

Preface

The climate—the average state of the atmosphere over a particular region, and the sequence of weather events characteristic of that part of the world—not only varies widely in the different climatic belts around the earth from equator to poles, but has also repeatedly undergone more or less pronounced changes in the course of time. Evidence of large global climate alterations in the earth's geological past is provided, e.g., by Tertiary plant remains in the Arctic and the presence of Jurassic coal in the Antarctic. In the European region, climate fluctuations during the Pleistocene, with a rapid alternation between warm and cold periods, have had a long-term significance, especially in view of the fact that the last Ice Age peaked less than 20,000 years ago, and the fauna and flora typical of the present day evolved thereafter, during the last 10,000 years. As the study of climate developed into a science—climatology—the period from 1931–1960 became defined as the “normal period”, in comparison with which it is ever more obvious that we are currently experiencing a progressive increase in world temperature: a “period of global warming”. However, many people—among them many scientists—are still sceptical and uncertain as to how the evidence of recent climatic warming and its possible consequences should be evaluated. There are three main reasons for this scepticism and uncertainty. First, even a clearly evident climatic change does not proceed without interruption; the weather is capricious, and even a single unusual cold spell (like that in Europe during December 2001) can be regarded by sceptics as “proof” that there are no grounds for speaking of a general global warming. Secondly, the short- and longer-term weather conditions are so changeable that an individual cannot, from personal experience and memory, compare the weather in successive years so accurately as to draw objective conclusions about climatic change. Systematic changes in climate can only be demonstrated to us by meteorologists, on the basis of many years of careful, large-scale measurements and comparisons of average values; but these assessments are not easy for many of the public to understand. Thirdly and finally, many people do not make a clear distinction between the moderate warming that *has already happened* in the last 100 years or so—and which is beyond dispute—and a *predicted greater warming in future*, inferred from very recent experience and currently the subject of vigorous debate.

In response to the marked global warming above all over the past decades, in 1998 the UN established a special investigative committee, the "Intergovernmental Panel on Climate Change" (IPCC). This international group of experts is examining the causes of the present alterations in climate, periodically publishes "best estimates" describing realistic expectations for future climate changes, and offers advice to governments and the like. In the view of the IPCC not only has the greatest warming within the last 1000 years already occurred, but the estimates for a further temperature rise by the year 2100 vary between about 1.5–5.5°C, ascribable to pollution of the atmosphere with so-called greenhouse gases.

Birds, as organisms with a very active metabolism, are highly sensitive to climatic changes, and as highly mobile creatures they are also extremely reactive. Thus, for some decades now the birds of many parts of the world have been exhibiting clear changes in a number of respects, often similarly directed in different species. These changes are so pronounced that, even if we knew nothing about the simultaneous climatic warming, we would be forced to conclude that some environmental factors have been undergoing systematic alterations that encouraged many bird species, for example, to expand their ranges to higher latitudes, to return earlier to breeding grounds, to stay there longer, to prolong breeding periods etc.

Because the biology of birds has been more thoroughly investigated than that of any other group of organisms, birds were pioneer indicators for changes related to global warming; as early as 15 years ago it was possible to make prognoses for them (Berthold, 1991: Patterns of avian migration in light of current global "greenhouse" effects: A central European perspective. *Acta XX Congr. Int. Orn.*, Christchurch 1990, 780–786). Since then such a large amount of data on birds has accumulated that it was urgently needed to be discussed at a special symposium, and the present proceedings are the result. It is to be hoped that these reports will contribute towards keeping birds in their pioneer role for the ongoing analysis of changes and adaptations in a time of rapid climate change—an opportunity that Charles Darwin would probably have envied. We would like to thank all the contributors for their collaboration. Numerous scientists are gratefully acknowledged for providing reviews of the chapters. The European Science Foundation and Prof. F. Bairlein in particular provided funding and help with organising the workshop on birds and climate change. Finally, we would like to thank the editors from Academic Press, J. Meyer and S. Mitra, for their help and encouragement.

Peter Berthold
Anders P. Møller
Wolfgang Fiedler