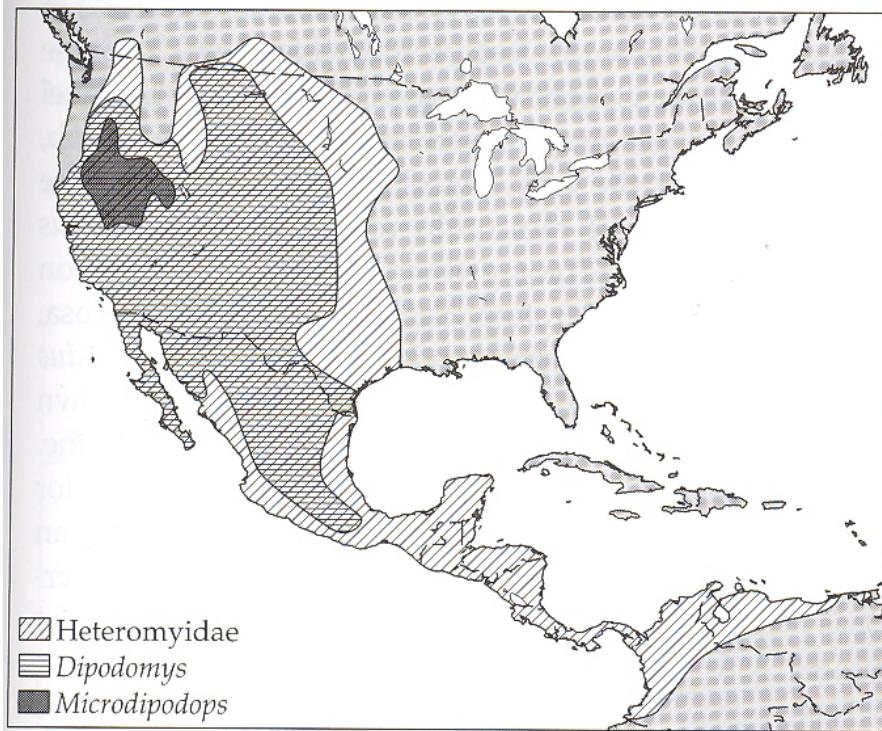
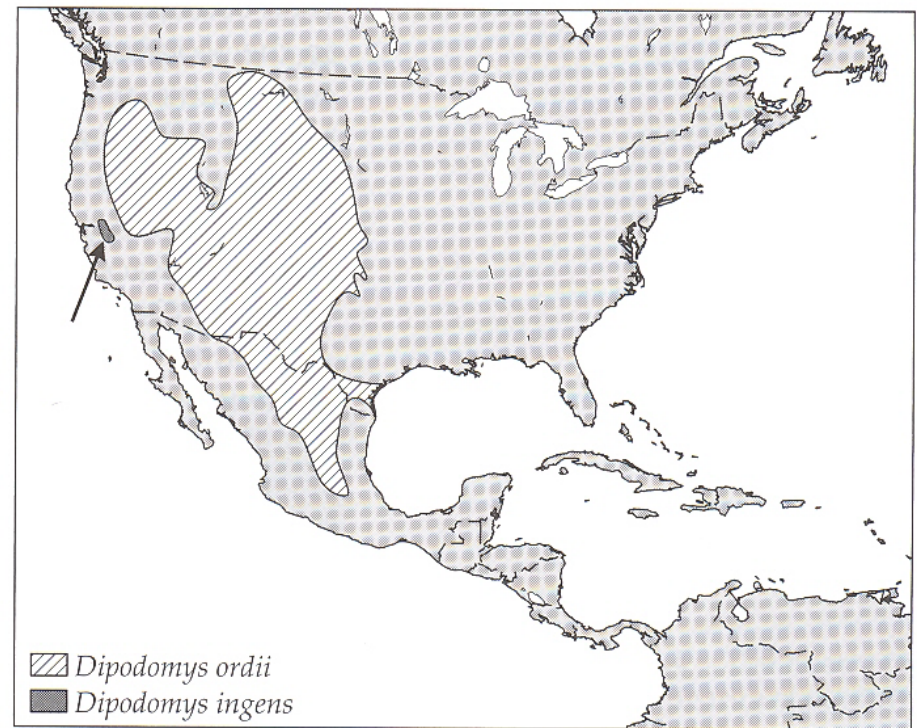


## Endemic genera



## Endemic species



**FIGURE 10.2** Hierarchical patterns of endemism in the rodent family Heteromyidae, which includes kangaroo rats and pocket mice. The entire family is endemic to the New World, ranging from southern Canada to northern South America. Distributions of its five genera vary in extent, from the kangaroo rats (*Dipodomys*), which range over most of western North America, to the kangaroo mice (*Microdipodops*), which are endemic to the Great Basin. Similarly, the range of just one species, *D. ordii*, encompasses most of the range of its genus, whereas *D. ingens* is endemic to the San Joaquin Valley of California.

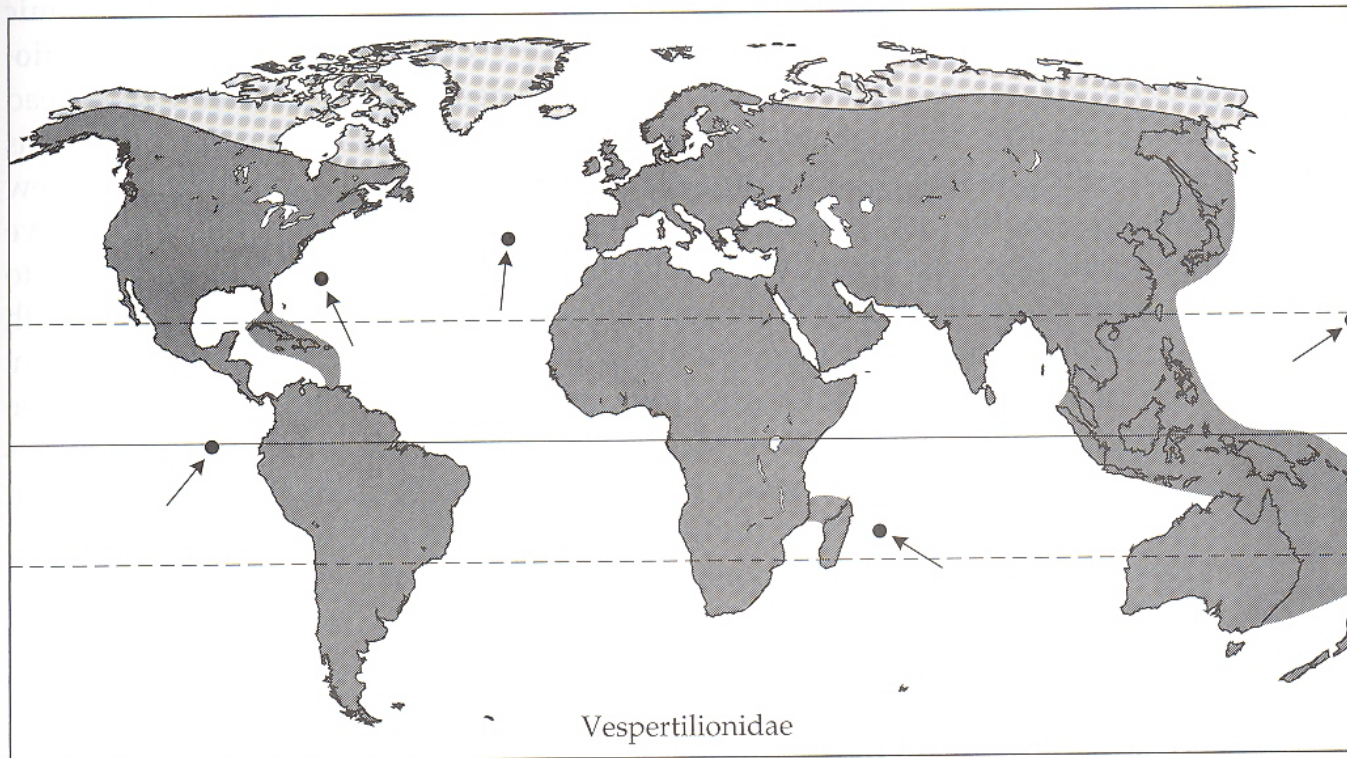
# Endemic species



**FIGURE 10.3** Native habitat of the Devil's Hole pupfish, (*Cyprinodon diabolis*) near Death Valley in the Mojave Desert, USA. This pool, connected to a large underground water basin and having surface dimensions of about  $20 \times 3$  m, represents the entire native habitat of the species. Photo courtesy of Lawrence Naiman.

Lomolino et al., 2006

# Cosmopolitan family



**FIGURE 10.4** The nearly cosmopolitan distribution of the bat family, Vespertilionidae. Representatives of this group occur on all of the continents except Antarctica and have colonized isolated archipelagos (indicated by arrows and black dots) such as Hawaii, the Galápagos, and the Azores. (After Koopman and Jones 1970.)

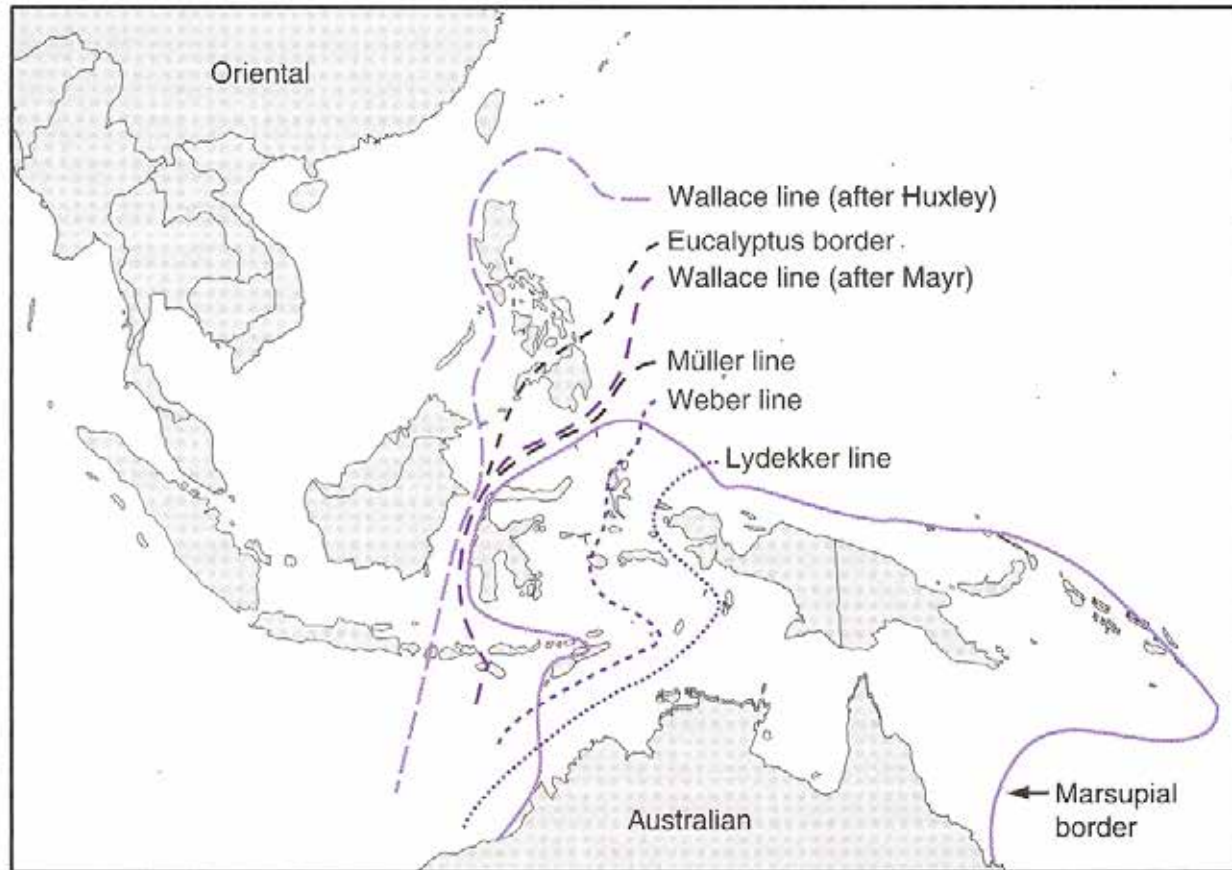
Lomolino et al., 2006

# Cosmopolitan species



[www.peregrinefund.org/explore\\_raptors/](http://www.peregrinefund.org/explore_raptors/)

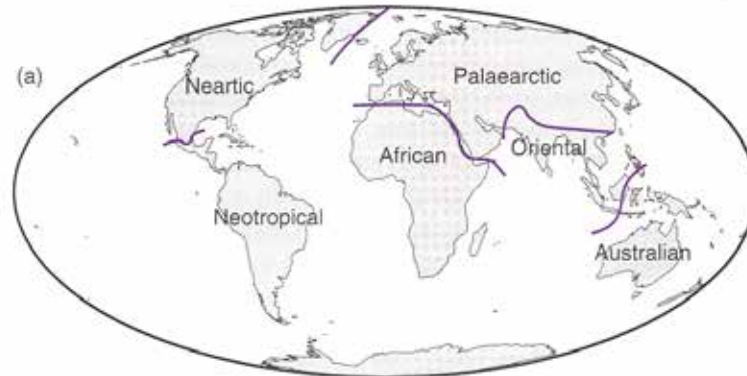
# Biogeographic boundaries



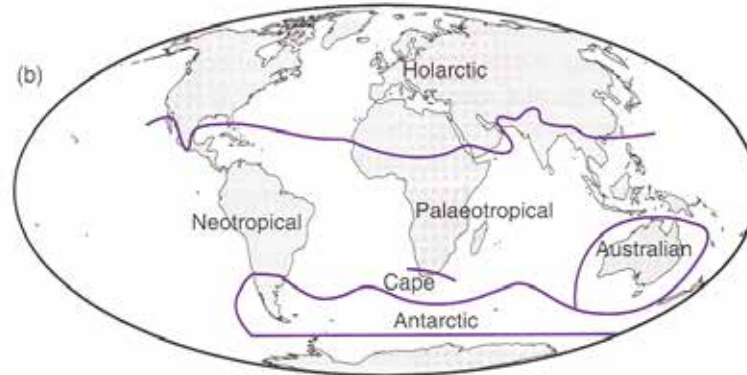
**FIGURE 10.2** The Wallacea region of southeastern Asia and Australia and several of the biogeographic lines that have been proposed to separate the Australasian and Oriental regions. The northwestern range limits of the Australian groups, the marsupials and eucalyptus, are also shown (after Zacharin, 1978 and other sources).

# Biogeographic realms

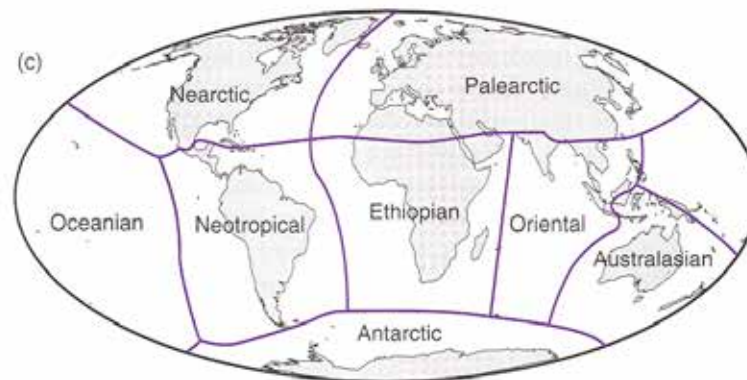
faunal



floral

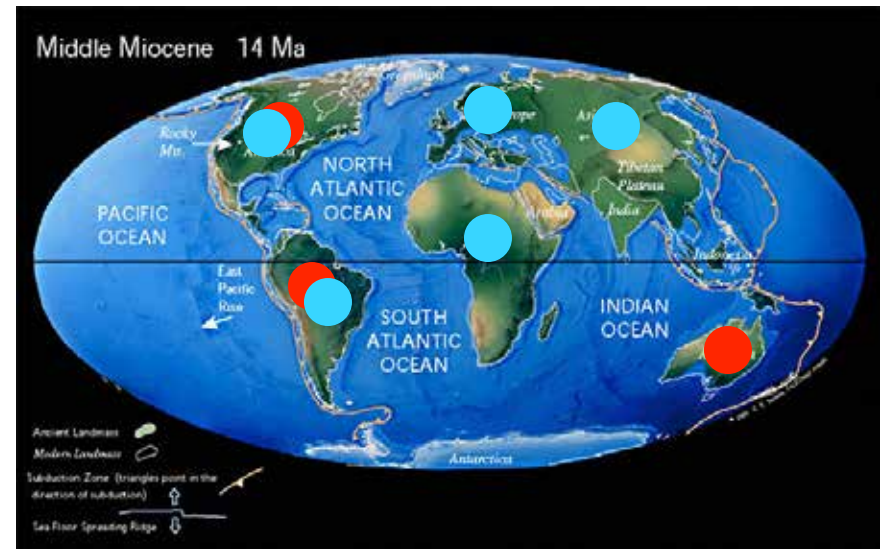
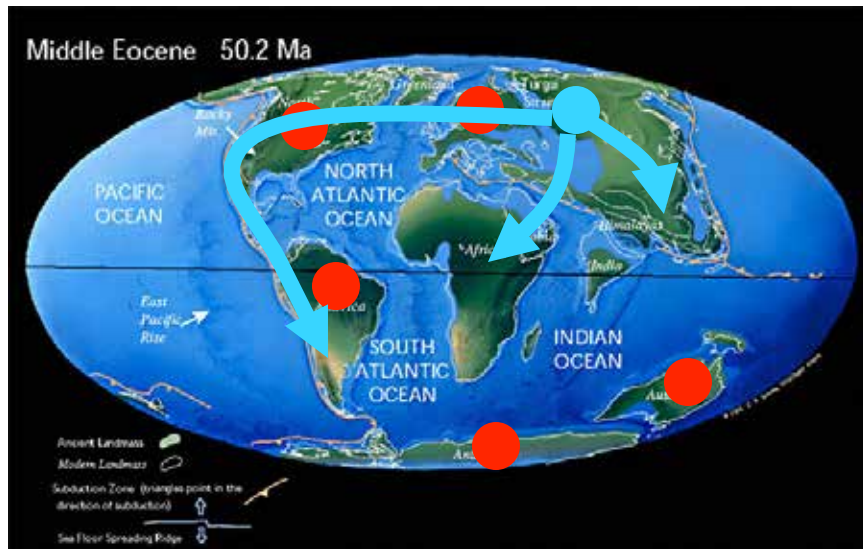
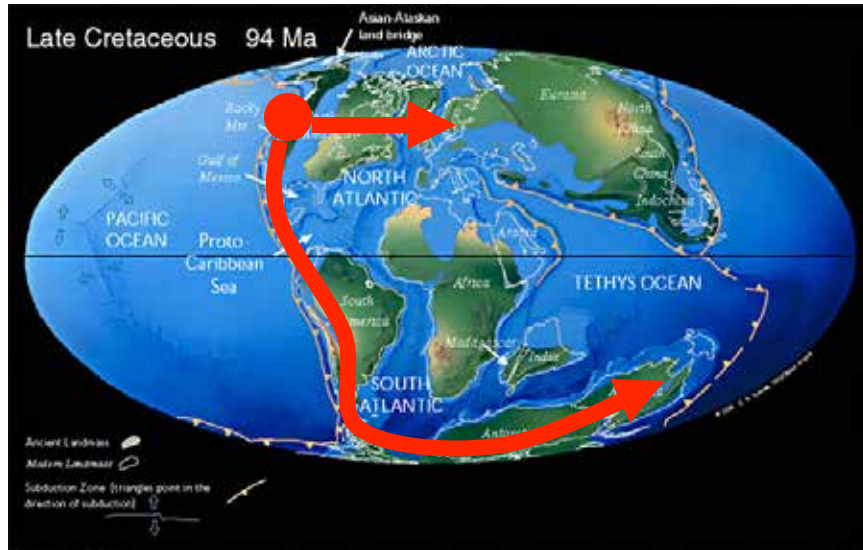


floral+faunal



**FIGURE 10.1** The world's faunal regions, floral regions, and Pielou's combined floral and fauna biogeographic regions (from a number of sources).

# Evolution of Marsupials and Placentals



# What's an angiosperm?

## Plants

Fern frond

Scientific classification	
Domain:	Eukaryota
(unranked)	Archaeplastida
Kingdom:	<b>Plantae</b>
	Haekel, 1866
Divisions	
<ul style="list-style-type: none"> <li>Green algae           <ul style="list-style-type: none"> <li>Chlorophyta</li> <li>Charophyta</li> </ul> </li> <li>Land plants (embryophytes)           <ul style="list-style-type: none"> <li>Non-vascular plants (bryophytes)               <ul style="list-style-type: none"> <li>Marchantiophyta—liverworts</li> <li>Anthocerotophyta—hornworts</li> <li>Bryophyta—mosses</li> </ul> </li> <li>Vascular plants (tracheophytes)               <ul style="list-style-type: none"> <li>†Rhyniophyta—rhyniophytes</li> <li>†Zosterophyllophyta—zosterophylls</li> <li>Lycopodiophyta—clubmosses</li> <li>†Trimerophytophyta—trimerophytes</li> <li>Pteridophyta—ferns and horsetails</li> <li>Seed plants (spermatophytes)                   <ul style="list-style-type: none"> <li>†Pteridospermatophyta—seed ferns</li> <li>Pinophyta—conifers</li> <li>Cycadophyta—cycads</li> <li>Ginkgophyta—ginkgo</li> <li>Gnetophyta—gnetae</li> <li>Magnoliophyta—flowering plants</li> </ul> </li> </ul> </li> </ul> </li> </ul>	

### Seed plants (spermatophytes)

- †Pteridospermatophyta—seed ferns
- Pinophyta—conifers
- Cycadophyta—cycads
- Ginkgophyta—ginkgo
- Gnetophyta—gnetae
- Magnoliophyta—flowering plants

} gymnosperms  
— angiosperms

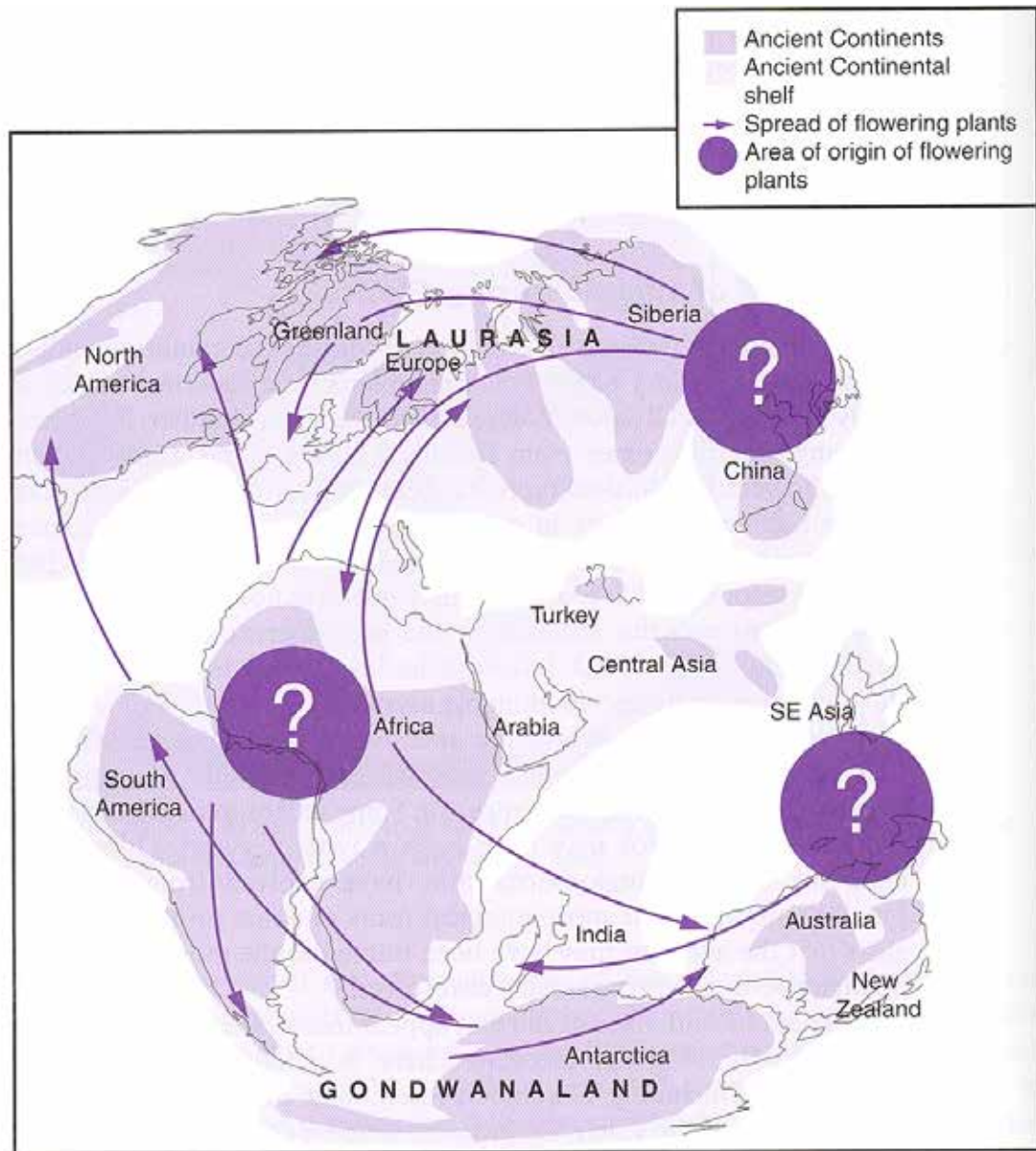
The most diverse families of flowering plants, in order of number of species, are:

1. Orchidaceae (orchid family): 25,000 or more species
2. Asteraceae or Compositae (daisy family): 20,000 species
3. Fabaceae or Leguminosae (pea family): 17,000
4. Rubiaceae (madder family): 13,183
5. Poaceae or Gramineae (grass family): 9,000
6. Euphorbiaceae (spurge family): 5,000
7. Malvaceae (mallow family): 4,300
8. Cyperaceae (sedge family): 4,000
9. Araceae (aroid family): 3700

en.wikipedia.org/wiki

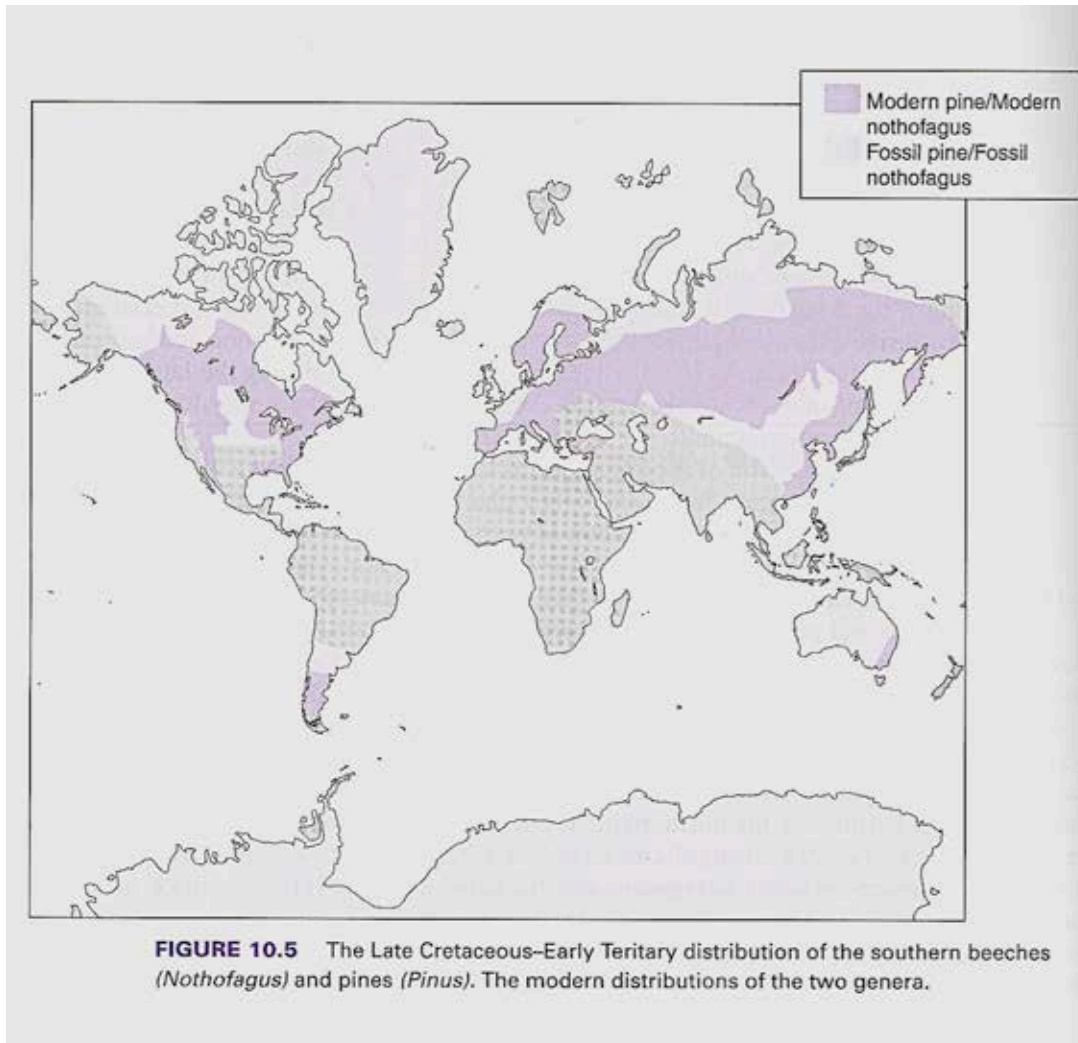


# Rise of Angiosperms



**FIGURE 10.4** The Late Jurassic to Cretaceous global dispersal of angiosperms (after Osborne and Tarling, 1996).

# Distribution of pines and southern beeches



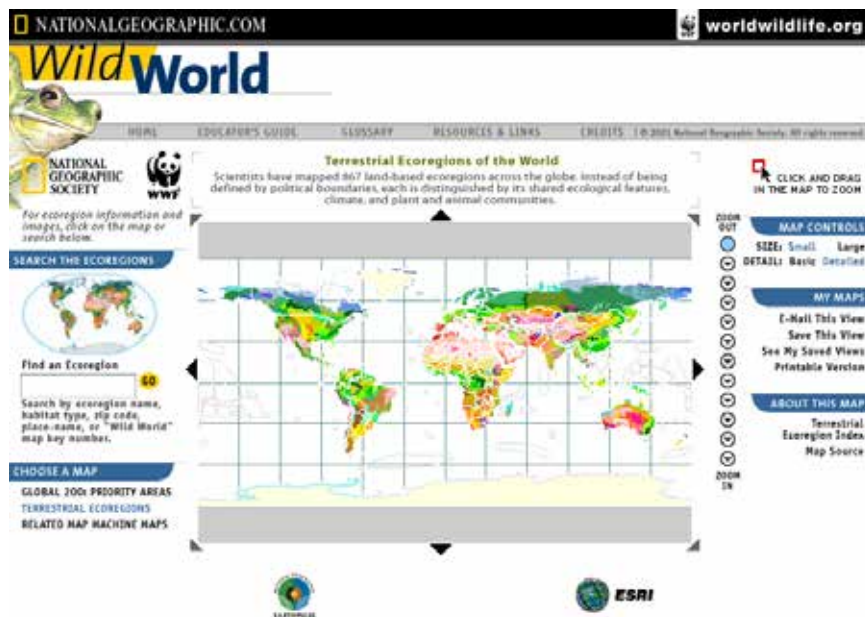
Long dispersal distances, ocean barriers prevented cold-adapted angiosperms to colonize Northern Hemisphere high latitudes

100 pine species, only several southern beech species

# Biogeographic Mapping and Conservation Planning: World Wildlife Fund (WWF) Ecoregions

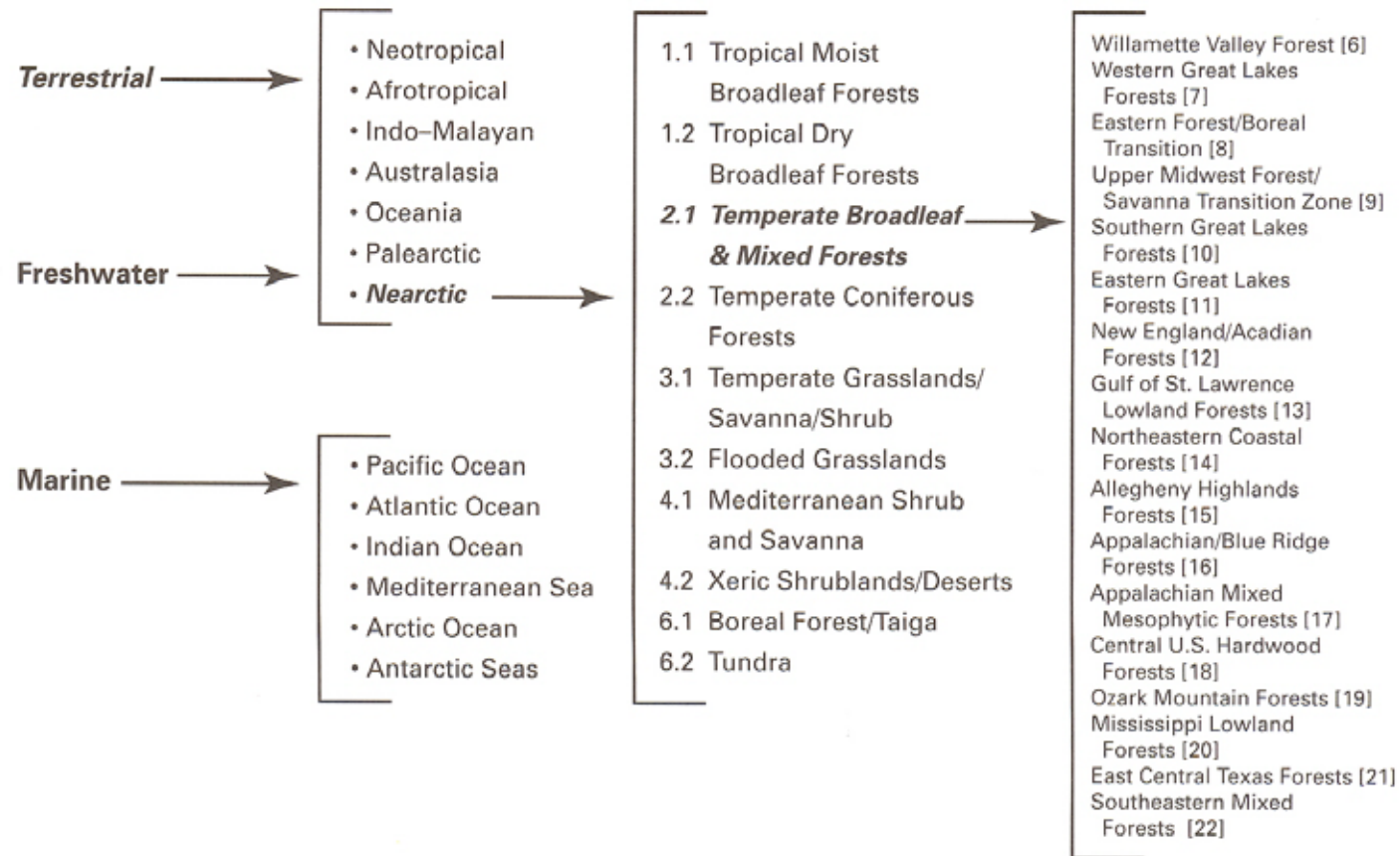
*“Biodiversity ignores national and other political boundaries, so a more relevant conservation planning unit is required - WWF addresses this need with ecoregions.”* ([www.worldwildlife.org/science/ecoregions](http://www.worldwildlife.org/science/ecoregions))

Ability to focus conservation efforts strategically is hindered by a global map of biodiversity with sufficient biogeographic resolution to reflect the complex distribution of natural communities (Olson et al., 2001)

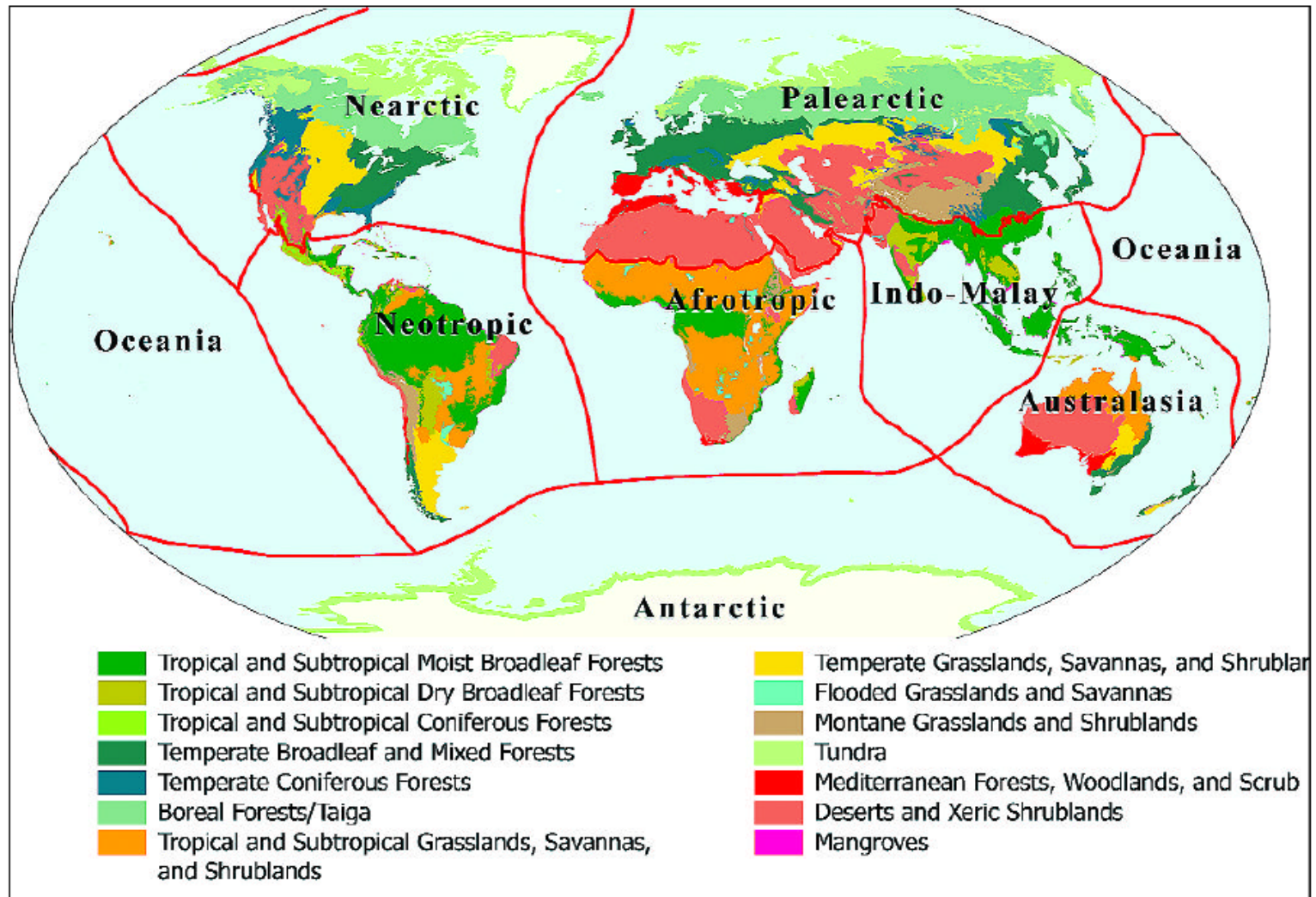


# Biogeographic Mapping and Conservation Planning: World Wildlife Fund (WWF) Ecoregions

Figure 2.3 Hierarchy of spatial units used in conservation assessment framework.

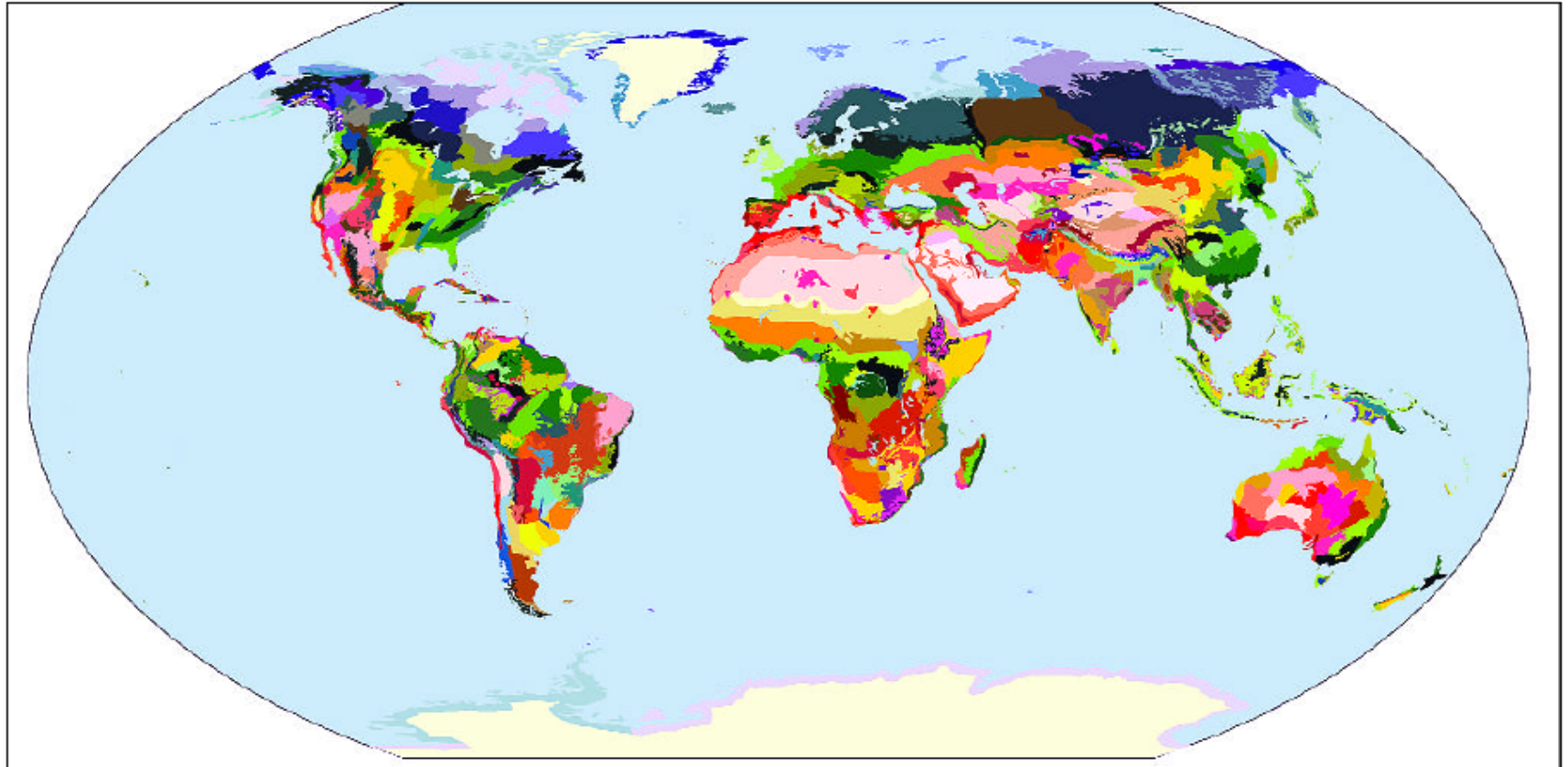


# Biogeographic Mapping and Conservation Planning: World Wildlife Fund (WWF) Ecoregions



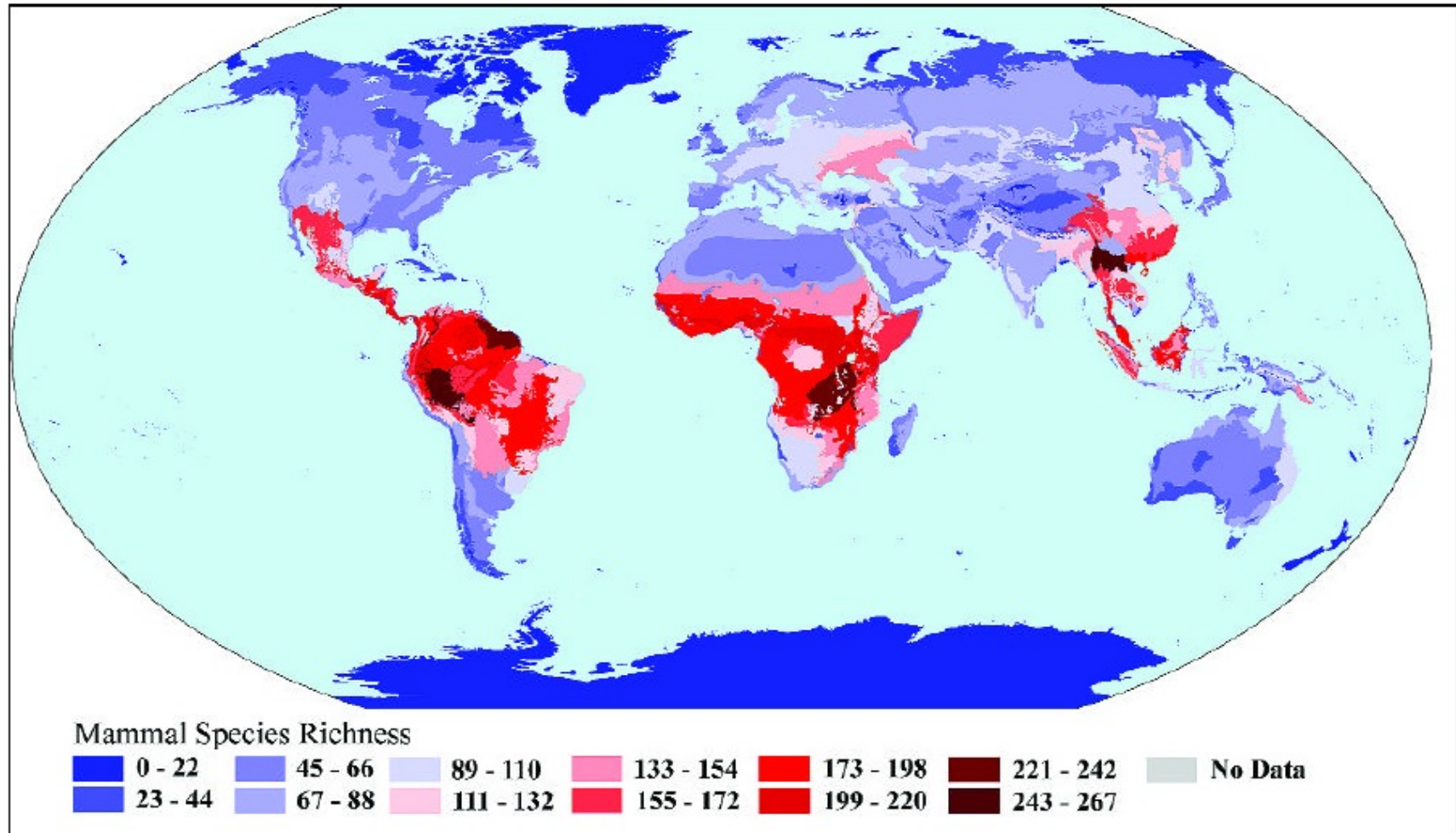
*Figure 1. The ecoregions are categorized within 14 biomes and eight biogeographic realms to facilitate representation analyses.*

# Biogeographic Mapping and Conservation Planning: World Wildlife Fund (WWF) Ecoregions



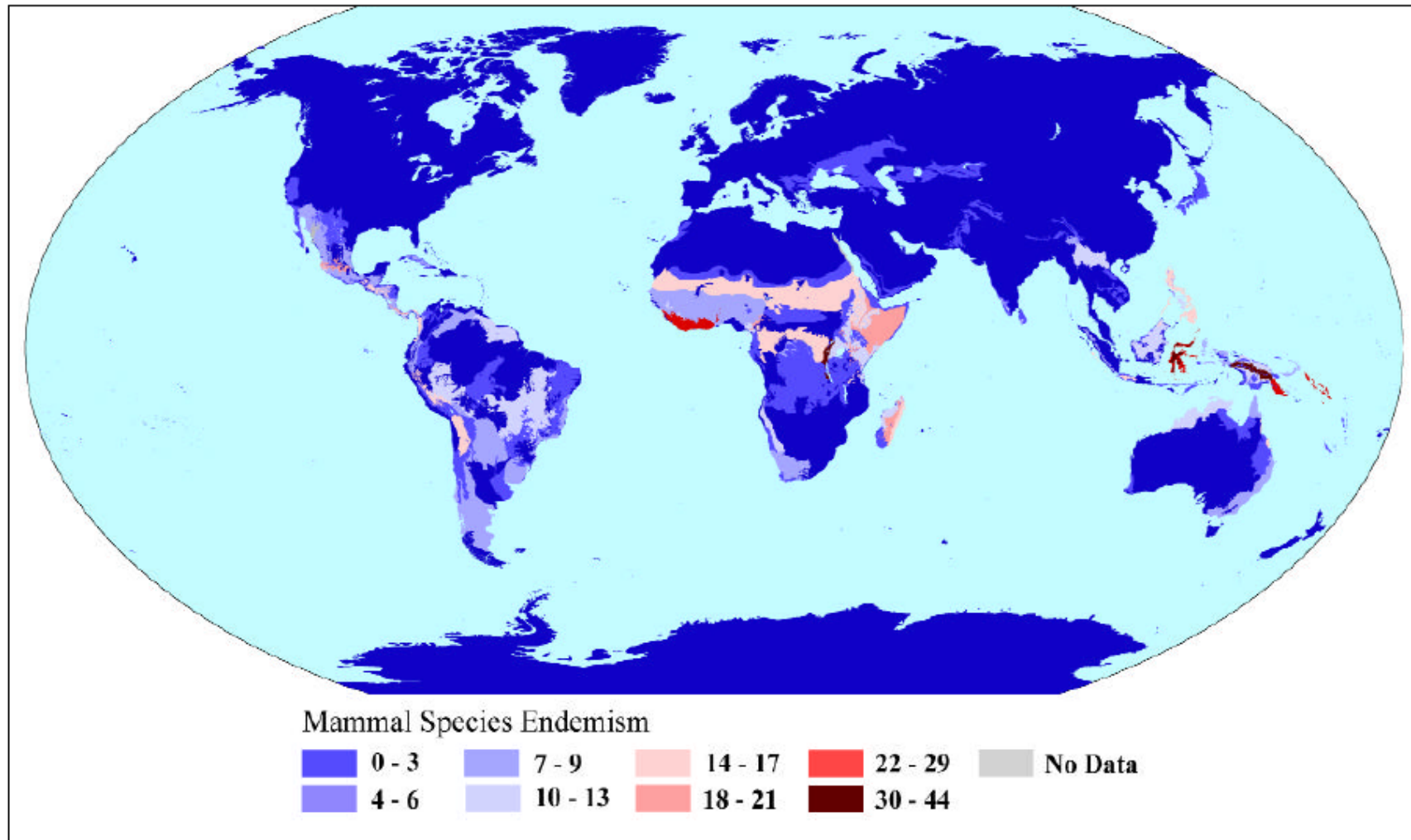
*Figure 2. The map of terrestrial ecoregions of the world recognizes 867 distinct units, roughly a fourfold increase in biogeographic discrimination over that of the 193 units of Udvardy (1975). Maps of freshwater and marine ecoregions are similarly needed for conservation planning.*

# Biogeographic Mapping and Conservation Planning: World Wildlife Fund (WWF) Ecoregions



*Figure 3. The relative richness of terrestrial mammal species by ecoregion is depicted. Warmer colors denote ecoregions containing richer assemblages.*

# Biogeographic Mapping and Conservation Planning: World Wildlife Fund (WWF) Ecoregions



*Figure 4. The level of species endemism for terrestrial mammals shows different patterns than that of richness. Warmer colors denote ecoregions containing more endemic species.*



# Biogeographic Mapping and Conservation Planning: World Wildlife Fund (WWF) Ecoregions

## WWF Global 200

*“...a first attempt to identify a set of ecoregions whose conservation would achieve the goal of saving a broad diversity of the Earth's ecosystems. These ecoregions include those with exceptional levels of biodiversity, such as high species richness or endemism, or those with unusual ecological or evolutionary phenomena.”*

[www.worldwildlife.org/science/ecoregions/g200.cfm](http://www.worldwildlife.org/science/ecoregions/g200.cfm)

# Biogeographic Mapping and Conservation Planning: World Wildlife Fund (WWF) Ecoregions

WWF Global 200 vision:

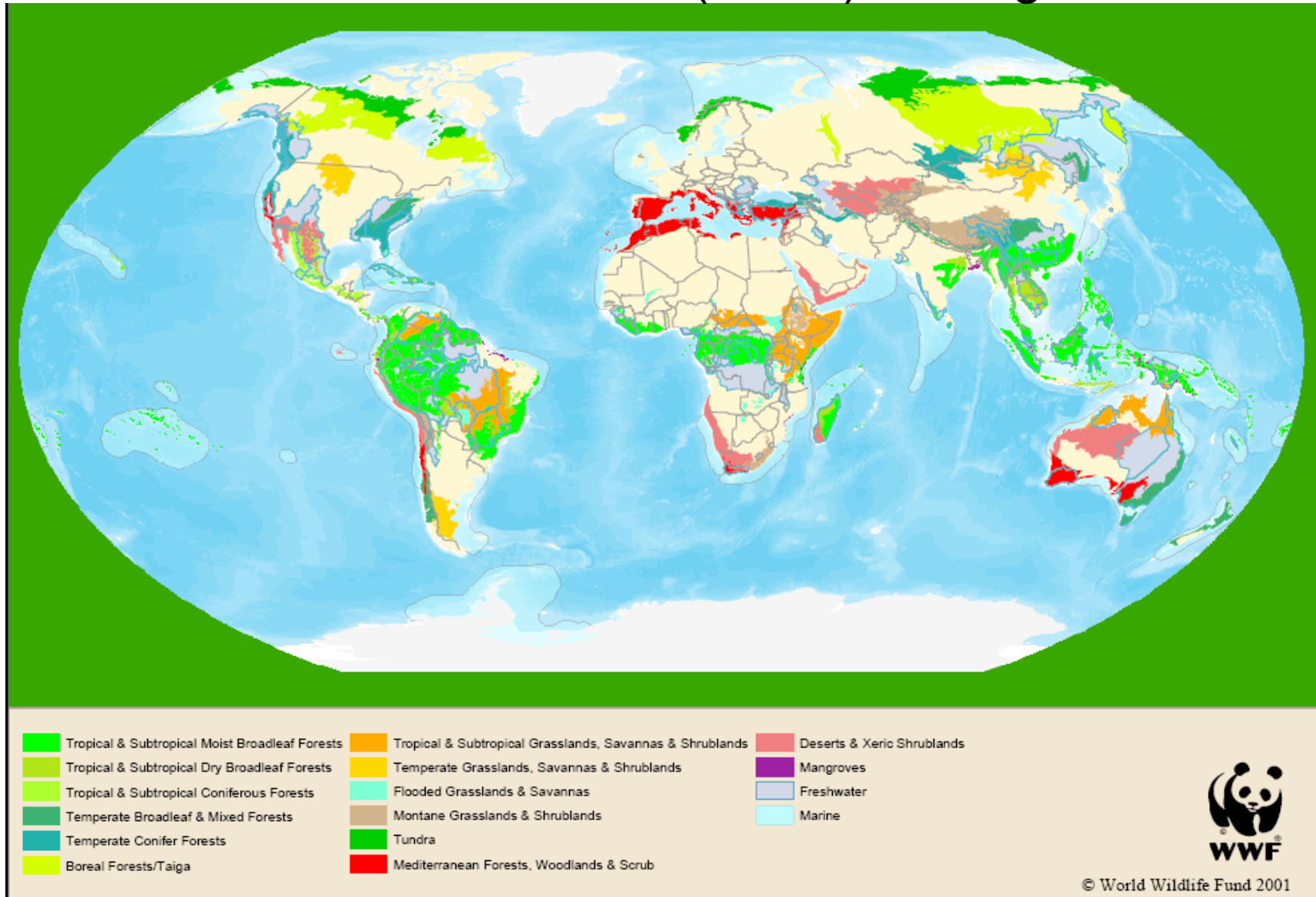
Identify and map priority areas critical to maintaining biodiversity

The vision should fulfill these basic tenets of conservation biology:

- **Representation** of all distinct natural communities within conservation landscapes and protected areas networks
- Maintenance of **ecological and evolutionary processes** that create and sustain biodiversity;
- Maintenance of **viable populations of all native species**; and
- Conservation of **blocks of natural habitat large enough** to be resilient to large-scale stochastic and deterministic disturbances and long-term changes.

[www.worldwildlife.org/science/ecoregions/visions.cfm](http://www.worldwildlife.org/science/ecoregions/visions.cfm)

# Biogeographic Mapping and Conservation Planning: World Wildlife Fund (WWF) Ecoregions



[www.worldwildlife.org/science/ecoregions/g200.cfm](http://www.worldwildlife.org/science/ecoregions/g200.cfm)