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# INTRODUCTION

## GENESIS OF THE BOOK

All the authors of this field guide have had a lifelong fascination with biogeography and wildlife habitats. Like the vast majority of other passionate traveling naturalists, we are most consistently interested in birds and larger mammals, while also paying some attention to reptiles, amphibians, butterflies, and other groups, especially in places where they're conspicuous. We have all been frustrated by the approach to habitat classification used in most books and the complete absence of habitat information in many field guides. An understanding of habitats is fundamental to becoming a knowledgeable traveling naturalist, but gaining this understanding has often required slowly piecing things together yourself. What we're hoping to do in this book is present our view of global wildlife habitats, in order to allow others to understand them far more readily than we were able to.

There are innumerable lenses through which planet Earth's habitats can be assessed. Geology, geography, and botany are all critically important. But we don't view any of them as the final word on habitats, and much of what these models prioritize is of little immediate relevance to traveling naturalists. A specialist in entomology or herpetology will also apply a different, and fascinating, lens to the world. A recent study of Illinois divided that US state into nearly 100 habitats based on their distinct assemblages of insects! None of these lenses is invalid, and all of them reveal fascinating things about this planet's biogeography. Our reason for prioritizing a larger mammal and bird "lens" is that we look at the world primarily through this lens, and so do the vast majority of the world's traveling naturalists. A handful of specialists seek out chameleons in Tanzania's Eastern Arc Mountains, whereas millions of tourists visit the Serengeti and Masai Mara to see big mammals and glamorous birds. A few people venture to the Amazon to seek out its incredible diversity of insects, but masses visit rainforest lodges in search of monkeys, Hoatzin, and an overall "jungle" experience. So our approach in this book might lack the academic purity of a cleanly geological or botanical approach to the world's habitats, but we think it has far greater utility to most world travelers than any other previous perspective on habitats.

In its attempt to cover the wildlife habitats of the entire globe, this is an ambitious book, in which hard decisions had to be made about what to include and exclude. We freely admit that habitats like wetlands, anthropogenic environments, and the oceans, are all worthy of far more detailed coverage. People who know their local area well may be frustrated by a lack of information about "their patch." Please remember that this book is about giving people a broad view. It also offers a sort of "virtual travel"; the first thing all the authors do when they find out they're headed somewhere new on the globe is conduct a bit of research about the local wildlife habitats. Deciding to "split" or "lump" some habitats was very tricky, and some of our decisions could be argued endlessly. But condensing a huge amount of research into a finite number of pages, and simply finishing this project, required a certain brutality. Our approach is certain to alienate some, but we firmly believe it will be both enjoyable and useful to other global naturalists like ourselves.

## WHAT DO WE COVER AS A DISTINCT HABITAT IN THIS BOOK?

We evaluate habitats based on two main criteria: 1) Their visual distinctiveness, which can be easily assessed by a casual observer. 2) Their assemblage of wildlife, primarily meaning larger mammals and birds, since that is our lens throughout this book. Most of the listed habitats are easily validated by a moderate score in both categories. An example is African miombo woodland, which is quite distinct in appearance from adjacent savanna habitats and supports a fairly distinctive set of wildlife, including quite a few species restricted to this habitat. But in some cases, one or the other criterion is of

predominant importance. Except to the eye of a trained botanist, Indian Ocean rainforest is not very different from other humid broadleaf forests around the world. But it has almost a continent's worth of diversity for many groups and virtually no overlap with any other place on earth. So, it is considered a distinct habitat. An example of the opposite case is African Mopane savanna. This habitat is characterized by the dominance of the Mopane tree, which is highly distinctive and easily recognizable. So the Mopane savanna qualifies strongly for the first criterion, even as it lacks a cohesive set of wildlife, having, rather, a subset of the wildlife of surrounding habitats.

## ZOOGEOGRAPHIC REGIONS

The book is organized by zoogeographic regions (fig. 1). These are similar to the conventional continents used by geographers and the floral kingdoms recognized by botanists but with some important differences.

There is a chapter for each zoogeographic region (except Antarctica, covered briefly in the Neotropics chapter), which contains individual accounts for all of its habitats. An alternative way to organize the book would have been by habitat category (see the Habitat Key below), but a continental approach seemed more useful, especially to travelers. The broad habitat categories, which are color-coded on the maps, and the "Habitat Affinities" section at the beginning of each account, are ways of cross-referencing similar habitats across zoogeographic regions. These are our zoogeographic regions:

- **Australasia** is everything east and south of Sulawesi and Bali. The exact placement of this line is often debated; all the islands between Borneo and New Guinea are a transition zone in the region referred to as Wallacea (fig. 2). Deer occur on the Lesser Sundas and Sulawesi but no farther east. Monkeys reach Sulawesi, the Lesser Sundas, and a few other islands but extend no farther east.



Fig. 1. Zoogeographic regions used in this book.

Meanwhile, marsupials are far more common in Australasia than Wallacea. The presence of eucalypts (*Eucalyptus* spp.) has been used as evidence that Sulawesi is part of Australasia, but they were an insignificant part of the Australian flora until very recently, so are not a valid indicator of what constitutes Australasia. The Lesser Sundas are included in Australasia because they have savanna and monsoon forest that are the same as habitats in Australia, with significant bird species overlap. Oceania (lands of the c. and s. Pacific Ocean including Micronesia, Melanesia, and Polynesia) is included as part of Australasia but doesn't receive extensive coverage because wildlife distribution is determined more by each island's remoteness rather than by the habitats it supports. Most species in Oceania tolerate a broad range of habitats.

- The **Neotropics** runs from Central America south through all of South America. It should be noted that despite this name, much of s. South America has a nontropical climate. The limit with the Nearctic is a political one of convenience along the Guatemala-Mexico border. Antarctica is included in this section.
- **Indo-Malaysia** region, or the Asian tropics, includes the Indian subcontinent and southeast Asia up to Sulawesi and Bali (excluding the rest of Wallacea and the Lesser Sundas). In the western and central regions, it is clearly demarcated in the Thar Desert along the India-Pakistan border and the heights of the Himalayas. In e. China, the division is messier. It is based on the transition from the predominantly tropical evergreen and semi-evergreen forests, with a monsoonal climate, to the predominately deciduous and coniferous and non-monsoonal areas of the Palearctic. This line runs, approximately, west from Shanghai along the Yangtze River.
- The **Afrotropics** is all of Africa south of the Sahara, with a transitional area in the southwestern part of the Arabian Peninsula, which has overlap with Africa. The Sahara and the Arabian Desert effectively divide the Afrotropics from the Palearctic. Northernmost Africa has much more in common biologically with Europe than with the rest of the continent and is included in the Palearctic region.
- The vast **Palearctic** region consists of n. Africa, Europe, most of the Middle East, and n. and c. Asia. Although there is great diversity within this region, it all shares much in common biologically and contains no clear divides. The conventional geographical divide between Europe and Asia, at the Ural Mountains, is of little biological importance.
- The **Nearctic** includes all of North America, running to Mexico's southern border. Biologically, this southern boundary is messy, leaving the political boundary as good as any option. But it is supported by the fact that there is only limited crossover of habitats, such as outliers lowland rainforest and cloud forest from the Neotropics, and dry conifer forest from the Nearctic.

### “Rival” Lines and the Arbitrary Divide Between Asia and Australasia

Where should we draw the line between Indo-Malaysia and Australasia? The best-known boundary is Wallace's Line, named after the famous biologist and explorer Alfred Russel Wallace (fig. 2). It follows the edge of the Sunda Shelf, an area of submerged continental shelf under shallow seas averaging about 330 ft. (100m) deep, that connects the islands of Sumatra, Borneo, Java, and Bali with continental se. Asia. These islands have been connected to the mainland during recent ice ages when sea levels were as much as 390 ft. (120m) lower than today. East of Bali and Borneo is a deep ocean trench, which has been the edge of the Sunda Shelf for around 50 million years. Despite the short distance between the islands of Bali and Lombok, many birds and mammals simply haven't crossed this short stretch of ocean.

Biologist Max Carl Wilhelm Weber suggested another line based on mammal data. To the west of Weber's Line is Sulawesi and the Lesser Sundas (from Lombok to Babar), and to the east are the

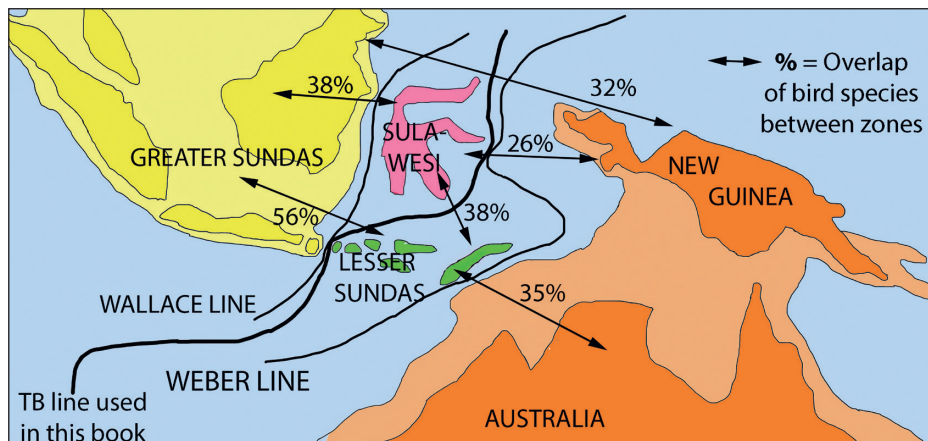


Fig. 2. Zoogeographic boundaries between Asia and Australasia. This illustration shows Weber's and Wallace's Lines, the two most famous zoogeographic boundaries between Asia and Australasia, and the line used in this book. Also indicated are percentages of overlap in bird species between the various regions.

Moluccas, including Halmahera, Buru, Seram, and the Tanimbar Islands. So which line do we use? Wallace's Line is based on bird data, whereas Weber's Line is based on mammal data. The area between Wallace's and Weber's Lines, known as Wallacea, is essentially a transitional zone containing a mixture of species of both Indo-Malayan and Australasian origin. These species must have arrived over the sea, and this process certainly favored species with greater dispersal ability. Any line we draw through Wallacea to separate the Indo-Malayan and Australasian regions is going to be rather subjective.

Our combined bird-and-mammal approach has led us to place the Lesser Sundas in Australasia, and Sulawesi in the Indo-Malayan zoogeographic region.

## HABITAT NOMENCLATURE

Within the zoogeographic regions explained above, there are individual habitats, which are divided into the broad categories explained in the Habitat Key section. This section includes some diagrams and definitions that will help the reader to understand some of the most important terms used in naming and defining habitats. These are terms that appear over and over in the book.

### A Few Important Terms to Start

Although wherever possible we used non-technical English throughout this book, there is a variety of unavoidable terms, jargon, and concepts that need fuller, and often quite detailed, explanation. To fully explain these terms, we have constructed an extensive online glossary and concepts page on this volume's sister website: [www.habitatsoftheworld.org](http://www.habitatsoftheworld.org).

**Desert.** Very dry and either unvegetated or sparsely vegetated habitat.

**Grassland.** Habitat dominated by grasses, with few shrubs or trees.

**Halophytic.** Refers to a plant that can grow in highly saline environments.



**Heath/Heathland.** Shrubland dominated by fine-leaved evergreen members of the erica family (Ericaceae). Moorland is a moist type of heath.

**Rainforest.** Lush forest that receives abundant moisture.

**Savanna.** A lightly wooded or treeless tropical grassland with a prominent wet and dry season.

**Steppe and Prairie.** Grassland in areas with a cold-winter/warm-summer climate.

**Taiga/Boreal Forest.** Forest of spruce and fir trees that grows in harsh northern climates, all the way around the North Pole.

**Tundra.** Open, treeless habitat of extreme environments that are covered in snow for most of the year.

**Wetland.** Habitat that is frequently or permanently flooded.

**Xeric.** Refers to a dry environment with little moisture.

**Xerophytic.** Refers to a plant that needs very little water and can grow in xeric conditions.

## COMMON CANOPY LEAF TYPES AND THE FORESTS WHERE YOU MAY FIND THEM

Fig. 3 presents the most common leaf types used in describing different types of forest canopy and some of the habitats where they are prominent. This does not take into account the many types of leaves of understory plants such as grasses, sedges, ferns, euphorbias, and cacti.

## CLIMATE DESCRIPTIONS AND GRAPHS

Throughout the book, the habitat descriptions include a brief overview of the climate. In sidebars sprinkled throughout the book, we provide deeper looks into the relationships between vegetation due to latitude and climate (fig. 6), the interaction of general climate with fire, the influence of drought (sidebar 2.4), and anthropogenic effects on habitat modification (sidebar 5.2). Looking at habitat distributions and their relationships to not only temperature and rainfall but also distribution of rainfall through the year, it became apparent that this rainfall distribution is often a more important factor in vegetation type than average precipitation alone. To help illustrate these variations through the year, we have created climate graphs for each habitat, based on the original work of Walter and Lieth, though we have heavily modified them to make them easier to read and interpret.






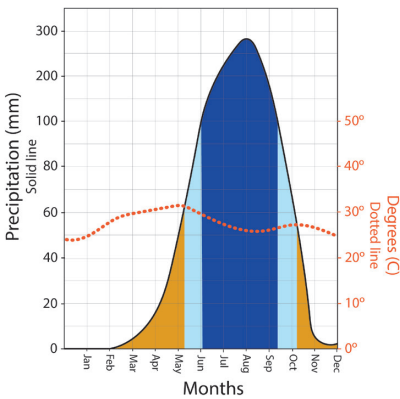
LEAF SHAPE	LEAF NAME	HABITATS
	Conifer Needle Thin linear leaves. Usually evergreen.	Taiga, dry conifer forests
	Deciduous Broadleaf Broad, thin leaves that grow quickly and last one season.	Temperate deciduous forests, wet/dry deciduous forests
	Evergreen Broadleaf Broad, thin, often with drip tips. They last a long time.	Rainforests, cloud forests
	Sclerophyllous Evergreen Thick, leathery leaves resist transpiration and fires. Often contain toxins. They last a long time.	Eucalypt forests, sclerophyll forests, heathlands, maquis, fynbos, mallee, Mulga, matorral, cerrado, chaparral
	Microphyllous Small Leaves that resist transpiration.	Acacia savanna, thornscrub, Chaco seco, desert scrubs

Fig. 3. Leaf types.



Reading these graphs may seem intimidating at first, but when their relevance is explained, they become more scrutable (see fig. 4). When temperature and precipitation are plotted together, and where each 20mm (0.8 in.) of precipitation is compared to each 10 degrees Celsius (50°F), for average daily temperatures, some really interesting patterns appear. When the precipitation plot drops below the temperature plot, the area is in a time of drought, and plants are stressed. We have colored these periods in **orange**. When the precipitation plot is above the temperature line, the area has a surplus of water, and plant growth is strong; these periods are colored **light blue**. However, once the precipitation exceeds 100mm (4 in.) a month, there is an extreme surplus of water, regardless of the temperature, and most runs off and is not used by plants; we have colored these periods in **dark blue**. Because the whole method makes sense only when used with the metric system, we have included average daily temperature only in Celsius and rainfall in millimeters on the graphs.

Fig. 4. Sample climate graphs.



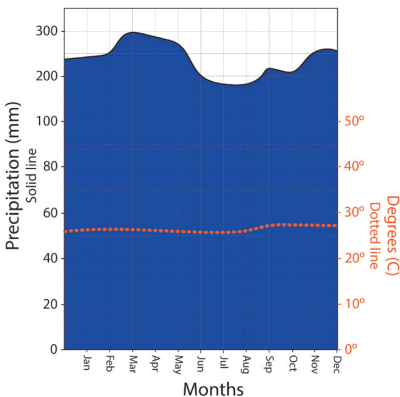
### SAVANNA

- > Temperature hot throughout the year
- > Drought conditions in winter
- > Very intense monsoonal summer rains



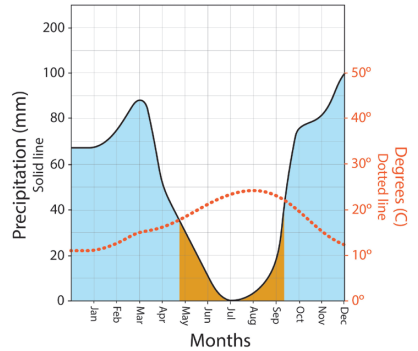
### LOWLAND RAINFOREST

- > Temperature hot throughout the year
- > Excessive precipitation throughout the year



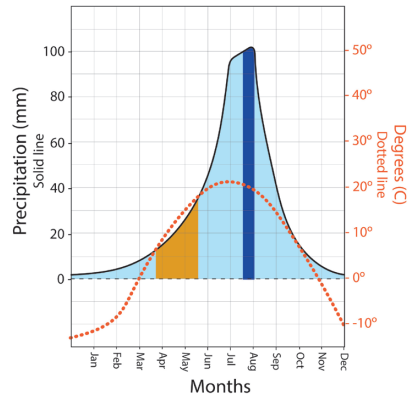
## MEDITERRANEAN SCRUB (INCLUDING CHAPARRAL)

- > Cold winters, warm summers
- > Wet winters
- > Moderately dry summers



## STEPPE AND PRAIRIE

- > Very cold winters, hot summers
- > Wetter in summer than in winter



## TAIGA

- > Very cold winters, cool summers
- > Moderate precipitation throughout the year

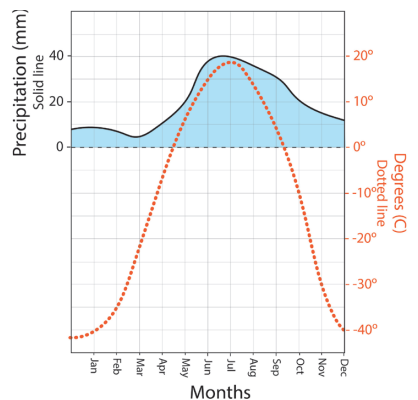
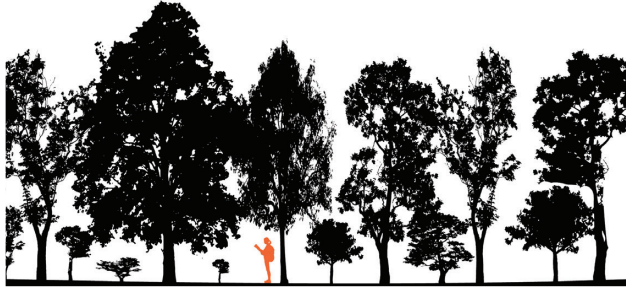
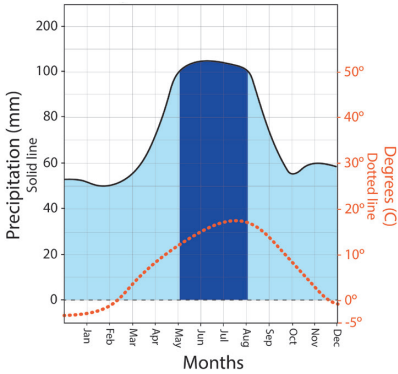


Fig. 4. Sample climate graphs (continued)

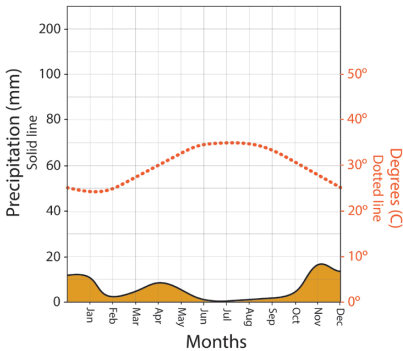
### TEMPERATE DECIDUOUS FOREST

- > Cold winters, cool summers
- > Precipitation throughout the year, but more in summer



### WARM DESERT

- > Dry and hot throughout the year



## HABITAT KEY

The broad habitat categories and subcategories used in this book are briefly explained in this section; the example habitats listed can be located in the table of contents. Refer to “Habitat Nomenclature,” above, for further explanation of most of the terms used here. Note that the color-coding used in the world map (fig. 5) corresponds with that used in the maps throughout the book. These descriptions broadly correspond to the major ecological community types known as “biomes.”

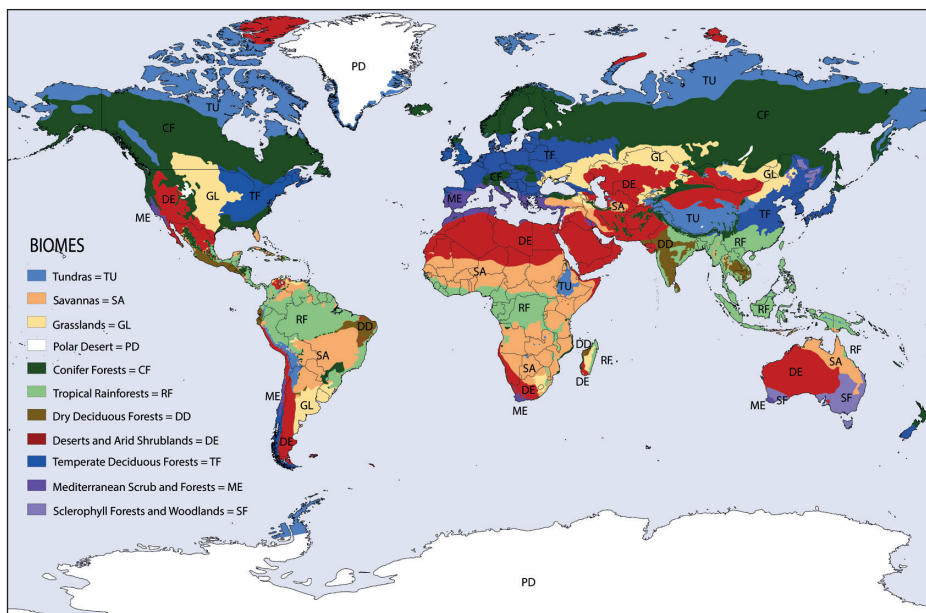


Fig. 5. Biomes of the world.

**CONIFER FORESTS:** Forests made up of coniferous trees (which generally don’t seasonally lose their leaves, with the exception of larches and few others).

- **Taiga (Boreal Forest):** Spruce and fir forests of the far north.  
Example: **Eurasian Spruce-Fir Taiga**
- **Temperate Conifer Forest:** Humid forests (usually) in temperate areas, including mountains.  
Example: **Nearctic Temperate Rainforest**
- **Dry Conifer Forest:** Forests and woodlands in dry temperate and tropical areas.  
Example: **Nearctic Montane Mixed-Conifer Forest**

**DESERTS AND ARID SCRUBS:** Arid areas with little plant growth.

- **Barren Desolate Desert:** Harshes of deserts, where little grows, with areas of rock and sand dunes.  
Example: **Neotropical Barren Desert (e.g., Atacama)**
- **Hot Desert:** Tropical/subtropical deserts with hot summers and cool or warm winters.  
Example: **Paleartic Hot Desert (e.g., Sahara)**

- **Cold Desert:** Temperate deserts with hot/warm summers and cold winters.  
Example: **Paleartic East Asian Cold Desert (e.g., Gobi)**
- **Desert and Semidesert Shrubland:** Open arid areas with small shrubs with generally small leaves; cacti or euphorbias can be present and may be large.  
Example: **Nearctic Columnar Cactus Desert**
- **Desert Steppe:** Very arid areas where grass growth is sparse and ephemeral.  
Example: **Paleartic Temperate Desert Steppe**
- **Desert and Semidesert Thornscrub:** Arid areas with thickets of tall thorn bushes and little grass growth.  
Example: **Paleartic Semidesert Thornscrub**
- **Arctic Polar Desert:** Extremely cold and dry areas where almost nothing grows.

**TEMPERATE DECIDUOUS FORESTS:** Forests that are either entirely broadleaf deciduous or are mixed with evergreen conifers.

- **Temperate Deciduous Forest:** Temperate broadleaf deciduous forests where most trees lose their leaves in winter.  
Example: **Nearctic Temperate Deciduous Forest**
- **Temperate Moist Mixed Forest:** Broadleaf forests of deciduous trees that also include evergreen broadleaf trees and/or conifers.  
Example: **Paleartic European Moist Mixed Forest**

**TROPICAL HUMID FORESTS:** Quintessential warm and wet rainforest-type environments.

- **Lowland Rainforest:** Wet, evergreen tall forest with thick full canopy cover and open undergrowth.  
Example: **Neotropical Lowland Rainforest (e.g., Amazon Basin)**
- **Semi-Evergreen Forest:** Generally humid forests with near-complete canopy cover in which a minority of the trees lose their leaves.  
Example: **Indo-Malayan Semi-Evergreen Forest**
- **Montane/Subtropical Evergreen Forest:** Warm, wet forests with almost closed canopy of evergreen or partially deciduous trees.  
Example: **Neotropical Cloud Forest**

**DRY DECIDUOUS FORESTS:** Warm forests that lose most of their leaves in dry periods.

- **Closed Deciduous Forest:** Closed-canopy, dry deciduous forests that in summer appear lush, but many trees lose their leaves in winter. Fire-intolerant.  
Example: **Indo-Malayan Moist Deciduous Forest**
- **Open Deciduous Forest:** Open-canopy forests where canopy trees can lose leaves in the dry season and the undergrowth consists of small-leaved shrubs, cacti, and/or euphorbias. Fire-intolerant.  
Example: **Neotropical Caatinga**

**SAVANNAS AND SEASONALLY MOIST SHRUBLANDS:** Habitats with an open canopy, lots of grass or shrubbery, and a strongly seasonal (usually wet-summer/dry-winter) climate. Most habitats in this category are heavily influenced by fire.

- **Open Broadleaf Woodland:** Non-sclerophyllous woodlands that can have tall trees and open canopy cover. Can have many deciduous trees. Fire-tolerant.  
Example: **Afrotropical Guinea Savanna**
- **Thorn Savanna:** Open (tall or short) woodlands with lots of grass cover. Trees are often dominated by acacias (of various genera), many of them with spines.  
Example: **Neotropical Chaco Seco and Espinal**

- **Broadleaf Sclerophyllous Savanna:** Low shrublands or forests that can be thick. Tend to not have as much grass as other savannas. Plants have thick leathery leaves, thick bark. Fire-tolerant.  
Example: **Neotropical Cerrado**
- **Mixed Shrub Savanna:** Thickets and low-canopy dry forest that has grass cover and a mix of coniferous, sclerophyllous, and broadleaf shrubs or trees. Fire-tolerant.  
Example: **Australasian Brigalow Woodland**

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**GRASSLANDS AND STEPPES:** Habitats that are dominated by grasses with or without shrubs and flowers, and few or no trees. Fire-dependent.

- **Temperate Grassland:** Grasslands that have moderate or warm summers but cold winters. Can receive precipitation as snow in winter or rain in summer, but growing season is usually restricted to spring and summer. Fire-tolerant  
Example: **Palearctic Western Flower Steppe**
- **Tropical Grassland:** Grasslands that have moderate winters and hot summers. Grasses can grow throughout the year but are dependent on rain. Fire-tolerant.  
Example: **Australasian Tussock Grassland**
- **Montane Grassland:** Grasslands in highlands, often receiving orographic rainfall. Fire-tolerant.  
Example: **Afrotropical Montane Grassland (e.g., Highveld)**
- **Flooded Grassland:** Grasslands that spend most of the year as lush grasslands but turn into huge wetlands during the wet season.  
Example: **Neotropical Flooded Grassland and Wetland (e.g., Pantanal)**

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**MEDITERRANEAN FORESTS, WOODLANDS, AND SHRUBLANDS:** Thick scrub in areas with climates with cold, wet winters and dry, hot summers.

- **Maquis, Chaparral, and Matorral:** Low shrubland that can be either closed or open. Dominated by fire and grazing. Plants are often similar to those of nearby forests.  
Example: **Palearctic Maquis**
- **Mediterranean Heathland:** Low heathlands with nearly 100% ground cover of sclerophyllous bushes and forbs. Fire-dependent.  
Example: **Afrotropical Fynbos**

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**SCLEROPHYLLOUS FORESTS AND WOODLANDS:** Forests and woodlands where the majority of the canopy trees are eucalypts and/or have small leathery leaves.

- **Wet Sclerophyll Forest:** Tall, straight-trunked trees that form a canopy where the tree branches touch each other. Understory is lush and wet. Canopy trees are fire-tolerant, but the understory is fire-intolerant.  
Example: **Australasian Wet Sclerophyll Forest**
- **Dry Sclerophyll Forest:** Tall, straight-trunked canopy trees that form a canopy where the tree branches can touch each other but are too widely spaced to form a closed canopy. Understory is grass- and shrub-dominated, with plants not found in neighboring rainforests. Fire-tolerant.  
Example: **Australasian Dry Sclerophyll Forest**
- **Eucalypt Woodland:** Open, spaced woodland with a thin canopy, dominated by eucalypts with short, crooked trunks.  
Example: **Mallee Woodland**
- **Australasian Acacia Woodlands:** Open spaced woodlands and shrublands, often with a thick canopy, dominated by acacias with short trunks.  
Example: **Mulga Woodland and Acacia Shrubland**

**TUNDRAS:** Very low vegetation dominated by mosses and many lichens. Found at extreme latitudes or elevations, where temperatures, snow cover, or exposure to wind prohibit the growth of trees.

Example: **Eurasian Rocky Tundra**

**FRESHWATER HABITATS:** Habitats whose most important aspect is their inundation with fresh water.

- **Swamp Forest:** Forested habitats that are seasonally or permanently inundated.

Example: **Neotropical Igapó and Várzea Flooded Forest**

- **Freshwater Wetland:** Nonforested habitats whose most important aspect is that they are seasonally or permanently flooded.

Example: **Australasian Tropical Wetland**

**SALT-DOMINATED HABITATS:** Habitats where the dominant force is the presence of high levels of salt in the water or soil.

- **Salt Pan:** Areas in which evaporation or volcanic activity have produced extremely high salt concentrations in the soil. Mostly unvegetated, though algae grows quickly when floods occur.

Example: **Afrotropical Salt Pan**

- **Mangrove:** A specialized forest that grows in tidally flooded coastal areas.

Example: **Australasian Mangrove**

- **Salt Marsh:** Salt-tolerant marsh vegetation that grows in sheltered coastal areas that are periodically flooded with seawater.

Example: **Nearctic Salt Marsh**

- **Tidal Mudflat:** Nutrient-rich areas of mud that are frequently flooded with seawater, usually in estuaries.

Example: **Nearctic Tidal Mudflat**

- **Rocky Coastline and Sandy Beach:** Nutrient-poor sandy and rocky beaches, cliffs, and other coastline types.

Example: **Indo-Malayan Rocky Coastline and Sandy Beach**

- **Pelagic Waters:** Marine environments with deep water.

Example: **Australasian Pelagic Waters**

- **Offshore Islands:** Small islands that are well offshore and that support a low growth of grass and/or shrubs.

Example: **Afrotropical Offshore Islands**

**ANTHROPOGENIC HABITATS:** The primary force in shaping these habitats is the presence of humans.

- **Grazing Lands:** Areas that are heavily grazed by domestic animals.

- **Cultivated Lands:** Areas cultivated by humans for the production of crops.

- **Human Habitation:** Areas directly inhabited by humans.



## GLOBAL BIOMES WITH LATITUDE AND PRECIPITATION

The graph in fig. 6 shows which habitats are most likely at any one latitude and precipitation level. What is interesting, and at first glance counterintuitive, is that habitats such as savannas and steppes cover massive areas of the planet but exist in narrow climatic bands, while other habitats such as temperate and subtropical rainforests are not very common across the planet but occur over wide ranges of precipitation. The other takeaway from the diagram is that some habitats, such as tundras, are heavily latitude- (and by inference temperature-) influenced yet can exist over a wide range of precipitation levels. Other habitats, such as Mediterranean scrub and semi-evergreen (including dry deciduous) forests, occur in a narrow precipitation range but exist over a wide range of latitudes (and again, by inference, temperatures). Across the world, precipitation of 1,200mm (48 in.) a year, or more importantly 100mm (4 in.) per month, seems to be a division between evergreen forests and those that undergo some stress due to (even short) periods of drought (sidebar 2.4). This diagram does not take into account variations due to elevation (sidebar 3.1) or continentality (sidebar 2.1). Please note that the size of the habitat shown is not indicative of the actual extent of that habitat over the planet.

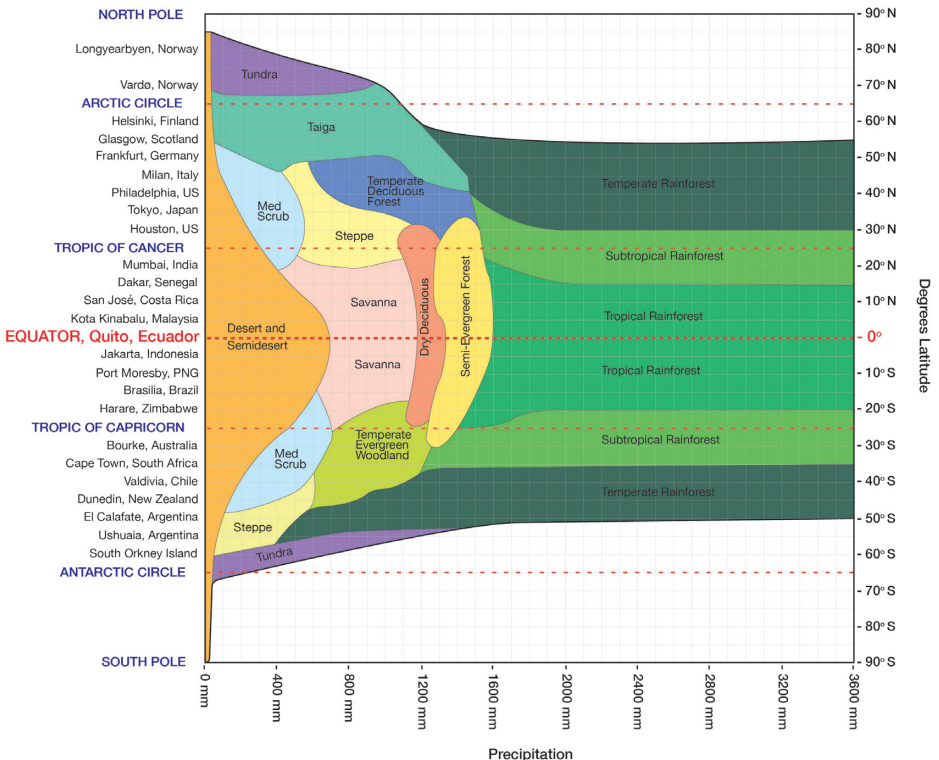


Fig. 6. Influence of latitude, precipitation, and temperature on habitats.

Transition through West African biomes from desert (A) to rainforest (C), showing habitats in between with their climate data.

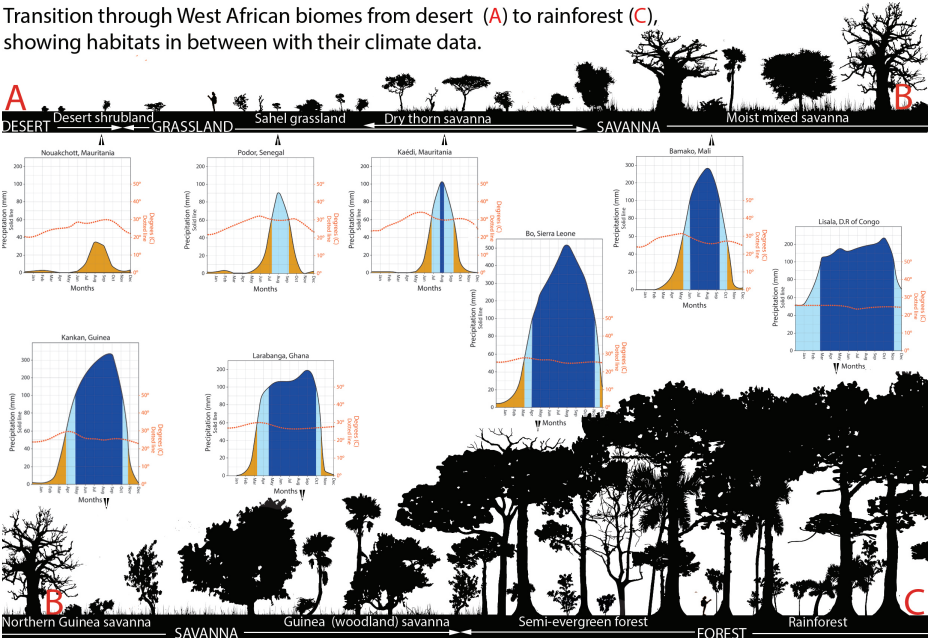


Fig. 7. How biomes blend into one another.

## TAXONOMY

For birds we follow the eBird-Clements taxonomy. It is up to date and carefully maintained, and is the most popular taxonomy for American birders. For mammals, reptiles, amphibians, insects, and plants, we mainly follow Wikipedia. This is sure to shock some scientists and purists, but in writing this book, we found Wikipedia to be accurate and up to date for the groups that we know intimately well, giving us confidence that other groups are covered similarly well. In an effort to keep the text flowing, we have avoided using scientific names except to avoid confusion. Plant taxonomy is far less defined than that of birds or mammals so we have included a plant list, so every plant mentioned in the text can be cross-referenced with its scientific name.

## ENDEMIC BIRD AREAS

Endemic Bird Areas (EBAs), first identified in 1987 by Birdlife International, are defined as areas that contain two or more bird species with restricted ranges of less than 19,300 sq. mi. (50,000km<sup>2</sup>). A Secondary EBA is one that contains the range of a single species. Range-restricted species are defined as those with a breeding range of less than 19,300 sq. mi., as recorded historically, i.e., since 1800. If at some point after 1800, the species had a breeding range larger than this, it is not considered a range-restricted species. The size of each EBA is flexible and is dictated by the ranges of the species contained therein.

While the identification of an EBA is a valuable tool in pinpointing areas of endemism, it doesn't show the whole picture, especially for the habitat-based approach used in this book. In the EBA designation, there is a natural bias toward island species, the ranges of which are intrinsically

restricted. The same holds true for continental species restricted to montane environments. Despite the fact that a bird species is restricted to a single continental lowland habitat, it can have a large distribution that is more extensive than the measurable threshold of a range-restricted species, and the area in which it lives may not count as an EBA, even though it is a major area of endemism. Examples of such excluded habitats include the monte of the Neotropics and the Mulga of Australia. In addition, this book uses a dual bird and larger mammal lens, which obviously is different from that of the purely bird-driven EBA concept.

## ABOUT THIS BOOK

Each of the habitat accounts includes the following sections, which are briefly explained here:

**In a Nutshell:** A succinct explanation of what makes a habitat distinctive and worthy of separation from other habitats.

**Habitat Affinities:** Habitats from other zoogeographic regions that are structurally similar. This is a way of cross-referencing similar habitats across the book. Perhaps one of the habitats mentioned will be familiar to you, helping you to understand the unfamiliar habitat covered.

**Species Overlap:** The habitats that have the most similar assemblages of larger mammals and birds. These are ranked from the most similar habitat down. The vast majority of these are habitats within the same zoogeographic region as the habitat covered.

**Habitat Silhouette:** These silhouettes are designed to give a quick visual snapshot of a habitat, showing some of its distinctive plant shapes and its overall height and structure. They include a human silhouette for scale. These diagrams are obviously simplifications, especially in the case of habitats with a huge range of variation, such as Africa's dry thorn savanna.

**Range Map:** These are visual representations of a habitat's occurrence within a given zoogeographical region. Dark shading is used for areas where the habitat is the predominant habitat, or one of the predominant habitats. In some maps, pale shading is used to indicate areas where the habitat is found only locally.

**Description:** This section explains what makes a habitat distinctive and how it works. Some of the commonly included information is the height and composition of the various layers of vegetation, the overall "feel" and accessibility, local temperature and rainfall, and a brief discussion of some of the conservation challenges. The accompanying climate graphs are discussed in "Climate Descriptions and Graphs," above. In these descriptions, we have purposefully chosen not to always include exactly the same information, or to put it in the same order. This is both to allow us to stress what is most important about a given habitat and simply to vary these sections to keep them interesting for readers.

**Wildlife:** This section may be the most interesting for a typical reader. Beyond the nuts and bolts of what makes a habitat distinctive, and what makes it work, most visitors are keen to learn about and to find its wildlife. Throughout this book, when considering wildlife, larger mammals and birds are our primary focus. Species that are restricted to a certain habitat (endemics) are given special weight, as finding these will be the priority for many visitors. A species that is an indicator species for that habitat has "(IS)" beside its name.

**Endemism:** This section talks about endemic hotspots within a given habitat, including Endemic Bird Areas, or "EBAs" (see above). Some habitats, especially montane ones or those occurring on

islands, host many distinct nodes of endemism and are given their own Endemism section. For more general habitats, if there are no major zones of endemism, the details are described in the main description section or are incorporated into the wildlife text.

**Distribution:** This section, and the accompanying range map, indicate where the habitat occurs within a given zoogeographic region. The elevations at which it is found are sometimes mentioned, though this information may also be in the Description.

**Where to See:** These are places that you can visit to experience a given habitat. In general, these are the most readily or frequently visited places, in the most accessible country or countries.

**Photos:** Photos are included that illustrate both the habitat itself and some of its charismatic wildlife.

**Sidebars:** Throughout the book there are boxes or sidebars that discuss aspects of a habitat, biome, or region—in some cases these discussions are slightly more tangential, in others more in-depth. Many of these are about geology, ecology, and climate. We have chosen to place this sort of information in side boxes to make it more accessible and relevant (rather than in long and dry introductory sections that are likely to be ignored by most readers!).

## ABBREVIATIONS

Directions (north, south, east, west, central) are abbreviated only when they directly precede a geographical place name.

aka	also known as	km	kilometer	s.	south/southern
c.	central	km <sup>2</sup>	square kilometer	sc.	south-central
cm	centimeter	lb.	pound	se.	southeastern
e.	east/eastern	m	meter	sp.	species (singular)
EBA	Endemic Bird Area	Ma	million years ago	spp.	species (plural)
ec.	east-central	mi.	mile	sq. mi.	square mile
ft.	foot/feet	mm	millimeter	sw.	southwestern
ha	hectare	n.	north/northern	w.	west/western
in.	inch/inches	nc.	north-central	wc.	west-central
IS	indicator species	ne.	northeastern	YBP	years before present
kg	kilogram	nw.	northwestern		

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