Appendix
Sources and Technical Notes for Tables

Table 2

Source: World Conservation Monitoring Centre (WCMC), *Global Biodiversity Status of the Earth's Living Resources* (Chapman & Hall, London, 1992).

The **number of species known** includes introductions. Data on mammals exclude cetaceans (whales and porpoises).

The **number of globally threatened species** consists of the following the World Conservation Union (IUCN) categories:

- Endangered. "Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating."
- Vulnerable. "Taxa believed likely to move into the Endangered category in the near future if the causal factors continue operating."
- Rare. "Taxa with world populations that are not at present Endangered or Vulnerable, but are at risk."
- Indeterminate. "Taxa known to be Endangered, Vulnerable, or Rare, but where there is not enough information to say which of the three categories is appropriate."
- Insufficiently Known. "Taxa that are suspected, but not definitely known, to belong to any of the above categories."

The number of threatened species listed for the countries shown excludes introduced or extinct species (in a few instances, species believed to be extinct, but whose present status is unconfirmed, are included). Threatened bird species are listed for countries in their breeding and/or wintering ranges.

Table 3

The number of endemics per 10,000 km^2 is a measure used in the species risk index to provide a relative estimate for comparing numbers of endemic species between countries of differing size. Because the relationship between area and number of endemics is nonlinear (as increasingly large areas are sampled, the number of new endemic species located decreases), a species-area curve has been used to standardize these numbers.

The curve predicts how many endemic species a country would have, given its current number of endemics, if it was a uniform 10,000 square kilometers. It is calculated using the formula: $S = cA^z$ where S = the number of endangered species, A = area, and c and z are constants. The slope of the species-area curve is determined by the constant z, which is approximately 0.33 for large areas containing many habitats. This constant is

based on data from previous studies of species-area relationships. In reality, the constant **z** would differ among regions and countries, because of differences in species' range size (which tends to be smaller in the tropics) and differences in varieties of habitats present. A tropical country with a broad variety of habitats would be expected to have a steeper species-area curve than a temperate, homogenous country because one would predict a greater number of endemic species per unit area. Species-area curves are also steeper for islands than for mainland countries. At present, there are insufficient regional data to estimate separate slopes for each country.

For a more detailed explanation of the species-area relationship, refer to: W. Reid, "How Many Species Will There Be?" in *Tropical Deforestation and Species Extinction*, T. Whitmore and J. Sayer, eds. (Chapman and Hall, London, United Kingdom, 1992).

Table 5

Source: Data for Sub-Saharan Africa and Asia are based on a study by John T. and Kathy MacKinnon. This study and other sources are described in the technical notes to Table 20.4, Habitat Loss, 1980s in World Resources Institute (WRI), *World Resources 1990-91* (Oxford University Press, New York, 1990).

The MacKinnons relied on field investigations, interviews and other personal communications, and published sources to estimate the extent of current and past habitats. They followed the United Nations Educational, Scientific, and Cultural Organization/AETFAT/United Nations Sahelian Office vegetation map of Africa with classifications by F. White for the Afrotropical realm. For the Indo-Malayan Realm, they generally followed the classifications of Miklos Udvardy, the maps by T. C. Whitmore for the Malaysian section and Indochina, and the maps by H. G. Champion and H. K. Seth for the Indian subcontinent. Habitat types, as described below, are aggregated from the MacKinnons' data and other sources.

Forest includes both dry and moist forests.

Savanna/grassland consist of salt-pan vegetation, brushland/thicket, shrubland, grassland, halophytic, and (for Asian countries) savanna forest. This category excludes areas whose original vegetation is known to have been other than grassland (for example cut forests, irrigated desert, drained wetlands).

Desert/scrub includes Asian tropical thorn forest.

Wetlands/marsh include freshwater swamp, peat swamp, and seasonal marsh/seasonal salt marsh. Many estimates of the extent of wetlands are likely to be low. Totals for Poland exclude peatlands. Some wetland figures may include lakes, ponds, streams, and areas that are flooded periodically; others note only permanently inundated areas.

Mangroves consist generally of mangrove forests and swamp.

The determination of the extent of vegetation types in a country is difficult, and estimates vary significantly. Some data on the current extent of habitats may include restorations, although the vegetation may differ in a major way from the original. In addition, Table 5 does not distinguish pristine habitats from those that are significantly degraded. Although the information in this table is as complete as possible, much is missing; the data presented must be considered preliminary. For further details, consult the technical notes to Table 20.4, Habitat Loss, 1980s, in WRI, *World Resources 1990-91* (Oxford University Press, New York, 1990).

Table 6

Source: World Conservation Monitoring Centre (WCMC) data as published in Table 20.1,

National and International Protection of Natural Areas, 1990 in World Resources Institute (WRI), *World Resources 1992-93* (Oxford University Press, WRI, Washington, DC, 1992).

National Protection Systems combine natural areas in five World Conservation Union (IUCN) management categories (the areas are at least 1,000 hectares). **Totally protected areas** are maintained in a natural state and are closed to extractive uses. They encompass the following three management categories:

- Category I. Scientific reserves and strict nature reserves possess outstanding representative ecosystems. A reserve's size is determined by the area required to ensure the integrity of the site. In many reserves, natural perturbations (for example insect epidemics and forest fires) are allowed. Generally, public access is limited, with only scientific research and educational use permitted.

- Category II. National parks and provincial parks are relatively large areas of national or international significance not materially altered by humans. Visitors may use them for recreation and study.

- Category III. Natural monuments and natural landmarks contain unique geological formations, special animals or plants, or unusual habitats.

Partially protected areas are areas that may be managed for specific uses, such as recreation or tourism, or that provide optimum conditions for certain species or communities of wildlife. Some extractive use within these areas is allowed. They encompass two management categories:

- Category IV. Managed nature reserves and wildlife sanctuaries are protected for specific purposes, such as the conservation of a significant plant or animal species. Manipulative management techniques are permitted to this end, such as predator control to protect an endangered species or livestock grazing to maintain grassland communities. Management for harvestable renewable resources is permitted.

- Category V. Protected landscapes and seascapes may be entirely natural or may include cultural landscapes (for example, scenically attractive agricultural areas). Examples would include coastlines, lakeshores, and hilly or mountainous terrain along scenic highways.

Biosphere reserves are representative of terrestrial and coastal environments that have been recognized internationally under the Man and the Biosphere Programme of the United Nations Educational, Scientific, and Cultural Organization. They have been selected for their value to conservation and are intended to foster the scientific knowledge, skills, and human values necessary to support sustainable development. Each reserve must contain a diverse natural ecosystem of a specific biogeographical province, large enough to be an effective conservation unit. These reserves also must include a minimally disturbed core area for conservation and research and may be surrounded by buffer zones where traditional land uses, experimental ecosystem research, and ecosystem rehabilitation may be permitted.

Any party to the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar, Iran, 1971) who agrees to respect the site's integrity and to establish wetland reserves can designate **wetlands of international importance.**

Marine and coastal protected areas refer to all protected areas with littoral, coral, island, marine, or estuarine components. The area given is the whole protected area. The figures in Table 6 do not include locally or provincially protected

sites, privately owned areas, or areas managed primarily for the extraction of natural resources. National lists usually include sites that are listed under **international protection systems.**

World heritage sites are areas of "outstanding universal value" inscribed either for their natural features, for their cultural value, or for both natural and cultural values. Table 6 includes both **natural** and **mixed** natural and cultural sites. Any party to the World Heritage Convention may nominate natural sites that contain examples of a major stage in the earth's evolutionary history; a significant ongoing geological process; a unique or superlative natural phenomenon, formation, or feature; or a habitat for threatened species.

Because categories overlap, the total number of protected sites is less than the sum of all of the categories.