

INTRODUCTION

Evolutionary adaptation has given rise to a cornucopia of life. Of all the species that have ever lived, only a tiny fraction is alive today. Spasms in Earth's history, caused by volcanoes erupting and meteorites impacting, wiped out entire groups of organisms, and gradual climatic changes have eliminated others. The evolutionary strategies of some species were just not good enough and they succumbed to competitors and predators. The demise of the dinosaurs is a humbling tale. Their awesome size and power did not assure their survival. Quite the reverse: it left them slow to adapt to a changing environment and more vulnerable than mammals to catastrophic events.

As humans, the psychological trap of believing ourselves to be a class apart from other creatures is exacerbated by the absence of other living hominids. The Australopithecines, *Homo ergaster* and our other ancestors took tools, organization and culture well beyond the level of sophistication of the primates. Although we are of their line, the biological changes that accompanied their advancement are sufficient for us to consider ourselves a different "chrono-species".

Some parts of the world are more ecologically interesting than others. Habitats such as coral reefs and rainforests contain a great variety of species. Some intrigue us because, like the Arctic and Antarctic, their wildlife is peculiar and we have not yet heavily disturbed them. Species on islands such as Madagascar developed in geographical isolation, giving rise to unique forms. Australia has the dubious distinction of the most mammal extinctions. Many other regions and ecosystems are worthy of study but limited space precluded descriptions of them in this book.

A small fraction – probably fewer than ten percent – of living species have been identified and classified. The remaining 90 percent are mostly invertebrates. Consequently, an anomaly arises in that the most intensely researched countries show up as having the highest number of threatened

species. The World Conservation Monitoring Centre, now a division of the United Nations Environment Programme, is the global data organization for conservation. IUCN-The World Conservation Union is the umbrella group for conservation bodies around the world. IUCN has promulgated a system for assessing whether a species is threatened and, if so, the severity of the risk. The definitive work is the organization's publication: the *IUCN Red List of Threatened Species*.

Representing the number of species threatened endorses the notion of a species as a closed gene-pool. This presents conceptual difficulties, such as in defining species among organisms that are "parthenogenetic" – they produce offspring from unfertilized eggs. Despite its flaws, however, the species concept is useful for conservation. Subspecies and isolated populations of species are not counted in this book, although they are sometimes described in the text.

The distribution of living things does not respect political boundaries. However, decisions affecting conservation are still usually made by states and their borders provide a convenient means of dividing the land surface. For groups of animals and plants, the level of threat has been represented in this atlas by the number of threatened species occurring in each country. This inevitably gives the impression that larger countries have greater conservation problems than smaller ones. To redress the balance, Part 6 "Issues of Conservation" highlights areas with the greatest biodiversity and those with the most endemic species.

Why should conserving biodiversity matter? Many people feel that we are stewards of the planet and that to annihilate species as we are doing is immoral. Quite apart from spiritual and aesthetic loss, each extinction also represents the loss of irreplaceable genetic information, including beneficial characteristics that could have been bred into domestic crops and livestock. Chemicals produced naturally are also used to develop pharmaceuticals. When "keystone"

species become extinct the balance of whole ecosystems is threatened.

Global warming is one of a number of threats outlined in the *Millennium Ecosystem Assessment*, completed in March 2005. This was the first comprehensive global evaluation of the world's major ecosystems. The assessment found that 60 percent of ecosystem services (the benefits people obtain from ecosystems, such as fisheries and prevention of soil erosion) are being degraded or used unsustainably. Loss of species was identified as a major factor affecting both the resilience of natural services and less tangible spiritual or cultural values. The consequences for human well-being are severe, but by protecting ecosystem services in agriculture, industry and in our lifestyles, we can halt the decline.

Agreement between states can secure the conservation of common resources, such as ocean fisheries. It can also suppress damaging wildlife trade, driven by our fascination with the rare and exotic and the purported medicinal properties of some plants and animals. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was adopted in 1973. More recent treaties have addressed conservation within national jurisdictions. In 1992 the United Nations Conference on Environment and Development in Rio de Janeiro (the "Rio Summit") adopted the Convention on Biological Diversity, the Convention on Climate Change and Forest Principles. All are relevant to threatened species. Although the Convention on Biological Diversity restated the principle of national sovereignty, it also placed a duty on states to conserve biodiversity by requiring that environmental impact assessments be carried out for infrastructure projects, for example.

The size of the human population is of major consequence in conserving biodiversity. Fewer people would allow us to leave habitats intact or to exploit them sustainably. Of course the environmental impact, or "footprint", of individual countries differs. The USA, with four percent of the world's population, produces a quarter of the world's greenhouse-gas emissions. However, the USA and other industrialized countries also produce most of the world's clean technologies.

Pollution is a global issue. Carbon dioxide warms the whole planet, not just your back yard. The impact of global warming on threatened species will be profound. Polar bears will be stranded and starve as ice retreats. Plants with a limited distribution may not survive rising temperatures. Coasts and estuaries will be inundated. The world will lose species that have evolved over billions of years to form communities and habitats that without human interference would still exist in exquisite equilibrium.

The Convention on Climate Change went to the very heart of economic systems. An accord was signed in Kyoto in 1997, outlining binding limits on the global warming contributions of developed countries. The extent to which the transfer of clean technology to developing countries and "carbon sinks" could be debited from national emissions was contentious. In November 2000 talks in The Hague, Netherlands on the detail of the Kyoto agreement foundered on US intransigence but in July 2001 a compromise agreement was reached by 180 countries (excluding the USA). Following ratification by Russia, the Kyoto Protocol finally came into force on 16 February 2005. It is hoped that this represents a significant first step towards concerted international action on global warming.

My thanks go to Patricia Patton at WWF-UK, and to Alex Solyom at WWF-US, who kindly supplied most of the photographs included in this book, and to the photographers who have generously given us permission to use their images (see opposite for full photo credits).

I would also like to thank the Species Survival Commission of IUCN and Birdlife International, who were both helpful in clarifying data.

I am very grateful to the team at Myriad Editions – Jannet King, Candida Lacey and Corinne Pearlman – who worked tirelessly to ensure the rigour and visual impact of the book, and to the cartographers, Isabelle Lewis and Angela Wilson.

Another sincere acknowledgement is to my parents Judith and John, who gave their wholehearted support.

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London, May 2005