

Preface

Increasingly, scientists, environmentalists, engineers, and land-use planners are coming to understand the living planet in a more interdisciplinary way. The boundaries between traditional disciplines have become blurred as ideas, methods, and findings from one discipline inform and influence those in another. This cross-fertilization is vital if professionals are going to evaluate and tackle the environmental challenges the world faces at the beginning of the 21st century.

There is also a need for the new generation of adults, currently students in high schools and colleges, to appreciate the interconnections between human actions and environmental responses if they are going to make informed decisions later, whether as concerned citizens or as interested professionals. Providing this balanced interdisciplinary overview—for students and for general readers as well as professionals requiring an introduction to Earth's major environments—is the main aim of the Ecosystem set of volumes.

The Earth is a patchwork of environments. The equatorial regions have warm seas with rich assemblages of corals and marine life, while the land is covered by tall forests, humid and fecund, and contain perhaps half of all Earth's living species. Beyond are the dry tropical woodlands and grassland and then the deserts, where plants and animals face the rigors of heat and drought. The grasslands and forests of the temperate zone grow because of the increasing moisture in these higher latitudes but grade into coniferous forests and eventually scrub tundra as the colder conditions of the polar regions become increasingly severe. The complexity of diverse landscapes and seascapes can, nevertheless, be simplified by considering them as the great global ecosystems that make up our patchwork planet. Each global ecosystem, or biome, is an assemblage of plants, animals, and microbes adapted to the prevailing climate and the associated physical, chemical, and biological conditions.

The six volumes in the set—*Deserts, Revised Edition*; *Tundra*; *Oceans, Revised Edition*; *Tropical Forests*; *Temperate Forests, Revised Edition*; and *Wetlands, Revised Edition*—

between them span the breadth of land-based and aquatic ecosystems on Earth. Each volume considers a specific global ecosystem from many viewpoints: geographical, geological, climatic, biological, historical, and economic. Such broad coverage is vital if people are to move closer to understanding how the various ecosystems came to be, how they are changing, and, if they are being modified in ways that seem detrimental to humankind and the wider world, what might be done about it.

Many factors are responsible for the creation of Earth's living mosaic. Climate varies greatly between Tropics and poles, depending on the input of solar energy and the movements of atmospheric air masses and ocean currents. The general trend of climate from equator to poles has resulted in a zoned pattern of vegetation types, together with their associated animals. Climate is also strongly affected by the interaction between oceans and landmasses, resulting in ecosystem patterns from east to west across continents. During the course of geological time even the distribution of the continents has altered so that the patterns of life currently found on Earth are the outcome of dynamic processes and constant change. The Ecosystem set examines the great ecosystems of the world as they have developed during this long history of climatic change, continental wandering, and the recent meteoric growth of human populations.

Each of the great global ecosystems has its own story to tell: its characteristic geographical distribution; its pattern of energy flow and nutrient cycling; its distinctive soils or bottom sediments, vegetation cover, and animal inhabitants; and its own history of interaction with humanity. The books in the Ecosystem set are structured so that the different global ecosystems can be analyzed and compared and so that the relevant information relating to any specific topic can be quickly located and extracted.

The study of global ecosystems involves an examination of the conditions that support the planet's diversity, but environmental conditions are currently changing rapidly. Human beings have eroded many of the great global

ecosystems as they have reclaimed land for agriculture and urban settlement and built roads that cut ecosystems into ever smaller units. The fragmentation of Earth's ecosystems is proving to be a serious problem, especially during times of rapid climate change, itself the outcome of intensive industrial activities on the surface of the planet. The next generation of ecologists will have to deal with the control of global climate and also the conservation and protection of the residue of Earth's biodiversity. The starting point in approaching

these problems is to understand how the great ecosystems of the world function, and how the species of animals and plants within them interact to form stable and productive assemblages. If these great natural systems are to survive, then humanity needs to develop greater respect and concern for them, and this can best be achieved by understanding better the remarkable properties of our patchwork planet. Such is the aim of the Ecosystem set.