13	29	3	75
Inverts.	10	24	9	29	3	75
Total	68	96	71	124	6	365

Table 3. Summary of plant conservation status information held at WCMC

IUCN Threat category	Number of species
Extinct	1
Endangered	7
Vulnerable	25
Rare	316
Indeterminate	15
Insufficiently known	6
No information	373
Not threatened	239
Total	983

Source: WCMC database

PAYSAGES VÉGÉTAUX ET PLANTES D'INDOCHINE

Tableau 1

Principaux types de végétation de la Péninsule indochinoise et leurs conditions écologiques

A. Formations littorales et paralittorales	Climat	Sol	Homme
– Mangrove	+	++	
– Arrière-mangrove	+	++	+
– Formations tourbeuses côtières	+	++	
– Forêts plus ou moins marécageuses	+	++	
– Forêts sur podzols	+	++	
– Autres formations côtières			
* plages sableuses	+	++	
* côtes rocheuses	+	++	
* dunes sableuses et roches cristallines	+	++	
* prairies marécageuses salées	+	++	
B. Formations de l'intérieur			
– Formations d'eau douce			
* prairies aquatiques	+	++	+
* fourrés à rhéophytes	+	++	
* forêts inondées	+	++	
* forêts galeries	+	++	
– Formations de terre ferme			
- - Régions basses			
* forêts denses humides sempervirentes et semi-sempervirentes	++	+	
* forêts denses secondaires	+	+	++
* forêts semi-denses décidues	+	+	+
* forêts claires décidues à Diptérocarpacées	+	++	++
* savanes boisées et herbeuses	+	++	++
- - Régions hautes			
* forêts denses de montagne	++	++	+
* forêts claires	+	++	++
* savanes et pseudo-steppes	+	++	++

Annex III

Appendix 1

WORLD CONSERVATION MONITORING CENTRE

The **World Conservation Monitoring Centre** *provides information services on conservation and sustainable use of the world's living resources, and helps others to develop information systems of their own.*

The Socialist Republic of Viet Nam

Compiled by WCMC in 1994

Appendix 2 - Endemic Vertebrates

Class: MAMMALIA

ARTIODACTYLA
- *Pseudoryx nghetinhensis* (Vu Quang Ox)
- *Sus bucculentus* Vietnam Warty Pig

CHIROPTERA
- *Paracoelops megalotis*

PRIMATES
- *Pygathrix avunculus* Tonkin Snub-nosed Monkey

RODENTIA
- *Rattus osgoodi*
- *Typhlomys chapensis*

INSECTIVORA
- *Euroscaptor parvidens*

Class: AVES

GALLIFORMES
- *Arborophila davidi* Orange-necked Partridge
- *Arborophila merlini* Annam Partridge
- *Lophura edwardsi* Edward's Pheasant
- *Lophura hatinhensis* Vietnamese Pheasant
- *Polyplectron germaini* Germain's Peacock-Pheasant

PASSERIFORMES
- *Garrulax milleti* Black-hooded Laughingthrush
- *Garrulax yersini* Collared Laughingthrush
- *Jabouilleia danjoui* Short-tailed Scimitar Babbler
- *Crocias langbianis* Grey-crowned Crocias
- *Carduelis monguilloti* Vietnamese Greenfinch

Class: REPTILIA

SERPENTES
- *Typhlops giadinhensis*
- *Achalinus ater*
- *Boiga multomaculata*
- *Calamaria buchi*
- *Lycodon paucifaciatus*
- *Oligodon lacroixi*
- *Oligodon macrurus*
- *Opisthotropis jacobi*
- *Parahelicops annamensis*

Pararhabdophis chapaensis
Pareas tamdaoensis
Rhabdophis angeli
Ovophis tonkinensis
Trimeresurus cornutus

TESTUDINES

Annamemys annamensis Annam Leaf Turtle

SAURIA

Dibamus montanus
Dibamus smithi
Cnemaspis boulengeri
Gonydactylus condorensis
Gonydactylus irregularis
Gekko palmatus
Hemidactylus vietnamensis
Japalura fasciata
Leiolepis guttata
Emoia laobaoense
Eumeces tamdaoensis
Lygosoma angeli
Lygosoma corpulentum
Mabuya chapaense
Sphenomorphus buenloicus
Sphenomorphus poilani
Sphenomorphus rufocaudatus
Sphenomorphus tridigitus
Sphenomorphus tritaeniatus
Tropidophorus baviensis
Tropidophorus cocincinensis
Ophisaurus sokolovi
Dibamus greeri
Mabuya darevskii

Class: AMPHIBIA

ANURA

Bufo spp
Bufo pageoti
Bufo tienhoensis
Microhyla fusca
Microhyla picta
Leptobrachium pullus
Leptolalax bourreti
Megophrys intermedia
Megophrys poilani
Rana chapaensis
Rana delacouri
Rana fransipani
Rana maosonensis
Rana milleti
Rana montivaga
Rana toumanoffi
Philautus banaensis
Philautus gryllus
Philautus maosonensis
Chrixalus laevis
Rhacophorus annamensis
Rhacophorus calcaneus
Rhacophorus notater
Theloderma bicolor

Theloderma corticale
CAUDATA
Paramesotriton deloustali Vietnamese Salamander

Note: this listing excludes fishes

Sources

WCMC database, compiled from a variety of sources, including:

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Wilson, D.E. and Reeder, D.M. (eds). 1993. *Mammal Species of the World: a taxonomic and geographic reference.* Second edition. Smithsonian Institution Press. Washington and London.

Appendix 2

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The Socialist Republic of Viet Nam

Compiled by WCMC in 1994

Appendix 3 - Globally Threatened Animal Species of Viet Nam

Class: MAMMALIA

Order:ARTIODACTYLA
- [V] *Bos gaurus* (Gaur)
- [V] *Bos javanicus* (Banteng)
- [E] *Bos sauveli* (Kouprey)
- [I] *Capricornis sumatraensis* (Mainland Serow)
- [V] *Cervus eldii* (Thamin)
- [E] *Pseudoryx nghetinhensis** (Vu Quang Ox)

Order:CARNIVORA
- [K] *Aonyx cinerea* (Oriental Small-clawed Otter)
- [V] *Canis lupus* (Grey Wolf)
- [I] *Catopuma temmincki* (Asiatic Golden Cat)
- [I] *Chrotogale owstoni* (Owston's Palm Civet)
- [V] *Cuon alpinus* (Asiatic Wild Dog)
- [E] *Cynogale bennettii* (Otter-civet)
- [V] *Helarctos malayanus* (Sun Bear)
- [K] *Lutra perspicillata* (Smooth-coated Otter)
- [K] *Lutra sumatrana* (Hairy-nosed Otter)
- [K] *Mustela strigidorsa* (Black-striped Weasel)
- [V] *Neofelis nebulosa* (Clouded Leopard)
- [E] *Panthera tigris* (Tiger)
- [K] *Pardofelis marmorata* (Marbled Cat)
- [K] *Prionailurus viverrinus* (Flat-headed Cat)
- [V] *Selenarctos thibetanus* (Asiatic Black Bear)

Order:CETACEA
- [K] *Neophocaena phocaenoides* (Finless Porpoise)
- [K] *Orcaella brevirostris* (Irrawaddy Dolphin)
- [K] *Sousa chinensis* (Indo-Pacific Hump-backed Dolphin)

Order:PERISSODACTYLA
- [E] *Dicerorhinus sumatrensis* (Sumatran Rhinoceros)
- [E] *Rhinoceros sondaicus* (Javan Rhinoceros)
- [E] *Tapirus indicus* (Malayan Tapir)

Order:PRIMATES
- [E] *Hylobates concolor* (Black Gibbon)
- [K] *Macaca arctoides* (Stump-tailed Macaque)
- [V] *Nycticebus pygmaeus* (Pygmy Loris)
- [E] *Pygathrix avunculus* (Tonkin Snub-nosed Monkey)
- [E] *Pygathrix nemaeus* (Douc Monkey)
- [E] *Trachypithecus francoisi* (Franois' Leaf Monkey)

Order:PROBOSCIDEA

[E] *Elephas maximus* (Indian Elephant)

Order:SIRENIA

[V] *Dugong dugon* (Dugong)

Class: AVES

Order:ANSERIFORMES

[V] *Aythya baeri* (Baer's Pochard)
[V] *Cairina scutulata* (White-winged Duck)

Order:CHARADRIIFORMES

[R] *Larus saundersi* (Saunder's Gull)
[R] *Limnodromus semipalmatus* (Asian Dowitcher)

Order:CICONIIFORMES

[E] *Leptoptilos dubius* (Greater Adjutant)
[V] *Leptoptilos javanicus* (Lesser Adjutant)
[V] *Mycteria cinerea* (Milky Stork)
[E] *Platalea minor* (Black-Faced Spoonbill)
[I] *Pseudibis davisoni* (White-shouldered Ibis)

Order:COLUMBIFORMES

[R] *Caloenas nicobarica* (Nicobar Pigeon)
[R] *Columba punicea* (Pale-capped Pigeon)

Order:CORACIIFORMES

[R] *Aceros nipalensis* (Rufous-necked Hornbill)
[I] *Alcedo hercules* (Blyth's Kingfisher)

Order:FALCONIFORMES

[R] *Aquila heliaca* (Imperial Eagle)

Order:GALLIFORMES

[R] *Arborophila charltonii* (Chestnut-necklaced Partridge)
[I] *Arborophila davidi** (Orange-necked Partridge)
[R] *Lophura diardi* (Siamese Fireback)
[V] *Lophura edwardsi** (Edward's Pheasant)
[I] *Lophura hatinhensis** (Vietnamese Pheasant)
[V] *Lophura imperialis* (Imperial Pheasant)
[V] *Pavo muticus* (Green Peafowl)
[R] *Polyplectron germaini* (Germain's Peacock-Pheasant)
[R] *Rheinardia ocellata* (Crested Argus)

Order:GRUIFORMES

[E] *Eupodotis bengalensis* (Bengal Florican)
[V] *Grus nigricollis* (Black-necked Crane)
[V] *Heliopais personata* (Masked Finfoot)

Order:PASSERIFORMES

[I] *Crocias langbianis** (Grey-crowned Crocias)
[I] *Garrulax milleti** (Black-hooded Laughingthrush)
[I] *Garrulax yersini** (Collared Laughingthrush)
[I] *Jabouilleia danjoui** (Short-tailed Scimitar-Babbler)
[R] *Paradoxornis davidianus* (Short-tailed Parrotbill)
[R] *Paradoxornis ruficeps* (Rufous-headed Parrotbill)
[R] *Pitta elliotii* (Bar-bellied Pitta)
[R] *Pitta nympha* (Fairy Pitta)
[R] *Sitta formosa* (Beautiful Nuthatch)
[I] *Sitta solangiae* (Yellow-billed Nuthatch)

Order:PELECANIFORMES

[V] *Fregata andrewsi* (Christmas Island Frigatebird)
[I] *Pelecanus philippensis* (Spot-billed Pelican)

Order:PICIFORMES

[I] *Picus rabieri* (Red-collared Woodpecker)

Class: REPTILIA

Order:CROCODYLIA

[V] *Crocodylus porosus* (Estuarine Crocodile)
[E] *Crocodylus siamensis* (Siamese Crocodile)

Order:SERPENTES

[V] *Python molurus* (Indian Python)
[R] *Trimeresurus cornutus**

Order:TESTUDINES

[K] *Annamemys annamensis** (Annam Leaf Turtle)
[E] *Batagur baska* (Batagur)
[E] *Chelonia mydas* (Green Turtle)
[K] *Cuora galbinifrons* (Indochinese Box Turtle)
[E] *Eretmochelys imbricata* (Hawksbill Turtle)
[K] *Indotestudo elongata* (Elongated Tortoise)
[V] *Manouria emys* (Asian Giant Tortoise)
[K] *Manouria impressa* (Impressed Tortoise)

Class: AMPHIBIA

Order:CAUDATA

[I] *Paramesotriton deloustali** (Vietnamese Salamander)

Class: ACTINOPTERYGII

Order:CYPRINIFORMES

[K] *Probarbus jullieni* (Ikan Temoleh)

Order:OSTEOGLOSSIFORMES

[K] *Scleropages formosus* (Asian Boneytongue)

Order:SILURIFORMES

[V] *Pangasianodon gigas* (Giant Catfish)
[R] *Pangasius sanitwongsei* (Pla Thepa)

Class: BIVALVIA

Order:VENEROIDA

[K] *Tridacna crocea* (Crocus Clam)
[K] *Tridacna maxima* (Small Giant Clam)
[I] *Tridacna squamosa* (Scaly Clam, Fluted Clam)

Class: INSECTA

Order:COLEOPTERA

[I] *Lacconectus punctatus*

Order:LEPIDOPTERA

[K] *Teinopalpus aureus* (Golden Kaiser-I-Hind)
[R] *Tirumala gautama*

Class: MEROSTOMATA

Order:XIPHOSURA

[K] *Tachypleus tridentatus* (Horseshoe Crab)

* endemic to Viet Nam

Source

Groombridge, B. (Ed.). 1993. *1994 IUCN Red List of Threatened Animals*. IUCN Gland, Switzerland and Cambridge, UK. lvi + 286pp.

Appendix 3

WORLD CONSERVATION MONITORING CENTRE

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The Socialist Republic of Viet Nam

Appendix 6 - List of Protected Areas

The following information is provided in this list, national designation, name of site, IUCN Management Category, latitude/longitude, area in hectares and year established.

Historic/Cultural Site

Ai Chi Lang HCR	?	2138'N/10640'E	1,000	1986
Ba To HCR	?	1450'N/10842'E	500	1986
Bai Chay HCR	?	2100'N/10700'E	582	1986
Boi Loi HCR	?	1105'N/10635'E	2,000	1986
Cac dao Vinh Ha Long HCR	?	2052'N/10710'E	1,000	1986
Cam Son HCR	?	2133'N/10635'E	5,000	1986
Chien Khu Boi Loi HCR	?	1105'N/10635'E	2,000	1986
Chua Huong Tich HCR	?	2042'N/10540'E	2,900	1986
Con Son-Kiep bac HCR	?	2110'N/10620'E	1,477	1986
Dao Ho Song Da HCR	?	2047'N/10512'E	3,000	1986
Den Ba Trieu HCR	?	1955'N/10550'E	300	1986
Den Hung HCR	?	2120'N/10520'E	285	1977
Deo Ca Hon ron HCR	?	1255'N/10925'E	10,000	1986
Do Son HCR	?	2040'N/10648'E	267	1986
Ho Lac HCR	?	1215'N/10812'E	10,000	1986
Ho Nui Coc HCR	?	2135'N/10545'E	6,000	1986
Hon Chong HCR	?	1010'N/10437'E	3,000	1986
Lam Son HCR	?	1058'N/10525'E	300	1986
Muong Phang HCR	?	2125'N/10300'E	1,000	1986
Ngoc Trao HCR	?	2010'N/10535'E	300	1986
Ngu Hanh Son HCR	?	1558'N/10515'E	400	1986
Nui Ba Den HCR	?	1122'N/10610'E	2,000	1986
Nui Ba Ra HCR	?	1140'N/10710'E	940	

1986			
Nui Thanh HCR	?	1545'N/10800'E	1,500
1986			
Pac Bo HCR	?	2258'N/10603'E	3,000
1977			
Tan Trao HCR	?	2143'N/10530'E	1,081
1977			

National Park

Ba Be	II	2224'N/10537'E	7,600
1977			
Ba Vi	II	2125'N/10530'E	7,200
1977			
Bach Ma	II	1612'N/10758'E	22,500
1986			
Ben En	II	1936'N/10530'E	16,634
1986			
Cat Ba	II	2048'N/10702'E	15,200
1986			
Con Dao	II	842'N/10638'E	15,043
1982			
Cuc Phuong	II	2019'N/10522'E	22,500
1962			
Nam Bai Cat Tien	II	1056'N/10720'E	37,550
1978			
Yok Don	II	1246'N/10740'E	58,200
1988			

Nature Reserve

Anh Son	IV	1850'N/10505'E	1,500
1986			
Ba Mun	IV	2104'N/10732'E	1,800
1977			
Bac Son	IV	2153'N/10625'E	4,000
1977			
Ban dao Son Tra	IV	1609'N/10816'E	4,439
1977			
Bana-Nui Chua	IV	1600'N/10800'E	5,217
1986			
Bien Lac-Nui Ong (Tanh Linh)	IV	1110'N/10730'E	35,400
1986			
Binh Chan Phuoc Buu	IV	1030'N/10730'E	11,293
1986			
Bu Gia Map	IV	1208'N/10710'E	22,300
1986			
Bu Huong	IV	1942'N/10445'E	5,000
1986			
Cac San chim #1	IV	0855'N/10515'E	300
1986			
Cac San chim #2	IV	0902'N/10505'E	300
1986			
Chiem Hoa Nahang	IV	2220'N/10523'E	20,000
1986			
Chu Yang Sinh	IV	1225'N/10825'E	20,000
1986			
Cu Lao Cham	IV	1558'N/10830'E	1,535
1986			
Dao Phu Quoc	IV	1020'N/10400'E	14,500
1986			
Dat Mui (Nam Can)	IV	0835'S/10446'E	4,460
1986			
Deo Ngoan Muc	IV	1150'N/10745'E	2,000
1986			
Dong Phong Nha	IV	1750'N/10552'E	41,232

1986			
Hon Me	IV	1922'N/10555'E	500
1986			
Huu Lien	IV	2140'N/10620'E	3,000
1986			
Kalon Song Mao	IV	1126'N/10828'E	2,000
1986			
Khu Dao Thac Ba	IV	2153'N/10430'E	5,000
1986			
Kon Kai Kinh	IV	1419'N/10822'E	28,000
1986			
Kong Cha Rang	IV	1433'N/10835'E	16,000
1986			
Lo Go-Sa Mat	IV	1142'N/10600'E	10,000
1986			
Mom Ray	IV	1425'N/10735'E	45,000
1986			
Mount Lang Bian (Nui Ba)	IV	1205'N/10825'E	6,000
1986			
Muong Cha	IV	2216'N/10228'E	390,000
1986			
Nam Ca	IV	1225'N/10800'E	24,550
1986			
Nam Don	IV	2140'N/10345'E	18,000
1986			
Nam Lung	IV	1216'N/10745'E	24,550
1986			
Ngoc Linh	IV	1506'N/10757'E	20,000
1986			
Nui Cam	IV	1030'N/10500'E	1,500
1986			
Nui Dai Binh	IV	1125'N/10747'E	5,000
1986			
Nui Hoang Lien	IV	2215'N/10348'E	40,000
1986			
Nui Pia Oac	IV	2236'N/10552'E	10,000
1986			
Nui Tam Dao	IV	2135'N/10539'E	40,000
1977			
Nui Yen Tu	IV	2110'N/10640'E	5,000
1986			
Pa Co Hang kia	IV	2042'N/10456'E	1,000
1986			
Phong Quang	IV	2250'N/10455'E	20,000
1986			
Quang Xuyen	IV	1225'N/10800'E	15,000
1986			
Rung Kho Phan Rang	IV	1146'N/10857'E	1,000
1986			
Sop Cop	IV	2042'N/10342'E	5,000
1986			
Suoi Trai	IV	1305'N/10850'E	28,000
1986			
Tam Quy	IV	2000'N/10550'E	350
1986			
Tay Bai Cat Tien	IV	1132'N/10712'E	10,000
1986			
Thanh Thuy	IV	1840'N/10515'E	7,000
1986			
Thuong Da Nhim (Bi Doup)	IV	1152'N/10837'E	25,000
1986			
Thuong Tien	IV	2040'N/10526'E	1,500
1986			
Trung Khanh	IV	2736'N/10630'E	3,000
1986			
U Minh	IV	933'N/10500'E	2,000

1986			
Vu Quang	IV	1815'N/10522'E	56,000
1986			
Xuan Nha	IV	2041'N/10443'E	60,000
1986			
Xuan Son	IV	2100'N/10506'E	4,585
1986			

Other area

Ha Long Bay	VIII	2050'N/10710'E	150,000
1962			

Reserve

Red River Estuary/ Xuan Thuy Reserve	?	2010'N/10620'E	12,000
1988			

Proposed sites

An Gia	?/?	20,000
Bao Loc	1132'N/10742'E	10,000
Son	?/?	4,631
Cao Veu	1932'N/10420'E	100,000
Cat Loc	1142'N/10727'E	30,000
Ho Ke Go	1810'N/10550'E	20,000
Khe Thoi	1950'N/10450'E	100,000
Tay Con Linh	2250'N/10445'E	30,000
Tram Chim	1030'N/10540'E	5,500

Recommended sites

Minh Hai (Melaleuca) Forest	919'N/10505'E	163,000

Degazetted sites

Duong Minh Chau HCR	1117'N/10620'E	5,000
1986		
Nui Ba	?/?	6,000
1986		
Tieu Tao-Easup	1320'N/10738'E	20,000
1986		

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Home Comments

Appendix 4

The Socialist Republic of Viet Nam

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Cac dao Vinh Ha Long HCR	?	2052'N/10710'E	1,000	1986
Cam Son HCR	?	2133'N/10635'E	5,000	1986
Chien Khu Boi Loi HCR	?	1105'N/10635'E	2,000	1986
Chua Huong Tich HCR	?	2042'N/10540'E	2,900	1986
Con Son-Kiep bac HCR	?	2110'N/10620'E	1,477	1986
Dao Ho Song Da HCR	?	2047'N/10512'E	3,000	1986
Den Ba Trieu HCR	?	1955'N/10550'E	300	1986
Den Hung HCR	?	2120'N/10520'E	285	1977
Deo Ca Hon ron HCR	?	1255'N/10925'E	10,000	1986
Do Son HCR	?	2040'N/10648'E	267	1986
Ho Lac HCR	?	1215'N/10812'E	10,000	1986
Ho Nui Coc HCR	?	2135'N/10545'E	6,000	1986
Hon Chong HCR	?	1010'N/10437'E	3,000	1986
Lam Son HCR	?	1058'N/10525'E	300	1986
Muong Phang HCR	?	2125'N/10300'E	1,000	1986
Ngoc Trao HCR	?	2010'N/10535'E	300	1986
Ngu Hanh Son HCR	?	1558'N/10515'E	400	1986
Nui Ba Den HCR	?	1122'N/10610'E	2,000	1986
Nui Ba Ra HCR	?	1140'N/10710'E	940	

APPENDIX 7

SELECTED PROTECTED AREAS ACCOUNTS

Ba Be National Park, VIET NAM

NAME
Ba Be National Park
MANAGEMENT CATEGORY
II (National Park)
BIOGEOGRAPHICAL PROVINCE
4.10.04 (Thailandian Monsoon Forest)
GEOGRAPHICAL LOCATION
Approximately 5km from Cho Ra District Town, Cho Ra District, Cao Bang Province, and a straight-line distance of 150km north-north-west of Ha Noi. Approximately 2224'N, 10537'E
DATE AND HISTORY OF ESTABLISHMENT
1977. Established under Council of Ministers Decision 41-TTg, dated 24 January 1977.
AREA
5,000ha
LAND TENURE
People's Committee of Cho Ra District
ALTITUDE
Approximately 400m to 893m
PHYSICAL FEATURES
Includes a freshwater lake, covering approximately 500ha, in an area of limestone mountains. The lake is 8km long and up to 0.8km wide. The depth generally varies from 17m to 23m with a maximum of 29m. The surrounding limestone hills rise to peaks at 570m-893m and a peak

some 13km to the south-east rises to 1,546m. The lake is connected to the Nang River by a channel; at high water levels during the rainy season, the lake drains into the river via this channel, while during the dry season, water flows from the river into the lake. The famous Dau Dang series of waterfalls, up to 45m high, and extending for about 10km, is located in the hills to the north-west. There are also numerous caves and grottos, the most notable being Phuong Grotto (Scott, 1989) with vaults 30-40m high (Duc, 1985).

CLIMATE

Tropical monsoonal

VEGETATION

No information on the aquatic vegetation is available. The lake is surrounded by tropical rain forest, some of which remains in good condition (Scott, 1989).

FAUNA

Approximately 100 species of birds and 30 species of mammal have been recorded, including several that are rare or endemic. Pheasants of the genus Lophura, green peafowl Pavo muticus (V), gibbons Nycticebus sp. and Francois' leaf monkey Presbytis francoisi may still be present. The fish fauna includes 17 native species, four of which are of economic value (Scott, 1989).

CULTURAL HERITAGE

No information

LOCAL HUMAN POPULATION

Ba Be township is located to the immediate south of the lake although specific details on the population are not available.

VISITORS AND VISITOR FACILITIES

Ba Be is accessible by road from Ha Noi, the journey taking about eight hours by road. The caves, waterfalls and lake are accessible either by boat or foot (Le Dien Duc, 1985).

SCIENTIFIC RESEARCH AND FACILITIES

Some preliminary faunal surveys have been carried out in the area (Scott, 1989).

CONSERVATION MANAGEMENT

The lake is of considerable importance for the local communities as it regulates water supply. It is set amidst spectacular mountain scenery and has considerable potential for both national and international tourism. It is also the only mountain lake in the country and possesses a flora unique at national level. According to Scott (1989) the area was declared a national park in 1985, although this appears to be erroneous. The Ministry of Forestry and the Natural Resources and Environment Centre are currently working together on a management plan. The hunting of animals and the cutting of trees is strictly forbidden. Plans have already been made to develop the area for tourism, which would enhance the income of local people (Scott, 1989).

MANAGEMENT PROBLEMS

The most serious threat is illegal hunting. Some protective measures have already been taken but they are not as yet fully effective. It is recommended that environmental education programmes are promoted in the region in order to reduce the level of poaching (Scott, 1989).

STAFF

No information

BUDGET

No information

LOCAL ADMINISTRATION

No information

REFERENCES

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- **Scott, D.A. (1989).** A directory of Asian wetlands. IUCN, Gland, Switzerland and Cambridge, UK. 1181 pp.

DATE

September 1989

Cat Ba National Park, VIET NAM

:

NAME

Cat Ba National Park

BIOGEOGRAPHICAL PROVINCE

4.05.01 (Indochinese Rainforest)

MANAGEMENT CATEGORY

II (National Park)

GEOGRAPHICAL LOCATION

Situated in Ha Long Bay, about 30km east of Hai Phong City and Port, and about 8km off the coast. 2042'-2054'N, 10654'-10709'E

DATE AND HISTORY OF ESTABLISHMENT

Established on 31 March 1986 under Council of Minister's Decision 79-CT.

AREA

27,700ha (Vo Quy, pers. comm., 1988). According to Scott (1989) the park covers 26,300ha, comprising 17,300ha on the main island and 9,000ha of the adjacent inshore waters.

LAND TENURE

Public possession

ALTITUDE

Sea level to 331m

:

PHYSICAL FEATURES

The archipelago consists of one main island, covering 345sq.km, and 366 smaller ones. There is a great diversity of landscapes and ecosystems, including offshore coral reefs, sandy beaches, mangrove forest, freshwater swamp forest, small freshwater lakes and forested hills. The scenery is spectacular in the karst limestone areas on the main island where there are numerous waterfalls, caves and grottos. The principal streams on the island are the Thung Luong, Treo Com, Hoi Trung Trang and Viet Hai. Most streams are seasonal, flowing only after tropical storms, but some of the streams in the higher valleys are perennial or almost so. Most of the rain water flows into caves and grottos, and follows underground streams to the sea. There is, therefore, often an acute shortage of water during the dry season. There are several small lakes and ponds in the hills, the largest of which is Ech Lake, a permanent waterbody with an area of 3ha and a depth of about 50m. Much of the main island is between 50m and 200m above sea level; the highest peaks rise to 331m (Cao Vong) and 302m (Hien Hoa) and only 10% of the island is below 50m in elevation. However, some places in the interior of the main island, such as Ang Tom in Viet Hai Village, are below sea level. The principal beaches are at Cai Vieng, Hong Xoai Lon and Hon Xoai Be. The tidal range is 3.3-3.9m, exceptionally 4.0m. The salinity of the surrounding waters fluctuates seasonally, ranging from 31.11 ppt in the dry season to 9.30 ppt in the wet season (Scott, 1989).

CLIMATE

Tropical monsoonal with pronounced wet and dry seasons. Mean annual rainfall is 1,700mm to 1,800mm, mean annual temperature at sea level is 25C to 28C and mean annual relative humidity is 85%. The rainy season lasts from May to September, the heaviest rainfall occurring in July and August. There is often some drizzle during January, February and March. The average temperature during the wet season is 30C, the prevailing wind is south-easterly, and typhoons and tropical storms are frequent. The dry or cold season lasts from November to March. The temperature normally varies between 16C and 19C, although it occasionally drops below 10C (Scott, 1989).

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VEGETATION

There are three main types of vegetation in the archipelago: tropical evergreen forest on the hills, freshwater swamp forest at the foot of the hills and coastal mangrove forest. The hill forest includes species such as Spondias lakonensis, Milius flipes, Indospermum sp., Pometia pinnata, Euphorbia sp., Carralli lancaefolia and Dimerocarpus brenieri, with trees up to 20-30m in height. Species of Urticacaea and Orchidaceae are dominant in the lowest strata of the forest. On mountain summits, the vegetation is drought resistant and stunted due to strong winds, the height not exceeding 5m. In some places Sasa japonica is dominant. Common species in the swamp and foothill forest include Dracontomelum duperreanum, Aglaia gigantea, Duabanga sonneratioides, Lagerstroemia balansea, Pterospermum sp., Cinnamomum spp., Caryodaphnopsis tonkinensis and Peltaphorum tonkinensis. These species, which grow to heights of up to 20m, dominate the upper strata of the forest. A lower strata with trees up to 12m in height includes Engelhardtia spicata, Gironniera subaequalis and Garcinia sp., while a third stratum, up to 8m high, includes Alphonsea spp. and Ardisia tonkinensis. The main island has over 2,300ha of mangrove forest comprising Rhizophora mucronata, Bruguiera gymnorhiza, Kandelia candel and Aegiceras mafus. The trees, however, only attain 2-3m in height because of the cold winters, low concentration of silt and over-exploitation (Scott, 1989). A preliminary survey found 118 timber species and 160 species of medicinal plants (R.M. Lesaca, pers. comm., 1984) and in total 620 species of plants have been recorded in the archipelago (Scott, 1989). The island once had large tracts of primary forest with hardwood trees such as Podocarpus wallichianus, Tarrietia cochinchinensis and Dalbergia sp. However, there is currently very little forest cover remaining and all of it has been disturbed (J. MacKinnon, pers. comm., 1987).

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FAUNA

The fauna has not been studied in detail but the island does not appear to support the large mammals or carnivores found on the mainland. However, preliminary surveys have revealed that the fauna is distinctive with unique elements adapted to island conditions. One such endemic is a subspecies of Francois' monkey Presbytis francoisi poliocephalus. Other mammals known to occur include leopard Panthera pardus (T), leopard cat Felis bengalensis, rhesus macaque Macaca mulatta, pigtail macaque M. nemestrina, bear macaque M. arctoides, mainland serow Capricornis sumatrensis, sambar Cervus unicolor, Indian muntjak Muntiacus muntjak, European otter Lutra lutra (V), large Indian civet Viverra zibetha, small Indian civet Viverricula malaccensis, black giant squirrel Ratufa bicolor, belly-banded squirrel Callosciurus erythraeus, Swinhoe's striped squirrel Tamiops swinhoe, three species of rat Rattus, bamboo rat Rhizomys sumatrensis, crested porcupine Hystrix hodgsoni, Asiatic brush-tailed porcupine Atherurus macrourus and Horsfield's leaf-nose bat Hipposideros larvatus (four subspecies) (Scott, 1989).

The islands lie on a main migration route for many species of waterfowl. The beaches and mangrove forests provide feeding and roosting sites for a large number of birds during the migration season, including several species of ducks, geese and shorebirds. Resident and migrant species include little grebe Tachybaptus ruficollis, common cormorant Phalacrocorax carbo, spotbill duck Anas poecilorhyncha, white-breasted water-hen Amaurornis phoenicurus, water cock Gallicrex cinera and pheasant-tailed jacana Hydrophasianus chirugus. Forest birds include Oriental pied hornbill Anthracoceros albirostris, a very rare species for northern Viet Nam. Reptiles include Gecko gecko, Python sp., Embrystoma sp and hawksbill turtle Eretmocheyls imbricata (E) (Scott, 1989). More than 100 bird species have been recorded (Vo Quy, pers. comm., 1988). Some 200 species of fish, 500 molluscs and 400 species of arthropods have been recorded (Scott, 1989).

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CULTURAL HERITAGE

Seventeen sites containing traces of humans have been located on the main island. Stone tools and bones found at the sites indicate that primitive man was living in the caves and grottos on the island between 6,000 and 7,000 years ago. Cai Beo Cave, about 1.5km south-east of Cat Ba

Town has been studied the most intensively and cave was first discovered by a French archaeologist in 1938 (Scott, 1989).

b>LOCAL HUMAN POPULATION

Several thousand people have migrated recently from nearby coastal provinces and mainly live in the south of the island. In 1983, the population of the main island was 7,751, and several villages are included in the park. The principal means of livelihood are forest exploitation, agriculture and fishing. Agricultural crops include rice, although this continues to be imported from the mainland, cassava and fruit such as orange, apple and lychee. About 350 tonnes of fish were landed in 1983 (R.M. Lesaca, pers. comm., 1984; Scott, 1989).

VISITORS AND VISITOR FACILITIES

Access is by boat which takes about 3.5 hours (Scott, 1989). No further information is available.

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SCIENTIFIC RESEARCH AND FACILITIES

Local scientists have conducted preliminary surveys of flora and fauna (R.M. Lesaca, pers. comm., 1984). One small island is used for breeding turtles and another for breeding rhesus monkeys (J. MacKinnon, pers. comm., 1987). The National Institute of Archaeology surveyed Cai Beo Cave some years after its discovery in 1938 and in 1983 the National Institute of Historical Museums and the Historical Museum of Hai Phong continued the research (Scott, 1989).

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CONSERVATION MANAGEMENT

The forests on the island are particularly valued for maintaining the water regime. They also contain important genetic resources and support the food chain of economically important aquatic animals such as fish, shrimp, bivalves and arthropods. The forests are also an important source of pit props for the mining areas in neighbouring Quang Ninh Province. The fishery is important not only for the local people but also for the inhabitants of the adjacent mainland (Scott, 1989). Although much of the island is gazetted as a national park, agricultural activities and forest clearance are both tolerated and actively encouraged by local authorities who envisage expanded production. However, it is not clear to what extent these activities take place within the park itself. A road from the south to the north of the island is under construction and a ferry service to Hai Phong is being implemented (R.M. Lesaca, pers. comm., 1984). A management plan prepared by the Ministry of Forestry was not accepted by local government. A plan for development by local government was not accepted by the Ministry of Forestry. A new management plan was due to be prepared (J. MacKinnon, pers. comm., 1987). The current objectives of the park, as outlined by Scott (1989) are: to preserve natural ecosystems and genetic resources; to restore the native flora and fauna through replanting, re-introduction and habitat improvement; to promote outdoor recreation and environmental education for the general public in collaboration with the tourist industry; and to promote scientific research relevant to the management of the park.

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MANAGEMENT PROBLEMS

Shifting agriculture, over-exploitation of forest resources for firewood and construction timber, and the demand for grazing land for domestic animals have resulted in widespread deforestation and the destruction of natural vegetation. This in turn has had a detrimental effect on fish production and water supply. In 1989 the park authorities were promoting rural planning in order to overcome these problems (Scott, 1989).

STAFF

No information

BUDGET

The total budget of the island in 1983 was approximately US$4-5 million, with about US$100,000 being spent on reafforestation.

LOCAL ADMINISTRATION

No information

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DATE

May 1987, reviewed September 1989

Cuc Phuong National Park, VIET NAM

:

NAME

Cuc Phuong National Park

MANAGEMENT CATEGORY

II (National Park)

BIOGEOGRAPHICAL PROVINCE

4.10.04 (Thailandian Monsoon Forest)

GEOGRAPHICAL LOCATION

Located in the foothills of the northern Annamite Mountains, some 100km south-west of Hanoi. The park comprises parts of Ha Nam Ninh, Ha Son Binh and Thanh Hoa provinces. Approximately 2019'N, 10522'E

DATE AND HISTORY OF ESTABLISHMENT

2 July 1962. Cuc Phuong was declared a Forest Reserve in 1960 and was later upgraded to become the first Vietnamese national park (Trung, 1985).

AREA

25,000ha

LAND TENURE

State

ALTITUDE

150m-637m

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PHYSICAL FEATURES

The park comprises a broad flat valley, between two ranges consisting of limestone hills and cliffs. The valley is wide at the western end but narrows to a canyon in the east. To the south and west the park is surrounded by lower, relatively flat and densely populated land. To the north-west, however, the park is bordered by other forested limestone hills leading to the main mountain ranges. The mountains in the area are mostly limestone of the Triassic period, and large underground river and cave systems are found. Hang Dang Cave measures 3-4m in height and over 30m in width at its mouth (Pfeiffer, 1984). Sub-soils comprise Triassic schist layers

overlaid with limey premium-ouralian secondary soils showing some signs of recent upheaval and intermixing. Ferralitic deposits impart a reddish colour. Top soils are partly red calcareous, with rendzina and sequential black soils on ridges. Forest soils are generally very shallow and show very fast turnover (MacKinnon, n.d.). The ground rock absorbs all surface water and there is no river draining the valley (Pfeiffer, 1984). There are, however, a number of seasonal water courses (MacKinnon, n.d.).

CLIMATE

The climate can be classed as seasonal moist sub-tropical. The mean annual temperature is 21C, with a mean winter temperature of 9C. Maximum and minimum temperatures are 35C and 0.5C, respectively, and frosts probably occur at higher levels. The topography of the park exaggerates both hot and cold temperature extremes. Mean annual rainfall is 2,100mm, with a maximum of 3,300mm recorded in 1963. On average rain falls on 224 days each year. The dry season is November to February, with less than 100mm rainfall in December and January being typical (MacKinnon, n.d.; Pfeiffer, 1984).

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VEGETATION

The primary vegetation of the park is remarkably luxuriant for such a latitude and seasonal climate. Although classified as lowland and sub-montane seasonal evergreen sub-tropical forest, the flatter parts of the valley support a more typical lowland rain forest with a multi-layered canopy, large boled trees up to 70m high, a high incidence of epiphytic ferns and orchids, an abundance of lianes and a high frequency of cauliflory. Such luxuriance is due to the sheltered aspect, high soil fertility and retention of high humidity in the valley. The forest on the karst crests is more specialised, less tall, less luxuriant and more similar to the forests on neighbouring limestone hills. The highest emergent layer attains 40-50m and is characterised by the dipterocarp Parashorea stellata, which may grow to as high as 70m. The second and main layer comprises both semi-evergreen and also a few deciduous species, depending on the degree of shelter enjoyed. Deciduous Terminalia myriocarpa and Pometia pinnata reach 25-30m. A dense canopy is formed by the sclerophyllous evergreen member of the families Fagaceae, mostly Castanopsis and Lithocarpus, Lauraceae such as Cinnamomum, Lindera and Caryodaphnophis, Anacardiaceae such as Drocontomelum, Meliaceae such as Aphanamixis, Aglaia and Chisocheton, Moraceae including Artocarpus and many Ficus and Tiliaceae such as Kydia calicina. The third layer at about 15m is made up mostly of Caesalpinaceae trees. The fourth layer consists of smaller bushes and shrubs mixed with saplings of the taller canopies. This layer is dominated by Sterculiaceae and wild bananas (Musaceae). The fifth layer or undergrowth is made up of herbs, comprising members of Rubiaceae, Araceae, Commeliaceae, Urticaceae and numerous ferns, reaching 2m in height. This whole complex structure is integrated with numerous epiphytic ferns such as Asplenium nidas and Drynaria coronatus, figs Ficus, semi-epiphytic climbers, epiphytic orchids and climbing rattan palms, as well as numerous mosses and liverworts. Cauliferous species Ficus and Artocarpus, numerous buttressing species and others showing permanent flowering and fruiting characteristics are typical. The park also contains numerous species which have practical uses such as spices, edible fruits, nuts, shoots, spices and medicines (MacKinnon, n.d.). The only gymnosperm found at higher altitudes is Podocarpus wallichianus (F. Ramade, pers. comm., 1984). More than 2,000 vascular plants grow in the park (J. MacKinnon, pers. comm., 1987) and several endangered and endemic species are found (Trung, 1985).

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FAUNA

Cuc Phuong lies in West Tonkin, one of the richest faunal regions of Viet Nam, being well-endowed both in term of species diversity and endemism or regional distinctiveness. The park may support as many as 300 species of birds, 65 species of mammals, 37 species of reptiles and 16 species of amphibians. Primates include macaques Macaca mulatta and M. arctoides, gibbon Hylobates concolor (V), Francois' leaf monkey Presbytis francoisi and Pygathrix nemoreus. The nocturnal slow loris Nycticebus coucang also occurs. All primates are now very rare from over-hunting. Carnivores include Asiatic black bear Selenarctos thibetanus and wild dog Cuon alpinus (V), although both are probably not resident, possibly tiger Panthera tigris (E) although there are probably insufficient numbers of prey species to maintain

a resident population, leopard P. pardus (V), clouded leopard Neofelis nebulosa and jungle cat F. bengalensis. Wild boar Sus scrofa occur throughout the park. A large range of smaller mammals is present, including numerous insectivores, bats and rodents and of these the most conspicuous by night are porcupine Hystrix sp. and flying squirrel Petaurista elegans. By day the most conspicuous mammals are small striped squirrel Tamiops, and more rarely black giant squirrel Ratufa bicolor (MacKinnon, n.d.). Also present is an endemic sub-species of belly-banded squirrel Callosciurus erythraeus cucphuongensis, found only in the park, and an endemic sub-species of sub-terranic cave fish (J. MacKinnon, pers. comm., 1987). Results from surveys in April and July 1988 indicated that bar-backed partridge Arborophila brunneopectus, scaly-breasted partridge A. chloropus tonkinensis, silver pheasant Lophura nycthemera beaulieu, red jungle fowl Gallus gallus and grey peacock-pheasant Polyplectron bicalcaratum (subspecies probably ghigii) were all fairly common (Eames et al., 1988). Other common species include laughing thrushes Garrulax spp., red-vented barbet Magalaima lagrandieri and green-eared barbet M. faiostricta, scimitar-billed babblers Pomatoninus spp. and brown hawk owl Ninox scutulata. Large flocks of scarlet minivet Pericrocotus flammeus occur and lesser racket-tailed drongos Dicrurus remifer, racket-tailed magpie Temnurus temnurus and magpies Cissa spp. and white-winged blue magpie Urocissa whiteheadi are characteristic. Bar-bellied pitta Pitta ellioti has been observed (Rozendaal, 1988). Northern migrants such as thrushes, flycatchers, tits, finches, pipits and many others are present during winter (MacKinnon, n.d.).

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CULTURAL HERITAGE

Palaeolithic and neolithic artifacts have been found in some of the caves. Parts of the park are inhabited by the ethnic minority Muong people who are considered amongst the earliest inhabitants of the area (Pfeiffer, 1984).

LOCAL HUMAN POPULATION

Some 2,500 Muong hill people, living in small family groups, until recently occupied several areas at the edge of the reserve. Whilst much of the park is not accessible for their slash-and-burn agriculture, extensive areas have been cleared for production of hill rice (Pfeiffer, 1984), and large areas in the central valley have been levelled and irrigated for productive rice fields. The Muong also hunt wildlife in the park using both modern firearms and traditional cross bows for food as well elimination of predators. Other activities include rearing chickens, pigs and cattle and producing saleable timber from the larger trees (Kemf, 1986; MacKinnon, n.d.; Pfeiffer, 1984).

VISITORS AND VISITOR FACILITIES

The park attracts some 7,000 visitors each year, of whom one-third are foreigners, mostly scientists. An unmetalled road, and narrow trails, provide access to various parts of the park and a 600-rung ladder provides access to the popular Hang Dang Cave. Accommodation includes a guest house which can house about twelve people (Pfeiffer, 1984) and a number of small bungalows (F. Ramade, pers. comm., 1984).

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SCIENTIFIC RESEARCH AND FACILITIES

Research activities include studies of flora, fauna, geology, hydrology and climate, and reafforestation trials have been undertaken. Research facilities include a zoological museum and deer-breeding station (Pfeiffer, 1984; Trung, 1985), and a permanent field laboratory was constructed in 1984. A general description of the ecology of the park is given in Labeyrie (1974). The research station, museum and arboretum were inaugurated in 1969 by President Ho Chi Minh as one of his last official duties (Labeyrie, 1974).

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CONSERVATION MANAGEMENT

Lying at the southern and altitudinally lowest extremity of the hill chain, the park enjoys the added richness of many sub-tropical and tropical lowland species. One of the most interesting features of the park is the luxurious flora, which to some extent can be interpreted as a tropical

refugia with several Malaysian affinities, isolated in the central valley of the reserve. This represents a relict of a period when the tropical forest of Indochina must have extended much further north than today. Interchange with forested areas to the north-west further enhances the value of the park as there is a generally free interchange of flora and fauna, particularly important in view of the park's relatively small size (MacKinnon, n.d.). The park is under the responsibility of the Department of Forest Management and Protection of the Ministry of Forestry and hunting and logging are prohibited, although both still occur. Management activities have in the past focused more on the maintenance of the headquarters facilities, rather than protecting the park. Of the twenty-nine staff assigned to guard duties, ten are based at the headquarters, six on the northern boundary, five on the southern boundary and three at the research station in the centre of the park. Of these guards only one in three has police status and is armed. There appears to be overmanning of the service and maintenance sectors and understaffing for protection duties (MacKinnon, n.d.). Proposals to resettle the Muong outside the park, or to encourage them to practice stable agriculture within a limited area have been made (Pfeiffer, 1984) and are now being implemented as part of an FAO project of assistance to the park. In 1987, 500 people were relocated outside the park. Economic constraints prevent the resettling of the remaining 2,000 people. However, the government hopes to move them as soon as suitable land can be found and housing established. The relocation of these people is the most serious management issue facing the park. A draft preliminary management plan was compiled some years ago (MacKinnon, n.d.) but was not fully implemented. There still remains a need for a comprehensive management plan, including the development of existing facilities (Eames, et al., 1988).

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MANAGEMENT PROBLEMS

The valley has been occupied by limited numbers of Muong hill people for several centuries, but the construction of a road 15km up the valley to the research station has allowed many more people to settle in the area. Extensive areas of the park were converted into terraced ricefields and open field gardens and fuelwood collecting and timber felling has also affected otherwise unopened slopes. Areas of secondary vegetation have developed and South American bamboo Bixa orellana now covers part of the park (MacKinnon, n.d.). The shifting agriculture practised by the Muong constitutes the greatest threat to the park whilst widely practised illegal hunting has lead to several local extinctions. Resettlement of these people is now underway, and shifting cultivation has now been abandoned, although some return to tend existing fields (Eames et al., 1988). Demand from neighbouring agricultural communities for firewood is high and apparently uncontrolled and has resulted in forest clearance around the periphery of the park (MacKinnon, n.d.).

STAFF

The park is managed by the Ministry of Forestry which has a resident Park Director at the headquarters. A staff of nearly 150 individuals includes approximately ten in administration, 34 research forestry engineers, 40 maintenance labourers, 27 service staff, tending the headquarters gardens, arboretum and deer compound, but only 29 specifically involved in guarding the reserve (MacKinnon, n.d.).

BUDGET

Approximately US$50,000 per annum (F. Ramade, pers. comm., 1984)

LOCAL ADMINISTRATION

No information

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DATE

May 1987; reviewed September 1989

Nam Bai Cat Tien National Park, VIET NAM

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NAME

Nam Bai Cat Tien National Park

MANAGEMENT CATEGORY

II (National Park)

BIOGEOGRAPHICAL PROVINCE

4.05.01 (Indochinese Rainforest)

GEOGRAPHICAL LOCATION

Located in southern Viet Nam in Dong Nai Province, Tan Phu District, 120km north-east of Ho Chi Minh City. The eastern boundary is defined by the Dong Nai River. 1020'-1132'N, 10711'-10728'E

DATE AND HISTORY OF ESTABLISHMENT

Established as a Forest Reserve under Decision No. 360/TTg of the Council of Ministers on 7 July 1978. Proposed as a Biosphere Reserve under the Unesco Man and the Biosphere Programme in 1989.

AREA

36,500ha

LAND TENURE

Public possession

ALTITUDE

100-380m

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PHYSICAL FEATURES

The reserve overlooks the flat country of the Mekong floodplain around Ho Chi Minh City from the western foothills of a massif that ultimately rises to Chu Yang Sin (2,405m) some 150km to the north-east. The reserve lies on the southern and western bank of a bend in the Dong Nai River, shortly before it emerges from the foothills of the southern highland massif of the Dihinh and Lang Bian plateaux. The higher ground in the reserve lies to the south and west (G.E. Morris, pers. comm., 1989). A small, permanent freshwater lake and a large area of seasonal lakes and marshes surrounded by seasonally flooded swamp forest is included in the reserve. The riparian lowlands of the Dong Nai River are to the south. About 3,000-5,000ha of these lowlands are flooded during the rainy season (G.E. Morris, pers. comm., 1989) and three

lakes are formed: Fish, Bird and Crocodile. Only Crocodile Lake (30-50ha), in the centre of the reserve, retains water throughout the dry season. A hydro-electric dam has recently been constructed at Tri An on the Dong Nai River, downstream of the reserve. The dam will flood large areas of forest to the south of the reserve, and the shallow end of the reservoir will extend to within a few kilometres of the reserve boundary (Scott, 1989). Underlying geology comprises basaltic and granite hills with basaltic soils, and alluvial soils on the lowlands (F. Ramade, pers. comm., 1984).

CLIMATE

Tropical monsoonal with a pronounced November to April dry season and May to October wet season. Mean annual rainfall is 2,435mm, mean annual temperature is 25.5C and mean relative humidity is 80% (Scott, 1989).

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VEGETATION

No information on the aquatic vegetation is available. The seasonally flooded grassland is dominated by Saccharum spontaneum and Negradia neyraudiana and the swamp forest by Hydrocarpus anthelmintica mixed with Ficus benjamica (Scott, 1989). The wetland is bounded to the east, south and west by dense humid evergreen forest with Dipterocarpus spp., such as D. alatus, D. dyeri and Anisoptera costata, as well as Shorea spp. and Hopea spp., coinciding with deep alluvial soils at lower altitudes. Hills, and shallow latosols, support semi-evergreen and deciduous forest with Lagerstroemia calyculata and Leguminosae such as Afzelia xylocarpa, Dalbergia bariensis, D. cochinensis and Pterocarpus pedatus. Extensive areas of pure bamboo brakes Bambusa procera and B. arundinaceae and other species are found to the north and south. Some 445 species, in 300 genera and 109 families have been recorded including endemic Dipterocarpus bandii and Dracontomelum schmidii (Trung, 1988). A high diversity of orchids Orchidaceae has been found, particularly in the wetland area, with some 62 species in 28 genera recorded, including 17 Dendrobium spp., six Sarcanthus spp., four Eria spp. and four Bulbophyllum spp. (Tam, 1988). Land to the north is cultivated, mainly for rice production (Scott, 1989).

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FAUNA

There is a strong possibility that Javan rhinoceros Rhinoceros sondaicus (E) occurs. Five individuals were thought to be present in 1983, but recent surveys indicate that perhaps 10-15 animals survive in the area (Schaller, 1989). The forest provides a refuge for a number of other threatened or unusual species including black gibbon Hylobates concolor (I), elephant Elephas maximus (E), tiger Panthera tigris (E), leopard P. pardus (V), clouded leopard Neofelis nebulosa, gaur Bos gaurus (V), banteng B. banteng, deer Cervus spp., Indian muntjac Muntiacus muntjak and wild boar Sus scrofa. This is the only location in mainland South-east Asia where southern douc langur Pygathrix nemaeus nigripes is still recorded (J. MacKinnon, pers. comm., 1987). Reports of kouprey Bos sauveli (E) being found in the reserve (Trung, 1985) are disputed (MacKinnon, 1986). Crocodile lake was formerly a breeding area for a large number of Siamese crocodile Crocodylus siamensis (E), possibly numbering thousands, but the species is now uncommon. Other reptiles include monitor lizard Varanus sp. (Scott, 1989) and a preliminary list of amphibians and reptiles is given by Thang (1988). Over 130 bird species have been recorded out of an estimated total of 230 resident and wintering species (G.E. Morris, pers. comm., 1989). Avifauna includes peafowl Pavo muticus (V), Siamese fireback Lophura diardi (K), endemic Germain's peacock-pheasant Polyplectron germainii (K), endemic red-vented bulbul Magalaima lagrandieri, Indian darter Anhinga melanogaster, milky stork Mycteria cinerea (G.E. Morris, pers. comm., 1989; Morris, 1987; Vo Quy, pers. comm., 1988) and a wide variety of resident and migratory waterfowl. Groups of 10-20 lesser adjutant storks Leptoptilos javanicus have been observed, and the species is said to breed in the centre of the marsh along with various herons and egrets. Woolly-necked stork Ciconia episcopus has also been reported in recent years. Other waterbirds are listed in Scott (1989). Some migratory ducks are present during winter. The reserve is also rich in birds of prey including several species associated with the wetlands, such as osprey Pandion haliaetus, black kite Milvus migrans, brahminy kite Haliastur indus, grey-headed fishing eagle Ichthyophaga icthyaetus, crested serpent eagle Spilornis cheela and red-legged falconet Microhierax caerulescens (Scott,

1989). An annotated but incomplete bird species list is given by Morris (1988).

CULTURAL HERITAGE

No information

LOCAL HUMAN POPULATION

Stieng, Ma, Ta Lai and Cho'ro tribes have lived in the central valley of the reserve for several centuries, and several hundred people are currently resident (Morris, 1987). Principal means of livelihood are fishing and hunting within the reserve and fishing, hunting and shifting agriculture in surrounding areas (Scott, 1989). The adjacent areas of Dong Nai Province on the east bank of the river, and of Lam Dong Province on the north bank, are New Economic Zones, created since 1975. The ethnic Vietnamese agricultural population is still growing by immigration and has cleared much of the forest outside the reserve. There are plans to resettle the 100-200 Vietnamese in the extreme north of the reserve who are growing sugar cane and rice on about 3,000ha (G.E. Morris, pers. comm., 1989).

VISITORS AND VISITOR FACILITIES

The reserve is accessible all year round and development of tourism is envisaged for the future (Thai van Trung, pers. comm., 1989).

SCIENTIFIC RESEARCH AND FACILITIES

Studies to compare primary forest with secondary forest damaged by defoliants in the war have been undertaken (F. Ramade, pers. comm., 1984). Several faunal and botanical studies have been undertaken and the Forest Ecology Group of the Botanical Museum in Ho Chi Minh City has carried out many investigations in the reserve since 1982 (Scott, 1989). From April 1977 to January 1979, the Zoological Investigation Group of the Forestry Department's Institute of Investigation and Management carried out basic research in the reserve. Preliminary zoological surveys have also been undertaken by the Faculty of Biology of the University of Ho Chi Minh City during May 1984, April 1984, April 1987 and November 1987. This work indicates that Nam Ba Cat Tien supports a wide variety of fauna characteristic to the region, which, in the light of development activities in the immediate environs, is increasingly concentrating in the protected area. However, these studies have tended to focus on relatively limited areas of the reserve and there is no full inventory of flora and fauna (Trung, 1988). An observation platform was constructed at the marsh in 1987 and there are plans to build a museum and research station capable of accommodating twenty people (Scott, 1989).

CONSERVATION MANAGEMENT

The area is valued as a representative of the types of forest largely destroyed by chemical warfare (Trung, 1985) and it has considerable potential for scientific research, conservation education and tourism. The recent confirmation of the presence of Javan rhinoceros emphasises the importance of Nam Ba Cat Tien, for the only other location in which the species is known to exist is Ujong Kulon National Park on the western tip of Java. In response the Vietnamese government has established a working group to promote the conservation of the species (Schaller, 1989). Protection of the reserve has been entrusted to the Dong Nai Provincial Forestry Department. The forestry protection staff are mainly concerned with the prevention of fires and illegal felling of trees, and there is no management of the wetland (Scott, 1989). Following revision of staffing arrangements in 1988 the best forest areas in the east may now have the most effective protection of any reserve in the country (G.E. Morris, pers. comm., 1989). Five guard posts have been established at Daklua, Da Co, Ben Cu, Nui Tuong and Ta Lai, all on the banks of the Dong Nai River (Trung, 1988). In 1986 a new track was created from the entrance to the control post at Da Co in the extreme east, and to Crocodile Lake. Traffic on a motor track through the reserve is restricted to sugar cane transport, which is projected to cease in 1989 (G.E. Morris, pers. comm., 1989). It is proposed to relocate and settle the Ta Lai and Cho'ro tribesmen outside the reserve (Thai van Trung, pers. comm., 1989), and in 1986 some farmers living in the south-east were relocated across the boundary (Morris, 1987). Areas on either side of the road from Ben Cu to Talai, in the south of the reserve, which had been cleared for rice and sugar cane cultivation are now being reforested using techniques developed at the nearby Ma Da forest. This entails establishing native hardwood species under a protective canopy of Acacia spp. (Thai van Trung, 1988). The

techniques of reforestation at Ma Da, following chemical defoliation, is further discussed by Kemf (1988). There have been proposals to try re-establish original grassland cover in areas near Crocodile Lake for the benefit of grazing wildlife (G. E. Morris, pers. comm., 1989). The site has been proposed for national park status, and biosphere reserve status under the Unesco Man and the Biosphere Programme (Trung, pers. comm., 1989). Principal recommendations emerging from a National Workshop, supported by Unesco, included termination of all economic activities within the reserve; an increase in reserve staff and the establishment of more control posts; and the extension of the reserve to include the wetland areas of Bac Cat Tien to the north-east. The Ministry of Forestry has made plans for the establishment of a National Park during the 1986-1990 five-year plan (Scott, 1989). The extent to which these recommendations and proposals have been implemented is not known.

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MANAGEMENT PROBLEMS

Excessive hunting and fires due to honey collection during the dry season are the only threats to the wetland. The principal threat to the remainder of the reserve is human population growth and consequently increased exploitation of the forest and its wildlife for timber, food and profit. Most of the area was sprayed with chemical defoliants during the war and since then much of the forest has been heavily exploited for timber and cleared for agriculture (Scott, 1989). Following the war North Vietnamese army units were allowed to plant rice and sugar cane in the north and south-east and also outside the reserve to the south of the Dong Nai River. Since then the human population has increased considerably and populations of large animals such as rhinoceros, elephant, gaur, crocodile and macaques have declined. Wardening is insufficient and in 1987 there was still widespread shooting and fishing in the wetland areas and burning of adjacent grassland (G.E. Morris, pers. comm., 1989) as well as illegal felling of valuable timber trees (Morris, 1987). The growing population outside the reserve will be a cause for concern unless access across the river can be regulated (G.E. Morris, pers. comm., 1989).

STAFF

Thirty-five forest wardens for forest protection (Trung, pers. comm., 1989).

BUDGET

In December 1987 the Dong Nai Forestry Department agreed to set aside as much as 10% of its profits from forest exploitation in the Province for the development of the reserve (Scott, 1989).

LOCAL ADMINISTRATION

Dong Nai Forestry Department

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DATE

May 1987; reviewed September 1989

Yok Don Reserve (Khu Bao Ton Thien Yok Don) VIET NAM

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NAME
Yok Don Reserve (Khu Bao Ton Thien Yok Don)

MANAGEMENT CATEGORY
IV (Managed Nature Reserve)

BIOGEOGRAPHICAL PROVINCE
4.05.01 (Indochinese Rainforest)

GEOGRAPHICAL LOCATION
Lies within the Easup District of Daklak Province in central southern Viet Nam. The western boundary is coincident with the international border with Kampuchea and is defined by the Prek Dak Dam River. The boundary is also defined by the Srepok River to the north and east and by the boundary between Daklak and Dakmil provinces to the south. 1230'-1301'N, 10730'-10750'E

DATE AND HISTORY OF ESTABLISHMENT
1988. The precise legal status is not clear (Laurie et al., 1989).

AREA
57,500ha

LAND TENURE
No information

ALTITUDE
The general elevation is 200m, with only two hill formations rising above 300m, namely Yok Da (474m) and Yok R'Heng in the north-west and Yok Don (482m) in the south-east (Laurie et al., 1989)

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PHYSICAL FEATURES
Lies in the south-western part of the Central Highlands (Tay Nguyen) and is largely flat with meandering river valleys flowing generally north or east to the Srepok River. The main rivers are Dak Ken and Dak Na which both flow north into the Srepok River. There is a permanent lake at the western end of the Yok Don massif. The bedrock predominantly comprises Jurassic sediments, with an igneous intrusion of mainly diorite along the Srepok River west of Dak Ken. Soils are mainly grey or yellow-red, rich in sialite and ferralite. There are slabs of red clay near Yok Don and extensive silt deposits near the Srepok River and several areas are used by wild cattle and other animals as mineral licks (Laurie et al., 1989).

CLIMATE
Yok Don has a tropical monsoon climate, with a well defined dry season from October to April. Mean annual rainfall is 1540mm and the annual rainfall during 1982-1985 ranged from 1,587mm to 2,037mm at Ban Don, located immediately beyond the north-east boundary, on the opposite bank of the Srepok River. Some 76% of rain falls between May and September, whilst

only two or three days each month are likely to be wet during January and February. The mean monthly temperature at Ban Don varies between 24C and 26C, with a maximum in May and minimum in January. Mean annual relative humidity is about 60%, falling to 40% in March and increasing to about 75% in August and September. There is a mean of about 2,500 hours of sunshine annually, or about 84% of potential hours of sunshine. Cloud cover is at maximum between May and September, with 5/8 to 7/8 cover (Laurie et al., 1989).

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VEGETATION

The following account is drawn exclusively from Laurie et al., (1989). The dominant vegetation type is dry dipterocarp (deciduous) forest, in which the trees are widely spaced with extensive grass cover between them. This is interspersed with grassland, and tropical semi-evergreen forest along the rivers and on the higher ground. All these vegetation types, particularly the grassland and the open dipterocarp forest, have been heavily influenced by fire. The dominant trees in the open dipterocarp forest are Dipterocarpus obtusifolius (dau trabeng), D. intricatus (dau long), D. tuberculatus (dau dong), Shorea obtusa (ca cach) and Pentacme siamensis (cam lien). Dipterocarpus alatus (dau nuoc) and Terminalia tomentosa (chieu lieu den) (Combretaceae) are also common. All the above are valuable timber trees. Other trees include Dillenia spp., Syzgium spp. and Bombax sp. Tree heights rarely exceed 20m. Small bamboo Arundinaria falcata is common in the more densely shaded areas. Elsewhere the ground cover consists of grasses such as Arundinella setosa, Heteropogon contortus, Themeda triandra, Imperata cylindrica, Allopteropsis semialata and many others, and young dipterocarp saplings. Shrubs include Bauhinia malbaricum, Grewia asiatica and Zizyphus spp. In the open areas there is a wide variety of grasses (more than 60 species recorded) and sedges Cyperus spp. and Fimbristylis spp. These open areas often surround waterholes which are used by wild cattle for drinking and wallowing. On higher ground and along rivers the variety of tree species increases. Characteristic species on the hills include dipterocarps Hopea odorata (sao den) and Shorea siamensis (sen) and Terminalia belerica, T. tomontosa, Cassia siamea and Artocarpus spp. Cycads and tree ferns also occur in these forests. Along rivers are thickets of larger bamboos Bambusa arundinaceae and B. beecheyna. Typical tall riverine trees include Lagerstroemia calyculata and L. augustifolia (bang lang), Tetrameles nudiflora, Pahudia cochinchinensis (go do), Sindora cochinchinensis (gu mat) and Pterocarpus pedatus (giang huong) up to 30m tall. A total of 464 plant species, from 97 families, has been recorded, and a detailed description and classification of the vegetation is given in the management document (Sung and Huynh, 1986), and general information on Tay Nguyen (Central Highlands) vegetation is given by Loc (1983).

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FAUNA

Lists of 58 mammal species, 136 bird species, 35 reptile species and 12 amphibian species recorded in the reserve are given in the management plan (Sung and Huynh, 1986). Large carnivores include tiger Panthera tigris (E), leopard P. pardus (T), sun bear Helarctos malayanus and wild dog Cuon alpinus (V). The most common large ungulates include banteng Bos javanicus (V), barking deer Muntiacus muntjak, sambar Cervus unicolor and wild pig Sus scrofa. The status of kouprey Bos sauveli (E), Eld's deer Cervus eldi and hog deer Axis porcinus is unclear. Amongst the birds, green peafowl Pavo muticus (V) is of particular interest, and appears to be relatively common. Silver pheasant Lophura nycthemera, Siamese fireback L. diardi (K) and Germain's peacock pheasant Polyplectron germanii (K) also occur. Other noteworthy birds include red-headed vulture Sarcogyps calvus, woolly-necked stork Ciconia episcopus, lesser adjutant stork Leptoptilus javanicus, green imperial pigeon Ducula aenea, Aleaxandrine parakeet Psittacula eupatria and racket-tailed treepie Temnurus temnurus. The most common reptiles appear to be agamid lizards of the genera Calotes and scincids of the genus Mabuya. Flying lizards Draco sp. and monitor lizards Varanus salvator are present. Siamese crocodile Crocodylus siamensis (E) still occur in the Srepok River, but are now rare (Laurie et al., 1989). A partial species list is given in Laurie et al. (1989).

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CULTURAL HERITAGE

No information

LOCAL HUMAN POPULATION

There about 1,500 villagers of Ede, Muong, Giarai and Lao origins at or near Ban Don, and about 500 employees of the Forestry stations at Ban Don and Bon Drang Phok, to the immediate north, making 2,000 altogether. Approximately 1,000 buffalo, 300 cattle and 20 domestic elephants are kept. Considerable numbers of people are engaged in farming in the east of the reserve and there is widespread collection of resin from dipterocarp trees, as well as collection of honey, bamboo shoots and a wide variety of medicinal plants. Areas have also been cleared along the banks of the Dak Ken River in the south by hunters and resin collectors, for the cultivation of tobacco and taro. These are then harvested on subsequent visits (Laurie et al., 1989).

VISITORS AND VISITOR FACILITIES

The principal means of access to the reserve is by road from Buan Ma Thuot to Ban Don. There are no motorable roads within the reserve, although it is possible to travel by small boat along the Srepok River, and there is a motorable road from Ban Don via Bon Drang Phok to the Kampuchean border. The most convenient means of transport within the reserve is by elephant (Laurie et al., 1989). Although there are at present no tourists, the development of various facilities to accommodate up to 10,000 visitors annually has been envisaged in the 1986 management plan (Sung and Huynh, 1986)

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SCIENTIFIC RESEARCH AND FACILITIES

As part of an international effort to save the kouprey from extinction (MacKinnon and Stuart, 1989), an initial survey for the species was made in the reserve during April 1989. Results of the survey suggested that there are few if any kouprey present, although individuals may migrate into the reserve from Kampuchea during the wet season (Laurie et al., 1989).

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CONSERVATION MANAGEMENT

There has been a hunting ban in Easup District since 1984 and commercial logging ceased in the present reserve area in 1986. The reserve headquarters lie on the west bank of the Srepok River opposite Buon Jeng Lan in the extreme east. There is also a reserve building on the bank of the Srepok River, opposite Ban Don. The management document (Sung and Huynh, 1986) suggests various development projects, the main priority being placed on office development. The proposals include: construction of the reserve headquarters and recruitment of an office staff of 45; construction of three guard posts at Jeng, Dak S'sot and on the border with Kampuchea; establishment of a zonation system; provision for sport hunting of game species; construction of footpaths and tree hides for tourists and 'development' of Yok Don Lake; provision of tourist activities such as boating and elephant riding; construction of a dam on Dak Na and Dak Nor rivers to provide water during the dry season; provision of controlled harvesting of medicinal plants, bamboo shoots and resin; research on local ecology and medicinal plants; and a fire prevention and control programme. This programme is likely to be revised in late 1989 to more fully accommodate conservation priorities (Laurie et al., 1989).

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MANAGEMENT PROBLEMS

There is widespread hunting, although it does not appear to be very intense, and elephants are still captured within the reserve (Laurie et al., 1989).

STAFF

Comprises one full time employee, who acts as Director, and a further 21 who are either temporarily employed or shortly to be employed. The Director is employed by the Easup District Forestry, Agriculture and Industry Union (Laurie et al., 1989).

BUDGET

No information

LOCAL ADMINISTRATION

Easup District Forestry, Agriculture and Industry Union

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September 1989
