Preface

In current times, a science project, far from being a rudimentary exercise in laboratory methods techniques, is an acute business of timely investigations, popular and/or adequately promoted unpopular positions, political lobbying and replicable experiments that in concert may gain traction. In other words, the project must catch the big wave, ride it and keep it going. Fundamental questions for any scientific endeavour are: 'Why is this important?' 'Are you sure?' and finally 'So what?'

Vultures are a group of birds that have been at least until recently been relatively ignored by scientists. The question is why should we study vultures? And what would be the relevance of our results? Are vultures relics from the past, irrelevant in the modern context of glass, concrete, highways, farms and small, rare mammals, destined for extinction with their former food, the huge mammals of the Pleistocene? Do they still serve any useful function, considering modern sanitary and landscape management may make their role in cleaning the environment redundant? Considering the historical fascination, quasi-religious and spiritual status, criminal association, repugnance and awe vultures elicit, do we even know enough about them, to assess what we will be missing when they are gone? Finally, what is a vulture—just any scavenging bird with a bald head?

Five key, incomplete components have emerged in current studies of vultures: (1) changing evidence, based on new, chemical and biochemical techniques, has waded into the already murky knowledge concerning the differences between the so called *New World* and *Old World* vultures; (2) vultures are variably susceptible to particular chemicals and many species have gone from being among the commonest birds of prey in the world to critically endangered species; (3) local vulture extinctions have serious negative consequences for both people and animals, in ways not foreseen; (4) captive breeding, unexpectedly can rescue nearly extinct species; and consequently (5) it is quite evident that we know so little about the background of vultures and their ecological importance, that the study of vulture is necessary.

The book searches current knowledge of all the vulture species, using literature sources covering the biology, ecology, evolutionary history, cultural

appraisal and current conservation status of both *New World* and *Old World* vultures. It examines recent developments in knowledge on the classification of these two groups, and assesses the importance of these changes. The book differs from older texts by creating ecological and conservation possibility networks around vulture species, examining their relations with other species, including avian competitors (eagles, storks and hawks), mammalian competitors (hyenas, felids and canids), disease-causing agents (that have recently seriously decimated vulture populations in Eurasia and Africa) and environmental change (deforestation, desertification, urbanization, agricultural intensification, hunting and public attitudes).

While these issues have been mentioned in earlier literature, and are scattered among many journal articles, there is insufficient information available on the overall scenario for all the vulture species, comparisons of different factors of vulture extinction and hence the socio-environmental networks within which these variables are embedded. In-depth attention is paid to the trends of these networks, in relation to the evolution, resilience, vulnerability and ecology for the future of vulture species, and to the necessary ameliorative actions. Throughout the book, as many references to relevant literature sources are cited as possible, to allow the reader to use this volume as a source for further reading and a guide to further studies.

The book is divided into three parts. Part 1 (Vulture Classification, Genetics and Ecology) introduces the reader to the ecology and forms of the vultures. Topics include anatomy, scavenging and predation. Three chapters examine in a systematic mode, the eight species of Griffon vultures of the Genus Gyps, the eight species of other *Old World* vultures and the seven species of *New World* vultures. Griffons are given their own chapter, as their genus comprises half of the *Old World* vultures and they have traits absent in the other species. This part may be used for field identification and study, and also serve as a background to the scientific analysis of vulture evolution, ecology and geography in the later chapters. Where the scientific name of the species is first mentioned, the naming authority (i.e., the person(s) who gave the animal its scientific name) is placed after the scientific name. For example, the Turkey Vulture's scientific name is *Cathartes aura* (Linnaeus 1758). Here *Cathartes* is the generic name or the name of the Genus to which the bird belongs. *Aura* is the species name. Linnaeus is the name of the person who gave the bird its classification, in 1958. The same would apply to the Griffon vulture, Gyps fulvus (Hablizl 1783). The name Linnaeus, which is a common name for classification, is usually shortened to L.

Part 2 (Vulture Evolution and Ecology) starts with an introduction that briefly describes the prehistoric evolution of animal species and land cover change and how this affects vulture ancestors and current species. After this there are three chapters. Chapter 4 deals with the biological evolution of vultures. This chapter illustrates the evolution of the New

and Old World vultures, their close relations among other species of birds (the storks and raptors), the species they fed on (other mammals and birds) and the land cover of the Earth. It also describes the different systems used for the classification of vultures; bone structure, other body features and DNA. This provides the background for Chapter 5, which looks at the relationship between modern vultures and other species, i.e., mammal and bird scavengers and predators, and Chapter 6, which looks at the climatic relations and landscape ecology of modern vultures.

Part 3 (Vulture Ecology and Conservation) describes the human attitudes and actions, including mysticism, preservation, conservation, extermination, urbanization, agricultural development and industrialization. This is followed by four chapters. Chapter 7 looks at Vultures, Cultural Landscapes and Environmental Change, concerning the impacts of urbanization, agriculture and human hunting practices on vulture populations. These events have had devastating effects on vulture ecology and biogeography, both positively (e.g., food supply increases in urban areas) and negatively (e.g., killing of the animals that provide food, and direct killing of vultures). Chapter 8 looks at a crucial aspect of this engagement; the pollutants and diseases that have ravaged the vulture populations in Asia and Africa, these effects being so important as to merit a separate chapter. Vultures formerly considered among the commonest raptors or large birds in some regions are now severely threatened, sometimes with local extinction. Solutions to such problems depend on social, economic and political factors, these largely depend on the social attitude towards vultures in both the local context, and among the international financial actors who may fund conservation and protection schemes. For this reason, Chapter 9 examines public attitudes and conservation policies related to both New and Old World vultures, through history, as historical views, both positive and negative are variably embedded in current attitudes to vultures in many parts of the world, and as such must be examined as a component of both current and future scenarios for vultures. Finally, Chapter 10 looks at the future of vultures. This future is assessed, using all the information presented in the preceding chapters, as vulture survival and wellbeing will depend on their biological and ecological resilience, their relations with other animals and environmental dynamics and ultimately, the will of humans.