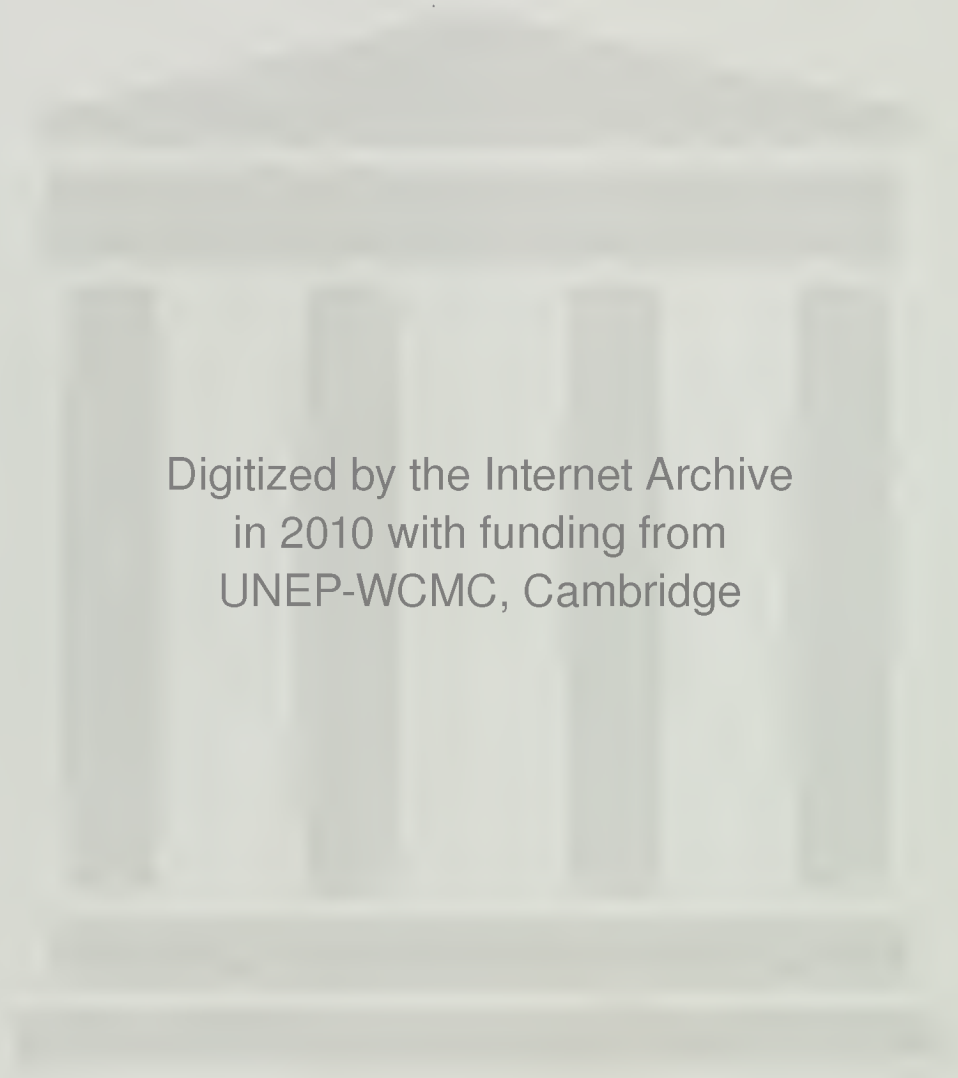
A GLOBAL OVERVIEW OF FOREST PROTECTED AREAS ON THE WORLD HERITAGE LIST

A Contribution to the Global Theme Study of World Heritage Natural Sites

Prepared by Jim Thorsell and Todd Sigaty
Natural Heritage Programme
IUCN
Gland, Switzerland
September 1997

WORLD CONSERVATION MONITORING CENTRE

IUCN
The World Conservation Union



A GLOBAL OVERVIEW OF FOREST PROTECTED AREAS ON THE WORLD HERITAGE LIST

A Contribution to the Global Theme Study of World Heritage Natural Sites

Prepared by Jim Thorsell and Todd Sigaty
Natural Heritage Programme
IUCN
Gland, Switzerland
September 1997

Working Paper 1: Earth's Geological History - A Contextual Framework Assessment of World Heritage Fossil Site Nominations

Working Paper 2: A Global Overview of Wetland and Marine Protected Areas on the World Heritage List

Working Paper 3: A Global Overview of Forest Protected Areas on the World Heritage List

Further volumes (in preparation) on biodiversity, mountains, deserts and grasslands, and geological features.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This working paper provides a global overview of the current coverage of forest protected areas on the World Heritage List and suggests potential forest areas which may merit future nomination to this prestigious List. Despite the essential role that forests play in climate control, flora and fauna habitat, and in the lives of the human population, they continue to be one of the most threatened biomes. Recent estimates indicate that nearly 50% of the world's original forest cover has been lost and over 4,000 tree species have been listed by IUCN as globally threatened.

In 1996, IUCN's Natural Heritage Program began a project to prepare a global strategy for natural World Heritage sites. As part of this project, this working paper on forests is the third in a series of global overviews of the various biomes of the world (e.g. wetlands, forests, mountains, deserts, grasslands, etc.). These theme studies involve close co-operation with the World Conservation Monitoring Centre (WCMC) and have benefitted from the support of Australia's Department of Environment.

This working paper identifies the 61 forest protected areas currently on the World Heritage List, representing 39 countries and over 50 million ha of protected area. It further locates 25 potential forest protected areas from various global regions which may merit future World Heritage nomination. The 61 sites are categorised by forest type (tropical moist, tropical dry, sub-tropical, temperate and boreal) and biogeographical realm and numbered to provide the reader easy reference to the tables, figures and maps.

The annex includes a summary description of all 61 forested protected sites on the World Heritage List cross referenced with their relations with other international programs and conventions (e.g. Biosphere Reserves and WWF Global 200 Ecoregions). Although Ramsar is not mentioned, 37 of the 61 sites in this overview were categorised in working paper 2 as World Heritage sites with wetland and marine values. A gap analysis of the sites listed in this overview indicates that a limited number of forest protected areas presently exist on the World Heritage List within Amazonia (Neotropical Realm), portions of the Indomalayan Realm, the boreal regions of the Palearctic realm, and no sites exist in the Oceanian Realm (Papua New Guinea and the North and South Pacific).

It is hoped that this overview will assist IUCN in making comparative evaluations and provide the World Heritage Committee with a firmer scientific basis for making decisions on new World Heritage nominations. It will also provide State Parties with a global perspective which is useful when identifying potential World Heritage properties in their territories.

RESUME

Ce document de travail présente un bilan au niveau planétaire des forêts protégées qui se trouvent sur la Liste du patrimoine mondial. Des forêts qui pourraient mériter d'être inscrites sur cette Liste prestigieuse y sont proposées.

Les forêts jouent un rôle essentiel dans la régulation du climat, servent d'habitat pour la flore et la faune et influencent considérablement la vie des populations humaines. Elles demeurent cependant l'un des biomes les plus menacés. Près de 50% de leur superficie mondiale originelle a été perdue et plus de 4000 espèces d'arbres ont été inscrites par l'UICN sur la Liste des espèces menacées.

En 1996, le Programme pour le patrimoine naturel de l'UICN a entrepris un projet dont le but est d'élaborer une stratégie mondiale pour les sites naturels du patrimoine mondial. Produit dans le cadre de ce projet, ce tome sur les forêts est le troisième d'une série de bilans mondiaux relatifs aux biomes de la planète (par exemple, zones humides, forêts, montagnes, prairies). Ces études thématiques sont réalisées en étroite coopération avec le "World Conservation Monitoring Centre" (WCMC) et à l'aide du soutien généreux du Département de l'environnement d'Australie.

Actuellement, 61 forêts se trouvent sur la Liste du patrimoine mondial (y compris 30 en région tropicale), représentant 39 pays et plus de 50 millions d'hectares d'aires protégées. Ces sites sont regroupés en catégories selon le type de forêts qu'ils comprennent (forêt tropicale humide, tropicale aride, subtropicale, tempérée ou boréale) et leur appartenance biogéographique, afin de permettre au lecteur de se référer aisément aux tables et plans. Une brève description des 61 forêts du patrimoine mondial se trouve en annexe et met en évidence leur relation avec d'autres programmes et conventions (par exemple, Réserves mondiales de la Biosphère, Ecorégions mondiales 200 de WWF).
L'analyse démontre que peu de forêts appartenant au patrimoine mondial se situent en Amazonie, dans le Pacifique Sud, certaines régions du Sud-Est asiatique, et les régions de forêts boréales.

Cet inventaire devrait assiter l'UICN à effectuer des évaluations comparatives et devrait fournir au Comité du patrimoine mondial une base scientifique plus solide pour ses prises de décisions relatives aux nominations à venir pour le patrimoine mondial. Les Etats Parties auront aussi à leur disposition une perspective mondiale qui les assistera à identifier des sites potentiels pour le patrimoine mondial au sein de leur territoire.

A GLOBAL OVERVIEW OF FOREST PROTECTED AREAS INSCRIBED ON THE WORLD HERITAGE LIST

"Of vast circumference and gloom profound
This solitary Tree! - a living thing
Produced too slowly ever to decay;
of form and aspect too magnificent
to be destroyed."

From "Yew Trees," William Wordsworth, 1770-1850.

I. Introduction

In 1996, IUCN's Natural Heritage Program initiated a project to prepare a global strategy for natural World Heritage sites. It was foreseen to prepare global overviews on World Heritage site coverage in the various biomes of the world (e.g. forests, wetlands, mountains, grasslands, etc.) and an overview of biodiversity values of World Heritage sites. The project would involve close co-operation with the World Conservation Monitoring Centre (WCMC) where the world's major biodiversity and protected area database is located. Support for the conduct of these theme studies was generously provided by Australia's Department of Environment.

The first in this series of working papers was the global theme study on "Earth's Geological History - A Contextual Framework for Assessments of World Heritage Fossil Site nominations." This report was prepared over the course of a year by Professor Rod Wells of Flinders University and was made available to the World Heritage Committee in December, 1996. It provides a temporal view of where fossil records best display the record of life on earth (natural heritage criteria i).

The second in the series was an overview of World Heritage natural sites with wetland and marine values prepared by IUCN's Natural Heritage program in September, 1997. It reviews 77 World Heritage sites with significant wetland and marine values and describes over 40 wetland and marine areas which may merit consideration for future nomination on the World Heritage List. Many of these potential sites are located in areas with minimal World Heritage protection at the current time.

This working paper is the third in the series and focuses on forest protected areas on the World Heritage List. It was first initiated at the "International Conference on World Heritage Forests," held in Queensland in September, 1996, with a background paper by Jim Thorsell and Jim Paine. It will also serve as useful background to the "World Heritage Convention as an International Instrument for Biodiversity Conservation in Tropical Rainforests", to be held in Brestagi, Northern Sumatra, Indonesia in May, 1998.

The purpose of this working paper is twofold: first, to inventory forest protected areas on the World Heritage List which provides an overview of the current "coverage;" and second, to locate potential forest protected areas from various global regions for future inscription on the World Heritage List (gap areas).

This overview identifies 61 forest protected areas on the World Heritage List and describes 25 forest protected areas which may merit consideration for future nomination. Thirty-seven of the 61 forest protected areas on the World Heritage List were included as World Heritage Sites with wetland and marine values (working paper #2), 15 categorised as major wetland sites and 22 as secondary. This overview will assist IUCN in making comparative evaluations and provide the World Heritage Committee with a firmer scientific basis for making decisions. It will also be of interest to State Parties as it will provide them with a global perspective which is useful when identifying potential World Heritage properties in their territories.

II. What are forests?

There are probably as many definitions of "forests" as there are sources. Although we all know a tree when we see it, defining a forest by type and amount of forest cover are difficult and oft-debated tasks. Moreover, a forest is a complex system of numerous species and ecological processes. Despite the biodiversity within forest ecosystems, most statistics have focused primarily on the amount of forest cover. The Food and Agricultural Organisation of the United Nations (FAO), in previous reports have defined forests as "ecological systems with a minimum of 10% crown cover of trees and/or bamboos, generally associated with wild flora and fauna and natural soil conditions and not subject to agricultural practices." In the case of developed countries, a forest is often defined by a minimum of 20% forest cover. The density and quality of species are also important characteristics to consider in defining forests, a topic which will be addressed in a future working paper on biodiversity values of World Heritage sites. For the purposes of this working paper, forest protected areas on the World Heritage List were included if the nominations of the respective State Parties or WCMC forest data revealed a substantial amount (defined in section III) of forest cover within the site.

According to recent estimates, over 35 million sq. km of forest cover remain in the world. Tropical forests comprise nearly 50% (17 million sq. km) of the remaining global forest, but have the highest rate of deforestation (4-8%) of the forest biomes. Central and South America contain 60% of the world's rainforest with the remaining portion being divided evenly between West Africa, Southeast Asia and the South Pacific. Tropical forests are located within an equatorial belt between 4 degrees north and south of the equator in areas with a constant temperature of 18-30 degrees Celsius and an evenly distributed rainfall of over 2,000m per year. This overview identifies tropical moist and tropical dry forest protected areas, which provide habitat for nearly 80% of the world's species.

Temperate forest comprises 8 million sq. km of forest cover and occurs within a belt between 32 and 60 degrees latitude. Temperate forests vary in composition and conditions, but usually contain open forests with beech, maple, oak and other deciduous trees. Temperate rainforest contains evergreen moist and deciduous trees and exists in a few coastal regions of the temperate zone. Only pockets of virgin growth temperate forests remain (2 to 3%) in Central Europe, Asia and North America, making them one of the most threatened forest biomes.

The remaining 10 million sq. km of global forest cover are the coniferous forests in the boreal zone which occur in the northern latitudes across Canada,

Alaska, Scandinavia and Siberia above the temperate broad leaf zone. The boreal forest is not a uniform expanse of trees, but merges with tundra vegetation. Each of these forest biomes are important resources for local populations and as habitat for numerous flora and fauna species.

III. Criteria

This working paper attempts to identify the forest protected areas on the current World Heritage List. As of 1996, 123 natural and mixed (natural/cultural) sites comprise the World Heritage List representing 62 countries. Many of these sites contain some forest, but only sites containing forest protected areas with significant forest cover were selected for this overview.

The indication of whether or not the amount of forest cover within each site was significant was based primarily on two criteria. The first, and most important source, was information regarding the type and amount of forest provided by the State Party in the nomination for World Heritage designation. The second source of information used to make this decision was derived from the WCMC database for each World Heritage site and forest database files. In the database files, forest cover is calculated on the basis of whether a 8km x 8km grid cell is more than 50% forested. In order to make mangrove forests, mixed mountain forest areas, and island system forest areas visible on a global scale, any grid cell containing these categories was classified as being entirely forested. A site was included in this overview if either or both of these sources revealed 20% or more forest cover within the site or if the amount of forest cover was a primary reason why the site was nominated and inscribed on the World Heritage List. This data can be unreliable since World Heritage sites represent small areas when overlayed with global forest data plots, but improved forest data for each World Heritage site is being completed by WCMC and will be included in future revisions of this working paper.

Based on this selection process, this working paper lists and describes 61 of the 123 World Heritage sites as containing significant forest protected areas. Therefore, for each of the 61 sites, either the information provided by the State Party in the site nomination stated that the forest component was a significant characteristic of the site or the forest data identified forest cover greater than 20% of the total size of the World Heritage site. When necessary, information on forest cover and forest type was also obtained from published articles on particular sites, as well as from observations and reports made from World Heritage site visits.

In order to present a harmonised overview, a broad, pragmatic and global forest classification system has been used for this working paper. Each national data set or map was translated into five forest classes: tropical moist; tropical dry; sub-tropic; temperate; and boreal. Moist forests in the tropics, which are synonymous with rain or humid forests, include lowland and montane rainforest, and seasonal monsoon forests. Dry forests generally seasonally deciduous, but may also include pine forests, particularly in Central America and the Caribbean. If a site contained a portion of two forest types or a type not listed, it was listed in the category with the largest percentage (Tables 2-6), however, a complete description of all forest types in each site has been included in the Annex 1.

Most World Heritage sites represent a large land area with multiple natural values. For this reason, many sites contain some forest area, but were not included in this inventory since the data revealed less than 20% forest cover within the site and/or the forest area was not a significant characteristic when considering the World Heritage site in its entirety. Examples of World Heritage sites not included in this overview for such reasons include: Tatsheshini-Alsek/Kluane National Park/Wrangell-St. Elias National Park and Reserve/Glacier Bay National Park (white boreal forest); Mammoth Caves National Park (84 tree species and one of last remaining examples of eastern North America ancient forest); Wulingyuan Scenic and Historic Interest Area (maple, pine, oak and Chinese plum yew); The Lapponian Area (over 100,000ha of pristine pine and fir forest); Volcanoes of Kamchatka (boreal forest); Komodo National Park (tropical monsoon and quasi cloud forests); Grand Canyon (over 100,000ha of temperate forest); and Huascaran National Park (highest altitude tropical rain forest in the world). In fact, almost all natural World Heritage sites contain some forest component, however, only those considered highly significant have been included in this document.

IV. Format of the Overview

The Overview is divided into two sections:

1. Forest protected areas on the World Heritage List (61 sites)

These 61 sites were categorised as forested protected areas on the World Heritage List based on the criteria stated above in section III. Although many sites were inscribed on the World Heritage List for meeting several criteria, the forest value for these sites was listed in the site nomination by the respective State Party as a major reason for inscription on the World Heritage List.

2. Analysis of forest protected areas on the World Heritage List - summary tables, figures and maps

To assist in analysis, the following tables and figures are attached:

Table 1 Forest protected areas on the World Heritage List
Table 2 Tropical moist forest protected areas on the World Heritage List
Table 3 Tropical dry forest protected areas on the World Heritage List
Table 4 Sub-tropical forest protected areas on the World Heritage List
Table 5 Temperate forest protected areas on the World Heritage List
Table 6 Boreal forest protected areas on the World Heritage List
Table 7 Forest protected areas inscribed on the List of World Heritage in Danger
Table 8 Forest regions that contain protected areas which may merit consideration for World Heritage nomination
Figure 1 Distribution by realm of forest protected areas on World Heritage List
Figure 2 Total size of World Heritage sites with forest protected areas by realm
Figure 3 Distribution by size of World Heritage sites with forest protected areas
Figure 4 Number of tropical forest protected areas on the World Heritage List and total size of sites by biogeographic realm

Attached are also seven maps which show the location of forest protected areas on the World Heritage List. On a global scale all but the very largest World Heritage sites are too small to be represented clearly. For this reason, seven maps of the forest protected areas on the World Heritage List have been prepared, each representing biogeographic realms: Nearctic; Palearctic (two maps); Afrotropical; Indomalayan; Neotropical; and (Oceanian Australian; and Antarctic mapped together). These maps show the location of forested protected areas on the World Heritage List within each realm. Each map categorises the forest cover into tropical moist, tropical dry, sub-tropic, temperate, and boreal. World Heritage sites are listed according to their corresponding number in Annex 1 and Tables 2-6. Each site is listed by name in the map legend.

V. Data Sources

Decisions regarding which World Heritage sites to include in the overview were primarily based on information extracted from the WCMC database. The database contains a record for each World Heritage site and includes discussion on the physical features, vegetation, flora and fauna, and conservation value of each site. WCMC drafts and updates the Data Sheets on the database based on materials received from the State Party and other sources. Reference was also made to *Global Biodiversity: Status of the Earth's Living Resources* (1992), a WCMC publication. Data for the amount of forest within each World Heritage site was compiled from the WCMC database and GIS files which attempt to present a comprehensive picture of the extent of the remaining global forest cover and its relation with World Heritage protection. The data are accurate to approximately 1:1,000,000 scale and are based on maps and digital files from national and international sources from the early 1980s to early 1990. Much of this data is difficult to to overlay with World Heritage sites, but has recently been updated in World Conservation Monitoring Centre. Iremonger, S., C. Ravilious and T. Quinton (eds.) (1997) *A Global Overview of Forest Conservation*. CD-ROM. WCMC and CIFOR, Cambridge, U.K. The original sources differed greatly in their accuracy, classification, and the definition of the term "forest". There were errors in the amount of forest within certain World Heritage sites and comments regarding total forest coverare are invited to assist in a future update of this working paper. New data from WCMC will better define the amount of forest cover within each World Heritage site and will be printed in future revisions of this working paper.

In compiling this overview several IUCN publications were used, including *Review of the Protected Areas System in the Indomalayan, Oceanian and Afrotropical Realms* (1986); *Conservation Atlas of Tropical Forests* - vols I, II, and III (1991); *The World Heritage Convention, Twenty Years Later* (1993); *IUCN Red Book* (1994); *Paradise on Earth* (1995), *The World's Centres of Plant Diversity* - vol. I, II, III (1995); as well as articles, conference proceedings and secondary sources. Other valuable resources were the UNESCO publication of current Biosphere Reserves; "Forests in a Changing World," by Jeff Sayer (1992); *Nature's Last Refugees* (1992) by Robert Burton; FAO's *Tropical Forest Action Plan*; *Nature in Danger: Threatened Habitats and Species* (1993) by Noel Simon and WCMC; and *The Last Frontier Forests* (1997) by the World Resources Institute; and various other articles and national forest website information.

VI. Observations and Future Suggestions

"Humans" have occupied and relied upon forest areas for thousands of years. This relationship continues today as humans become even more dependant on forests as an important resource economic, cultural, ecological and recreational resource and essential habitat for numerous threatened and endangered species of flora and fauna. Some of the most notable services and products provided by forests include: climate control, shelter, food, clothing, fuel, medicines, building materials, water quality, storm protection, and habitat for fauna.

Despite their importance, forests remain among the world's most threatened biomes. Nearly 50% of the earth's original forest have been lost, mainly in the past three decades. Morevover, only 20% of original forest cover remain in large tracts of undisturbed forest, of which 70% is located within Russia, Canada and Brazil. A mere 3% of these large undisturbed tracts are temperate forests. Equally as threatened are tropical moist forests, which have lost 50% forest cover over the last few decades to plantations, grazing or scrubland. Each year, some 10 to 50 million ha (300,000ha per day) of virgin forest are lost. With over 50% of all terrestrial species inhabiting the world's forests, this loss of habitat is resulting in massive species extinction as well as soil erosion, loss of biodiversity and climate change.

Accessible tropical forest areas have virtually all been logged, except for pockets in Amazonia, Central Africa, and remote parts of insular Asia. Much of the remaining forest area in the tropics has increasingly been cleared or transformed into second growth or timber plantations. Over the last century tropical deforestation has been responsible for 125 billion tonnes of carbon into the atmosphere which is over half the amount contributed by fossil fuels combustion. Deforestation is a complex problem stemming from a number of economic, social and ecological factors. Threats to forests are numerous and vary depending on location, but include: commercial logging; clearing for agriculture and grazing, dams, mining, institutional weaknesses, inequitable land distribution, poverty, and in some cases war and civil strife. As a result to many of these threats, seven of the 61 forest protected areas included in this overview have been placed on the List of World Heritage Sites in Danger (Table 7). This suggests that inscription on the World Heritage List does not necessarily guarantee effective stewardship.

Protection for forest areas can be achieved on many scales; from local practices, to national legislation, to international recognition through inscription as a Biosphere Reserve and/or on the World Heritage List. Eighteen of the 61 World Heritage sites included in this overview are also designated Biosphere Reserves, including nine of the 30 tropical forest protected areas. Over the past few years there have been achievements in protecting forests, but the situation facing the earth's forest areas remains a global conservation concern (Table 1). Less than 10% of the world's remaining forest cover is legally protected. Likewise, a mere 4% of the remaining tropical moist forests are legally protected, with very few countries having over 10% of their tropical moist forests protected. Only Burundi, Singapore, Australia and Sri Lanka have over 50% of their remaining forests under protection.

Despite advances in the capacity to make a more accurate assessment of the amount and type of forest remaining in the world, statistics on the amount of global

forests and types of forest remain mere estimates. WCMC and others are in the process of compiling data to gain more precise global data. There are more accurate sources of information regarding the amount/percentage of forest remaining in individual countries or for specific forest types. Whatever the statistics, it is generally agreed that the rate of deforestation is high and that conservation of forest protected areas is a global conservation priority. As "humans" continue to learn more about their demands on the environment, there is an increasing need to inventory forest areas that have received international protection through the World Heritage Convention. Furthermore, it is important to identify forest areas in the world with minimal protection (gap areas) and list protected forest areas which may merit future nomination on the World Heritage List.

From this overview of 61 forest protected areas inscribed on the World Heritage List, it is clear that there remain several other important forest areas which may be suitable for consideration for World Heritage nomination. A preliminary list of 25 prospective forest protected areas with potential for World Heritage inscription is listed and described in Table 8. The main criteria used in complying the list of potential forest areas which may merit future nomination for the World Heritage List were the World Heritage Operational Guidelines 43-45, IUCN (Annex 2), IUCN forest program staff and publications reviewing forest protected areas, primarily in regions with minimal World Heritage protection at the present time. This is certainly not an exhaustive list, but is an example of sites located in some of the gap areas currently not represented on the World Heritage List. Omissions of potential sites from Table 9 may not have been due to the lack of forest values, but rather because there were already other forest protected areas inscribed on the World Heritage List located in that particular region.

Upon review of the forest protected areas inscribed on the World Heritage List (Table 1 and the maps), a gap analysis indicates that a limited number of forest protected areas exist on the World Heritage List at the present time within Amazonia (Neotropical Realm), portions of the Indomalayan Realm, the Caribbean (although a forest site in Dominica was nominated and recommended for inscription this year), the boreal regions of the Palearctic Realm, and no sites exist in the Oceanian Realm (Papua New Guinea or the North and South Pacific).

Table 1 lists the 61 forest protected areas which are inscribed on the World Heritage List. Each biogeographical realm is represented except the Oceanian. Otherwise, the division is quite balanced between most of the realms with 10 or more sites located in each the Nearctic (10), Palearctic (14), Afrotropical (13) and Neotropical Realm (11). (Figure 1 and 2). However, these four realms contain 48 of the 61 sites (nearly 80%), whereas only 13 sites (20%) are located in the four remaining realms (Figure 1). A biogeographical balance in the location of forest protected areas is not only politically equitable, but is beneficial to maintain a healthy global biodiversity and conservation of flora and fauna species. By inventorying current coverage of forest protected areas on the World Heritage List and identifying gap areas for future nomination, it is hoped to help create a balanced world system of the most outstanding forest protected areas.

Four additional sites (Sundarbans in Bangladesh, Mount Kenya in Kenya, the Nature Reserve El Triunfo in Mexico, and Morne Trois Pitons National Park in

Dominica) were nominated by the respective State Parties and recommended for inscription by the World Heritage Bureau at the June, 1997 meeting in Paris. If approved by the December, 1997, World Heritage Committee these sites would be included in Table 1 as forest protected areas inscribed on the World Heritage List.

The 61 protected forest areas on the World Heritage List were divided into five forest categories in order to show the range of forest type protected by World Heritage and to indicate which areas may merit future nomination (Tables 2-6). Tropical forest protected areas comprise 30 of the 61 (50%) forest areas inscribed on the World Heritage List (Table 2 and 3). These 30 sites contain significant tropical forest cover which was a primary reason for the nomination and inscription of the site on the World Heritage List. 13 tropical forest sites, comprising nearly 13 million ha, are located in the Afrotropical Realm (Figure 4). Although four of the Afrotropical forest sites are located within the Democratic Republic of Congo, nine countries are represented by the 13 sites (Table 2). A diverse distribution is evident in the Neotropical Realm where nine countries are represented by 10 sites (Table 2) and comprise nearly 8 million ha (Figure 4). The Indomalayan Realm has five sites totalling less than a million ha, which is a small proportion of the actual amount of forest within this realm.

Table 2 and 3 indicate the distribution of tropical moist and tropical dry forest protected areas on the World Heritage List. These sites are also listed in Table 1, but further reveal that 25 sites contain tropical moist forest and 5 sites are tropical dry forest areas. Sub-tropical forest protected areas comprise 7 of the 61 sites and cover less than one million ha of forest protected area from four different biogeographic realms (Table 4). Temperate forest protected areas are better represented with 17 sites on the World Heritage List, 10 of which are located in China and the USA. On the other hand, only six boreal forest protected areas are on the World Heritage List (Table 6), but they cover nearly 17 million ha of forest, the largest of the five forest biomes addressed in this overview. Mention should be made regarding mangrove forest areas on the World Heritage List. The global overview of wetland and marine World Heritage sites identified 15 sites containing mangroves of which seven are included in this overview of forest protected areas on the World Heritage List: Rio Platano Biosphere Reserve (Honduras); Sundarbans (India); Sian Ka'an (Mexico); Darien/Los Katios National Parks (Panama/Colombia; and Kakadu National Park and Fraser Island (Australia). The mangrove forest of these seven sites is mentioned in the site descriptions (Annex 1) and is indicated by red shading on each map.

The size distribution of forest protected areas inscribed on the World Heritage List (Figures 2, 3 and 4) are disparate with an expansive range 19.5ha forest in Vallée de Mai Nature Reserve to the nine million ha Lake Baikal. The entire size of the World Heritage site was used in tabulating Figures 2, 3 and 4 instead of merely the amount of forest cover. For example, data shows that one million of ha surround Lake Bakail within the World Heritage site, but the entire nine million hectares of the site was tabulated in Figures 2 and 3, which is the majority of the 12 million hectares within the Palearctic Realm (Figure 2). In contrast, the six sites within the Indomalayan Realm comprise less than one million hectares. Overall size of the site is shown since it is important to protect a large area of forest in order to include a buffer zone and as much habitat for species diversity as possible within the

larger protected area. Over 50% of the sites are a minimum of 100,000ha with 23 being over 500,000 and 12 over one million ha. Only 2 of the 61 sites are less than 10,000ha (Figure 3). Figure 4 focuses on the 30 tropical forest protected areas on the World Heritage List and shows both the total number of sites within the four tropical realms and the total size (in millions hectares) of the 30 sites.

IUCN welcomes comments on this working paper and suggestions on other potential World Heritage sites. Such comments and information will be useful in preparation of future revisions of this working paper. In an era of the transformation of forests for economic development and agricultural production, the need to protect the world's forests is more important than ever.

VII. Acknowledgements

We would like to acknowledge the assistance of Natarajan Ishwaran of UNESCO World Heritage Centre; Jim Paine, Simon Blyth and Corrina Ravilious of WCMC; and Maryse Mahy of Ramsar for translation of the executive summary into French. We also acknowledge the assistance of Jeff McNeely, Simon Rietbergen and Andrea Finger-Stich, of IUCN; the WWF forest program staff; and the Australian Department of Environment for their generous support towards the production of this document.

TABLES AND FIGURES

TABLE 1

Forest Protected Areas on the World Heritage List

NEARCTIC REALM	
CANADA	Canadian Rocky Mountain Parks
CANADA	Gros Morne National Park
CANADA	Nahanni National Park
CANADA	Wood Buffalo National Park
CANADA & USA	Waterton Glacier International Peace Park
USA	Great Smoky Mountains National Park
USA	Olympic National Park
USA	Redwood National Park
USA	*Yellowstone National Park
USA	Yosemite National Park USA
PALEARCTIC REALM	
BELARUS/POLAND	Beloveshskaya Pushcha/Bialowieza Forest
BULGARIA	Pirin National Park
CHINA	Huanglong Scenic and Historic Interest Area
CHINA	Jiuzhaigou Valley Scenic and Historic Interest Area
CHINA	Mount Emei
CHINA	Huangshan
CHINA	Taishan
CROATIA	*Plitvice Lakes National Park
JAPAN	Shirakami-Sanchi
JAPAN	Yakushima (Yaku-Island)
RUSSIAN FEDERATION	Lake Baikal
RUSSIAN FEDERATION	Virgin Komi Forests
SPAIN	Garajonay National Park
YUGOSLAVIA	Durmitor National Park
AFROTROPICAL REALM	
CAMEROON	Dja Faunal Reserve
COTE DE'IVOIRE	Tai National Park
COTE D'IVOIRE\GUINEA	*Mount Nimba Strict Nature Reserve
DEM. REPUBLIC OF CONGO	Kahuzi-Biega National Park
DEM. REPUBLIC OF CONGO	Okapi Faunal Reserve
DEM. REPUBLIC OF CONGO	Salonga National Park
DEM. REPUBLIC OF CONGO	*Virunga National Park
MADAGASCAR	Tsingy de Bemaraha Strict Nature Reserve
SENEGAL	Niokolo-Koba National Park
SEYCHELLES	Valée de Mai Nature Reserve
TANZANIA	Selous Game Reserve
UGANDA	Bwindi Impenetrable Forest National Park
UGANDA	Rwenzori Mountains National Park
INDOMALAYAN REALM	
INDIA	*Manas National Park
INDONESIA	Ujung Kulon National Park
INDIA	Sundarbans National Park
NEPAL	Royal Chitwan National Park
SRI LANKA	Sinharaja Forest Reserve
THAILAND	Thungyai - Huai Kha Khaeng Wildlife Sanctuaries

* These sites are also included on the List of World Heritage in Danger (Table 7).

(CONTINUED ON NEXT PAGE)

TABLE 1 (cont.)

Forest Protected Areas Inscribed on the World Heritage List

ANTARCTIC REALM	
NEW ZEALAND	Te Wahipounamu - South West New Zealand
NEW ZEALAND	Tongariro National Park
AUSTRALIAN REALM	
AUSTRALIA	Central Eastern Australian Rainforests
AUSTRALIA	Fraser Island
AUSTRALIA	Kakadu National Park
AUSTRALIA	Tasmanian Wilderness
AUSTRALIA	Wet Tropics of Queensland
NEOTROPICAL REALM	
ARGENTINA/BRAZIL	Iguazú and Iguaçu National Parks
COSTA RICA\PANAMA	Talamanca Range & La Amistad Reserves
ECUADOR	*Sangay National Park
GUATEMALA	Tikal National Park
HONDURAS	*Río Platano Biosphere Reserve
MEXICO	Sian Ka'an Biosphere Reserve
PANAMA /COLOMBIA	Darien and Los Katios National Parks
PERU	Historic Sanctuary of Machu Picchu
PERU	Manu National Park
PERU	Rio Abiseo National Park
VENEZUELA	Canaima National Park

* These seven sites are also included on the List of World Heritage in Danger (Table 7).

The Sundarbans (Bangladesh), Morne Trois Pitons National Park (Dominica), Mount Kenya (Kenya), and The Nature Reserve El Triunfo (Mexico) were nominated in 1997 for inscription on the World Heritage List. If approved by the December, 1997, Committee these sites would be included in Table 1 as forest protected areas inscribed on the World Heritage List.

TABLE 2

Tropical Moist Forest Protected Areas on the World Heritage List

Site numbers are listed for ease of reference to detailed information in Annex and maps

AUSTRALIA	50. Wet Tropics of Queensland
CAMEROON	25. Dja Faunal Reserve
COSTA RICA/PANAMA	52. Talamanca Range and La Amistad Reserves
COTE D'IVOIRE	26. Tai National Park
COTE D'IVOIRE/GUINEA	27. Mount Nimba Strict Nature Reserve
DEM. REPUBLIC OF CONGO	28. Kahuzi-Biega National Park
DEM. REPUBLIC OF CONGO	29. Okapi Faunal Reserve
DEM. REPUBLIC OF CONGO	30. Salonga National Park
DEM. REPUBLIC OF CONGO	31. Virunga National Park
ECUADOR	53. Sangay National Park
GUATEMALA	54. Tikal National Park
HONDURAS	55. Rio Platano Biosphere Reserve
INDIA	40. Sundarbans National Park
INDONESIA	39. Ujung Kulon National Park
MEXICO	56. Sian Ka'an Biosphere Reserve
PANAMA/COLOMBIA	57. Darien and Los Katios National Parks
PERU	58. Historic Sanctuary of Machu Picchu
PERU	59. Manu National Park
PERU	60. Rio Abiseo National Park
SEYCHELLES	34. Vallée de Mai Nature Reserve
SRI LANKA	42. Sinharaja Forest Reserve
UGANDA	36. Bwindi Impenetrable Forest National Park
UGANDA	37. Rwenzori Mountains National Park
VENEZUELA	61. Canaima National Park

TABLE 3

Tropical Dry Forest Protected Areas on the World Heritage List

Site numbers are listed for ease of reference to detailed information in Annex and maps

AUSTRALIA	47. Kakadu National Park
INDIA	37. Manas Wildlife Sanctuary
MADAGASCAR	31. Tsingy de Bemaraha Strict Nature Reserve
REPUBLIC OF TANZANIA	34. Selous Game Reserve
SENEGAL	32. Niokolo-Koba National Park
THAILAND	42. Thungyai - Huai Kha Khaeng Wildlife Sanctuaries

TABLE 4

Sub-Tropical Forest Protected Areas on the World Heritage List

Site numbers are listed for ease of reference to detailed information in Annex and maps

ARGENTINA/BRAZIL	51. Iguacu and Iguazu National Parks
AUSTRALIA	46. Central Eastern Australian Rainforests
AUSTRALIA	47. Fraser Island
CHINA	15. Mt. Emei
JAPAN	19. Shirakami - Sanchi
JAPAN	20. Yakushima (Yaku - Island)
SPAIN	23. Garajonay National Park

TABLE 5

Temperate Forest Protected Areas on the World Heritage List

Site numbers are listed for ease of reference to detailed information in Annex and maps

AUSTRALIA	49. Tasmanian Wilderness
BELARUS/POLAND	11. Beloveshskaya Pushcha/Bialowieza Forest
BULGARIA	12. Pirin National Park
CHINA	13. Huanglong Scenic and Historic Interest Area
CHINA	14. Jiuzhaigou Valley Scenic and Historic Interest Area
CHINA	16. Huangshan
CHINA	17. Taishan
CROATIA	18. Plitvice Lakes National Park
NEPAL	41. Royal Chitwan National Park
NEW ZEALAND	44 Te Wahipounamu
NEW ZEALAND	45. Tongariro National Park
USA	6. Great Smoky Mountains National Park
USA	7. Olympic National Park
USA	8. Redwood National Park
USA	9. Yellowstone National Park
USA	10. Yosemite National Park
YUGOSLAVIA	24. Durmitor National Park

TABLE 6

Boreal Forest Protected Areas Inscribed on the World Heritage List

Site numbers are listed for ease of reference to detailed information in Annex and maps

CANADA	1. Canadian Rocky Mountain Parks
CANADA	2. Gros Morne National Park
CANADA	3. Nahanni National Park
CANADA	4. Wood Buffalo National Park
CANADA/USA	5. Waterton Lakes Glacier International Peace Park
RUSSIAN FEDERATION	21. Lake Baikal
RUSSIAN FEDERATION	22. Virgin Komi Forests

TABLE 7

Forest Protected Areas Inscribed on the List of World Heritage Sites in Danger

SITE	COUNTRY	DANGER LIST	FOREST VALUES	THREATS
1. Plitvice Lakes	Croatia	1991	70% of site is forested, last remaining stands of pure beech in Europe, spruce, fir, pine, juniper, black alder, maple, sumac, bears, wolves, threatened bird species	military occupation, civil unrest
2. Sangay	Ecuador	1992	high diverse natural habitat, tropical mist forest, subtropical rain forest (40m canopy), cedro, aliso, palms, cloud forests, bamboo, low montane rain forests	human encroachment, poaching, illegal livestock grazing, potential road construction
3. Mount Nimba	Cote d'Ivoire & Guinea	1992	high altitude, gallery and dense forest rich in flora with over 2,000 plant species (16 endemic), epiphytes, tree ferns	influx of refugees, proposed iron-ore mining, site boundary confusion, proposal to reduce site size
4. Manas	India	1992	tropical rain, tropical dense semi-evergreen, and dry deciduous forests, most diverse wildlife reserve in India, expansive tiger reserve.	civil unrest, commercial poaching, political instability, habitat destruction, limited resources, management restricted
5. Virunga	Democratic Rep.Congo	1994	diverse forest habitats, including tropical rain, alpine, eastern steppe, bamboo, equatorial, swamp, and dry thick forests on lava plains, wooded savannah	civil unrest, refugee impact, commercial poaching, human encroachment and demand for food and fuel, donors suspended aid, restrictions on management
6. Yellowstone	USA	1995	80% of site is forested with lodgepole pine *Pinus contorta* being the most abundant, total of seven coniferous tree species in park	mining operations, water pollution, sewage leakage, waste contamination, disease impact on bison, tourism
7. Rio Platano	Honduras	1996	90% tropical humid rain forest, largest surviving virgin rain forest area in Honduras, mangroves, pine savannahs, swamp and hardwood gallery forest, palm, cedar, bamboo, mahogany	agricultural expansion, human encroachment, commercial poaching, introduced species, over fishing, social conflict, poor infrastructure, inadequate management

Nb. Both Kahuzi-Biega National Park and Okapi Faunal Reserve are being proposed as additions to the Danger List in 1997.

TABLE 8

FORESTED PROTECTED AREAS WHICH MAY MERIT CONSIDERATION FOR WORLD HERITAGE NOMINATION

* This is not an exhaustive list, but an illustration of forest protected areas which may merit consideration for nomination on the World Heritage List.

AREA	COUNTRY	MAIN NATURAL VALUES
NEARCTIC		
1. South Moresby NP	CANADA	147,000ha temperate rainforest area on the south end of Queen Charlotte Islands in British Columbia; Despite extensive logging in surrounding areas, S. Moresby was protected in 1988 through efforts of local Haida people and Islands Protection Society. Consists of hemlock, other temperate tree species and endemic flora and fauna (blacktail deer).
2. Volcan Nevado de Colima National Park	MEXICO	22,000ha dry pine forest in west, central Mexico; high biodiversity - Mexico contains 10% of world's terrestrial vertebrates (1352) and plant (25,000) species.
3. Kalimiopsis Wilderness and Siskiyou Region	USA	Over 5 million ha wilderness area known for its extensive biodiversity (3500 flora species) and forest habitat; coniferous and mixed evergreen forests; unique landscape of canyons, perodotite, volcanic debris, ophioliote crust, rock ridges, and three wild and scenic rivers; named after a unique pre-ice age shrub, the Kalimiopsis contains over 100 coniferous and hardwood tree species (madrone, pine ,fir, cedar, spruce and 5 sensitive species) and over 200 herbaceous plants and ferns - many endemic and sensitive; one of largest roadless areas in the U.S.
PALEARCTIC		
4. Carpathian Forest Reserve and NP	UKRAINE	20,000ha protected forest area in Zakarpatska region; covers only 4% of the country, but contains 33% of the Ukraine's forest resources, over 50% of plant species (2110 total) and highest forest concentration area (53% of region is forest); severe threats have endangered the area, but structural changes are planned to promote the Carpathians as a recreation zone to reduce the industrial impact; recent projects funded by GEF, the MacArthur Foundation and the World Bank for conservation biodiversity.
AFROTROPICAL		
5. Korup National Park	CAMEROON	126,000ha Biosphere Reserve; contains much of Cameroon's tropical moist and lowland evergreen rainforest with over 3500 flora species; sustainable forestry and community development project.
6. West Gabon Complex	GABON	Expansive tropical lowland & hill rainforest; habitat for baboon, mandrill, colobus monkeys; home to Baka people; numerous flora, fauna and protected areas including Ipassa Makokou (15,000ha Bio Reserve).
7. Montagne D'Ambre Protected Areas	MADAGASCAR	Four protected areas in north Madagascar; tropical dry and moist evergreen forest; one of country's richest areas of biodiversity and ecological diversity; transition zone between dry deciduous and eastern moist forest permits a species rich transition zone with high endemism, karstic pinnacles, caves, etc.; rivers are only year round water source for local people.

AREA	COUNTRY	MAIN NATURAL VALUES
INDOMALAY		
8. Andaman Island Protected Areas	INDIA	Six national parks and 94 wildlife sanctuaries on Andaman and Nicobar islands covering 70,800ha; tropical evergreen, semi-evergreen, moist deciduous, beach, bamboo and mangrove forests; high rate of biodiversity of flora species, esp. on Andaman.
9. Western Ghats	INDIA	Over 15 million ha area with eight national parks and 39 wildlife sanctuaries; moist evergreen forest across mountain range; rich in species diversity (84 of India's 112 endemic amphibians); monkeys, squirrels and bats live in tree canopy; deer and elephants browse in lower branches and understorey; clear felling was stopped in mountainous areas by Chipko movement.
10. Gunung Leuser NP	INDONESIA (SUMATRA)	one of largest tropical rain forests protected areas in Indonesia (835,500ha); montane, swamp, subalpine and lowland dipterocarp rain forest; over 2000 flora species; Biosphere Reserve, ecosystem development project and Orang-utan Rehab Centre (orang-utans, gibbons, tigers, monkeys, elephants, leopards, Sumatran rhino); waterfalls, hot springs, volcanic rock.
11. Kutai Game Reserve	INDONESIA (KALIMANTAN)	200,000ha Biosphere reserve is best example of tropical rainforest on Kalimantan one of Southeast Asia's largest lowland montane rainforests; 262 dipterocarps and 83% of Borneo's forest species.
12. Irian Jaya Tropical Forest Protected Areas	IRIAN JAYA	Irian Jaya is one of the largest expanses of pristine tropical rainforest (35 million ha) in Southeast Asia; lower montane forests occur below 3000m and upper montane and subalpine forest above 3400m; swamp, eucalyptus, beach, and mangrove (2nd largest behind Sundarbans) forest; sago palm is staple foodsource; two national parks and seven nature/game reserves.
13. Gunung Mulu NP	MALAYSIA (SARAWAK)	52,900ha protected area with expansive tropical lowland montane rainforest; 2371m Mt. Mulu; limestone massif; high endemism and biodiversity of flora and fauna; inhabited by Penan peoples.
14. Kinabulu NP	MALAYSIA (SABAH)	75,400ha park north Sabah; lowland montane tropical rainforest; high biodiversity with 75 of Borneo's 135 ficus species (13 endemic), and 72 Fagaceae species; 25% of fauna species are endemic, 290 species of butterfly and moth; 4094m Mt. Kinabulu.
15. Taman Negara NP	MALAYSIA (PENISULA)	434,000ha area is one of largest tropical rainforest reserves in Southeast Asia; lowland montane evergreen rainforest, high biodiversity with over 2000 flora species; 2189m Mt. Tahan (highest point on Peninsula); dam project was thwarted in 1970's.
16. Southern Laos Tropical Forest Reserves	LAOS	Most extensive undisturbed tropical evergreen forest region in Laos;, the lowland tropical forest of Belovens Plateau (80,000ha) Xe Piane (15,000ha) and Bung Nong Ngom National Parks have been identified as priority areas for conservation and consist of dense evergreen and semi-evergreen monsoon forests and open deciduous forest in flatter areas; numerous flora and fauna including threatened black gibbon, clouded leopard, tiger, Asian elephant and kouprey; proposed transborder site with Vietnam, Cambodia and Laos.
17. St. Paul National Park	PHILLIPINES	5,800ha park on north portion of Puerto Princesa Island; montane rainforest; subterranean river; high rate of endemism in plants, fungi, birds and reptiles.

AREA	COUNTRY	MAIN NATURAL VALUE
18. Horton Plains and Peak Wilderness	SRI LANKA	Remote plateau is Sri Lanka's largest relatively undisturbed montane forest and habitat for many endemic flora and fauna species; the Peak Wilderness is a unique facet of nature of low dense and slow growing forest trees, a stunted species of clustracene(Keena) with its crown interlocked in a web of leaves; foliage of Horton Plains include species such as Rhododendron and magnolia; underlayer of forest has smaller trees and plants.
AUSTRALIA/OCEANIAN		
19. Rennell Islands	SOLOMON ISLANDS	Largest coral atoll in the world (86 x 15km) is mostly covered by dense forest with a 20m tall average canopy with numerous larger remergent trees; numerous endemic flora and fauna species (40% of birds); over 20 orchid species; limestone karsts; andlargest lake in South Pacific (Lake Tungano).
20. Le Popu-Pue NP	WESTERN SAMOA	Extending from central mountains to coast of Opula Island, this park is the best remaining tract of tropical rainforest in Samoa; only 2,857ha in size, but relative to size of island and two other rainforest reserves in W. Samoa (Falealupo and Tafua) comprise 7,000ha.
NEOTROPICAL		
21. Bolivian Amazon Basin Protected Areas	BOLIVIA	Amazonian basin and lowlands of Bolivia are characterised by extensive areas of lowland moist forest and seasonally inundated savannahs; these open landscapes are traversed by numerous rivers bordered by dense gallery forests; within the savannahs, numerous forest islands dot the horizon providing habitat for the maned wolf, giant anteater, Amazon river dolphin and some of the highest concentration of plant species in the world. Protected areas include the Beni Biosphere Reserve (1.3 million ha), Isoiboro Secure (1.1 million ha) and others.
22. Jau National Park	BRASIL	2.2 million ha park in Northwest Amazonia; extensive lowland moist tropical and dense evergreen forest; complex variety of forest features including vines, palms, diverse forest species, and numerous vegetation types in the understorey; "centres of endemism" and high rate of threatened species.
23. Xingu National Park	BRASIL	2.2 million protected area in Maro Grosso, lower Amazonia (2nd largest park in Brasil behind Jau); extensive lowland moist tropical forest and river system; complex vegetation and high endemism.
24. Serraniade de Macarena	COLOMBIA	63 0,000ha park in central Colombia; lowland moist, submontane and montane tropical forest; aesthetic beauty in Caño Cristales and stream areas of the buffer zone, vegetation, petroglyphs, Tablazo ridge, Guayabero canyon, and rapids of Angosturas.
25. Sierra Nevada de Santa Marta BR	COLOMBIA	Over 1.5 million ha area in the Cordillera Central, the highest coastal range of mountains in Colombia; rich variety of flora and fauna in the dense rain forest covering the northern slopes; southern slopes are drier; inhabited by the Kogi and Arhuaco Indians; there are no continuous forest above 1,200 m, but trees grow along the rivers up to 1,700 m and provide habitat for numerous flora and bird (15 endemic) species, especially at higher altitudes.

FIGURE 1

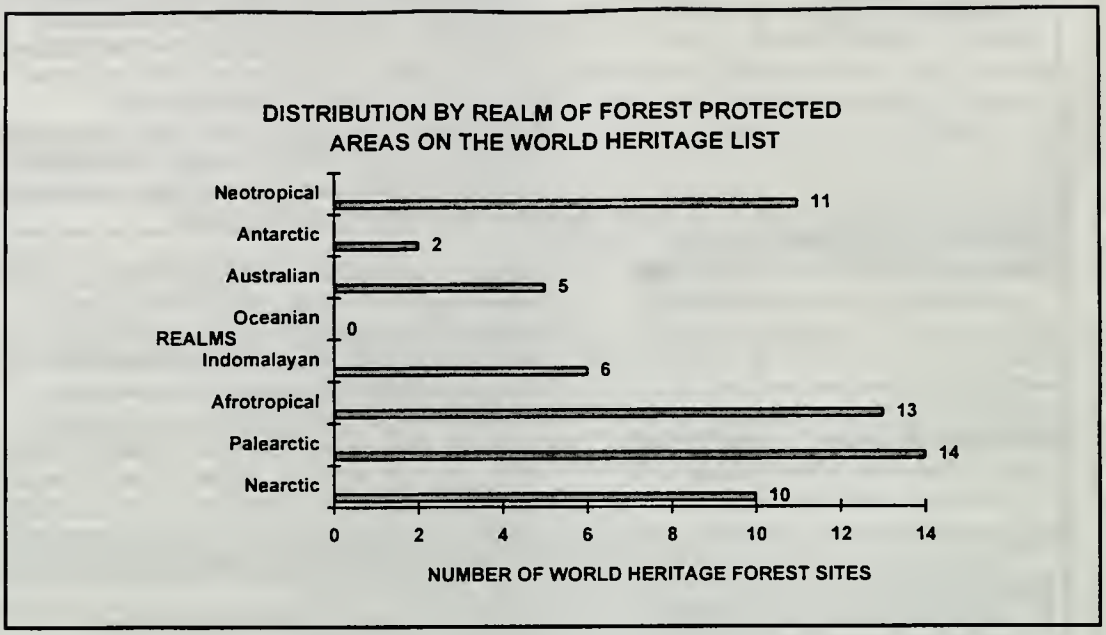


FIGURE 2

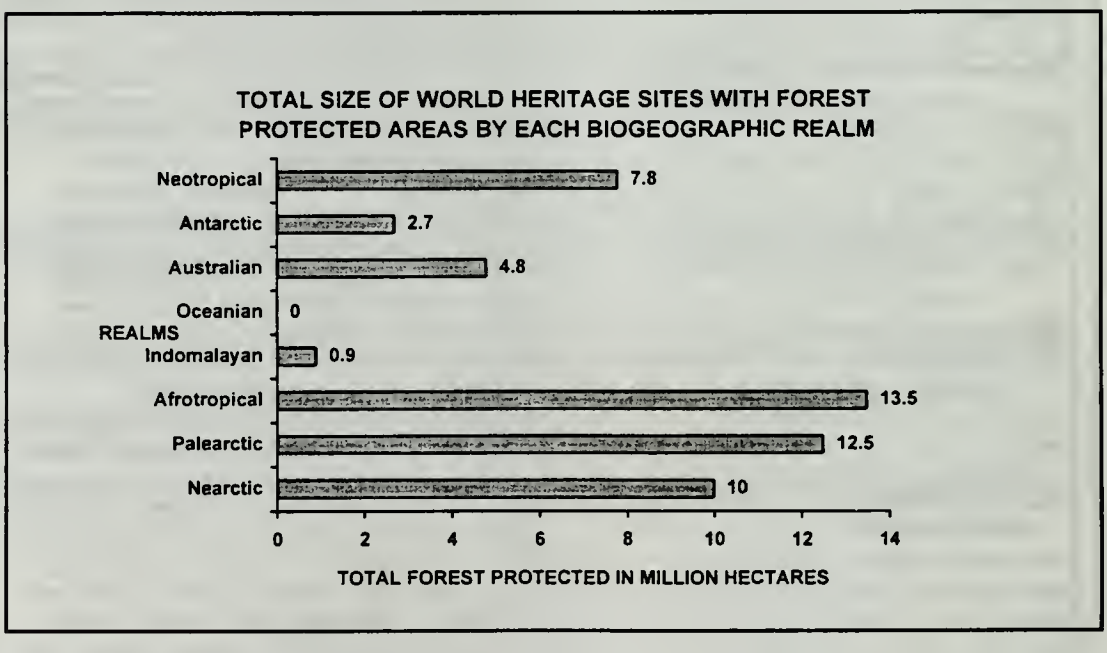


FIGURE 3

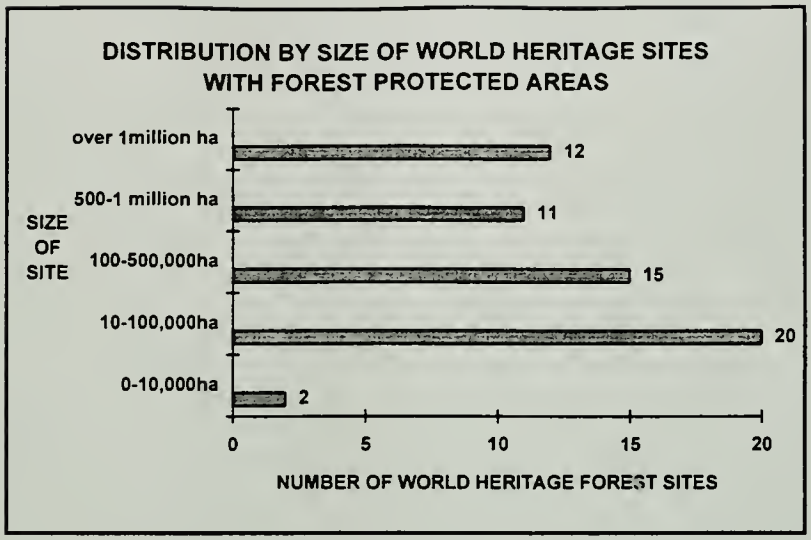
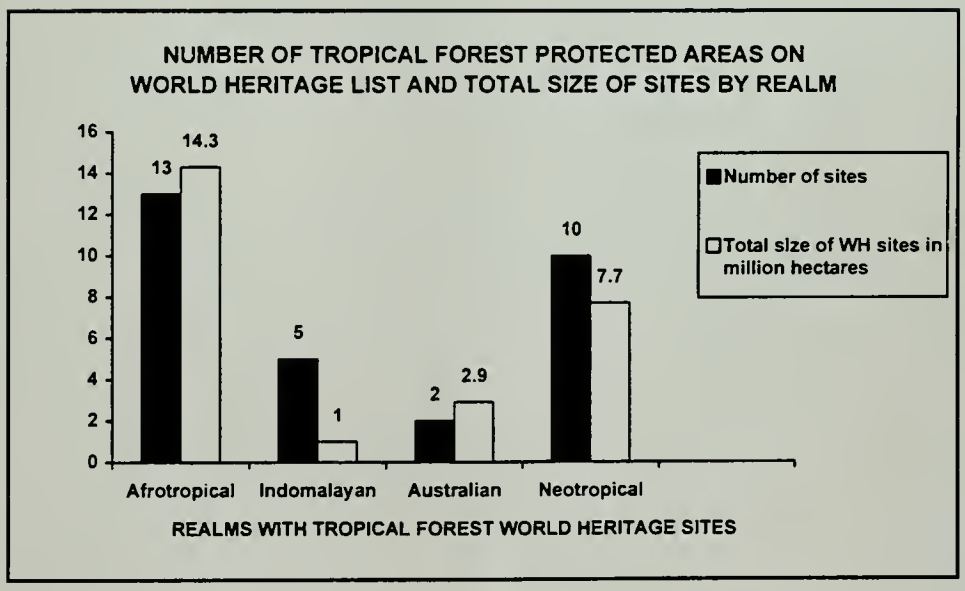
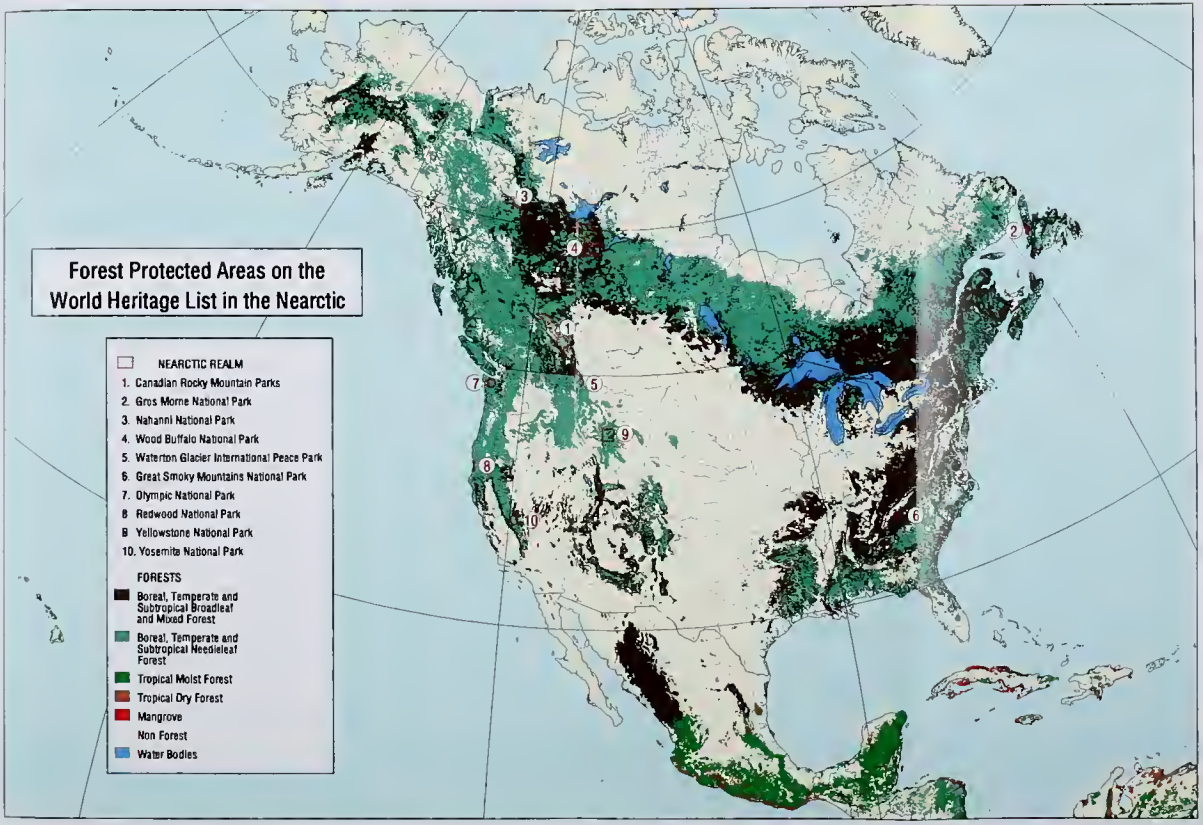


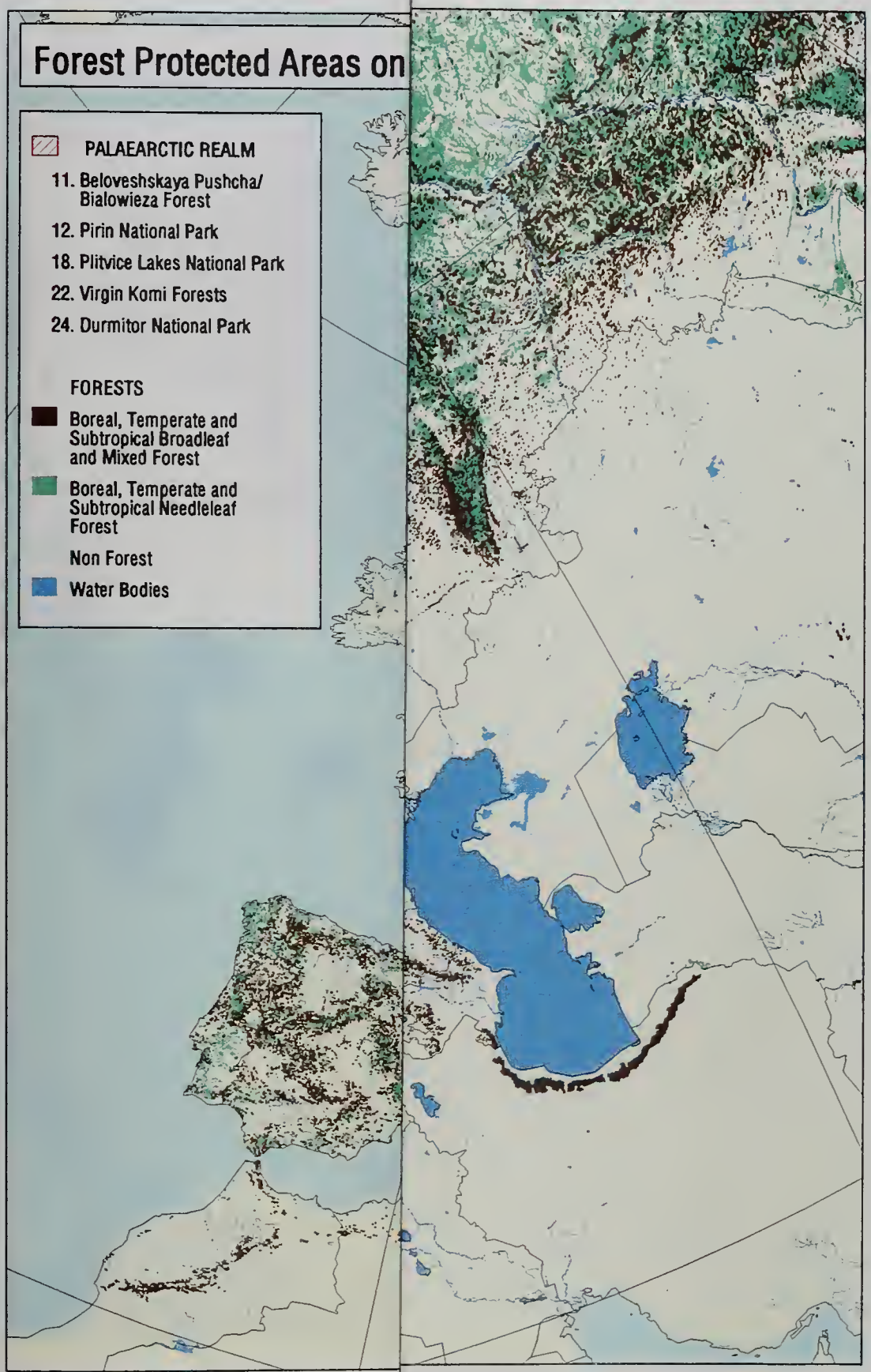
FIGURE 4

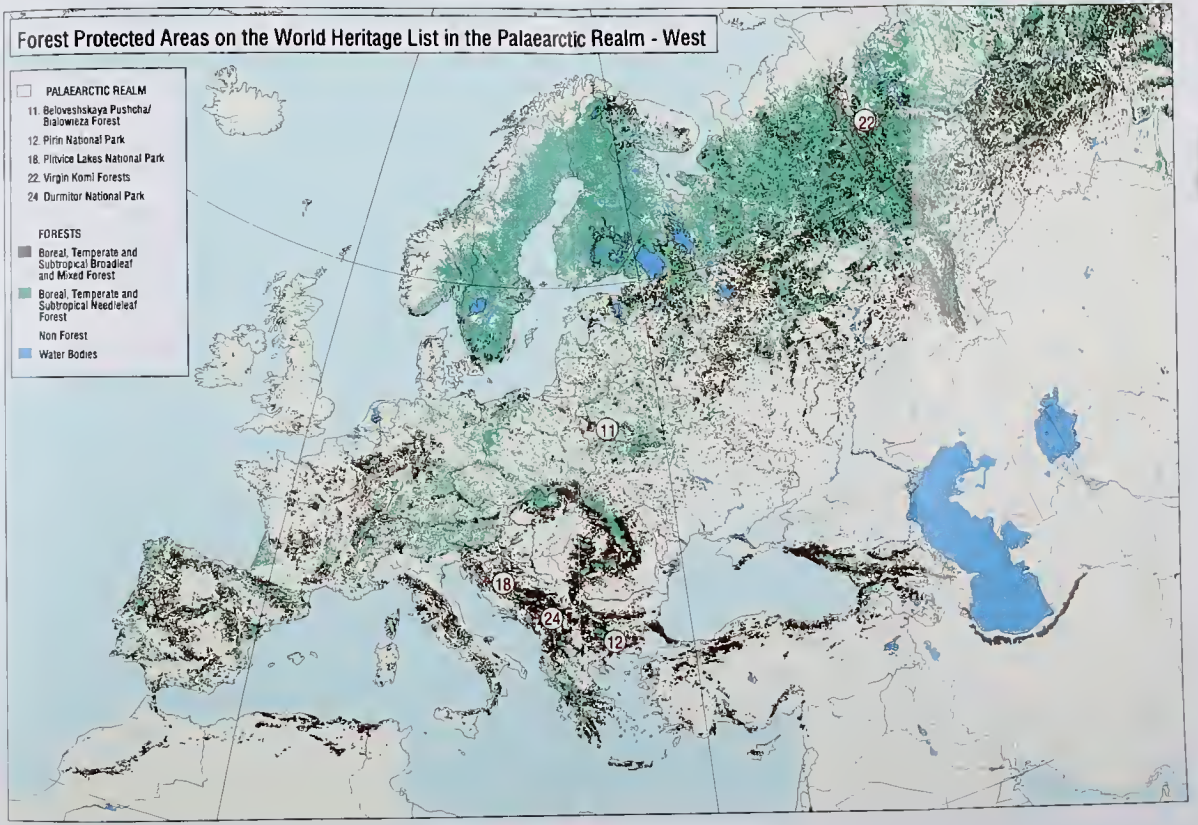


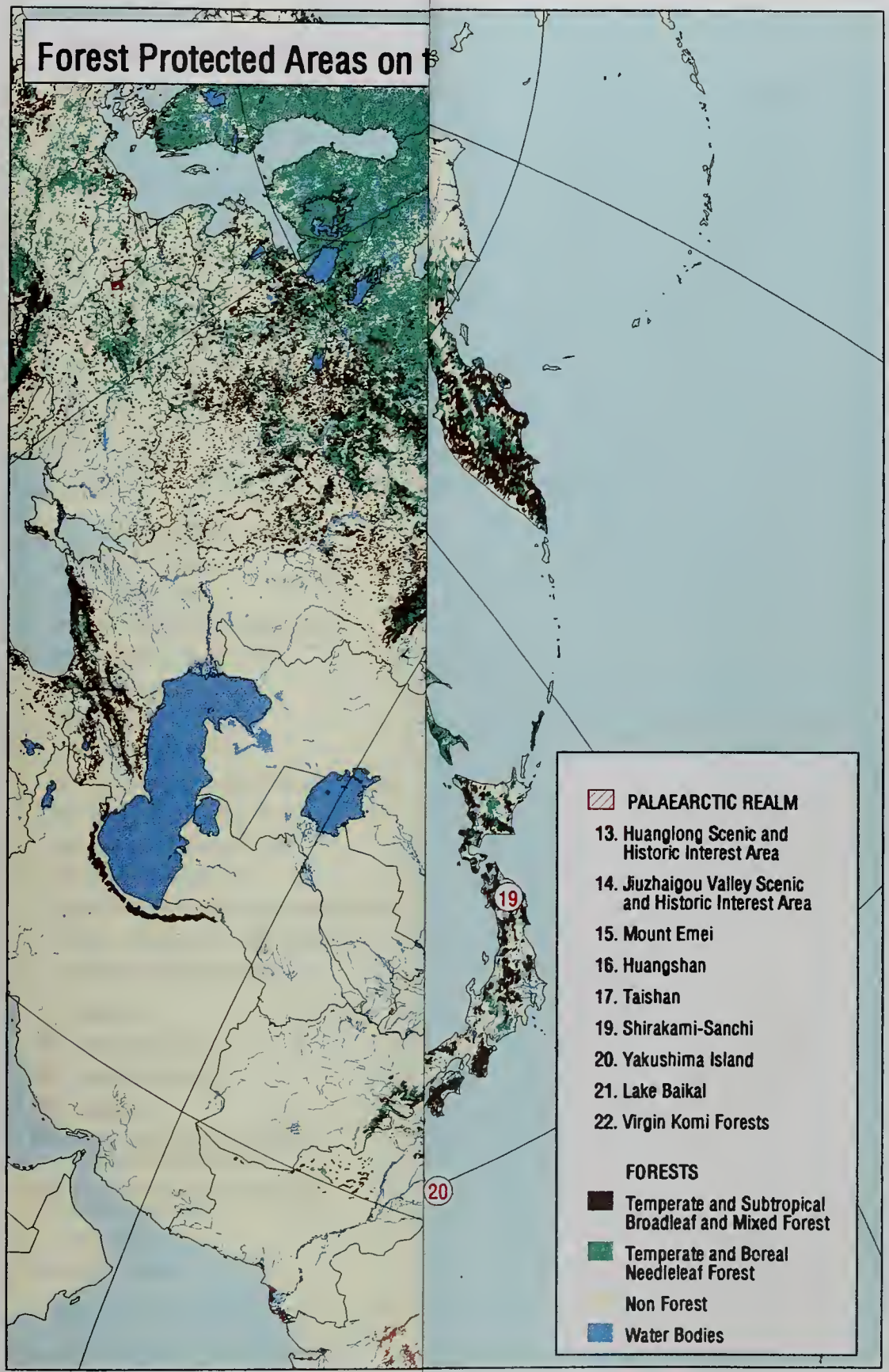
MAPS

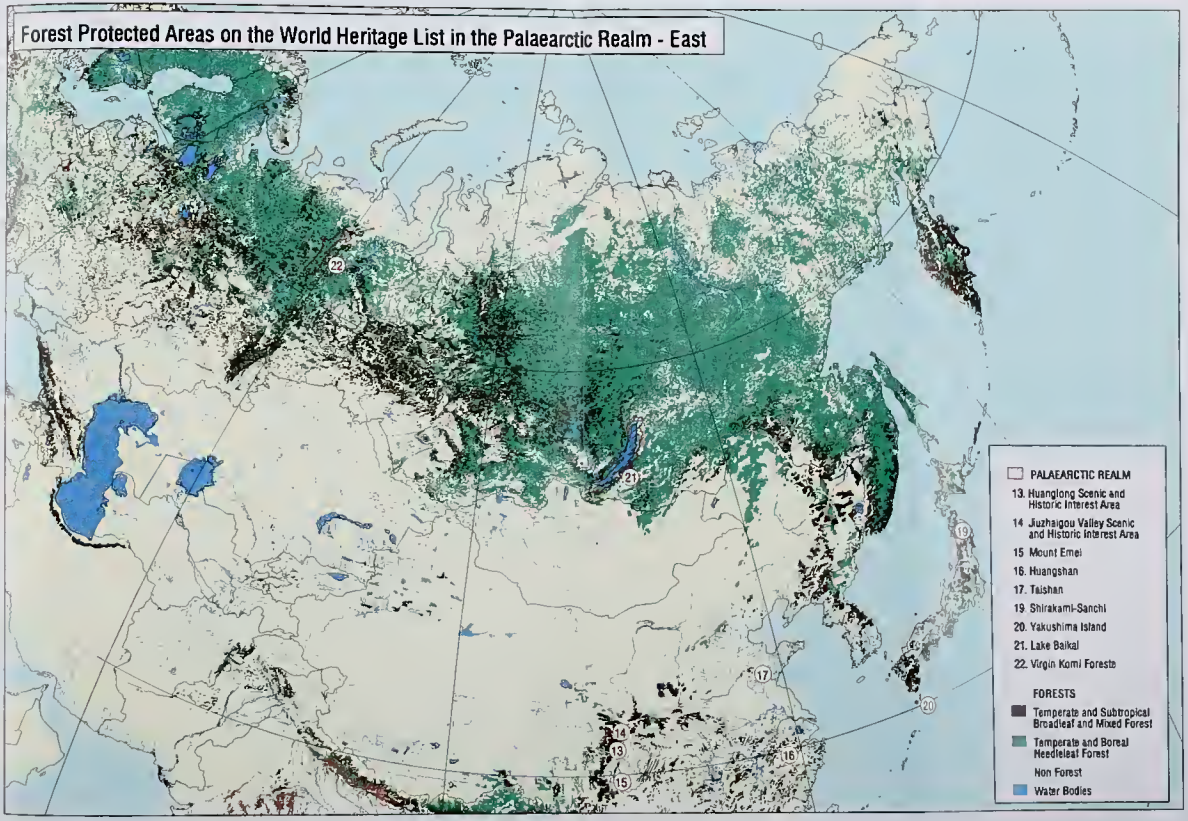

Forest Protected Are
World Heritage List in
NEARCTIC REALM
1. Canadian Rocky Mount
2. Gros Morne National Pa
3. Nahanni National Park
4. Wood Buffalo National
5. Waterton Glacier Intern
6. Great Smoky Mountain
7. Olympic National Park
8. Redwood National Park
9. Yellowstone National P
10. Yosemite National Par
FORESTS
Boreal, Temperate and Subtropical Broadleaf and Mixed Forest
Boreal, Temperate and Subtropical Needleleaf Forest
Tropical Moist Forest
Tropical Dry Forest
Mangrove
Non Forest
Water Bodies
2

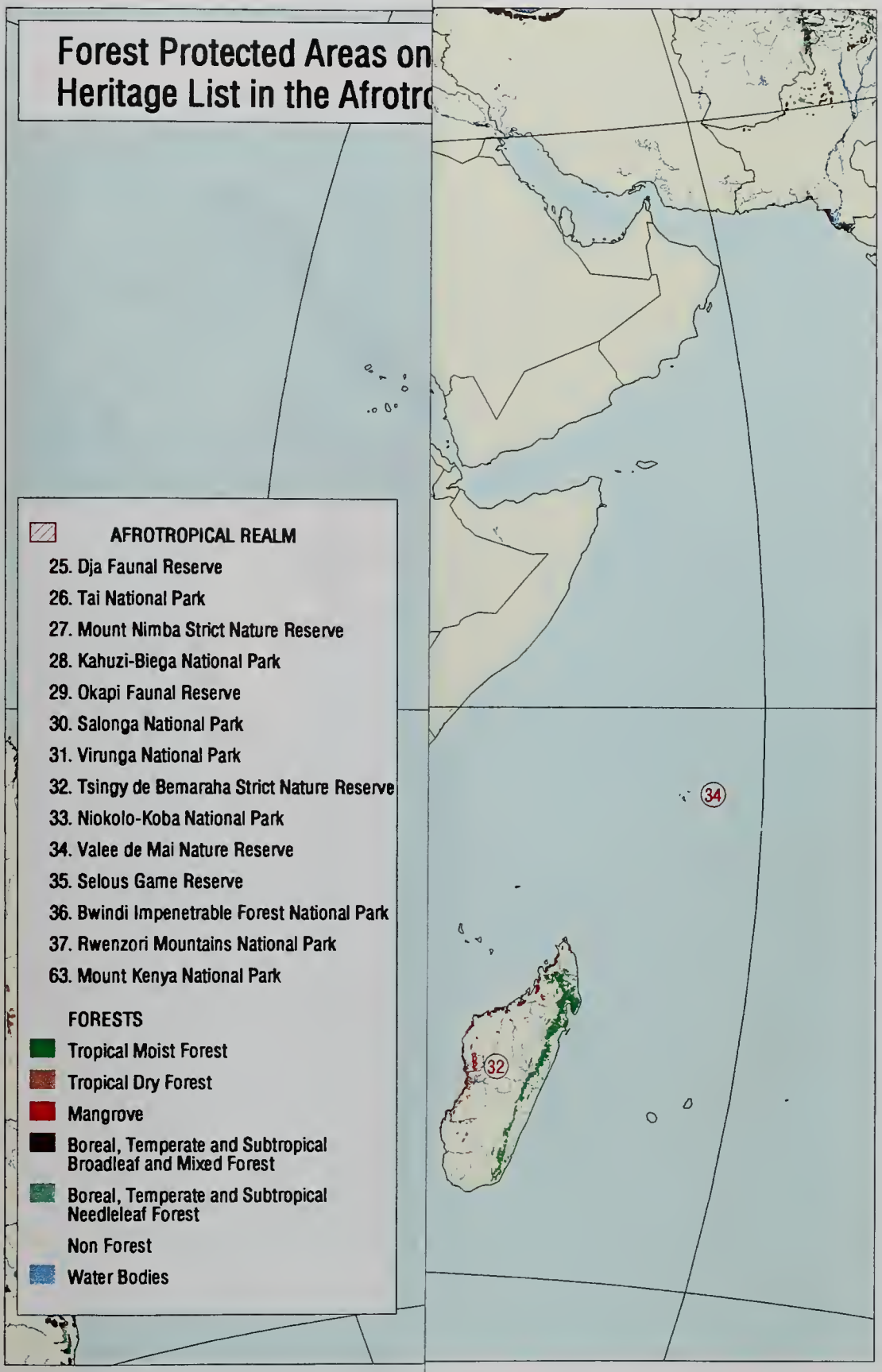

Forest Protected Areas on the World Heritage List in the Nearctic
NEARCTIC REALM
1. Canadian Rocky Mountain Parks
2. Gros Morne National Park
3. Nahanni National Park
4. Wood Buffalo National Park
5. Waterton Glacier International Peace Park
6. Great Smoky Mountains National Park
7. Olympic National Park
8 Redwood National Park
9 Yellowstone National Park
10. Yosemite National Park
FORESTS
Boreal, Temperate and Subtropical Broadleaf and Mixed Forest
Boreal, Temperate and Subtropical Needleleaf Forest
Tropical Moist Forest
Tropical Dry Forest
Mangrove
Non Forest
Water Bodies


Forest Protected Areas on
PALAEARCTIC REALM
11. Beloveshskaya Pushcha/ Bialowieza Forest
12. Pirin National Park
18. Plitvice Lakes National Park
22. Virgin Komi Forests
24. Durmitor National Park
FORESTS
Boreal, Temperate and Subtropical Broadleaf and Mixed Forest
Boreal, Temperate and Subtropical Needleleaf Forest
Non Forest
Water Bodies

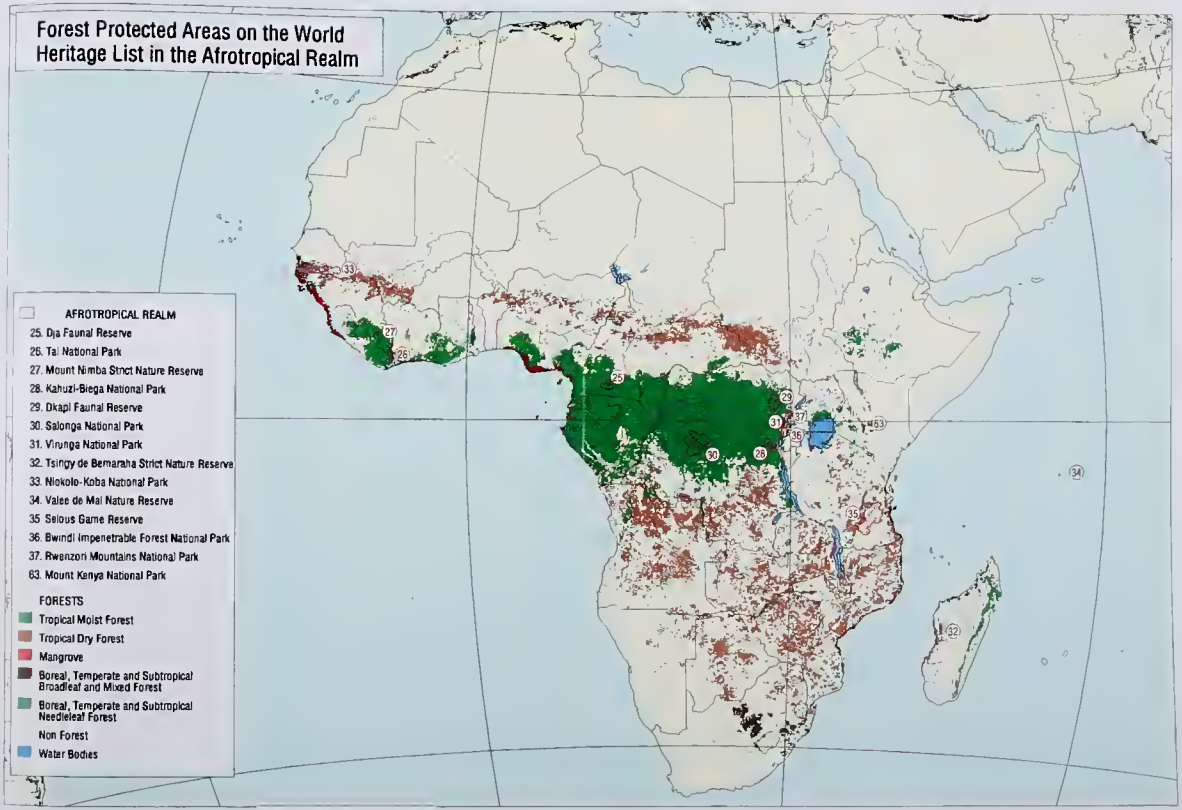

Forest Protected Areas on the World Heritage List in the Palaearctic Realm - West
PALAEARCTIC REALM
11. Beloveshskaya Pushcha/ Bialowieza Forest
12. Pirin National Park
18. Plitvice Lakes National Park
22. Virgin Komi Forests
24. Durmitor National Park
FORESTS
Boreal, Temperate and Subtropical Broadleaf and Mixed Forest
Boreal, Temperate and Subtropical Needleleaf Forest
Non Forest
Water Bodies
22
11
18
24
12

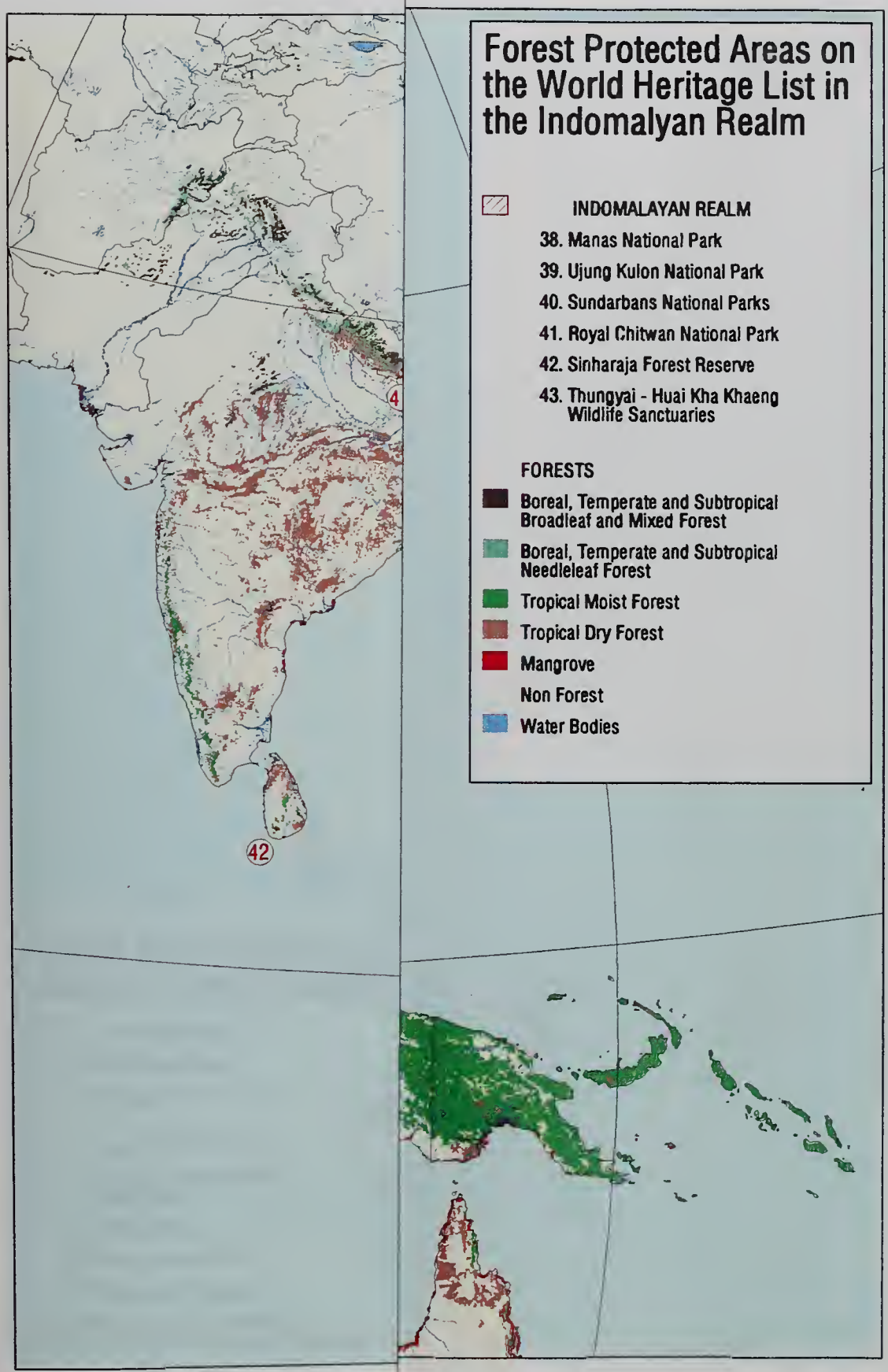

Forest Protected Areas on t
PALAEARCTIC REALM
13. Huanglong Scenic and Historic Interest Area
14. Jiuzhaigou Valley Scenic and Historic Interest Area
15. Mount Emei
16. Huangshan
17. Taishan
19. Shirakami-Sanchi
20. Yakushima Island
21. Lake Baikal
22. Virgin Komi Forests
FORESTS
Temperate and Subtropical Broadleaf and Mixed Forest
Temperate and Boreal Needleleaf Forest
Non Forest
Water Bodies
19
20

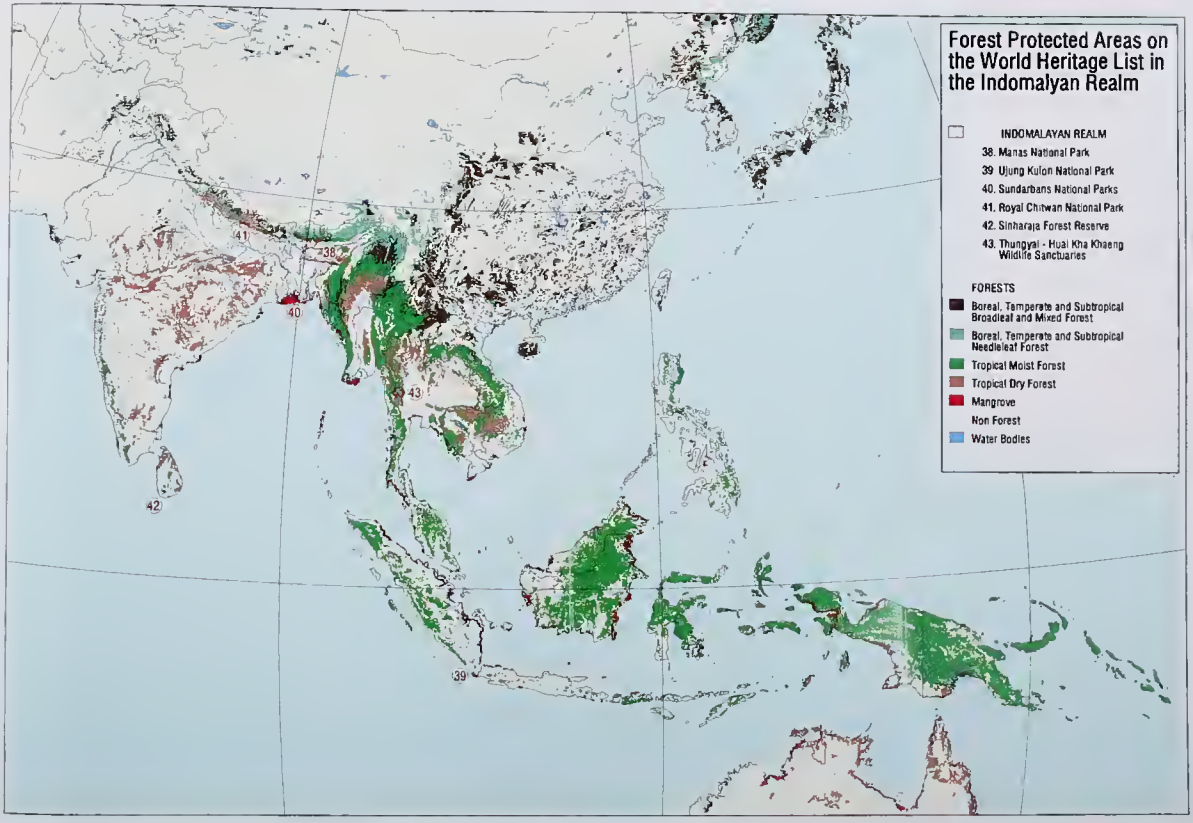

Forest Protected Areas on the World Heritage List in the Palaearctic Realm - East
PALAEARCTIC REALM
13. Huanglong Scenic and Historic Interest Area
14. Jiuzhaigou Valley Scenic and Historic Interest Area
15. Mount Emei
16. Huangshan
17. Taishan
19. Shirakami-Sanchi
20. Yakushima Island
21. Lake Baikal
22. Virgin Komi Forests
FORESTS
Temperate and Subtropical Broadleaf and Mixed Forest
Temperate and Boreal Needleleaf Forest
Non Forest
Water Bodies

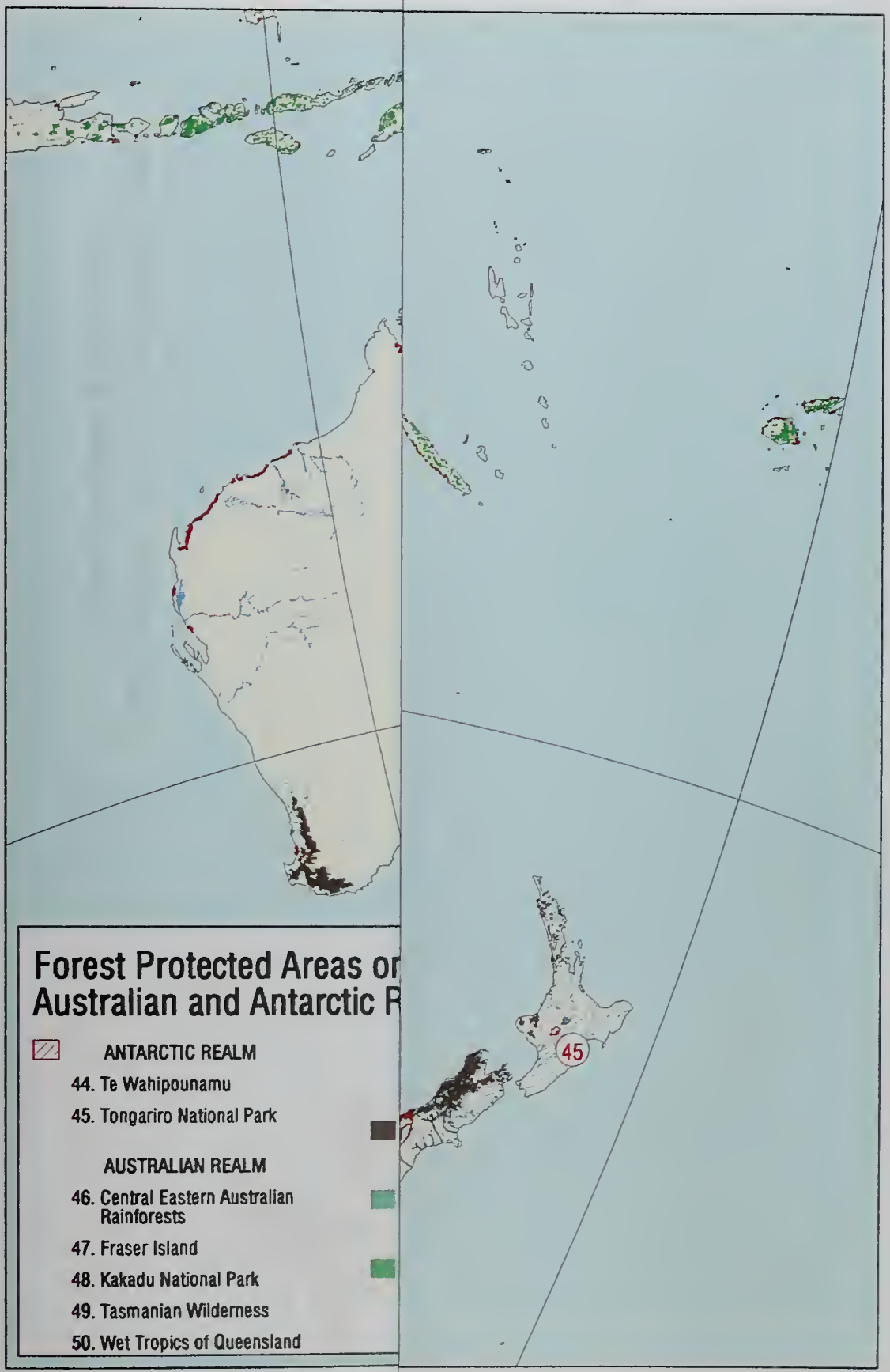

Forest Protected Areas on
Heritage List in the Afrotr
AFROTROPICAL REALM
25. Dja Faunal Reserve
26. Tai National Park
27. Mount Nimba Strict Nature Reserve
28. Kahuzi-Biega National Park
29. Okapi Faunal Reserve
30. Salonga National Park
31. Virunga National Park
32. Tsingy de Bemaraha Strict Nature Reserve
33. Niokolo-Koba National Park
34. Valee de Mai Nature Reserve
35. Selous Game Reserve
36. Bwindi Impenetrable Forest National Park
37. Rwenzori Mountains National Park
63. Mount Kenya National Park
FORESTS
Tropical Moist Forest
Tropical Dry Forest
Mangrove
Boreal, Temperate and Subtropical Broadleaf and Mixed Forest
Boreal, Temperate and Subtropical Needleleaf Forest
Non Forest
Water Bodies
34
32

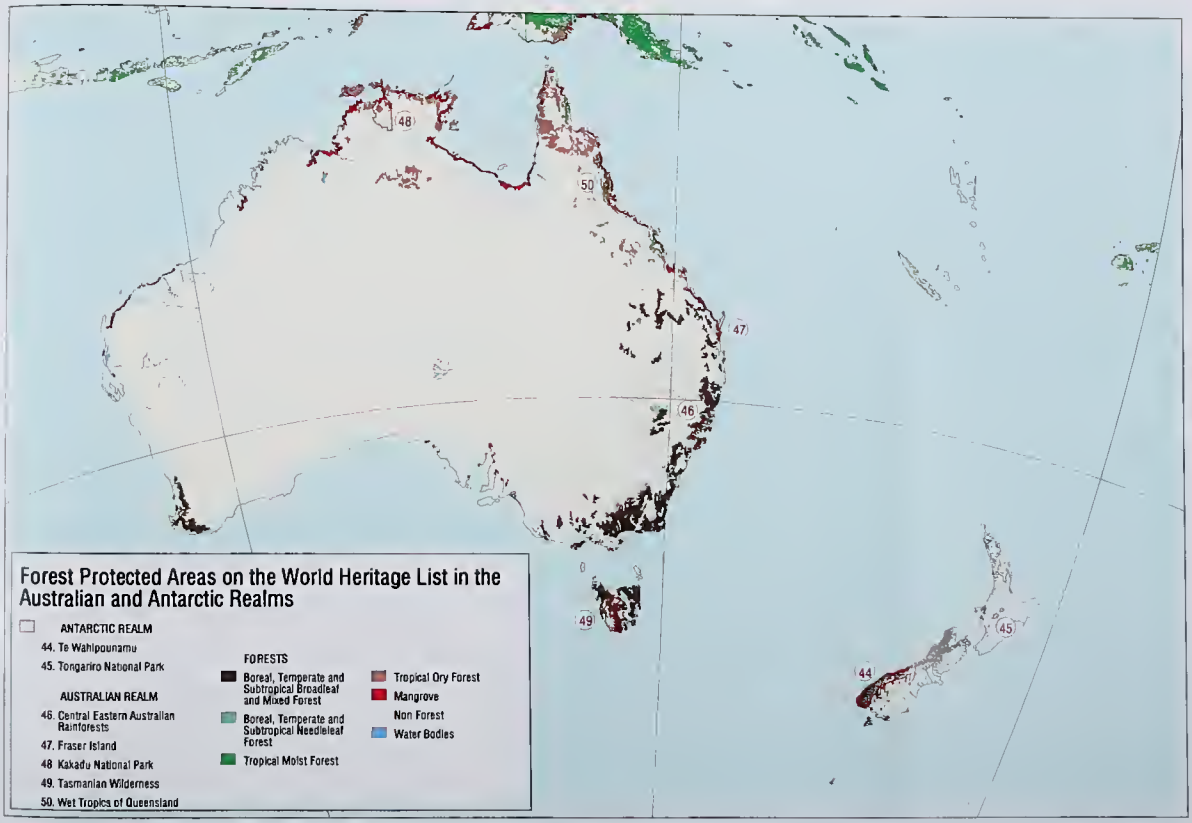
Forest Protected Areas on the World Heritage List in the Afrotropical Realm




Forest Protected Areas on the World Heritage List in the Indomalyan Realm
INDOMALAYAN REALM
38. Manas National Park
39. Ujung Kulon National Park
40. Sundarbans National Parks
41. Royal Chitwan National Park
42. Sinharaja Forest Reserve
43. Thungyai - Huai Kha Khaeng Wildlife Sanctuaries
FORESTS
Boreal, Temperate and Subtropical Broadleaf and Mixed Forest
Boreal, Temperate and Subtropical Needleleaf Forest
Tropical Moist Forest
Tropical Dry Forest
Mangrove
Non Forest
Water Bodies
4
42


Forest Protected Areas on the World Heritage List in the Indomalayan Realm
INDOMALAYAN REALM
38. Manas National Park
39. Ujung Kulon National Park
40. Sundarbans National Parks
41. Royal Chitwan National Park
42. Sinharaja Forest Reserve
43. Thungyai - Huai Kha Khaeng Wildlife Sanctuaries
FORESTS
Boreal, Temperate and Subtropical Broadleaf and Mixed Forest
Boreal, Temperate and Subtropical Needleleaf Forest
Tropical Moist Forest
Tropical Dry Forest
Mangrove
Non Forest
Water Bodies
41
38
40
43
42
39


Forest Protected Areas or
Australian and Antarctic R
ANTARCTIC REALM
44. Te Wahipounamu
45. Tongariro National Park
AUSTRALIAN REALM
46. Central Eastern Australian Rainforests
47. Fraser Island
48. Kakadu National Park
49. Tasmanian Wilderness
50. Wet Tropics of Queensland
45



Forest Protected Areas on the World Heritage List in the Australian and Antarctic Realms

ANTARCTIC REALM

44. Te Wahipounamu
45. Tongariro National Park

AUSTRALIAN REALM

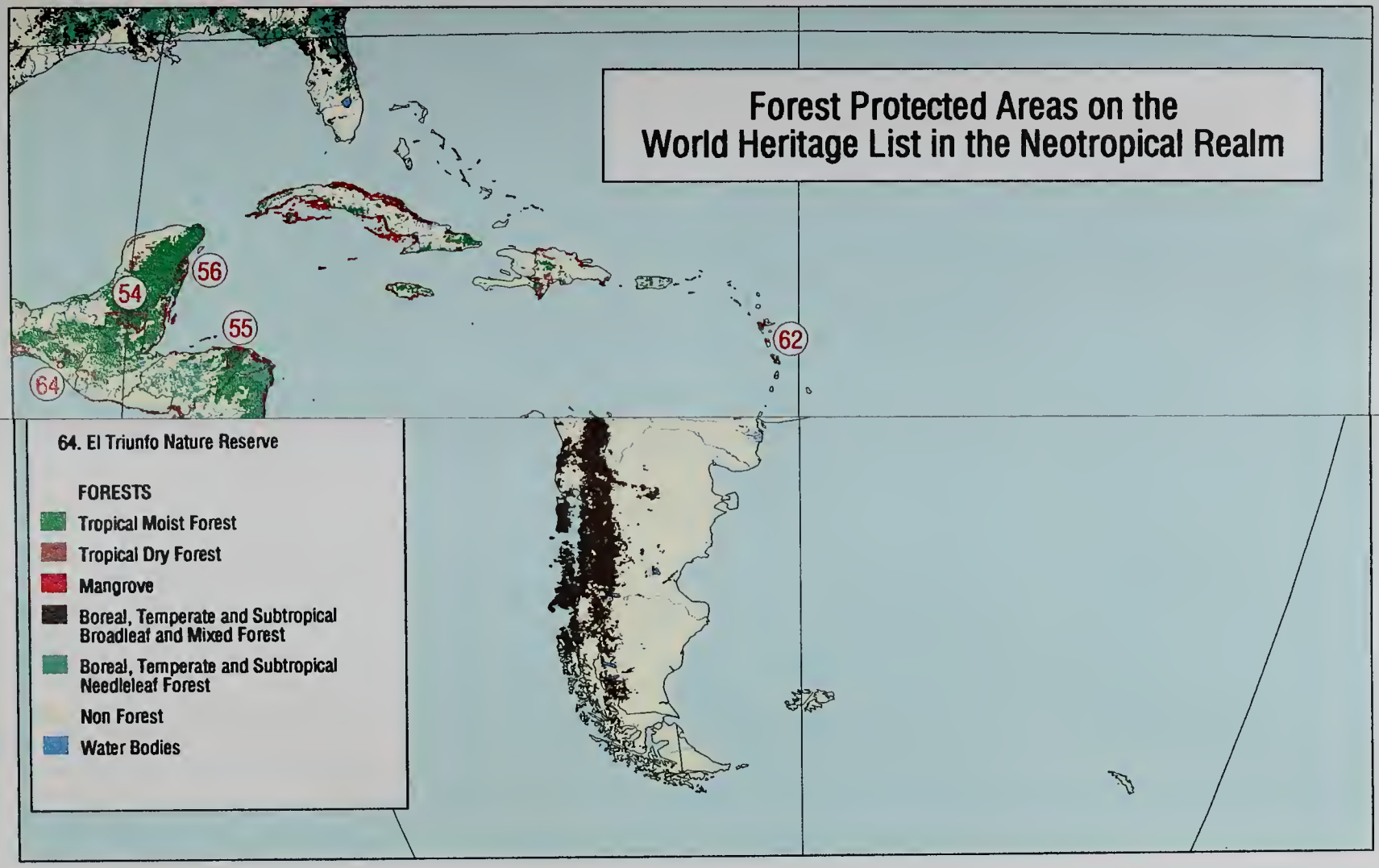
46. Central Eastern Australian Rainforests
47. Fraser Island
48. Kakadu National Park
49. Tasmanian Wilderness
50. Wet Tropics of Queensland

FORESTS

- Boreal, Temperate and Subtropical Broadleaf and Mixed Forest
- Boreal, Temperate and Subtropical Needleleaf Forest
- Tropical Moist Forest
- Tropical Dry Forest
- Mangrove

Non Forest

- Water Bodies


Forest Protected Areas on the
World Heritage List in the Neotropical Realm
54
55
56
62
64
64. El Triunfo Nature Reserve
FORESTS
Tropical Moist Forest
Tropical Dry Forest
Mangrove
Boreal, Temperate and Subtropical Broadleaf and Mixed Forest
Boreal, Temperate and Subtropical Needleleaf Forest
Non Forest
Water Bodies


Forest Protected Areas on the
World Heritage List in the Neotropical Realm
NEARCTIC REALM
51. Iguazú and Iguaçu National Parks
52. Talamanca Range & La Amistad Reserves
53. Sangay National Park
54. Tikal National Park
55. Río Platano Biosphere Reserve
56. Sian Ka'an Biosphere Reserve
57. Darien and Los Katios National Parks
58. Historic Sanctuary of Machu Picchu
59. Manu National Park
60. Río Abiseo National Park
61. Canaima National Park
62. Morne Trois Pitons National Park
64. El Triunfo Nature Reserve
FORESTS
Tropical Moist Forest
Tropical Dry Forest
Mangrove
Boreal, Temperate and Subtropical Broadleaf and Mixed Forest
Boreal, Temperate and Subtropical Needleleaf Forest
Non Forest
Water Bodies

ANNEX

SITE INVENTORY DESCRIPTIONS

The following annex inventories the forest protected areas on the World Heritage List (61 sites). A key/legend is located at the top of each inventory describing other relevant international environmental treaties and designations. The year each site was inscribed as a World Heritage site (WH) along with the criteria (natural heritage criteria i- iv) for which the selection was based is included. Criteria for World Heritage sites is defined into four categories which are described in detail in the Operational Guidelines for the Implementation of the World Heritage Convention #43-45 (Attached as Annex 2). Special note is made if the site is designated on the World Heritage Site in Danger List (WD) including the year it was placed on the Danger List. Special note is also made for sites designated as a UNESCO Man and Biosphere Reserve (BR); and/or included in World Wildlife Fund for Nature's (WWF) Global 200 Ecoregions: The Living Planet Campaign (WWF - Ecoregion #). WWF Global 200 Ecoregions (1995) is a broader and more recent overview of global biodiversity than the Udvardy system (1975). The WWF Ecoregions attempt to identify the areas which best indicate global biodiversity that deserve conservation attention. It is helpful to compare these ecoregions with forest protected areas on the World Heritage List and to locate regions with minimal World Heritage protection (gap areas) at the present, in order to establish a list of forest areas which may merit consideration for future World Heritage nomination (Table 8). Of the 61 World Heritage sites included in this overview, 45 are located within a WWF Global 200 Ecoregion.

In the inventory text, World Heritage forest sites are listed in rows and categorised by Biogeographic Realm (Udvardy, 1975), which divides the world into eight realms: Nearctic, Palearctic, Afrotropical, Indomalayan, Oceanian, Australian, Antarctic, and Neotropical. In the inventory text, the columns include the country name, the World Heritage site name, and the physical area of the World Heritage site in hectares (may differ from the size of the national park or other international designation) as stated in each site's nomination. The final row explains the major characteristics of the forest protected area within the World Heritage site. IUCN welcomes comments regarding the forest protected areas in any of the sites included in this overview, which will be useful in preparation of future revisions of this working paper. Attached are the World Heritage Operational Guidelines #43-45 which cover the criteria for inscription of natural sites on the World Heritage List (Annex 2).

1. FOREST PROTECTED AREAS INSCRIBED ON THE WORLD HERITAGE LIST

Key:

WH	World Heritage List (Date of Inscription)
WHD	World Heritage in Danger
BR	UNESCO Man and the Biosphere Reserve (1974) (Date of Inscription)
WWF- 200	Included in the WWF- Global 200 Ecoregions system (1995). Ecoregion number(s) is in parentheses.

COUNTRY	SITE NAME	AREA	FOREST VALUES
NEARCTIC REALM			
CANADA	1. Canadian Rocky Mountain Parks **WH (1984) i, ii, iii**	2,306,884ha	Noted for its natural beauty, diverse flora and fauna and large tracts of wilderness, Canadian Rocky Mountain Parks site is comprised of three major ecoregions (montane, subalpine and alpine), identified largely by different vegetation. The montane region (over 18,000 ha) contains lodgepole pine, white spruce, aspen, poplar, douglas fir and extensive grasslands. Black spruce is occasionally found along river valleys. The lower subalpine areas (over 115,000ha) support closed coniferous forests dominated by Engleman spruce, subalpine fir and, and in its younger successional stages, lodgepole pine. Willow, dwarf birch and health can be found in the alpine region, but the area predominately lacks forest due to the cold harsh climate of the higher elevations. Within the park, pockets of wetbelt forest can be found with western red cedar, western hemlock and yew being the primary tree species.
CANADA	2. Gros Morne National Park **WH (1987) i, iii**	180,500ha	Gros Morne contains 60% of Newfoundland's flora, including coastal and boreal forest. The coast includes white spruce while prostrate spruce, balsam fir and spruce fir occur on the cliffs. American larch occur in meadows and black spruce and dwarf larch dominate wet areas. The plateau above contains small areas of stunted and coniferous forest. There also exists yellow birch, black ash, eastern white-pine and red maple.
CANADA	3. Nahanni National Park **WH (1978) ii, iii** **WWF- 200 (84)**	476,560ha	Nahanni National Park is a transition zone between nearctic boreal forest and nearctic alpine tundra with nearly 1,000 flora species. The bottom valleys are covered with dense stands of spruce and poplar while heavy concentrations of black spruce and larch occur at higher elevations.
CANADA	4. Wood Buffalo National Park **WH (1983) ii, iii, iv** **WWF - 200 (84)**	4,480,000ha	Protected primarily to protect the North American bison, Wood Buffalo also has an extensive boreal forest zone with black spruce, white spruce, jack pine, and tamarack being the dominant tree species. Balsam poplar and aspen stands occur along watercourses. The high prairie supports a spruce-willow-birch upland tundra community. This park contains the largest inland delta in the world and the largest undisturbed grass meadow in North America.
CANADA & USA	5. Waterton/Glacier International Peace Park **WH (1995) ii, iii** **BR (1979 Waterton)**	457,696ha	The major ecoregions found within this site are montane forest, and aspen parkland and the subalpine forest which is the single-most vegetation cover in the park. A strong boreal element is typical of this ecoregion, characterised by dwarf birch. Montane forests occur at low elevations and include douglas fir and lodgepole pine. .Trembling aspen is the dominant tree species within the aspen parkland which separates the higher coniferous forest from the lower grasslands. Stands of fir-whitebark and large areas of limber pine scrub have been identified within the park and are undescribed elsewhere.

COUNTRY	SITE NAME	AREA	FOREST VALUES
USA	6. Great Smoky Mountains National Park **WH (1983)** **BR (1976)** **WWF- 200 (70)**	209,000ha	This protected area contains over 130 species and fourteen major types of trees, the most notable being cove hardwood and spruce-fir, which contain 20 different species in the canopy at any one site. Approximately 20% of the park's forest is high in virgin attributes and in recovering areas, deciduous broad-leaved and evergreen coniferous predominate. On mesic sites, clove and hemlock hardwoods reside in low and mid-elevations with spruce-fir occurring at about 1,500m. On a gradient from mesic to xeri, the cove hardwoods are replaced by mixed oak, xeric oak, and oak-pine. About 75% of all Southern Appalachian spruce-fir occurs at high elevations within this park and include the largest contiguous block of virgin *Picea rubens* on earth.
USA	7. Olympic National Park **WH (1981) ii, iii** **BR (1976)** **WWF- 200 (68)**	369,660ha	90% of the park is comprised of four forested zones: the montane zone (50%) contains western hemlock, pacific silver fir and douglas fir. The subalpine zone (20%) contains mostly mountain hemlock and subalpine fir. The lowland forest zone (10%) is comprised of western red cedar, western red hemlock, grand fir and douglas fir. Finally the sitka spruce zone contains temperate rain forest characterised by sitka spruce, western hemlock, western red cedar and big leaf maple.
USA	8. Redwood National Park **WH (1980) Ii, iii** **BR** **WWF- 200 (68)**	44,610ha	Redwood National Park is a significant example of the unique and diverse primeval coastal redwood forest, which represents 42% of the remaining old growth redwood stands in the world. The redwoods are now confined to wet regions on the west coast of North America. The park contains the tallest tree in the world (112.1m). This park contains 15,776ha of old growth redwood and 20,800ha of post-harvest regrowth, with the dominant vegetation type being coastal redwood with *Sequoia sempervirens*. Trees in the regrowth region range from 20 to 50 years in age and are comprised mainly of western hemlock, douglas fir, big maple leaf, madrone and California laurel\bay. Nearly 70% of the park is forested.
USA	9. Yellowstone National Park **WH (1978) I, ii, iii, iv** **BR (1976)** **WHD (1995)**	898,349ha	Aside from being the oldest national park in the world, Yellowstone is also heavily forested. In fact, 80% of Yellowstone National Park is forested (Yellowstone Plateau alone contains 650,000ha forested area), with 80% of the forest being lodgepole pine *Pinus contorta*. In total, the park contains seven species of coniferous trees
USA	10. Yosemite National Park **WH (1984) I, ii, iii** **WWF- 200 (69)**	308,283 ha	Yosemite contains five of the seven recognised life zones in the USA. Few areas have more variety of native fauna than the Sierra slopes, evident by the 16 major forest types and 37 native tree species, the most extensive being white fir (15%), lodgepole pine (20%) and red fir (12%). The park also contains 169 ha of three stands of giant sequoia which contain many important trees including the Grizzly Giant. Other notable tree types within the park include black oak, chaparral woodlands, digger pine and mixed coniferous forests with ponderosa pine, incense-cedar, douglas fir, white fir and California black oak. Red fir, western juniper, jeffrey pine, western white pine and virgin sugar pine stands characterise the lower elevations. The meadows are comprised of primarily black oak whereas the subalpine zones are dominated by lodgepole pine and mountain hemlock.
PALEARCTIC REALM			
BELARUS/ POLAND	11. Beloveshskaya Pushcha/ Bialowieza National Park **WH (1979; 1992) iii**	147,872ha	This area comprises a vast stretch of ancient, virgin, palearctic forest with relatively little human disturbance. The forest stands represent the characteristics of primeval forest with all of the major forest associations in this part of Europe (over 20 different types) occurring in this park.

COUNTRY	SITE NAME	AREA	FOREST VALUES
BULGARIA	12. Pirin National Park **WH (1983) i ii, iii** **BR (1977)**	40,060ha	Forests occupy 60% of this protected area comprised mainly of mixed coniferous forests with a high incidence of relic Balkan endemics. The top of the treeline elevation is dominated by Macedonian pine and endemic Bosnian pine occurs in the highest zone of the karst area. Unique stands of pine species are 500 years old (*P. leucodermis*) and others grow up to 45m in height. Silver fir, Austrian pine, spruce, Scots pine and beech form most of the remaining coniferous forest type. Thickets of dwarf mountain pine are evident in the subalpine zone.
CHINA	13. Huanglong Scenic and Historic Interest Area **WH (1992) iii** **WWF- 200 (78)**	60,000ha	Huanglong is situated at the transition zone between the eastern damp forest zone and the mountainous coniferous woods of Jing-Zang Plateau. About 65% of the site is covered in forest at various altitudes. From 1,700m to 2,300m, there is a belt of mixed forests dominated by Chinese hemlock, dragon spruce and three species of maple. Between 2,300m and 3,600m the forest is largely coniferous and subalpine characterised by spruces, larch and birches. Above this level the forest gives way to alpine meadows and permanent snow and granite.
CHINA	14. Jiuzhaigou Valley Scenic and Historic Interest Area **WH (1992) iii** **WWF- 200 (78)**	72,000ha	This forest protected area is 65% forested and lies in the Szechuan highlands and within the Sichuan Yunnan temperate conifer and broadleaf forest zone. Located within Juizhaigou are virgin conifer forests and two species of bamboo which provide a vital food source for the giant panda. Other vegetation information is unavailable for this site but is similar to that in Huanglong Scenic and Historic Interest Area (#13 above).
CHINA	15. Mt. Emei /Leshan Giant Buddha **WH (1996) iv**	15,400ha	Five major vegetation belts cover 87% (52% forest) of Mt. Emei protected area: sub-tropical evergreen broad-leaved forest (below 1500m), evergreen and deciduous broad-leaved mixed forest, coniferous and broad-leaved mixed forest, subalpine coniferous forest and subalpine shrubs above 2,800m. These forests are home to over 3,200 plant species representing 10% of all those found in China with 1,600 used for medicinal purposes.
CHINA	16. Huangshan **WH (1990) iii, iv**	15,400ha	Known as a top scenic site for its mountains, Huangshan also contains endemic vegetation and forest regions, which cover 56% of the protected area. 45% of the buffer zone is also forested. The primary species below 800m is Masson pine with Huangshan pine occurring between 600 and 1100m. Above 1100m lies deciduous forest with oak and beech. A number of trees in the site are celebrated on account of age, unique shape, or precipitously perched position, including 1,000 year old specimens of Huangshan pine, maidenhair and alpine juniper.
CHINA	17. Taishan **WH(1987) iii**	25,000ha	Taishan has been symbol of ancient Chinese culture and an imperial pilgrimage for nearly two thousand years. Vegetation covers 80% of the area, which is densely wooded, but information about its composition is lacking. The flora is diverse and known to comprise 989 species, 433 are woody and the rest herbaceous. Medicinal plants total 462 species, many renowned throughout China. Some trees are very old and famous, notably the 'Han Dynasty Cypresses' (planted 2,100 years ago by Emperor Wu Di), 'Tang Chinese Scholartree' (planted 1,300 years ago), 'Welcoming Guest Pine' (500 years old) and 'Fifth Rank Pine' (named by Emperor Qin Shi Huang of the Qin Dynasty and replanted some 250 years ago).
CROATIA	18.. Plitvice Lakes National Park **WH (1979) ii, iii**	19,200ha	Nearly 70% of the Plitvice is forested. Nearly three-fourths of the forested area within the park consists of some of the last remaining stands of pure beech in Europe. This forest area is a refuge for bears, wolves and threatened bird species. Other forests within the park include fir (22%), spruce (5%), pine (1%), hornbeam, sumac, juniper, black alder and maple.

COUNTRY	SITE NAME	AREA	FOREST VALUES
JAPAN	19. Shirakami-Sanchi **WH (1993) ii**	16,971ha	Shirakami-Sanchi contains the last remaining area of virgin Siebold's beech forest and the largest virgin beech forest remaining in East Asia. The beech forest contains the Siebold's beech species, *Fagus crenata*, which is the typical Japanese climax temperate forest. This site also contains over 500 plaint species including some endemism and globally endangered species. The area has had no logging due to its remoteness and steep slopes.
JAPAN	20. Yakushima Island **WH (1993) ii, iii** **WWF - 200 (44)**	10,747ha	This tiny and mountainous island has remarkable flora diversity ranging from a dense tropical rainforest in the lowlands to the cool temperate forest on the mountain slopes. On the primary forests on the slopes lies the indigenous Japanese cedar, known as "sugi." Trees are named by age, with "Yakusugi" (nearly 3,000 years old) and "Jamonsugi" (some say 7,200 years old) being some of the oldest living things on earth. These remnant patches of ancient forest are unique since beech forests have overtaken ancient cedars in most areas since the last Ice Age.
RUSSIAN FEDERATION	21. Lake Baikal **WH (1996) i, ii, iii, iv** **BR (1986)** **WWF - 200 (85 and 165)**	8,800,000ha	As well as being the world's largest lake (20% of the world's freshwater), the area around Lake Bakail has a rich biological diversity and expansive boreal forests. The west portion of the basin contains light coniferous forests and mountain steppes. In the east, pine forest predominate, whilst the north is dominated by deciduous forest supporting larch, spruce, willow and fir-Korean pine. At higher altitudes, fir and cedar are found, followed by thickets of dwarf pine at higher elevations. Poplar and willow occupy low areas in the south basin, while river valleys contain bird cherry and alder. North mountain slopes contain Korean pine, spruce, cedar, larch and fir.
RUSSIAN FEDERATION	22. Virgin Komi Forests **WH (1995) ii, iii** **BR** **WWF- 200 (86)**	3,280,000ha	Virgin Komi is the only place in Europe where the Siberian pine *Pinus siirica* grows and includes a vast expanse of boreal forest ecosystem which extends from the marshes into the Ural's foothills. This park contains extensive boreal forest where spruce, fir and pine are found. Pine and larch dominate the higher elevations and subalpine scrub woodlands occur in the valleys.
SPAIN	23. Garajonay National Park **WH (1986) ii, iii** **WWF - 200 (21)**	3,984ha	Garajonay contains one of the largest continuous areas of *laurisilva forest* in the world, which has nearly disappeared from Southern Europe and North Africa. The laurel forest comprises 70% of the park and 50% of the total forest in the Canary Islands. The park contains a high number of endemic species (25% flora and 50% fauna), many which are threatened. The forest cover causes mist vapour condensation and helps maintain the island's main water sources.
YUGOSLAVIA	24. Durmitor National Park **WH (1980) ii, iii, iv**	32,000ha	The virgin forest of Mlinski are one of the principle reasons for the area's special management status. Vegetation covers over 50% of the park including zones of deciduous forest, coniferous forest, sub-alpine and alpine meadows. The dominant tree species include Scots pine, Norway pine, silver fir, beech, occasional birch, mugo pine and juniper. The park contains one of the last virgin black pine Pinus nigra forests in Europe.
AFROTROPICAL REALM			
CAMEROON	25. Dja Faunal Reserve **WH (1987) ii, iv** **BR (1981)** **WWF- 200 (23)**	526,000ha	The reserve is located in a transition zone between the nearly undisturbed forests of southern Nigeria, south-west Cameroon and the Congo Basin. With two wet seasons, high humidity and temperatures, the reserve is a magnificent example of primary Congo rainforest, which is comprised of almost pure stands of *Gilbertiodendron dewevri* forest and over 40 different species which make up the canopy and reach 60m heights. Although development now threatens this remote reserve, no commercial logging has taken place within the reserve and agriculture and hunting are prohibited except for traditional practices by pygmies.

COUNTRY	SITE NAME	AREA	FOREST VALUES
COTE D'IVOIRE	26. Tai National Park **WH (1982) ii, iv** **BR (1978)** **WWF- 200 (14)**	330,000ha	Tai National Park is the largest remaining island of forest in West Africa and one of the last remnants of the vast primary forest that once stretched across present day Ghana, Cote d'Ivoire, Liberia and Sierra Leone. This humid tropical forest contains over 150 endemic species of plants, some thought to have been extinct, and giant trees reaching up to 60m with massive trunks and large buttresses or stilt roots. Tai has recovered well since banning timber exploitation in 1972.
COTE D'IVOIRE/ GUINEA	27. Mt. Nimba Strict Nature Reserve **WH (1981) ii, iv** **BR (1980)** **WWF - 200 (14)**	18,000ha	This dense forest area contains rich flora with over 2,000 plant species, 16 thought to be endemic. The high altitude forests are dominated by Mytaceae species and tree ferns. At above 1000m, the savannah supports gallery forest and abundant epiphytes. Primary forests predominate the lower foothills and valleys. Agricultural pressures have reduced the drier mid altitude forests.
DEMOCRATIC REPUB LIC OF CONGO	28. Kahuzi-Biega National Park **WH (1981)** **WWF- 200 (17 and 115)**	600,000ha	KBNP is one of the largest reserves in Central Africa for flora and fauna conservation. With the addition of 75,000ha to the park in 1975, the prevailing vegetation type is equatorial rain forest. It is a typical tropical moist forest dominated by tall trees branching at the top to form a dense evergreen 45m canopy. The lower rainforest area is home to one of the last groups of mountain gorillas. Overall, two-thirds of the mountain forest in this park is dense primary forest intermixed with bamboo. The remaining area is mainly mesophytic woodland including Hagenia trees and areas of Cyperus swamp. One side of the park is covered with 60,000 ha of humid tropical mountain forest between 900 to 2300m, whereas the other side is covered by tropical forest between 600 to 1200m. Low mountain forest exists with productive timber and sufficient light to allow growth of herbaceous plants. High altitude forest occurs between 1600 to 2700m with a conifer forest termed "primary Padocarpus forest" and bamboo above 2300m.
DEMOCRATIC REPUBLIC OF CONGO	29. Okapi Faunal Reserve **WH (1996) iv** **WWF - 200 (25)**	1,372,625ha	The reserve is mainly comprised of rolling forested uplands with a very high floral density. On only a 9ha of inventoried mixed forest, over 300 tree and 130 liana species were recorded and on a separate 4.6ha section, 257 tree species were found. Four main types of forest occur: swamp forest along drainage channels; mixed forest with 40m crown heights and a heterogeneous canopy with frequent emergent trees; mabu forest with 30-40m heights with an even, dense canopy; and secondary forest in deforested areas. Several species of canopy trees and emergents exist, including two threatened endemic cycads *Encephalartos marunguensis* (E) and *E. schmitzii* (E). The forest is a Pleistone refuge providing exceptional species richness with a 15% endemicity, one of the world's highest, and is listed as one of the top forest sites for bird conservation.
DEMOCRATIC REPUBLIC OF CONGO	30. Salonga National Park **WH (1984) ii, iii** **WWF- 200 (25, 17, 146, 115)**	3,600,000ha	Salonga National Park is the largest tropical forest national park in the world and the last great concentration of protected equatorial forest in Africa. Equatorial forests cover most of this park, varying in composition, with the principal types being swamp, riverine, and dry-land forests Some semi-deciduous forest covers all areas between the park's extensive river system.
DEMOCRATIC REPUBLIC OF CONGO	31. Virunga National Park **WH (1979) ii, iii, iv** **WHD (1994); Ramsar** **WWF - 200 (17 and 200)**	790,000ha	Located on the border of several biogeographical zones, Virunga is home to an incomparable diversity of forest habitats including tropical rain forest, alpine forest, eastern steppe, bamboo on the mountainous areas, equatorial forest along the Semiliki river, wooded savannah, swamps and dry thick forest on the lava plains.

COUNTRY	SITE NAME	AREA	FOREST VALUES
MADAGASCAR	32. Tsingy de Bemaraha **WH (1990) iii, iv** **WWF - 200 (57 and 144)**	152,000ha	This remote area consists of dense, very dry forest typical of Western Madagascar's limestone plateau. Ebony, wild banana and baobab are the most prevalent tree species in the reserve, which is home to the lemur and other species. The southern region of the reserve consists of famous pinnacles and outcrops of jagged pillars, columns and towers which have been compared to a "limestone forest." This area is inaccessible and has been spared the intrusions of herders which have threatened other areas of the park with slash and burn practices for cattle grazing.
SENEGAL	33. Niokolo-Koba National Park **WH (1981) iv** **BR (1981)**	913,000ha	Being the largest protected area in western Africa, Niokolo-Koba is able to support diverse naturally sustaining populations of fauna. Much of the area is riparian forest. The area of dry Sudanian forest in much of the park is alleviated from seasonal flooding by patches of bamboo whilst the southern more equatorial portion of the park contains patches of gallery forest, home to chimpanzees and other primates.
SEYCHELLES	34. Vallée de Mai Nature Reserve **WH (1983) i, ii, iii, iv** **WWF- 200 (19)**	19.5ha	Set on the Praslin island, the unique and remarkable forest of this reserve is home to the Coco-de-Mer, a palm species with largest and heaviest seed in the world (20kg). The entire forest contains six endemic palm tree species which provide a dense canopy. The high rainfall provides conditions for a well developed secondary forest of palm, cinnamon, mango, epiphytes, lichens, mosses and several other species of flora.
TANZANIA	35. Selous Game Reserve **WH (1982) ii, iv** **WWF- 200 (104) 15? 102?**	5,000,000ha	Selous is the second largest game reserve in Africa. There are two main vegetation types in the reserve: wooded grassland comprises 17% of the reserve and 75% of the reserve is deciduous miombo woodland, a vegetation type maintained by fire. There are also areas of dense thicket, riverine and ground water forest. More than 2,000plant species have been recorded, but it is thought more may be found in the remote forests in the south.
UGANDA	36. Bwindi Impenetrable Forest National Park **WH (1994) iii, iv** **WWF- 200 (17)**	32,092ha	Bwindi is one of the few large expanses of forest in east Africa where lowland montane and montane vegetation communities meet. Due to its extensive lowland montane forest continuum, Bwindi is believed to hold the richest faunal community in east Africa with over 200 tree (10 endemic) and 100 fern species which led IUCN to select Bwindi one of the 29 forests in Africa most important for conserving plant diversity It contains 47% of Uganda's tree species including *Lovoa swynnertonii*, an internationally threatened species. The forest is called "impenetrable" due to the dense cover of herbs, vines and shrubs on the valley bottoms. It is undoubtedly the most important area in Uganda for species conservation with 9 globally threatened species and one third of the world population of mountain gorillas.
UGANDA	37. Rwenzori Mountains National Park **WH (1994) iii, iv** **WWF- 200 (17)**	99,600ha	In this Albertine Rift mountainous area, the type of vegetation varies with altitude. Although most research has occurred in the higher elevations, there have already been nine tree species found that are endemic to the Rwenzori Mountains and montane forest zones of this region of Uganda. Below 2,400m, the vegetation is broken montane forest with few large trees and broken canopy that merges into bamboo zones. Biologically unique cloud forests occur between 2,000 and 3,500m. Up to 3,800 the bamboo zone becomes dense thickets of giant heathers over 10m in height. A zone of Afro-alpine moorland exists up to 4,400m. Some 300,000 Bakonjo and a few other tribes have been granted rights for sustainable use of park resources.

COUNTRY	SITE NAME	AREA	FOREST VALUES
INDOMALAYAN REALM			
INDIA	38. Manas National Park **WH (1985) ii, iii, iv**	39,100ha	First established as a forest reserve seventy years ago, Manas is the most diverse of India's wildlife reserves. The hot climate has created dense tropical semi-evergreen forests, and tropical rain forest and dry deciduous forests in the south and east. The dry deciduous represents early stages of succession and are replaced by moist deciduous away from water sources, then succeeded by the tropical climax forest. Grassland covers 50% of the park. Some 393 species of dicotyledons, including 197 trees, and 98 species of monocotyledons have been identified within Manas. The park is also noted for its scenery and wide variety of habitat types.
INDIA	39. Sundarbans National Park **WH (1987) ii, iv** **WWF- 200 (185 and "g")**	133,010ha	The Sundarbans contains the world's largest region of mangrove forests with 36 true mangrove forest, 28 associated forest and seven obligatory forest type, representing 29 families and 49 genera. It is the only mangrove forest in the world to be inhabited by tigers. The area is called Sundarbans due to the dominance of the tree species *Heritiera fomes*, locally known as "sundari" because of its elegance. The only other place it is found is in a small part of the Mahanadi and Godaveri deltas. Sundarbans are classified as a moist tropical seral forest, comprising of beach forest and tidal forests. Beach forest occurs in sand-dunes on coastal islands. Salt-water forests grow between 6-11m near rivers and include garjan, kankra, goran, keora, gengwa, date palm and golpata palm, which is a rare species. Low mangrove forest grows 3-6m in height in an area devoid of freshwater, consisting mainly of dense goan and baen.
INDONESIA	40 Ujung-Kulon National Park **WH (1991) iii, iv**	76,119ha	Ujung Kulon protects one of the last extensive areas of lowland rain forest in Java and is home to the Javan rhinoceros. Due to the natural geological modifications, including the eruption of Krakatau in 1883, primary lowland rain forest has been reduced to 50% of the total protected area. A tall closed canopy forest occurs on Gunung Payung with an understory of low palms and herbs. Primary forest comprises a portion of Palau Peuchang typified by an open canopy with emergents up to 40m in height. Primary lowland forest with a palm understorey exists in the Gunung Honje region. Higher slopes contain a denser canopy with an understorey characterised by moss growth and epiphytic orchids. The central lowlands have a more open secondary forest dominated by palms interspersed with bamboo. Freshwater swamp forests seasonally inundate the northern promontory of Ujung Kulon. Mangrove forests occur in a broad belt along the northern side of the isthmus as far as the Cikalong River and beach forest lies on the ridges of the north and north-west coasts of Ujung Kulon.
NEPAL	41. Royal Chitwan National Park **WH (1984) ii, iii, iv** **WWF - 200 (76, 79 or 95??)**	93,200ha	Royal Chitwan National Park and the adjacent Parsa Wildlife Reserve contain the largest, least disturbed sal forest in the world, which covers over 70% of the site. Sal forests average 30-40m in height and though deciduous, it is never entirely without leaves. Sal wood is hard and durable and one of the most important trees in Nepal for building and religious festivals. Purest stands of sal forest occur on the better drained lowland at the park's centre Elsewhere sal is intermingled with chir pine, asna, saj and barro trees. Several types of riverine forest occur along riverbanks and streams in 7% of the park, including *Eugenia* woodland and tropical evergreen forest.

COUNTRY	SITE NAME	AREA	FOREST VALUES
SRI LANKA	42. Sinharaja Forest Reserve **WH (1988) ii, iv** **WWF- 200 (28 and 147)**	8,864ha	This undisturbed tropical rain forest area is thought to be a relic of Gondwanaland and is the only remnant of the once immense tropical rain forest that covered the entire southwest of Sri Lanka. The forest has a dense canopy of about 40m in height. Climbing cane palms wind themselves up tree trunks in the search for sunlight and tree ferns and staghorns are prevalent throughout the forest
THAILAND	43. Thungyai - Huai Kha Khaeng Wildlife Sanctuaries **WH (1991) ii, iii, iv** **WWF- 200 (59 and 29)**	577,464ha	This site is the largest protected area in mainland Southeast Asia and one of the most outstanding conservation areas due to its primeval forest. Located at the meeting place of Asia's four principal biogeographic zones, the Sanctuary contains one of the last remaining lowland riverines forest in Thailand among several other types of forest zones: tropical lower montane at the highest areas; dry evergreen on slopes above 600m; mixed deciduous and bamboo at lower altitudes; evergreen gallery in moist areas; and dry dipterocarp and savannah forest covering the remaining areas. Since the vegetation is largely undisturbed, with little logging or shifting agriculture, several commercially important species of teak remain. There are no longer any hill-tribe villages within the protected area. Protected forests of substantial size buffer the north and south of the Sanctuary.
AUSTRALASIA REALM			
AUSTRALIA	44. Central Australian Rainforests **WH (1994) i, ii, iii** **WWF - 200 (80)**	366,455ha	This group of six forest protected areas contains several of the last remaining stands of undisturbed sub-tropical and temperate rain forest in Australia and numerous endemic and threatened flora species including *M. coronata* and *M. longiloba* of the genus *Marsdenia*. The main range includes sub-tropical and warm temperate rain forest (at elevations over 700m), tall open forest and woodland. Temperate eucalyptus species also occur in the tall open forests at higher altitudes of the main range. The primary forest type occurring in other portions of the protected area are cool sub-tropical rain forest, cool temperate rain forest (including the largest *Nothofagus* trees in existence), eucalyptus (endemic and endangered species), tall open forest, dry rain forest with hoop pine, coastal rain forest, the largest stand of littoral rain forest in New South Wales, one of the last remaining unlogged stands of blackbutt eucalyptus (most important commercial hardwood species) and the largest extent of coachwood rain forest in the world.
AUSTRALIA	45. Fraser Island **WH (1992) ii, iii**	166,283ha	Fraser, the world's largest sand island, contains forests growing on tall sand dunes in what is a unique global ecosystem. Several forest types comprise the seven main vegetation communities on the island, including closed forest, rain forest, tall eucalyptus forest dominated by satinay and brushwood, blackbutt forest, Callitris forest, woodlands, and mangroves. The rain forest is characterised by upper strata species such as piccabeen palm, hoop pine, kauri pine and carrol. This community covers about 3,260ha of the island with 25% represented within the park. The tall eucalyptus forests, dominated by pure stands of blackbutt *Eucalyptus pilularis*, occur mainly on the high dunes next to the rain forests. The low scherophyll forest, behind the foredunes is dominated by scribbly gum.
AUSTRALIA	46. Kakadu National Park **WH (1981) ii, iii, iv** **WWF - 200 (108 and "ff")**	1,980,400ha	Kakadu is recognised as one of Australia's most significant national park due to its large size, ancient remnants of aboriginal culture, major tropical monsoon river system, 1,600 plant species and several forest types, including lowland rain forest, sandstone rain forest, woodlands, mangroves and several types of Eucalyptus. The Eucalyptus open forest is the dominant

COUNTRY	SITE NAME	AREA	FOREST VALUES
			vegetation in the park. Mangroves occur extensively along tidal reaches of all major coastal river systems. Lowland rain forests comprise small pockets in Eucalyptus or paperbark dominated areas.
AUSTRALIA	47. Tasmanian Wilderness **WH (1982) i, ii, iii, iv** **BR** **WWF- 200 (81)**	1,383,640ha	This site contains most of the last great temperate wilderness remaining in Australia, most being in natural condition. With a high endemism and a significant number of threatened species, the protected area supports a flora and fauna that includes many primitive groups of Gondwanan origins and 33 of the 39 temperate rain forest communities of Tasmania. Temperate rain forest covers nearly 30% of the area below treeline, dominated by Antarctic tree species and differing from tropical and subtropical rain forests in many ways. Most of the rain forest in the park contains myrtle beech, Huon pine *Lagarostrobos franklinii*, one of the oldest species in Australia (over 2,000 years old), King Billy pine and celery top pine. Emerging from the rain forest are mixed forests with eucalyptus with rain forest understorey. Eucalyptus also dominate sub-alpine woodland and dry sclerophyll forest communities. Of particular conservation significance are the magnificent examples of pristine tall forests, with eucalyptus regnans (world's largest flowering plant) forming 60-90m high canopy over 20m high closed wet understorey.
AUSTRALIA	48. Wet Tropics of Queensland **WH (1988) i, ii, iii, iv** **WWF- 200 (47)**	894,420ha	This protected area comprises one of the most significant regional ecosystems in the world. A primary reason for its protection was that it comprises the main distribution of rain forest in Queensland and the unique association between coastal rainforest and fringing coral reef (bordering the Great Barrier Reef). The mangrove forests comprise some 30 tree species and shrubs, comparable in diversity to those of New Guinea and Southeast Asia which are acclaimed as being among the richest in the world. The main vegetation type in the park is wet tropical rainforest, but is dissected by sclerophyll forests (Eucalyptus and Acacia), woodlands, swamps and mangrove forests. In all there are over 27 forest communities from multi-storeyed vine forests to simple vine forests and fern forests and thickets. The contrast between tropical rainforest and wet tall open sclerophyll forests (Eucalyptus grandis) is considered unique to Australia. The tall open Eucalyptus forest is crucial for conservation of three mammal species.
OCEANIC REALM			
NEW ZEALAND	49. Te Wahipounamu - South West New Zealand **WH (1990) i, ii, iii, iv** **WWF- 200 (82)**	2,600,000ha	the diversity of vegetation of this area is distributed from sea level, to fjordlans, to forest and high mountains with southern beech and podocarps (some over 800 years old) comprising nearly 70% of the park. Running horizontally at tree line (1,000m) are stands of silver beech. At warmer lower altitudes, the rain forest is dominated by dense stands of tall podocarps (10 different forest tree species). The wetter, milder west is comprised of luxurious rain forest, whereas the drier east has more open forest, usually mountain beech.
NEW ZEALAND	50.Tongariro National Park **WH (1990) ii, iii** **WWF - 200 (46)**	79,596ha	Being both rich in culture to the local Maori people and in biodiversity, Tongariro was the first World Heritage site to be inscribed under the revised cultural landscape criteria. The diverse habitat ranges from rain forest to barren icefields. In the west and north, over 3,000ha of once nation-wide mixed Podocarp-broadleaf rain forest occurs up to 1000m. At higher altitudes, pure beech stands of red, silver and mountain beech cover an 17,730ha area. The pinhole beetle has spread a fungus throughout mature beech on Ruapehu, but regeneration is occurring Various scrubland covers 24,500ha and includes dwarf beech, heather, and podocarps.

COUNTRY	SITE NAME	AREA	FOREST VALUES
NEOTROPICAL REALM			
ARGENTINA/BRAZIL	51. Iguazu and Iguacu National Parks **WH (1984) iii, iv** **WWF - 200 (1)**	225,000ha	Iguazu harbours one of the most complete remnant patches of the highly endangered Parananese forest (in brazil and Paraguay only 5-10% remain) and comprises one of the most biologically diverse areas in Argentina with 44% of the country's fauna and the unique interdependency of subtropical rain forests. The upper strata comprises the giant trees, such as the lapacho (flowering tree), palo rosa (tallest at 40m) and rabo, reaching over 30m in height with their branches interlocking to form the rain forest canopy. The lower strata of trees consists of bamboo, high ferns and shrubs. Although number of individual trees may be less than other forest areas, the diversity of species is extraordinary. One such species is the palmito whose heart of palm is used in making ice cream and becoming increasingly scarce. No permanent settlements are located within the park, however rapid population growth in the area may put pressure on the park. Combined with Iguazu National Park in Argentina, this park contains enormous waterfalls and lush vegetation. Subtropical rain forest occupies 90% of the park. The park comprises subtropical rain forest rich in tree ferns while the upper part is mainly humid subtropical deciduous forest with stands of Brazilian pine and many types of palm.
COSTA RICA/PANAMA	52.Talamanca Range and La Amistad Reserves **WH (1983) i, il, iii, iv** **BR (1982, extension in 1988)** **WWF- 200 (8)**	740,142ha	Talamanca Range and La Amistad protected areas comprise the single largest natural forest unit in Central America with tropical rain forests covering 90% of these reserves which has been the case since since the last glaciations over 25,000 years ago. No other protected area in Central America contains as many viable populations, species, life zones, or as much altitudal variation, in fact the Talamanca range is estimated to harbour almost four percent of the varieties of all terrestrial species on earth and the largest tracts of virgin rain forest in Costa Rica. Eight of the twelve life zones of Costa Rica and Panama are covered in the park, including lowland tropical rain forest, cloud forest, sub-alpine paramo forests, and pure oak stands, the last two not being found elsewhere in Central America. The most varied vegetation in the entire range occur in large stands of paramo which grow on high mountain ridge points and are the only place in Costa Rica with no signs of human intervention. These reserves contain over 9,000 flowering plants, 4,000 non-vascular plants, 900 lichen, 1,000 fern species and 80% of the moss found in Costa Rica.
ECUADOR	53. Sangay National Park **WH (1983) ii, lii, iv** **WHD (1992)** **WWF- 200 (9 and 114)**	271,925ha or	Sangay National Park's extremely diverse natural habitat, ranging from tropical eastern mist forests to the ice capped Andes, has led to recognition as one of the highest resource analysis ratings of any park in Ecuador. The high diversity of vegetation ranges from alpine zones of the high paramo to the subtropical rain and wet forests of the upper Amazon Basin, where the canopy reaches heights of 40m. Within this range dense sections of cedro, aliso, palms and wild avacado are also found. The high country contains cloud forests and undisturbed stands of bamboo which also occur in the subalpine rain paramo zone below. Montane rain forest occurs on the wet eastern slopes below 3,750m. Below 3,000m, forests grow up to 12m. Lower montane rain forest dominates steep valleys from 2,000 to 3,000m where the canopy reaches 40m in height. Pure stands of Alnus jorullensis are found in disturbed areas and Cecropia, cedro, palms and Rubiaceae are present towards 2,000m. Below 2,000m subtropical rain forest occurs along with varieties of small trees.

COUNTRY	SITE NAME	AREA	FOREST VALUES
GUATEMALA	54. Tikal National Park **WH (1979) ii, iv** **BR (1990)**	57,600ha	Tikal lies within the 1,600,000 ha Maya Biosphere Reserve which is the largest tropical rain forest in Central America. Consisting mainly of warm moist tropical forest with intact natural ecosystems of international importance, the reserve is home to a considerable number of threatened species and contains over 2,000 plant and 300 tree species, including cedar, West Indian mahogany, bread-nut tree and many types of palm, *Sabal mayarum* being the most common.
HONDURAS	55. Rio Platano Biosphere Reserve **WH (1982) i, ii, iii, iv** **WHD (1996)** **BR (1980)** **WWF- 200 (173)**	500,000ha	Rio Platano is the largest surviving area of virgin tropical rain forest in Honduras and one of the few remaining areas of humid tropical rain forest in Central America. 90% of the reserve is comprised of two dominant life zones: Very Humid Tropical Forest and Humid Tropical Forest. The greatest portion of the watershed is covered by mature broadleaf forest with vegetation including pine savannahs, mangroves, swamp forest and hardwood gallery forest along the Platano river and its tributaries. Other types of tree species throughout the reserve include mahogany, yagua palm, climax forest, cedar and bamboo.
MEXICO	56. Sian Ka'an Biosphere Reserve **WH (1987) iii, iv** **BR (1986)** **WWF- 200 (189 and 176)**	528,000ha	Medium altitude semi-evergreen forest covers 20% of the park and represents the climax vegetation in non-flooded areas with over 120 types of shrubs and trees, reaching up to 14m in height. Medium and low semi-deciduous forest covers only 11,700ha of the park, but contains over 100 shrub and tree species. Flood forests are divided into the lower portions with open canopy tree communities in moister areas and higher areas where flooded palms are found. An extensive mangrove system is found in the park.
PANAMA /COLOMBIA	57. Darien and Los Katios National Parks **WH (1981, ii, iii, iv);(1994, ii, iv)** **BR (Darien 1983)** **WWF- 200 (6)**	669,000ha	Darien Forests have been called by scientists as the most diverse ecosystems of tropical America and the most extensive lowland tropical forest on the Central American Pacific coast. Most of these forests contain large tracts of relatively undisturbed primary and secondary forests. The average height of the monsoon forest is 40m with occasional dominant trees reaching 50m. The most abundant species in Darien is "cuipo" *cavanillisia platanifolia*. Above 200m, Premontane and montane forests occur with several ecosystems including cloud forest and the elfin forest of Cerro Pirre. Wetland forests exist along rivers, including the Arato, world's fastest moving river, and are often covered by pure stands of "cativo," which can grow to 50m and are the region's most utilised timber tree. 50% of Los Katios is covered by lowland swamp forests while the remainder is lowland through to montane tropical rain forest, which are characterised by several tree and plant species (25% of the 669 recorded plant species are endemic). Five species of mangroves occur along the Pacific coast. 99% of Los Katios has never been cultivated besides some felling of Ceiba petandra and Cedrela trees.
PERU	58. Machu Picchu National Park **WH (1983) ii, iii** **WWF- 200 (3)**	32,592ha	The areas of untouched forest range from dry and sub-tropical along the river valleys to the very humid low montane and harbour tree species in the dense woodland such as the locally endangered mahogany, lauraceae and the only Peruvian conifer *"podocarpus."* There is also a variety of tree ferns, palms, willow, alder and bamboo around the ruins and on mountain ridges. The local population live in communities and farms on the lower slopes and are permitted to graze livestock and perform agriculture in two-thirds of the park. Despite centuries of Incan presence, partially degraded virgin forest remains and former cultivated land has reverted back to forest. Fire is a major threat to the forest area in this site.

COUNTRY	SITE NAME	AREA	FOREST VALUES
PERU	59. Manu National Park **WH (1987) ii, iv** **WWF- 200 (3, 11)**	1,532,806ha	Manu, situated entirely within the Amazon river Basin, is probably the most biologically diverse protected area in the world. In fact, in a single hectare plot there has been found more than 200 tree species many with a diameter over 70cm, including *Ceiba pentandra* (120cm); the rare *Poulsenia armata* (110cm) and *Calycolphyllum* (117cm); and the endangered *Swietenia macrophylla* (105cm) and *dipteryx odorata* (100cm). Although the extent of flora remains unknown, 14 forest types have been mapped with a wide range of vegetation including cloud forest, montane rain forest, lowland tropical rain forest and grasslands. Another striking feature is the high abundance of Ficus with at least 18 species. Two commercially recognised species of trees are the *swietenia macrophylla* and *Cedrela odorata* which grow almost in pure stands.
PERU	60. Rio Abiseo National Park **WH (1990) ii, iii, iv** **WWF- 200 (9, 11 and 55)**	274,520ha	One of the primary objectives in preserving Rio Abiseo was for its renowned and largely untouched primary cloud forest, which is home to several species of monkeys. In fact, due to its high biodiversity, Rio Abiseo is among the WWW's top Andean conservation priorities. Other vegetation zones include rain forest, grasslands and paramo. The four ecological zones of the park are dry forest which occurs up to 2300m on the sides of Maranon River valley; moist montane forest at around 2300 to 3600m; tropical alpine zones which straddle the mountain chain; and montane rain forests with tropical alpine grassland occurring on the eastern side of the mountain range.
VENEZUELA	61. Canaima National Park **WH (1994) i, Ii, iii, iv** **WWF- 200 (12, 98 and 141)**	3,000,000ha	This enormous park contains montane forests along rivers, in damp depressions and on lower slopes and gullies of the tepuis. The park contains an estimated 3,000 to 5,000 species of phanerogams and ferns as well as a high proportion of endemic taxa, carniverous plants and over 500 species of orchids. The park contains many waterfalls, including the world's largest (Angel Falls at 1002m), and is the source of 60% of Venezuela's energy needs.

ANNEX 2

UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANISATION

INTERGOVERNMENTAL COMMITTEE FOR THE PROTECTION OF THE WORLD CULTURAL AND NATURAL HERITAGE

Operational Guidelines for the Implementation of the World Heritage Convention

WHC-97/2
February 1997

D. Criteria for the inclusion of natural properties in the World Heritage List

43. In accordance with Article 2 of the Convention, the following is considered as "natural heritage":

> "natural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view;
>
> geological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation;
>
> natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty."

44. A natural heritage property - as defined above - which is submitted for inclusion in the World Heritage List will be considered to be of outstanding universal value for the purposes of the Convention when the Committee finds that it meets one or more of the following criteria and fulfills the conditions of integrity set out below. Sites nominated should therefore:

(a) (i) be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of land forms, or significant geomorphic or physiographic features; or

(ii) be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals; or

(iii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance; or

(iv) contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation;

and

(b) also fulfil the following conditions of integrity:

(i) The sites described in 44(a)(i) should contain all or most of the key interrelated and interdependent elements in their natural relationships; for example, an "ice age" area should include the snow field, the glacier itself and samples of cutting patterns, deposition and colonization

(e.g. striations, moraines, pioneer stages of plant succession, etc.); in the case of volcanoes, the magmatic series should be complete and all or most of the varieties of effusive rocks and types of eruptions be represented.

(ii) The sites described in 44(a)(ii) should have sufficient size and contain the necessary elements to demonstrate the key aspects of processes that are essential for the long-term conservation of the ecosystems and the biological diversity they contain; for example, an area of tropical rain forest should include a certain amount of variation in elevation above sea-level, changes in topography and soil types, patch systems and naturally regenerating patches; similarly a coral reef should include, for example, seagrass, mangrove or other adjacent ecosystems that regulate nutrient and sediment inputs into the reef.

(iii) The sites described in 44(a)(iii) should be of outstanding aesthetic value and include areas that are essential for maintaining the beauty of the site; for example, a site whose scenic values depend on a waterfall, should include adjacent catchment and downstream areas that are integrally linked to the maintenance of the aesthetic qualities of the site.

(iv) The sites described in paragraph 44(a)(iv) should contain habitats for maintaining the most diverse fauna and flora characteristic of the biographic province and ecosystems under consideration; for example, a tropical savannah should include a complete assemblage of co-evolved herbivores and plants; an island ecosystem should include habitats for maintaining endemic biota; a site containing wide-ranging species should be large enough to include the most critical habitats essential to ensure the survival of viable populations of those species; for an area containing migratory species, seasonal breeding and nesting sites, and migratory routes, wherever they are located, should be adequately protected; international conventions, e.g. the Convention of Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention), for ensuring the protection of habitats of migratory species of waterfowl, and other multi- and bilateral agreements could provide this assurance.

(v) The sites described in paragraph 44(a) should have a management plan. When a site does not have a management plan at the time when it is nominated for the consideration of the World Heritage Committee, the State Party concerned should indicate when such a plan will become available and how it proposes to mobilize the resources required for the preparation and implementation of the plan. The State Party should also provide other document(s) (e.g. operational plans) which will guide the management of the site until such time when a management plan is finalized.

(vi) A site described in paragraph 44(a) should have adequate long-term legislative, regulatory or institutional protection. The boundaries of that site should reflect the spatial requirements of habitats, species, processes or phenomena that provide the basis for its nomination for inscription on the World Heritage List. The boundaries should include sufficient areas immediately adjacent to the area of outstanding universal value in order to protect the site's heritage values from direct effects of human encroachment and impacts of resource use outside of the nominated area. The boundaries of the nominated site may coincide with one or more existing or proposed protected areas, such as national parks or biosphere reserves. While an existing or proposed protected area may contain several management zones, only some of those zones may satisfy criteria described in paragraph 44(a); other zones, although they may not meet the criteria set out in paragraph 44(a), may be essential for the management to ensure the integrity of the nominated site; for example, in the case of a biosphere reserve, only the core zone may meet the criteria and the conditions of integrity, although other zones, i.e. buffer and transitional zones, would be important for the conservation of the biosphere reserve in its totality.

(vii) Sites described in paragraph 44(a) should be the most important sites for the conservation of biological diversity. Biological diversity, according to the new global Convention on Biological Diversity , means the variability among living organisms in terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and includes diversity within species, between species and of ecosystems. Only those sites which are the most biologically diverse are likely to meet criterion (iv) of paragraph 44 (a).

45. In principle, a site could be inscribed on the World Heritage List as long as it satisfies one of the four criteria and the relevant conditions of integrity. However, most inscribed sites have met two or more criteria. Nomination dossiers, IUCN evaluations and the final recommendations of the Committee on each inscribed site are available for consultation by States Parties which may wish to use such information as guides for identifying and elaborating nomination of sites within their own territories.

E. Procedure for the eventual deletion of properties from the World Heritage List

46. The Committee adopted the following procedure for the deletion of properties from the World Heritage List in cases:

(a) where the property has deteriorated to the extent that it has lost those characteristics which determined its inclusion in the World Heritage List; and

World Headquarters

IUCN - The World Conservation Union
Rue Mauverney 28
CH-1196 Gland, Switzerland
Tel. : + + 4122 999 00 01
Fax : + + 4122 999 00 02
http://www.iucn.org

IUCN
The World Conservation Union