THE GLOBAL 200: PRIORITY ECOREGIONS FOR GLOBAL CONSERVATION[1]

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Abstract

A global strategy to conserve biodiversity must aim to protect representative examples of all of the world's ecosystems, as well as those areas that contain exceptional concentrations of species and endemics. Although lacking the richness of tropical forests, deserts, tropical lakes, and subpolar seas all contain distinct species, communities, and ecological phenomena. We analyzed global patterns of biodiversity to identify a set of the Earth's terrestrial, freshwater, and marine ecoregions that harbor exceptional biodiversity and are representative of its ecosystems. We placed each of the Earth's ecoregions within a system of 30 biomes and biogeographic realms to facilitate a representation analysis. Biodiversity features were compared among ecoregions to assess their irreplaceability or distinctiveness. These features included species richness, endemic species, unusual higher taxa, unusual ecological or evolutionary phenomena, and the global rarity of habitats. This process yielded 238 ecoregions—the Global 200—comprised of 142 terrestrial, 53 freshwater, and 43 marine priority ecoregions. Effective conservation in this set of ecoregions would help conserve the most outstanding and representative habitats for biodiversity on this planet.

Key words: biodiversity, conservation, ecoregions, endemism, global, phenomena, priority-setting, representation.

Tropical rain forests rightfully receive much conservation attention as they may contain half of the world's species. A comprehensive strategy for conserving global biodiversity, however, must strive to save the other 50 percent of species and the distinctive ecosystems that support them. For example, while they may not support the rich communities seen in tropical rain forests or coral reefs, tropical dry forests, tundra, polar seas, and mangroves all harbor unique species, communities, adaptations, and phenomena. Some of these biomes, such as tropical dry forests and Mediterranean-climate shrublands, are more threatened than are tropical rain forests and require immediate conservation action. To lose examples of these assemblages would represent an enormous loss of global biodiversity.

Limited funding compels the conservation community to be strategic and earmark the greatest amount of resources to protect the most outstanding and representative areas for biodiversity. On a global scale, this requires identifying large regions with exceptional levels of species richness or endemism, or those with unusual ecological or evolutionary phenomena. We must also target representative examples of all of the world's biomes within each biogeographic realm where they occur (Fig. 1). Because of distinct biogeographic histories, similar kinds of ecosystems found on different continents or in different ocean basins support unique assemblages of species and higher taxa. For this reason, global strategies should strive to conserve examples of every biome in each realm where it occurs for terrestrial, freshwater, and marine biodiversity (Olson & Dinerstein, 1998; Udvardy, 1975; Dasmann, 1974). Here we present the Global 200—an attempt to identify a set of ecoregions whose conservation would achieve this goal of saving a broad diversity of the Earth's ecosystems (Figs. 2, 3). This paper expands and updates an earlier analysis by Olson and Dinerstein (1998). Several additional ecoregions have been identified through ongoing regional analyses (e.g., Wikramanayake et al., 2001) and the marine Global 200 have been reduced, largely due to combining several adjacent areas

[1] We thank the regional experts, biologists, and conservationists who contributed their time and knowledge to the conservation analyses that went into the Global 200. J. Leape and C. Hails have provided critical support for this effort. The staff of WWF contributed greatly to the regional assessments from which the map is derived. We thank World Wildlife Fund's Conservation Science Program for their contribution to the analysis and preparation of the Global 200, specifically R. Abell, T. Allnutt, C. Carpenter, J. D'Amico, P. Hurley, K. Kassem, H. Strand, M. Taye, M. Thieme, W. Wettengel, E. Underwood, E. Wikramanayake, I. Itoua, C. Loucks, T. Ricketts, S. Walters, P. Hedao, M. McKnight, Y. Kura, J. Morrison, and G. Powell. J. Martin-Jones and U. Lagler helped in many ways to facilitate the completion of this project. We thank the staff of the WWF Network, including all of the national organizations, various field offices and programs, and associates, for their review and comments on earlier drafts.

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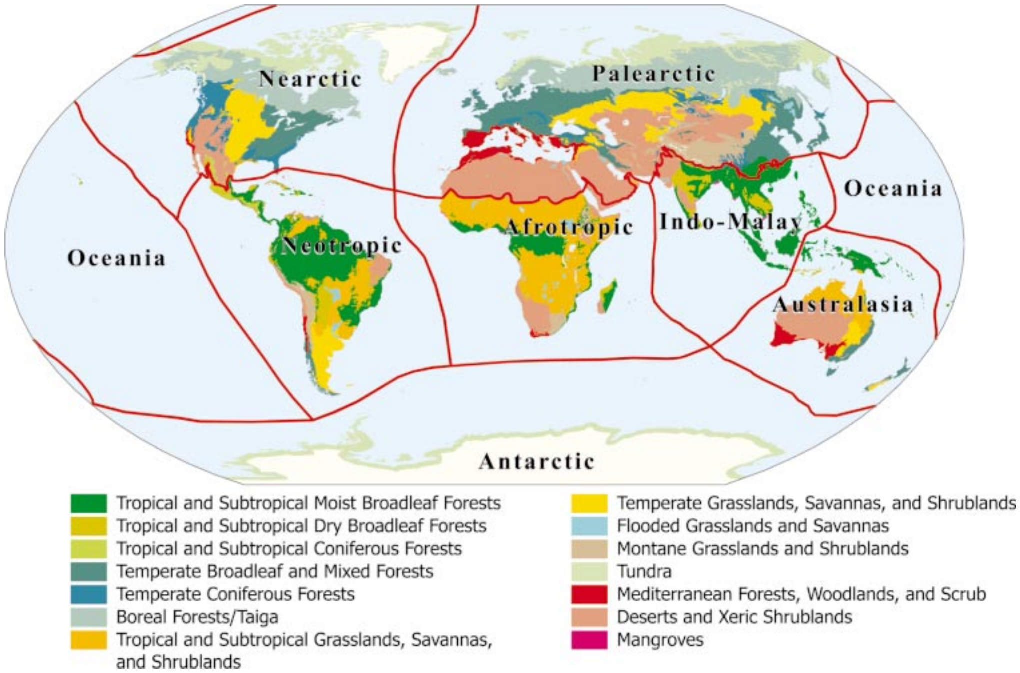

Figure 1. Terrestrial biomes, terrestrial and freshwater biogeographic realms, and marine biogeographic realms (sensu Dasmann, 1974; Udvardy, 1975).

into larger units. In addition, the conservation status of all ecoregions has been estimated.

Ecoregions are regional-scale (continental-scale) units of biodiversity. We define ecoregions as a relatively large area of land or water containing a characteristic set of natural communities that share a large majority of their species, ecological dynamics, and environmental conditions (Dinerstein et al., 1995; Groves et al., 2000). They function effectively as coarse-scale conservation units because they encompass similar biological communities, and their extent roughly coincides with the area over which key ecological processes interact most strongly (Orians, 1993).

For each of the Earth's 30 terrestrial, freshwater, and marine biomes (formerly referred to as major habitat types in our previous analysis), we compared the biodiversity of each constituent ecoregion. Those ecoregions whose levels of biodiversity were considered exceptional (that is, highly distinctive or irreplaceable; see Dinerstein et al., 1995; Pressey et al., 1994) for their biome, or which were considered the best example of a biome within a realm (even if none of the candidates harbored exceptional biodiversity), were identified as areas of particular importance for achieving global conservation goals. This prioritization yielded 238 ecoregions—the Global 200—comprised of 142 terrestrial, 53 freshwater, and 43 marine ecoregions nested within 30 biomes and 8 terrestrial and freshwater biogeographic realms and 13 marine biogeographic subdivisions (Table 1).

Delineation of Ecoregions

terrestrial ecoregions

Dasmann (1974) and Udvardy (1975) were the first to conduct a global representation analysis for terrestrial conservation. Dasmann's system of 198 biotic provinces and Udvardy's 193 units are nested within 7 biogeographic realms and 13 terrestrial biomes and 1 freshwater biome. Both these geographic models serve as logical frameworks for analyses of global representation.

The relative coarseness of Dasmann's and Udvardy's biotic provinces, however, limits their utility as regional conservation planning tools as many distinctive biotas may remain unrecognized. We believed a more finely resolved map of biodiversity patterns was required, one that mapped distinctive biotas within single, continuous biomes. This called for intensive regional analyses of biodiversity patterns across five continents by synthesizing existing

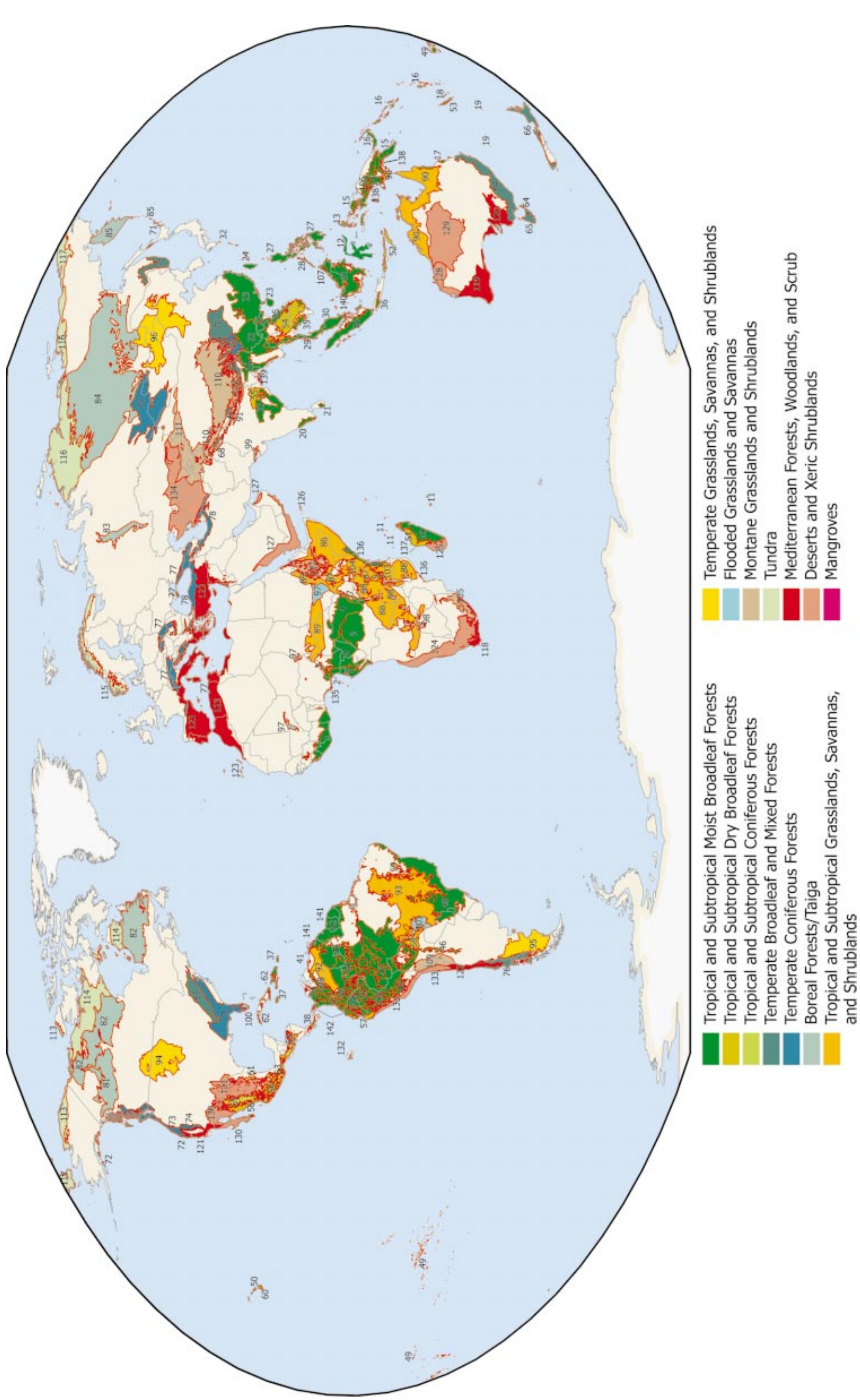

Figure 2. The terrestrial Global 200 ecoregions targets ecoregions with outstanding biodiversity features and representative value. The numbers correspond to the ecoregions listed in Table 1.

Table 1. Global 200 ecoregions organized by biomes and biogeographic realms. the estimated conservation status for each ecoregion is noted as follows: CE for critical or endangered, V for vulnerable, and RS for relatively stable or intact. Ecoregions marked by asterisks (*) represent new areas presently under review for elevation to Global 200 status based on their biodiversity features and representation value.

TERRESTRIAL REALM	
TROPICAL AND SUBTROPICAL MOIST BROADLEAF FORESTS	
Afrotropical	
1. Guinean Moist Forest	CE
2. Congolian Coastal Forests	CE
3. Cameroon Highland Forests	CE
4. Northeastern Congo Basin Moist Forests	V
5. Central Congo Basin Moist Forests	RS
6. Western Congo Basin Moist Forests	V
7. Albertine Rift Montane Forests	CE
8. East African Coastal Forests	CE
9. Eastern Arc Montane Forests	CE
10. Madagascar Forests and Shrublands	CE
11. Seychelle and Mascarene Moist Forests	CE
Australasian	
12. Sulawesi Moist Forests	CE
13. Moluccas Moist Forests	V
14. Southern New Guinea Lowland Forests	V
15. New Guinea Montane Forests	RS
16. Solomons-Vanuatu-Bismarck Moist Forests	V
17. Queensland Tropical Forests	V
18. New Caledonia Moist Forests	CE
19. Lord Howe–Norfolk Islands Forests	CE
Indo-Malayan	
20. Southwestern Ghats Moist Forests	CE
21. Sri Lankan Moist Forests	CE
22. Northern Indochina Subtropical Moist Forests	V
23. Southeast China-Hainan Moist Forests	CE
24. Taiwan Montane Forests	V
25. Annamite Range Moist Forests	V
26. Sumatran Islands Lowland and Montane Forests	CE
27. Philippine Moist Forests	CE
28. Palawan Moist Forests	CE
29. Kayah-Karen/Tenasserim Moist Forests	V
30. Peninsular Malaysian Lowland and Montane Forests	V
31. Borneo Lowland and Montane Forests	CE
32. Nansei Shoto Archipelago Forests	CE
33. Eastern Deccan Plateau Moist Forests	CE
34. Naga-Manupuri–Chin Hills Moist Forests	V
35. Cardamom Mountains Moist Forests	RS
36. Western Java Montane Forests	CE
Neotropical	
37. Greater Antillean Moist Forests	CE
* (Lesser Antillean Moist Forests)	CE
38. Talamancan-Isthmian Pacific Forests	RS
39. Chocó–Darién Moist Forests	RS
40. Northern Andean Montane Forests	CE
41. Coastal Venezuela Montane Forests	V
42. Guianan Moist Forests	RS
43. Napo Moist Forests	V
44. Rio Negro-Juruá Moist Forests	CE
45. Guayanan Highland Moist Forests	RS

Table 1. Continued.

46. Central Andean Yungas	CE
47. Southwestern Amazonian Moist Forests	RS
48. Atlantic Forests	CE
Oceania	
49. South Pacific Island Forests	CE
50. Hawaii Moist Forests	CE
TROPICAL AND SUBTROPICAL DRY BROADLEAF FORESTS	
Afrotropical	
51. Madagascar Dry Forests	CE
Australasia	
52. Nusa Tenggara Dry Forests	CE
53. New Caledonia Dry Forests	CE
Indo-Malayan	
54. Indochina Dry Forests	CE
55. Chhota-Nagpur Dry Forests	CE
Neotropical	
56. Mexican dry Forests	CE
57. Tumbesian-Andean Valleys Dry Forests	CE
58. Chiquitano Dry Forests	CE
59. Atlantic Dry Forests	CE
Oceania	
60. Hawaii Dry Forests	CE
TROPICAL AND SUBTROPICAL CONIFEROUS FORESTS	
Nearctic	
61. Sierra Madre Oriental and Occidental Pine-Oak Forests	CE
Neotropical	
62. Greater Antillean Pine Forests	CE
63. Mesoamerican Pine-Oak Forests	CE
TEMPERATE BROADLEAF AND MIXED FORESTS	
Australasia	
64. Eastern Australia Temperate Forests	CE
65. Tasmanian Temperate Rain Forests	V
66. New Zealand Temperate Forests	V
Indo-Malayan	
67. Eastern Himalayan Broadleaf and Conifer Forests	V
68. Western Himalayan Temperate Forests	CE
Nearctic	
69. Appalachian and Mixed Mesophytic Forests	V
Palearctic	
70. Southwest China Temperate Forests	V
71. Russian Far East Temperate Forests	V
TEMPERATE CONIFEROUS FORESTS	
Nearctic	
72. Pacific Temperate Rainforests	CE
73. Klamath-Siskiyou Coniferous Forests	CE
74. Sierra Nevada Coniferous Forests	CE
75. Southeastern Coniferous and Broadleaf Forests	CE
Neotropical	
76. Valdivian Temperate Rainforests/Juan Fernández Islands	CE
* (Juan Fernández Islands and Desventuradas Islands)	CE
Palearctic	
77. European-Mediterranean Montane Mixed Forests	CE

Table 1. Continued.

78. Caucasus-Anatolian-Hyrcanian Temperate Forests	CE
79. Altai-Sayan Montane Forests	V
80. Hengduan Shan Coniferous Forests	RS
BOREAL FORESTS/TAIGA	
Nearctic	
81. Muskwa/Slave Lake Boreal Forests	RS
82. Canadian Boreal Forests	RS
Palearctic	
83. Ural Mountains Taiga	V
84. Eastern Siberian Taiga	RS
85. Kamchatka Taiga and Grasslands	RS
TROPICAL AND SUBTROPICAL GRASSLANDS, SAVANNAS, AND SHRUBLANDS	
Afrotropical	
86. Horn of Africa Acacia Savannas	V
87. East African Acacia Savannas	V
88. Central and Eastern Miombo Woodlands	V
89. Sudanian Savannas	CE
Australasia	
90. Northern Australia and Trans-Fly Savannas	RS
Indo-Malayan	
91. Terai-Duar Savannas and Grasslands	CE
Neotropical	
92. Llanos Savannas	V
93. Cerrado Woodlands and Savannas	V
TEMPERATE GRASSLANDS, SAVANNAS, AND SHRUBLANDS	
Nearctic	
94. Northern Prairie	CE
* Tallgrass prairies	
Neotropical	
95. Patagonian Steppe	CE
Palearctic	
96. Daurian Steppe	V
FLOODED GRASSLANDS AND SAVANNAS	
Afrotropical	
97. Sudd-Sahelian Flooded Grasslands and Savannas	CE
98. Zambezian Flooded Savannas	V
Indo-Malayan	
99. Rann of Kutch Flooded Grasslands	CE
Neotropical	
100. Everglades Flooded Grassland	V
101. Pantanal Flooded Savannas	CE
MONTANE GRASSLANDS AND SHRUBLANDS	
Afrotropical	
102. Ethiopian Highlands	CE
103. Southern Rift Montane Woodlands	CE
104. East African Moorlands	RS
105. Drakensberg Montane Shrublands and Woodlands	CE
Australasia	
106. Central Range Subalpine Grasslands	RS
Indo-Malayan	
107. Kinabalu Montane Shrublands	RS
Neotropical	
108. Northern Andean Paramo	RS
109. Central Andean Dry Puna	V
Paleartic	
110. Tibetan Plateau Steppe	V

Table 1. Continued.

111. Middle Asian Montane Steppe and Woodlands	V
112. Eastern Himalayan Alpine Meadows	RS
TUNDRA	
Nearctic	
113. Alaskan North Slope Coastal Tundra	RS
114. Canadian Low Arctic Tundra	RS
Palearctic	
115. Fenno-Scandia Alpine Tundra and Taiga	V
116. Taimyr and Siberian Coastal Tundra	RS
117. Chukote Coastal Tundra	RS
MEDITERRANEAN FORESTS, WOODLANDS, AND SCRUB	
Afrotropical	
118. Fynbos	CE
Australasia	
119. Southwestern Australia Forests and Scrub	CE
120. Southern Australia Mallee and Woodlands	CE
Nearctic	
121. California Chaparral and Woodlands	CE
Neotropical	
122. Chilean Matorral	CE
Palearctic	
123. Mediterranean Forests, Woodlands, and Scrub	CE
DESERTS AND XERIC SHRUBLANDS	
Afrotropical	
124. Namib-Karoo-Kaokoveld Deserts	V
125. Madagascar Spiny Thicket	CE
126. Socotra Island Desert	CE
127. Arabian Highland Woodlands and Shrublands	V
Australasia	
128. Carnavon Xeric Scrub	CE
129. Great Sandy-Tanami Deserts	RS
Nearctic	
130. Sonoran-Baja Deserts	RS
131. Chihuahuan-Tehuacán Deserts	V
Neotropical	
132. Galápagos Islands Scrub	V
133. Atacama-Sechura Deserts	V
Palearctic	
134. Central Asian Deserts	CE
MANGROVES	
Afrotropical Atlantic	
135. Gulf of Guinea Mangroves	CE
Afrotropical Indian	
136. East African Mangroves	CE
137. Madagascar Mangroves	CE
Australasia	
138. New Guinea Mangroves	RS
Indo-Malayan Indo-Pacific	
139. Sundarbans Mangroves	CE
140. Greater Sundas Mangroves	CE
Neotropical Atlantic	
141. Guianan–Amazon Mangroves	RS
Neotropical Pacific	
142. Panama Bight Mangroves	RS

Table 1. Continued.

Freshwater Realm	
large rivers	
Afrotropical	
143. Congo River and Flooded Forests	RS
Indo-Malayan	
144. Mekong River	V
Nearctic	
145. Colorado River	CE
146. Lower Mississippi River	CE
Neotropical	
147. Amazon River and Flooded Forests	RS
148. Orinoco River and Flooded Forests	RS
Palearctic	
149. Yangtze River and Lakes	CE
large river headwaters	
Afrotropical	
150. Congo Basin Piedmont Rivers and Streams	RS
Nearctic	
151. Mississippi Piedmont Rivers and Streams	CE
Neotropical	
152. Upper Amazon Rivers and Streams	RS
153. Upper Paraná Rivers and Streams	CE
154. Brazilian Shield Amazonian Rivers and Streams	V
large river deltas	
Afrotropical	
155. Niger River Delta	CE
Indo-Malayan	
156. Indus River Delta	CE
Palearctic	
157. Volga River Delta	CE
158. Mesopotamian Delta and Marshes	CE
159. Danube River Delta	CE
160. Lena River Delta	RS
small rivers	
Afrotropical	
161. Upper Guinea Rivers and Streams	CE
162. Madagascar Freshwater	CE
163. Gulf of Guinea Rivers and Streams	V
164. Cape Rivers and Streams	CE
Australasia	
165. New Guinea Rivers and Streams	RS
166. New Caledonia Rivers and Streams	CE
167. Kimberley Rivers and Streams	RS
168. Southwest Australia Rivers and Streams	CE
169. Eastern Australia Rivers and Streams	CE
* (New Zealand Rivers and Streams)	V
Indo-Malayan	
170. Xi Jiang Rivers and Streams	CE
171. Western Ghats Rivers and Streams	CE
172. Southwestern Sri Lanka Rivers and Streams	V
173. Salween River	V
174. Sundaland Rivers and Swamps	V
Nearctic	
175. Southeastern Rivers and Streams	CE
176. Pacific Coastal Rivers and Streams	CE
177. Gulf of Alaska Coastal Rivers and Streams	RS
Neotropical	
178. Guianan Freshwater	RS

Table 1. Continued.

179. Greater Antillean Freshwater	CE
* (Southern Cone Freshwater, especially Valdivian region)	V
* (Atlantic Coast rivers of SE Brazil, Uruguay)	V
Palearctic	
180. Balkan Rivers and Streams	CE
* (expansion to Mediterranean region in general including western North Africa)	
181. Russian Far East Rivers and Wetlands	RS
* (Aral Sea Basin, particularly Syr- and Amu-Dar'ya Rivers)	CE
large lakes	
Afrotropical	
182. Rift Valley Lakes	CE
Neotropical	
183. High Andean Lakes	CE
Palearctic	
184. Lake Baikal	V
185. Lake Biwa	CE
small lakes	
Afrotropical	
186. Cameroon Crater Lakes	CE
Australasia	
187. Lakes Kutubu and Sentani	RS
188. Central Sulawesi Lakes	V
Indo-Malayan	
189. Philippines Freshwater	CE
190. Lake Inle	V
191. Yunnan Lakes and Streams	CE
Neotropical	
192. Mexican Highland Lakes	CE
xeric basins	
Australasia	
193. Central Australian Freshwater	V
Nearctic	
194. Chihuahuan Freshwater	CE
Palearctic	
195. Anatolian Freshwater	CE
Marine Realm	
polar	
Antarctic	
196. Antarctic Peninsula and Weddell Sea	RS
Arctic	
197. Bering Sea	V
198. Barents-Kara Seas	CE
temperate shelf and seas	
Mediterranean	
199. Mediterranean Sea	CE
North Temperate Atlantic	
200. Northeast Atlantic Shelf Marine	CE
201. Grand Banks	CE
202. Chesapeake Bay	V
North Temperate Indo-Pacific	
203. Yellow Sea	CE
204. Okhotsk Sea	RS

Table 1. Continued.

Southern Ocean	
205. Patagonian Southwest Atlantic	V
206. Southern Australian Marine	RS
207. New Zealand Marine	V
TEMPERATE UPWELLING	
North Temperate Indo-Pacific	
208. California Current	RS
South Temperate Atlantic	
209. Benguela Current	V
South Temperate Indo-Pacific	
210. Humboldt Current	V
211. Agulhas Current	RS
TROPICAL UPWELLING	
Central Indo-Pacific	
212. Western Australia Marine	RS
Eastern Indo-Pacific	
213. Panama Bight	V
214. Gulf of California	CE
215. Galápagos Marine	V
Eastern Tropical Atlantic	
216. Canary Current	CE
TROPICAL CORAL	
Central Indo-Pacific	
217. Nansei Shoto	CE
218. Sulu-Sulawesi Seas	CE
219. Bismarck-Solomon Seas	RS
220. Banda-Flores Sea	V
221. New Caledonia Barrier Reef	RS
222. Great Barrier Reef	RS
223. Lord Howe–Norfolk Islands Marine	RS
224. Palau Marine	V
225. Andaman Sea	V
Eastern Indo-Pacific	
226. Societies/Marquesas/Tuamotus Marine	V
227. Hawaiian Marine	V
228. Rapa Nui Marine	RS
229. Fiji Barrier Reef & Marine	RS
Western Indo-Pacific	
230. Maldives, Chagos, Lakshadweep Atolls	V
231. Red Sea	V
232. Arabian Sea	CE
233. East African Marine	N
234. West Madagascar Marine	V
* (The Mascarene Islands are under consideration due to high numbers of endemic reef fish)	
* (The Maldives are under consideration for extension to include Sri Lanka and southern Indian coast)	
Western Tropical Atlantic	
235. Mesoamerican Reef	CE
236. Greater Antillean Marine	CE
237. Southern Caribbean Sea	V
238. Northeast Brazil Shelf Marine	V

classifications from finer scales.[4] Furthermore, delineations were conducted in collaboration with hundreds of regional experts and included extensive literature reviews. The result is a digital map of 867 terrestrial ecoregions, classified within biomes and realms, to be used for priority-setting analyses (Olson et al., 2001). This map provides a much more detailed picture of how species assemblages are distributed across the world. The increased resolution is most apparent in the tropics where Dasmann (1974) and Udvardy (1975) identified 115 and 117 provinces respectively, compared to 463 terrestrial ecoregions.

Dasmann and Udvardy both went on to assess how well existing protected areas represented the Earth's terrestrial biomes and realms. Biotic provinces with little or no protection were identified as priorities. The Global 200 analysis frames the goal of prioritization differently: We ask which regions should be a priority for conservation action (e.g., designating and strengthening protected areas) because of their outstanding biodiversity features or their representation value. We also apply this question to the terrestrial, freshwater, and marine realms.

FRESHWATER ECOREGIONS

Separate analyses of freshwater and terrestrial ecoregions were conducted because the distribution of freshwater biodiversity diverges from terrestrial patterns. Freshwater ecoregions were based on several regional analyses and consultations with regional experts.[5] Currently, the Global 200 analysis effectively targets the majority of freshwater priorities. Some targets, however, may change as we near completion of a global map of freshwater ecoregions that is based on a standard level of biogeographic resolution and relevant biomes.

[4] Victor (1955), Freitag (1971), Zohary (1973), Miyawaki (1975), Yim (1977), Chinese Vegetation Map Compilation Committee (1979), Wiken (1986), New Zealand Department of Conservation (1987), Noirfalise (1987), Changchun Institute of Geography and Chinese Academy of Sciences (1990), Kurnaev (1990), Bohn (1994), Krever et al. (1994), Dinerstein et al. (1995), Ecological Stratification Working Group (1995), Gallant et al. (1995), Hilbig (1995), Omernik (1995), Thackway & Cresswell (1995), Mongolian Ministry for Nature and the Environment et al. (1996), European Topic Centre on Nature Conservation (2000), Ricketts et al. (1999), WWF/IUCN (1994, 1995, 1997), Bohn & Katenina (1996), Wikramanayake et al. (2001), S. Gon (pers. comm.).

[5] Hocutt & Wiley (1986), Frest & Johannes (1991), WCMC (1992), Maxwell et al. (1995), Oberdorff et al. (1995), Kottelat & Whitten (1996), Olson et al. (1999), Abell et al. (2000), Thieme et al. (in press).

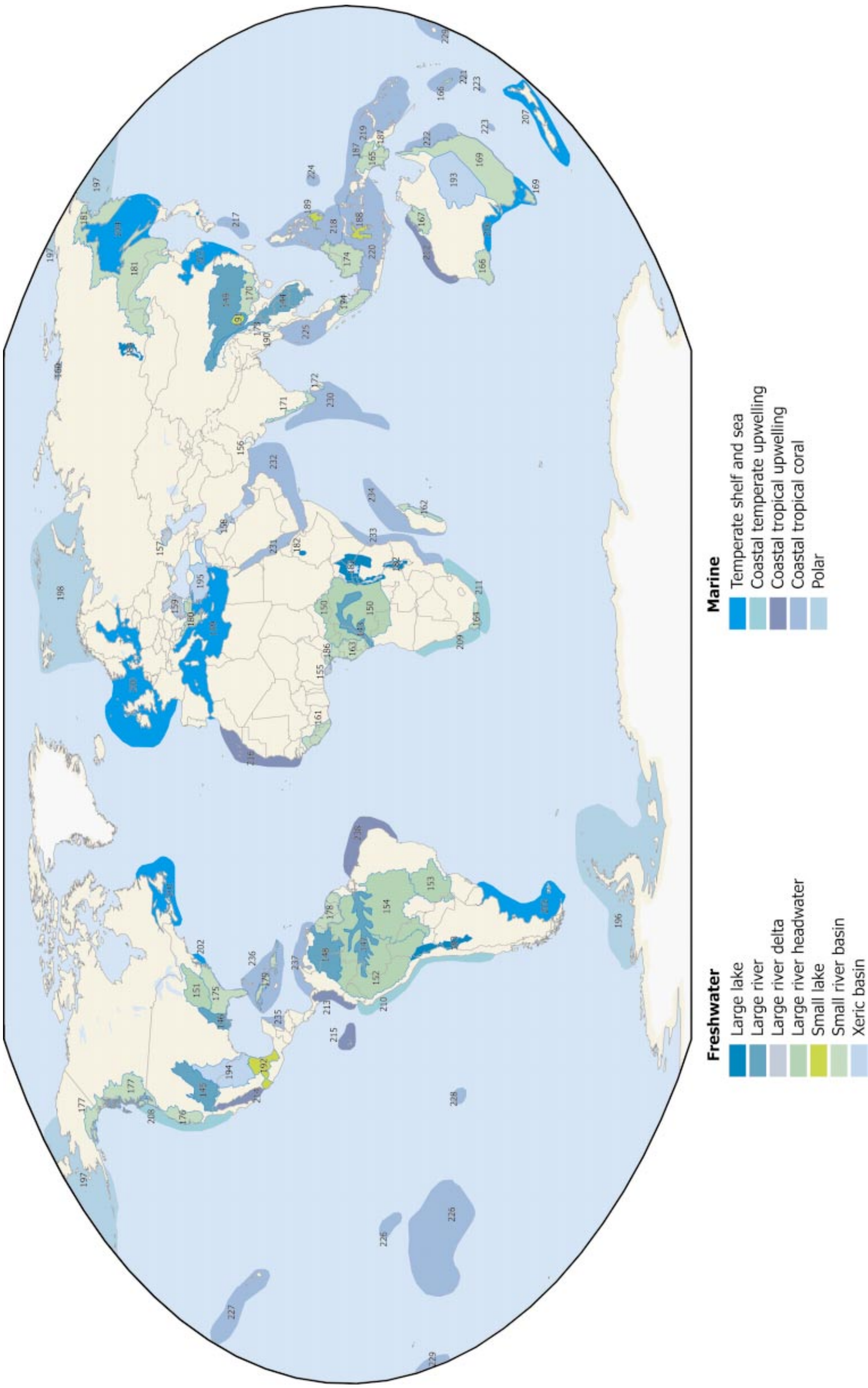

Figure 3. The freshwater and marine Global 200 ecoregions. The numbers correspond to the ecoregions listed in Table 1.

MARINE ECOREGIONS

Relative to most terrestrial and freshwater ecoregions, marine ecological and biogeographic units are more spatially and temporally dynamic (Sherman et al., 1990) and therefore more challenging to delineate. Marine ecoregions delineated by the Global 200 are derived from a synthesis of global and regional spatial schemas, review of the available literature[6] and consultations with experts. Kelleher et al. (1995), Sherman et al. (1990), Longhurst (1998), and Bailey (1998) served as the primary sources for the Global 200. Our base map does not cover deep water ecosystems (i.e., pelagic, abyssal, or hadal) nor are its biogeographic units as finely resolved as the maps used in the freshwater or terrestrial analyses. We believe that several forthcoming and detailed analyses of marine biodiversity around the world (Callum Roberts, pers. comm. 2001, Gerald Allen, pers. comm. 2002) will be useful in testing and improving the accuracy of our results. As in the land-based analyses, the delineation of marine ecoregions is intended to highlight general regions within which characteristic animals, plants, ecological interactions, and biophysical processes occur.

BIOGEOGRAPHIC RESOLUTION

The majority of Global 200 regions are composed of an aggregation of continental-scale ecoregions. This reflects the coarser level of biogeographic resolution applied on a global scale. For example, whereas 12 terrestrial units were delineated for the island of New Guinea in the regional analysis (Wikramanayake et al., 2001), only 5 Global 200 units are recognized. The ecoregions that were combined are adjacent, related by habitat type, and are biogeographically similar at a global scale. Appoximately a third of the ecoregions used in the regional analyses correspond directly to Global 200 ecoregions. The specific location and configuration of boundaries of Global 200 ecoregions do not present exact target areas for detailed planning. Rather, Global 200 ecoregions are primarily intended to spotlight regions of exceptional importance for strategic decision-making.

Selection Criteria for the Global 200

Selection of the Global 200 draws heavily from the results of intensive regional analyses of biodiversity conducted over the last several years (Krever et al., 1994; Dinerstein et al., 1995; Olson et al., 1999; Ricketts et al., 1999; Abell et al., 2000; Wikramanayake et al., 2001; Burgess et al., in press; Thieme et al., in press). Within each biome and biogeographic realm, the relative importance of ecoregions was classified at one of four levels: globally outstanding, regionally outstanding (e.g., Neotropics, Atlantic Ocean), bioregionally outstanding (e.g., Caribbean), or locally important. The criteria used to prioritize ecoregions for the Global 200 are the same as those used for the regional assessments. We chose the set of ecoregions within each biome that were considered to harbor biodiversity that was globally outstanding or regionally outstanding based on the parameters described below.

These parameters were weighted and measured in the regional analyses as illustrated in Appendix 1. The weight assigned to the different parameters varied by biome to better address specific patterns of biodiversity and ecological dynamics.

SPECIES RICHNESS AND ENDEMISM

Richness values were first corrected for area. We then divided the range of values for the set of ecoregions sharing the same biome and realm into four categories based on natural breaks. Globally outstanding ecoregions were compared with those identified for other realms to ensure consistency. In general, widely recognized global and regional centers of richness and endemism were selected for Global 200 status. The precision of the data varied considerably as illustrated by richness and endemism values for vascular plants in temperate conifer and tundra biomes (Tables 2, 3).

HIGHER TAXONOMIC UNIQUENESS

The presence of an endemic higher taxon (genus or family) would contribute more to an ecoregion's biotic distinctiveness than would an endemic species. Some ecoregions are notable for biotas that contain unique taxa at higher taxonomic levels than species (Vane-Wright et al., 1991; Williams et al., 1991; Gaston & Williams, 1993; Forey et al., 1994; Williams & Humphries, 1994). For example, the moist forests of northeastern Australia, northern New Zealand, and New Caledonia are recognized as having a number of the most primitive lineages of conifers and flowering plants in the world (WWF/IUCN, 1994–1997).

UNIQUE ECOLOGICAL OR EVOLUTIONARY PHENOMENA

Some ecoregions were elevated to Global 200 status because of their extraordinary ecological

[6] Hayden et al. (1984), IUCN (1988), Sherman (1990), Croom et al. (1992), Ray & Hayden (1993), Kelleher et al. (1995), Groombridge & Jenkins (1996), Ormond et al. (1997), Sullivan & Bustamante (1996), Longhurst (1998).

Table 2. Estimated richness and endemism (expressed as number of species) of native vascular plant species for temperate coniferous forest ecoregions around the world. Data for ecoregions of the United States and Canada are derived from the Biota of North America Program databases developed by Kartesz and Meacham (1999). The estimates for Eurasian ecoregions may be comparatively higher than values for the Americas because the former typically encompass biogeographic areas that are broader in scope (i.e., they include mixed-conifer and broadleaf forest habitats) than ecoregions delineated for the Americas (WWF/IUCN, 1994–1997; Mittermeier et al., 1999).

Ecoregion	Species richness	Endemism
Nearctic		
Southeastern Conifer Forests	3095	>201
Sierra Nevada Forests	2373	51–75
Arizona Mountains Forests	2204	76–110
South Central Rockies Forests	1933	51–75
Klamath–Siskiyou Forests	1859	111–151
Piney Woods Forests	1729	4–10
North Central Rockies Forests	1695	21–50
Colorado Rockies Forests	1626	76–110
Middle Atlantic Coastal Forests	1488	11–20
Okanogan Forests	1355	1–3
Cascade Mountain Leeward Forests	1328	11–20
North Cascades Forests	1325	4–10
Central and Southern Cascades Forests	1296	21–50
Eastern Cascade Forests	1224	21–50
Northern California Coastal Forests	1212	11–20
Blue Mountain Forests	1134	21–50
Wasatch and Uinta Montane Forests	1109	51–75
Central Pacific Coastal Forests	1109	11–20
Puget Lowlands Forests	1100	1–3
Great Basin Montane Forests	1043	21–50
Fraser Plateau and Basin Complex	1012	0
Florida Sand Pine Scrub	951	21–50
Northern British Columbia Mountain Forests	909	0
Northern Transitional Alpine Forests	876	0
Alberta/British Columbia Foothill Forests	740	1–3
Alberta Mountain Forests	660	1–3
Northern Pacific Coastal Forests	615	1–3
Queen Charlotte Islands	459	1–3
Atlantic Coastal Pine Barrens	632	1–3
Neotropics		
Valdivian Temperate Rainforests	463	>33
Palearctic		
Caucasus Mountains	~6300	~1600
Middle Asia Mountains*	~5500	~1500
Pyrenees	~3500	~200
Balkan–Rhodope Mountains	~3000	~900
Alps	~3000	~350
Carpathians	~2000	~100
Central China Mixed-Conifer Forests	~1900	?
Eastern Himalayan Temperate Conifer Forests	~1500	?

* Kopetdag, Tienshan, Pamiro-Alai, Pamir, Dzhungarian Alatau.

phenomena. Ecoregions that contain extensive intact habitats and large vertebrate assemblages were recognized. Also considered were the long-distance migrations of larger terrestrial vertebrates such as caribou or wildebeest, and the tremendous seasonal fish migrations and fish frugivory in the flooded forests of the Amazon (varzea forests) (Goulding, 1980; Goulding et al., 1996). Such phenomena were once widespread but are now rare due to the prevalence of human disturbance around the world. This is the only situation where we consider global patterns within the context of threats. Otherwise,

Table 3. Actual or estimated vascular plant species richness and endemism (expressed as species number) of some tundra ecoregions or regions based on data from WWF/IUCN (1994), Ricketts et al. (1999), and J. T. Kartesz (pers. comm.).

Ecoregion or region	Species richness	Endemism
Nearctic		
Pacific Coastal Mountain Icefields	792	0
Alaska/St. Elias Range Tundra	747	4–10
Interior Yukon/Alaska Alpine Tundra	617	4–10
Brooks/British Range Tundra	593	1–3
Ogilvie/MacKenzie Alpine Tundra	589	4–10
Arctic Foothills Tundra	580	0
Beringia Lowland Tundra	553	0
Arctic Coastal Tundra	539	1–3
Beringia Upland Tundra	538	1–3
Low Arctic Tundra	497	0
Aleutian Islands Tundra	388	4–10
Middle Arctic Tundra	371	1–3
Torngat Mountain Tundra	286	0
High Arctic Tundra	245	0
David Highlands Tundra	216	0
Baffin Coastal Tundra	135	0
Palearctic		
Chukotsky Peninsula	939	~50
Taimyr Peninsula	240	5

the Global 200 emphasizes biodiversity features that were in place prior to major human impacts of natural habitats and species populations.

Both ecological and evolutionary phenomena are a critical, but widely overlooked, aspect of biodiversity conservation. Unusual evolutionary phenomena such as the extraordinary adaptive radiations seen in Hawaiian plants, birds, and insects, the radiation of Galápagos finches, the radiation of cichlids in Rift Valley lakes of Africa, also elevated some ecoregions to the Global 200. While evolutionary or ecological phenomena occur in every ecoregion, we highlight those that are recognized as exceptional in global comparisons.

GLOBAL RARITY

All ecoregions in globally rare biomes were considered priorities. We elevated ecoregions to Global 200 status if their biome or major habitat type was represented in fewer than eight distinct regions around the world. Examples of rare biomes include the six Mediterranean woodlands, forests, and scrub, all of limited area. Temperate rain forest ecosystems (a major habitat) occur in seven relatively localized areas around the world. Paramos, or wet tropical alpine shrublands, occur in only a few areas of the northern Andes and Central America, a few East African mountain ranges, and in New Guinea. For this criterion, we counted only naturally occurring rarity, although human-induced rarity is an important condition to assess when developing conservation strategies.

INTACTNESS

For ecoregions in the same biome that were assessed at a similar level of biological importance, we selected the ecoregions that had relatively more intact habitats and biotas (see conservation status below).

REPRESENTATION

Ecoregions were also elevated to Global 200 status if they were the best example of their biome within a realm in situations where no other ecoregion had been selected due to its outstanding biodiversity. In this selection we emphasized those ecoregions that harbored the richest or most endemic biotas, or had the most intact natural ecosystems if biological importance was similar among candidates.

The Global 200 focuses on biological values as the critical first step in setting global conservation priorities. There are many other factors that may be used in the prioritization process. We purposefully did not use ecological function, conservation feasibility (i.e., political, social, economic, cultural factors), or human utility as discriminators to identify the Global 200 as these features are either difficult to measure or are highly fluid. The development and implementation of ecoregion strategies, however, require careful attention to ecological function and non-biological factors.

The recognition of remaining wild animal migrations and other contemporary ecological phenomena is the only criterion where human impacts to the environment are recognized, because areas of extinguished phenomena are ignored. Otherwise, the Global 200 emphasizes biodiversity features that were in place prior to major human impacts on natural habitats and species populations.

Conservation Status of the Global 200 Ecoregions

Ecoregions vary greatly not only in their biological distinctiveness, but also in their conservation status. Conservation status represents an estimate of the ability of an ecoregion to maintain viable species populations, to sustain ecological processes, and to be responsive to short- and long-term environmental changes. Conservation status assessments of the Global 200 ecoregions were based on landscape or aquascape-level criteria, such as total habitat loss, the degree of fragmentation, water quality, and estimates of future threat. From a practical perspective, a measure of conservation status can dictate the urgency, kinds of conservation activities, and level of effort needed among ecoregions or biomes. Conservation status can also indicate areas with relatively high opportunity for far-reaching conservation measures.

We estimated the conservation status of ecoregions specifically to enable us to make decisions about elevating ecoregions when the similarity of their biodiversity features made discrimination challenging. Conservation status was also used to assess broad trends in threats among different regions and biomes. Again, we drew heavily from regional conservation assessments to estimate conservation status.[7] For the Global 200, we classified ecoregions into one of three broad categories: critical/endangered, vulnerable, or relatively stable/relatively intact over the next 40 years. For terrestrial ecoregions, the most prominent contributor to conservation status is habitat loss, followed by the size of remaining habitat blocks, degree of fragmentation, degree of degradation, and degree of protection (see Appendix 2). Weightings for factors varied by biome for freshwater and marine ecoregions.

The Global 200 Ecoregions

We identified 238 ecoregions whose biodiversity and representation values are outstanding or significant on a global scale (Table 1). They represent the terrestrial, freshwater, and marine realms, and the 30 biomes nested within these realms. Among the three realms, 142 (60%) are terrestrial, 53 (22%) are freshwater ecoregions, and 43 (18%) are marine. Terrestrial ecoregions outnumber those of the other realms largely because there is more localized endemism in terrestrial than in marine biotas. Gaps in biogeographic information for freshwater and marine biodiversity also account for some of the variation.

terrestrial realm

Tropical and subtropical moist forests

Among the 14 terrestrial biomes, the largest number of Global 200 ecoregions falls within the tropical and subtropical moist forests biome (50 ecoregions or 35% of all terrestrial ecoregions) (Table 1). The high number of ecoregions reflects the biological richness and complexity of tropical moist forests. Although there are more tropical moist forest ecoregions in the Indo-Malayan Biogeographic realm (17) than in the Neotropics (12), this is partly due to the archipelagic distributions of Asian tropical moist forests and their characteristic biotas (Whitmore, 1986, 1990; Whitten et al., 1987a, 1987b, 1996; Wikramanayake et al., 2001). Four of the Asian tropical moist forests are small island systems, and the original extent of all of the Asian ecoregions fits easily within the area covered by western Amazonian moist forests.

The most diverse terrestrial ecoregions occur in the Western Arc forests of the Amazon Basin, with close rivals in the Atlantic Forest ecoregion of Brazil, the Chocó-Darién ecoregion of northwestern South America, Sumatra, and Peninsular Malaysia and northern Borneo forest ecoregions. The montane forest biotas of the Northern Andes are remarkable for their globally high rates of beta-diversity and extraordinary local endemism (Terborgh & Winter, 1983; ICBP, 1992; Hamilton et al., 1995; Wege & Long, 1995; WWF/IUCN, 1994–1997). The forests of the Guayanan region and Cuba are known for their pronounced endemism and unusual

[7] IUCN (1991, 1992), Krever et al. (1994), BSP et al. (1995), Dinerstein et al. (1995), Harcourt et al. (1996), MacKinnon & Bunting (1996), Bryant et al. (1997), Dinerstein et al. (1995), Dobson et al. (1997), Ricketts et al. (1999), Abell et al. (2000), Bryant et al. (2000), Conservation International (2000), Wikramanayake et al. (2001), Burgess et al. (in press).

biogeographic relationships (Whitmore & Prance, 1987; Borhidi, 1991; Dinerstein et al., 1995; Steyermark et al., 1995; Hedges, 1996). The forests of the Greater Antilles also are notable for a number of relict mammals, such as solenodons and hutias. The Congolian coastal forests are likely the most diverse in the Afrotropics, although diversity information is scarce for several ecoregions in the central Congo Basin (Oates, 1996; Kingdon, 1997; Burgess et al., in press). The Guinean moist forests support many species not found in the Central African region (IUCN/UNEP, 1986a; IUCN, 1990; Martin, 1991; IUCN, 1992; Mittermeier et al., 1999). The Albertine Rift montane forests are extremely rich for some taxa, such as birds, and have a high degree of endemism (Collar & Stuart, 1988; Kingdon, 1989; WWF/IUCN, 1994). The distinctiveness of the Eastern Arc montane and East African coastal forests is attributable to their great age and isolation (Hamilton & Bensted-Smith, 1989; Lovett & Wasser, 1993; Hamilton et al., 1995; Burgess et al., in press). Madagascar forests and shrublands are also highly distinctive on global scales, especially at higher taxonomic levels (Nicoll & Langrand, 1989; Preston-Mafham, 1991; WWF/IUCN, 1994). Tropical moist forests of New Guinea are highly distinctive (Brooks, 1987; Flannery, 1990, 1994; WWF/IUCN, 1994; Mittermeier et al., 1996; Wikramanayake et al., 2001), although Australian moist forests do share many affinities with New Guinea. The long-isolated forests of New Caledonia are exceptionally unusual, with so many endemic and relict higher taxa and species that the island is considered the 'Madagascar of the Pacific.' The forests of Sulawesi are noted for their regionally high degree of endemism in a range of taxa, a phenomenon also seen in the Philippine moist forests and in the Lesser Sundas semi-evergreen forests (IUCN/UNEP, 1986b; IUCN, 1991; ICBP, 1992; Stattersfield et al., 1998; Wikramanayake et al., 2001). The Western Ghats and southwestern Sri Lankan moist forests are distinctive due to their isolation and stability of conditions over millions of years. Tropical moist forests on oceanic islands are often highly distinctive due to high rates of endemism, extraordinary radiations of taxa and adaptive radiation, and relictual or unique higher taxa (Dahl, 1986; Mitchell, 1989; Johnson & Stattersfield, 1990; Flannery, 1994; WWF/IUCN, 1994; Wagner & Funk, 1995).

Tropical and subtropical dry forests

The most diverse dry forests in the world occur in southern Mexico and in the Bolivian lowlands (Gentry, 1993; Parker et al., 1993; Bullock et al., 1996). The dry forests of the Pacific Coast of northwestern South America support a wealth of unique species due to their isolation (Parker & Carr, 1992; WWF/IUCN, 1994; Bullock et al., 1996). The subtropical forests of Maputaland-Pondoland in southeastern Africa are diverse and support many endemics (Cowling & Hilton-Taylor, 1994; WWF/IUCN, 1994). The dry forests of central India and Indochina are notable for their diverse large vertebrate faunas (Corbett & Hill, 1992; Stewart-Cox, 1995). Dry forests of Madagascar and New Caledonia are globally distinctive because of their high number of relictual taxa and extreme endemism (IUCN/UNEP/WWF, 1987; Preston-Mafham, 1991; WWF/IUCN, 1994; Wikramanayake et al., 2001).

Tropical and subtropical coniferous forests

Mexico harbors the world's richest and most complex subtropical coniferous forests (Perry, 1991; Peterson et al., 1993; Ramamoorthy et al., 1993; WWF/IUCN, 1994). The conifer forests of the Greater Antilles contain many endemics and relictual taxa (Borhidi, 1991). Subtropical conifer forests of Indochina are incorporated into the dry and moist forests of the region.

Temperate broadleaf and mixed forests

Temperate broadleaf and mixed forests are richest in central China and eastern North America, with other globally distinctive ecoregions occurring in the Caucasus, the Himalayas, southern Europe, and the Russian Far East (Table 2) (Zhao et al., 1990; Martin et al., 1993; Oosterbroek, 1994; WWF/IUCN, 1994; MacKinnon & Hicks, 1996; Ricketts et al., 1999).

Temperate coniferous forests

Temperate rain forests only occur in seven regions around the world—the Pacific Northwest, the Validivian forests of southwestern South America, the rain forests of New Zealand and Tasmania, the Northeastern Atlantic (small, isolated pockets in Ireland, Scotland, and Iceland), southwestern Japan, and those of the eastern Black Sea (Kellogg et al., 1992; WWF/IUCN, 1994). Forest communities dominated by huge trees (e.g., giant sequoia, *Sequoiadendron gigantea* (Lindl.) J. Buchholz; redwood, *Sequoia sempervirens* (D. Don) Endl.; mountain ash, *Eucalyptus regnans* F. Muell.) are unusual ecological phenomena that are found only in western North America, southwestern South America, and in the Australasian region in such areas as southeastern Australia and northern New Zealand. The Klamath–Siskiyou ecoregion of western North America harbors diverse and unusual assemblages and displays notable endemism for a number of plant and animal taxa. The Valdivian forests of Chile are notable for their diversity of tree genera, many of which are monotypic and have Gondwanaland origins. These long-isolated forests have many other unusual taxa and unique communities.

Boreal forests and taiga

Low species richness and endemism are characteristic of circumboreal and circumpolar ecoregions (USSR Academy of Sciences, 1988), thus the presence of intact ecological phenomena denoted outstanding ecoregions. Large-scale migrations of caribou, or reindeer (*Rangifer tarandus*), and intact predator assemblages can still be found in some regions. For example, the Northern Cordillera boreal forests of Canada have been called the Serengeti of the Far North due to their abundance and diversity of large vertebrates (Ricketts et al., 1999). Extensive tracts of boreal forest and taiga still exist in the northern Nearctic and Palearctic, the largest expanses being in central and eastern Russia (Stewart, 1992; Krever et al., 1994). This biome also enjoys relatively unaltered natural disturbance regimes, an increasingly rare situation in other biomes.

Tropical and subtropical grasslands, savannas, and shrublands

In many parts of the tropics large mammal faunas have evolved to take advantage of the productive grasses and browse typical of this biome. These large mammal faunas are richest in African savannas and grasslands. Presently the most intact assemblages occur in East African acacia savannas and Zambezian savannas comprised of mosaics of miombo, mopane, and other habitats (McClanahan & Young, 1996). Large-scale migration of tropical savanna herbivores, such as wildebeest (*Connochaetes taurinus*) and zebra (*Equus zebra*), are continuing to decline through habitat alteration and hunting. Only in East Africa, the central Zambezian region, and in the Sudd region (Uganda kob or *Kobus kob*) do sizable migrations still persist. Many of the extraordinary migrations of the Guinean and Sahelian savannas have disappeared. Sahelian ecoregions support a large number of endemic rodent species, while the Somalian bushland and thickets harbor a concentration of endemic mammals, from rodents to antelopes. Both the Cerrado and the Llanos are noted for complexity of habitats and the unusually high levels of endemism and beta diversity in plants for tropical savannas. The tropical savannas of northern Australia and southern New Guinea support distinctive communities with several pockets of endemism for a range of taxa (Stattersfield et al., 1998).

Temperate grasslands, savannas, and shrublands

The vast expanses of grass in North America and Eurasia once sustained vast migrations of large vertebrates such as buffalo (*Bison bison*) and saiga (*Saiga tatarica*). Such extraordinary phenomena now occur only in isolated pockets, such as on the Daurian Steppe (Krever et al., 1994; Hilbig, 1995; Finch, 1996). The extraordinary floral communities of the Eurasian steppes and the North American Great Plains have been largely extirpated through conversion to agriculture. Nearly 300 different plant species can occur on a few hectares of North American tallgrass prairie. The Patagonian steppe and grasslands are notable for endemic higher taxa for mammals.

Flooded grasslands and savannas

Some globally outstanding flooded savannas and grasslands occur in the Everglades, Pantanal, Sahelian flooded savannas, Zambezian flooded savannas (including the Okavango Delta), and the Sudd. The Everglades are the world's largest rain-fed flooded grassland on a limestone substrate. The flooded savannas and grasslands selected are generally the largest complexes in each region. Another extraordinary inland delta, the Mamberamo River inland delta, is captured within the montane forests of the New Guinea ecoregion.

Montane grasslands and shrublands

The paramos of the northern Andes are the most extensive examples of this biome. Paramo ecosystems occur in only a few other localities in the tropics. The heathlands and moorlands of East Africa (e.g., Mt. Kilimanjaro, Mt. Kenya, Rwenzori Mts., Ethiopian Highlands), Mt. Kinabalu of Borneo, and the Central Range of New Guinea are all limited in extent, extremely isolated, and support highly endemic plants and animals. A characteristic feature of many tropical paramos is the presence of large rosette plants from a variety of plant genera, such as *Lobelia* (Africa), *Puya* (South America), *Cyathea* (New Guinea), and *Argyroxiphium* (Hawaii)—these plant forms can reach elevations of 4500–4600 m above sea level. Drier, yet distinctive, subtropical montane grasslands, savannas, and woodlands include the Ethiopian Highlands, the Zambezian montane grasslands and woodlands, and the montane habitats of southeastern Africa (Werger, 1978; White, 1983; Huntley, 1989, 1994; Timberlake & Müller, 1994; WWF/IUCN, 1994). The montane grasslands of the Tibetan Plateau still support relatively intact migrations of Tibetan antelope (*Pantholops hodgsoni*) and kiang, the Tibetan wild ass (*Equus hemionus*). The puna grasslands of the high Andes support over 30 species of endemic rodents (45 total species).

Tundra

Tundra ecoregions were selected primarily because of extraordinary seasonal concentrations of breeding waterfowl and shorebirds, and caribou (Stewart, 1992; Krever et al., 1994; Ricketts et al., 1999). Relatively intact tundra ecoregions were chosen, wherever possible. The Chukotsky tundra ecoregion is unusual with nearly 50 endemic plant species (Knystautas, 1987; USSR Academy of Sciences, 1988; WWF/IUCN, 1994).

Deserts and xeric shrublands

The Namib–Karoo deserts of southwestern Africa support the world's richest desert floras (Cowling & Hilton-Taylor, 1994; Maggs et al., 1994; WWF/IUCN, 1994), while the Chihuahuan Desert and central Mexican deserts are a close second and are the richest Neotropical deserts (Cowling et al., 1989; Hernandez & Barcenas, 1995; Ricketts et al., 1999). Australian deserts support the richest reptile faunas. The Carnavon Xeric Scrub of western Australia is a regional center of endemism for a range of taxa. Unusual desert communities dominated by giant columnar cacti occur in the Sonoran and Baja Deserts of North America (Brown, 1994), while the spiny thickets of southwestern Madagascar are globally unique in terms of structure and taxa. Some Baja California communities are partially convergent in structure with the Madagascar thickets. The Atacama Desert ecoregion of western South America (including the adjacent transition area of the Monte/Puna/Yungas) and the Horn of Africa deserts were recognized as some of the more outstanding regional centers of richness and endemism. The Central Asian deserts, while not as rich as Afrotropical or Neotropical deserts, are representative of the region's deserts with diverse reptile and mammal faunas.

Mediterranean forests, woodlands, and scrub

All five Mediterranean-climate ecoregions are highly distinctive, collectively harboring 20 percent of the Earth's plant species (Cody, 1986; Kalin Arroyo et al., 1995; Picker & Samways, 1995). Phytogeographers consider the Fynbos as a separate floral kingdom because 68% of the 8600 vascular plant species crowded into its 90,000 km^2 are endemic and highly distinctive at several taxonomic levels (Cowling et al., 1989, 1996; Cowling & Hilton-Taylor, 1994). In terms of species densities, this is equivalent to about 40 percent of the plant species of the United States and Canada combined, found within an area the size of the state of Indiana (N. Myers, pers. comm.). The Fynbos and Southwest Australia shrublands have floras that are significantly more diverse than the other ecoregions, although any Mediterranean shrubland is still rich in species and endemics relative to other non-forest ecoregions (Cowling et al., 1996; Oosterbroek, 1994).

Mangroves

The diversity of mangroves in the Indo-West Pacific (IWP) region is much greater than those of the Atlantic–Caribbean–East Pacific (ACEP) region—the former supporting 17 genera and 40–42 species of true mangroves and the latter having only 4 genera and 7 species (MacNae, 1968; Lacerda, 1993; Olson et al., 1996; Spalding et al., 1997; Rickleffs & Latham, 1993). A single site in the ACEP typically contains 3 or 4 true mangrove species, while 30 species have been recorded from one locality in the IWP region (Ricklefs & Latham, 1993). Mangrove forests on the western coast of Madagascar support a number of endemic bird species that are endangered. The mangrove swamps and forests of the Indo-Malayan and Australasian realms are the world's most extensive. South and Southeast Asia alone contain 42% of the total area of the world's mangroves (Spalding et al., 1997). The Sundarbans are the largest contiguous mangrove forest in the world. The vast floodplains of New Guinea also support extensive mangrove swamps unrivaled elsewhere in the world.

If all of the marine, freshwater, and terrestrial species that occur in mangroves are considered, these seemingly simple forests can be considered as one of the more diverse ecosystems in the tropics. Mangroves are keystone habitats in the sense that they have an inordinately strong influence on species populations and ecosystems well beyond their limited area. In addition to providing habitat and resources to a wide range of species, mangrove forests and swamps also protect inland habitats and shorelines from damage by damping storm waves and tidal action. Mangroves filter silt and pollutants from terrestrial runoff that would otherwise damage seagrass beds and coral reefs.

FRESHWATER REALM

Large rivers

Faunas adapted to high-flow regimes of large rivers are uncommon and best developed in the Yangtze, Colorado, and lower Congo Rivers. A relatively small area of rapids in the latter region supports 22 endemic species of fish that are rapid specialists (Lowe-McConnell, 1987). The Mekong, Congo, Paraná, and Amazon–Orinoco Rivers harbor the four great large tropical river fish faunas (Mori, 1936; Roberts, 1975; Hocutt & Wiley, 1986; Lowe-McConnell, 1987; Kottelat & Whitten, 1996). The waters of the Lower Yangtze and Mississippi Rivers contain outstanding examples of large-river fishes, amphibians, reptiles, and invertebrates, including relicts and many endemics (Abell et al., 2000).

Large river headwaters

Species, assemblages, and processes in headwater areas are distinct from those of their larger mainstems. The Mississippi Piedmont, Guayanan highlands, Upper Amazon, Upper Paraná, Brazilian Shield, and Congo Basin Piedmont harbor a tremendous array of species, including numerous endemics adapted to life in these waters. In turn, these river systems ultimately feed a number of the world's largest and richest rivers (Hocutt & Wiley, 1986; Kottelat & Whitten, 1996; Thieme et al., in press). The most diverse vertebrate assemblages on Earth occur in freshwater communities of the Amazon and the Orinoco River basins. Over 3000 species of fish are estimated to occur in the Amazon Basin alone (Goulding, 1980).

Large river deltas

Delta complexes of several large temperate and polar rivers are identified, including the Mesopotamian, Volga, and Lena River deltas. The Niger River delta, the most extensive river delta in Africa, is characterized by high species richness (Wetlands International and The World Bank, 1996; Thieme et al., in press). The extensive deltas of the Orinoco and Amazon Rivers are encompassed in their respective large-river ecoregions (see above).

Small river basins

The Mississippi River embayment, the Mobile River basin, and numerous coastal streams and rivers of southeastern North America together support one of the Earth's richest temperate freshwater biotas (Hocutt & Wiley, 1986; Hackney et al., 1992; Abell et al., 2000). The headwater streams and rivers of the Yangtze River in central China are also extremely diverse (recognized as a large river biome in this analysis) (Mori, 1936; Nichols, 1943; Taki, 1975). Secondary centers of temperate diversity occur in the rivers and streams of southeastern North America, the western coast of North America, and the Russian Far East (Zhadin & Gerd, 1961; Lee et al., 1980; Hocutt & Wiley, 1986; Groombridge & Jenkins, 1998; Abell et al., 2000). Several freshwater biotas on islands are highly distinctive, including those of Madagascar, New Guinea, the Greater Sundas, the Greater Antilles, Sri Lanka, and New Caledonia (IUCN/UNEP/WWF, 1987; Zakaria-Ismail, 1987, 1994; Allen, 1991; Preston-Mafham, 1991; Oberdorff et al., 1995). The Southwest Australian Rivers and streams ecoregion is a center of endemism, while also harboring a number of primitive higher taxa and several species with highly unusual freshwater life histories (McDowall, 1996; State of the Environment Advisory Council, 1996). Rivers and streams along the Gulf of Guinea harbor some of the richest and most endemic riverine freshwater biotas in Africa (Kingdon, 1989; Lévêque et al., 1992; Lévêque, 1997; Thieme et al., in press). The Salween River of Southeast Asia is recognized for its rich and endemic freshwater fish fauna (WCMC, 1992). The rivers and streams of New Guinea, including the inland delta of the Mamberamo River of New Guinea, support a large number of unusual and endemic species and higher taxa.

Large lakes

The Global 200 also identifies the most outstanding examples of diverse and endemic freshwater faunas in large lakes found in temperate and tropical regions, many displaying extraordinary species flocks and adaptive radiations in fish taxa. Some particularly notable lake biotas include those of the African Rift Lakes and Lake Tana in Ethiopia, Lake Baikal, Lake Biwa of southern Japan, the high-altitude lakes of the Andes, and the highland lakes of Mexico (Myers, 1960; Roberts, 1975; Hocutt & Wiley, 1986; Allen, 1991; Stiassny et al., 1992; WCMC, 1992; Nagelkerke et al., 1995; Kottelat & Whitten, 1996; Olson et al., 1999; Thieme et al., in press).

Small lakes

Similarly, a number of smaller lakes around the world host extraordinary expressions of freshwater biodiversity. Lake Kutubu and Lake Sentani of New Guinea, Yunnan Lakes and Streams, Mexican Highland Lakes, the Cameroon Crater Lakes, Lake Lanao of the Philippines, Lake Inle in Myanmar (Burma), and the Central Sulawesi Lakes have been selected for their globally outstanding biodiversity features.

Xeric basins

Ephemeral streams, rivers, and lakes, and permanent springs characterize ecoregions in this biome. Low richness and high endemism in fish and invertebrates (e.g., molluscs) is typical of the Chihuahuan, Anatolian, and Central Australian freshwater ecoregions (Hocutt & Wiley, 1986; Balik, 1995; Abell et al., 2000). The Cuatro Ciénegas spring and pool complex in the Chihuahuan Desert is globally unique in its high richness, extreme endemism, and unusual evolutionary adaptations (Contreras-Balderas, 1978; Hocutt & Wiley, 1986). Freshwater habitats in the Anatolian region of Turkey support many endemic species (Balik, 1995).

MARINE REALM

The distribution of marine biodiversity varies widely throughout ocean basins (Briggs, 1974; Elder & Pernetta, 1991; Angel, 1992, 1993; Clarke, 1992; Kendall & Aschan, 1993; Kelleher et al., 1995; Groombridge & Jenkins, 1996; Ormond et al., 1997). The abundance and diversity of most taxa tend to be highest near continental and island margins that are less than 2000 m deep (Ray, 1991; Johannes & Hatcher, 1986; Gray, 1997). These areas experience nutrient enrichment from upwelling processes and terrestrial runoff (Ray, 1988; Norse, 1995). Areas where significant upwelling occurs are often extraordinarily productive in tropical, temperate, and polar regions. Within biomes, species richness and endemism also vary enormously around the globe.

Current biogeographic data suggest that species endemism tends to be less pronounced in marine ecosystems than in terrestrial or freshwater ecoregions, but several regional centers of endemism are recognized, including the southern coast of Australia, New Caledonia, Lord Howe and Norfolk Islands, the northern coast of South America, the Yellow and East China Seas, the Red Sea, the Mediterranean Sea, the Sea of Cortez, the Great Barrier Reef, and tropical Pacific Islands such as Hawaii, the Marquesas, the Tuamotus and Societies, and Easter Island (Robbins, 1991; Lieske & Myers, 1996; Vernon, 1995; Groombridge & Jenkins, 1996). In general, marine ecoregions associated with isolated islands and enclosed seas tend to display pronounced endemism (Kelleher et al., 1995; Groombridge & Jenkins, 1996).

We categorized the marine realm into 10 biomes. Pelagic (trades and westerlies), abyssal, and hadal biomes, however, were not assessed for the Global 200 marine analysis because of the large scale of these units compared to other Global 200 ecoregions, the lack of consensus on their classification, and the limited biodiversity information for these ecosystems (see Gage & Tyler, 1991; Grassle, 1991; Grassle & Maciolek, 1992). Large biogeographic units have been identified for pelagic and abyssal biotas (e.g., Brinton, 1962; Angel, 1993; Longhurst, 1998; Pierrot-Bults, 1997; Vinogradova, 1997), but their scale is several orders of magnitude greater than most Global 200 ecoregions. These larger units may be biogeographically and dynamically appropriate for open ocean environments. The vast size and dynamic nature of these biomes precluded delineating biogeographic subunits at an appropriate level of resolution for the Global 200. Pelagic species are noted for widespread distributions, while the few ocean trench surveys that are available suggest many species are endemic to single trenches. The paucity of species data for these ecosystems also reduces our confidence to undertake comparative analyses.

Polar

The Weddell Sea and Peninsular Antarctica were identified as the most productive and diverse ecoregions of the Antarctic large marine ecosystem. The Bering, Beaufort, and Chukchi Seas and Barents–Kara Seas ecoregions are arguably the two most diverse and productive Arctic marine ecosystems (USSR Academy of Sciences, 1988; Reeves & Leatherwood, 1994). Marine ecosystems near southern Greenland require further evaluation.

Temperate shelf and seas

Some of the most productive marine ecosystems occur in the Grand Banks and New Zealand plus the Patagonia ecoregions. The South Australian coastal waters are remarkable for unusually high levels of endemism in invertebrates and some groups of fish, in addition to the diverse marine mammal assemblage found there. Two of the world's largest temperate estuaries, the Chesapeake and Delaware Bays, and the Northeast Atlantic Shelf are elevated to the Global 200 due to their size, productivity, and habitat diversity. Some of the most distinctive enclosed temperate seas, the Mediterranean Sea and the Yellow–East China Seas, are recognized in the Global 200.

Temperate upwelling

Highly productive and diverse coastal upwelling areas occur along the West Coast of North America where the California Current moves southward. Along the southwest coast of Africa the Benguela Current exhibits similar dynamics.

Tropical upwelling

The Humboldt Current along the West Coast of South America and the Canary Current along the West Coast of Africa bring rich nutrients to the sea surface where they support highly productive marine systems. Important tropical upwelling and current areas also occur in the Panama Bight ecoregions.

Tropical coral

Southeast Asian seas support more than 450 species of hard (scleractinian) corals, the western Indian Ocean around 200, and the Caribbean only 50 species (Vernon, 1995). Variation in reef fish and non-coral invertebrate diversity follows a similar biogeographic pattern (McAllister et al., 1994; Lieske & Myers, 1996). Overall, the coral reef communities of the central Indo-Pacific seas are the most diverse in the world, with the Sulu, Sulawesi, Banda, and Coral Sea ecoregions being the most diverse on Earth (Vernon, 1995; Lieske & Myers, 1996). The largest barrier reef in the world is the Great Barrier Reef. Other world-class barrier reefs include the barrier reefs of New Caledonia, the Mesoamerican and Bahamian barrier reefs, and the large barrier reefs of Fiji. The largest coral atoll complexes occur in the Maldive-Lakshadweep ecoregion of the central Indian Ocean and in the Tuamotus of the central Pacific.

Conservation Status of Ecoregions

Among all terrestrial Global 200 ecoregions (142 in total), 75 ecoregions (53%) are considered critical or endangered, 39 ecoregions (27%) vulnerable, and 28 ecoregions (20%) relatively stable or intact (Table 1). Terrestrial ecoregion boundaries do not reflect the extensive habitat loss, fragmentation, and degradation that have occurred in many of the terrestrial ecoregions. In ecoregions that have been dramatically altered, characteristic species and communities survive only in the few remaining small blocks of habitat (e.g., Collar & Stuart, 1988; Dinerstein et al., 1995). Among the terrestrial biomes, ecoregions falling within the tropical and subtropical dry broadleaf forests, temperate grasslands, Mediterranean shrublands, and temperate broadleaf and mixed forests are the most threatened. Virtually all biotas on small islands are vulnerable or critical/endangered due, in large part, to their limited habitat area and extreme sensitivity to anthropogenic disturbance and alien species (Raven, 1988; Wilson, 1988, 1992; WCMC, 1992; Sujatnika et al., 1995; Brooks et al., 1997; Reaka-Kudla et al., 1997). Island ecoregions are projected to experience a wave of extinctions over the next two decades given the fragility of island ecosystems, the sensitivity and endemicity of island species, and the severe threats native island biotas face worldwide. Mangrove habitats are threatened worldwide from a range of threats including clearing and channelization for shrimp ponds, aquaculture, and agriculture, the extraction of timber and fuelwood, pollution, and habitat loss due to urban and industrial expansion.

Assessment of conservation status for freshwater ecoregions in North America and South America was based on existing regional analyses (Abell et al., 2000; Olson et al., 1999). In Africa and Europe, analyses currently under way (Thieme et al., in press) provided the basis for rankings presented here. In areas where no regional assessment has been undertaken, review of relevant literature facilitated decisions on the levels of threat faced by native biotas. Worldwide, freshwater organisms represent a disproportionate number of endangered species; thus, it is not surprising that so many freshwater ecoregions received a critical rating in the assessment. In particular, seasonally flooded forests, cataracts, and freshwater communities in xeric areas, are endangered worldwide (Goulding et al., 1996; Abell et al., 2000; Olson et al., 1999). Moreover, most temperate freshwater biotas are threatened by invasion of exotics, pollution, dams, and habitat degradation. Among the 53 freshwater ecoregions 31 (58%) were deemed to be critical or endangered, 10 (19%) were assessed as vulnerable, and only 12 (23%) were assessed as relatively stable.

The individual status of marine ecoregions was estimated through review of the literature and consultations with regional specialists. Twelve marine ecoregions (29%) were considered relatively stable or intact, while another 12 (29%) were considered critical or endangered. In marine biomes, upwelling areas are heavily overfished, enclosed seas are degraded, and coral reefs and mangroves are severely affected by habitat destruction, degradation, and overfishing around the world (Sherman et al., 1990;

Suchanek, 1994; Kelleher et al., 1995; Bryant et al., 1995; Olson et al., 1996; Ormond et al., 1997). Increasingly rising sea surface temperatures from global warming may endanger all coral reef ecoregions within several decades.

Degree of Overlap of Terrestrial, Freshwater, and Marine Global 200 Ecoregions

The linkages among terrestrial, freshwater, and marine conservation are often overlooked. Among the Global 200, 33 (23%) of the 143 terrestrial ecoregions overlap extensively with freshwater ecoregions (i.e., more than 50% of the original extent of the terrestrial ecoregion is covered by a freshwater unit). Thirty-four (23%) of the terrestrial ecoregions share at least 50% of their coastline with a marine ecoregion. Ten (6%) of the terrestrial ecoregions do both, overlapping extensively with a freshwater ecoregion and sharing at least 50% of their coastline with a marine ecoregion. The terrestrial ecoregions of this third group are the Madagascar dry forests, Congolian coastal forests, Greater Antilles moist forests, Pacific temperate rain forests of North America, Queensland tropical moist forests, southeastern Australia *Eucalyptus–Acacia* forests, New Caledonia moist forests, New Caledonia dry forests, New Guinea lowland forests, Sulawesi moist forests, Philippine moist forests, Northeast Borneo/Palawan moist forests, and Russian Far East temperate forests. Carefully designed conservation activities in these 13 units could ultimately affect 39 ecoregions.

The Global 200 as a Conservation Tool

The Global 200 is based on the best available information and biological insights. As new interpretations of biogeography and better information on the distribution of species and phenomena become available, we expect to periodically revise the Global 200. The present list and map incorporate a number of changes from an earlier version (Olson & Dinerstein, 1998). For example, the highly unusual freshwater biota of southwestern Australia is now recognized, and the terrestrial ecoregions of the Amazon Basin have undergone major revisions based on a recent biogeographic analysis by Silva (1998).

expanding conservation goals

The Global 200 goes beyond the conservation targets of other prominent global priority-setting efforts by explicitly incorporating representation guidelines for biomes within realms. Biological phenomena are also important criteria used in its selection protocol. The Global 200 also emphasizes freshwater and marine biodiversity. The Hotspots analysis (Mittermeier et al., 1999; Myers et al., 2000), for example, mostly targets very large and threatened terrestrial regions with concentrations of range-restricted (locally endemic) species. The Hotspots are largely nested within the Global 200 ($>$ 90% congruence) because both analyses emphasize exceptional levels of endemism for species and higher taxa. The Global 200 can complement hotspot analyses by corroborating the vast majority of their priority areas and, in some cases, by providing a finer resolution of the variation of biodiversity features within important regions. For example, the Madagascar Hotspot identified by Myers et al. (2000) corresponds to five separate Global 200 ecoregions and the Indo-Burma Hotspot overlaps with 14 Global 200 terrestrial and freshwater ecoregions. The Global 200 also encompasses distinct freshwater and marine hotspots and warmspots, as well as ecoregions important for their extraordinary ecological or evolutionary phenomena and their representation value. Endemic Bird Areas of the World highlights concentrations of bird species with restricted ranges (Stattersfield et al., 1998). Like hotspots, the majority of the Endemic Bird Areas are nested within the Global 200. Both Tropical Forest Wilderness Areas (Mittermeier et al., 1999) and Frontier Forests (Bryant et al., 1997) map larger landscapes of relatively undisturbed natural forests around the world. Although the Global 200 does not specifically employ forest wilderness as a discriminator, again there is extensive overlap with these wilderness areas because such areas often harbor rich assemblages of species and endemics, and unusual phenomena such as intact predator-prey systems.

other conservation targets

Other conservation targets, such as species of special concern, keystone species, habitats, and phenomena, large-scale ecological phenomena (e.g., bird, butterfly, caribou, cetacean, sea turtle migrations), wilderness areas, ameliorating climate change impacts, reducing toxins, and maintaining ecosystems with low impacts from alien species are also not directly addressed by the Global 200. Again, effective conservation within priority ecoregions and coordinated efforts among ecoregions will help achieve conservation goals for these targets.

An Ambitious Blueprint for Global Conservation

One tactical concern of the Global 200 is that it is ambitious, and that by focusing on 238 ecoregions rather than on a handful of conservation units, we run the risk of placing less emphasis on the most diverse and distinct ecoregions. In response, we maintain that the broad geographic reach of the Global 200 makes almost every nation on Earth a stakeholder in a global conservation strategy. From the global scale to regional and national-level conservation strategies, the Global 200 lends weight to shared priorities and provides a global perspective for lobbying efforts by local conservation groups. The Global 200 also can help major development agencies better recognize and mitigate the effects of projects that result in land use change, or forego development activities in particularly important and sensitive ecoregions.

The targets of the Global 200—representation, outstanding ecoregions, and ecological phenomena—are all essential elements of a global conservation strategy. The conservation community should not shrink from this ambitious but necessary agenda. The widespread destruction of the Earth's biodiversity occurring today must be matched by a response at least an order of magnitude greater than currently exists. The Global 200 provides a necessarily ambitious template for a global conservation strategy.

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Appendix 1. Weighting and Measuring Biological Distinctiveness Criteria

The weighting and measurement of the parameters used to assess the biological distinctiveness of terrestrial ecoregions of North America are presented here to illustrate how different biodiversity features were evaluated as conservation targets and how analyses were tailored to different biomes. Comparisons among biodiversity parameters were only conducted within the set of ecoregions sharing the same biome.

species richness*

Globally outstanding	100
High	15
Medium	10
Low	5

*Only native species were used in species counts.

endemism

Globally outstanding	100
High	25
Medium	15
Low	5

For species richness and endemism, the total number of species that occurs within each ecoregion, and the total number of endemic species, were determined for a range of native taxa: full species of native vascular plants, land snails, butterflies, reptiles, amphibians, birds, and mammals. Species distributions were derived from published range maps and the available literature. For land snails and native vascular plants, regional experts compiled the databases. Barry Roth analyzed land snail distributions for western North America, and John Kartesz analyzed richness and endemism data for native vascular plants. A species was considered "endemic" to an ecoregion if its estimated range fell entirely within a single ecoregion (strict endemic), 75% or more of its range fell within a single ecoregion (near-endemic), or its range was less than 50,000 km² (range-restricted). If a species had a significant distribution outside of the United States and Canada, it was not considered as an endemic. Higher taxonomic uniqueness—e.g., unique genera or families, relict species or communities, primitive lineages—was also considered for identifying globally outstanding ecoregions from an endemism perspective.

The actual number of species and endemics for each taxon found within an ecoregion were log transformed to reduce the influence of very species-rich groups. The logs were then summed to derive a single richness and endemism score. These scores were plotted for the ecoregions within each biome and the curves broken subjectively into high, medium, and low scores. Globally outstanding scores were determined through comparisons with values for ecoregions within the same biome found throughout the world.

unusual ecological or evolutionary phenomena

Globally outstanding	100
Regionally outstanding	5
No globally or regionally unusual phenomena	0

Examples of unusual ecological or evolutionary phenomena at global or regional scales include relatively intact, large-scale migrations of large vertebrates such as caribou, intact predator assemblages, superabundant concentrations of breeding waterfowl and shorebirds, extraordinary levels of adaptive radiations, rain-fed flooded grasslands on limestone, and conifer forests dominated by gigantic trees.

global rarity of biome

Global rarity	100
Regional rarity	5
Not rare at global scale	0

Biomes or habitats that were considered globally rare include Mediterranean-climate forests, woodlands, and scrub, temperate rainforests, and paramo.

total scores for determining biological distinctiveness index

The points from each criterion were summed to arrive at a final score. This score was then translated into a biological distinctiveness category as follows:

Globally outstanding	45, 50, or 55+ points
Regionally outstanding	30, 35, 40
Bioregionally outstanding	20, 25
Locally important	10, 15

Ecoregions identified as globally outstanding were subsequently compared with similar ecoregions around the world to validate their relative status.

Appendix 2. Assessing Conservation Status of Ecoregions

Conservation status measures landscape and ecosystem-level features and relates these to the ecological integrity of ecoregions, namely, how with increasing habitat loss, degradation, and fragmentation, ecological processes cease to function naturally, or at all, resiliency to disturbance declines, and major components of biodiversity are steadily eroded. We assess the conservation status of ecoregions in the tradition of IUCN Red Data Book categories for threatened and endangered species: critical, endangered, and vulnerable. For ecoregions we used the following conservation status categories: critical, endangered, vulnerable, relatively stable, and relatively intact. Throughout all of the regional analyses, the specific parameters and thresholds used for assessing conservation status were tailored to the characteristic patterns of biodiversity, ecological dynamics, and responses to disturbance of different biomes.

terrestrial ecoregions

We present the method used to assess conservation status for the terrestrial ecoregions of North America to illustrate the approach (Ricketts et al., 1999). The relative contributions of different parameters were as follows: 40%—habitat loss, 25%—number and size of remaining blocks of intact habitat, 20%—degree of habitat fragmentation, and 15%—degree of protection. A snapshot conservation status was estimated using current landscape and ecosystem-level parameters, using a point range of 0 to 100, with higher values denoting a higher level of endangerment. The point thresholds for different categories of conservation status were as follows: critical 89–100 points, endangered 65–88, vulnerable 37–64, relatively stable 7–37, and relatively intact 0–6. Total point values were determined by summing points assigned for each parameter. Individual parameter point values were associated with different landscape scenarios. For example, total habitat loss scenarios were related to points as follows:

% Original habitat	Heavily altered	Altered
90–100%	40	20
75–89%	30	15
50–74%	20	10
10–49%	10	5
0–9%	0	0

An ecoregion receives both a heavily altered score and an altered habitat score, which represents the amount of habitat in each category. For example, consider an ecoregion with 35% heavily altered habitat (10 points), 55% altered habitat (10 points), and therefore 10% intact habitat. By combining the two scores, the ecoregion would receive a total score of 20 points. Different quantitative and qualitative biodiversity and landscape ecology characteristics are used to define intact, altered, and heavily altered states tailored to the specific patterns and dynamics of different biomes. Total scores for each of the parameters are summed to give a total conservation status index score.

Snapshot scores were subsequently modified by a 20-year projected threat analysis to arrive at a final conservation status assessment. Ecoregions that were assessed as facing high threat were elevated to a more serious conservation status. The threat analysis estimated the cumulative impacts of all current and projected threats on habitat conversion, habitat degradation, and wildlife exploitation using a point system associated with different qualitative and quantitative impacts. Using an index of 0–100 points, pending threats within an ecoregion were assessed and point totals assigned for each of the above categories. Conversion threats were considered to be the most serious, and thus habitat loss comprised half (50) of all possible points in the weighting of threats. For example, 50 points were assigned to conversion threats if 25% or more of remaining habitat would be categorized as heavily altered within 20 years. For conversion of between 10% and 24% of remaining habitat, a score of 20 points was assigned. The remaining two threats, habitat degradation and wildlife exploitation, were assessed using maximum point totals of 30 and 20 respectively using a scale based on high, medium, or no threat.