Preface

Despite the many signs of global warming, global dimming, and changes to the climate, there are still many people who will not accept that something very ominous is taking place. This book is a very positive contribution to the problem. Professor Letcher is to be congratulated for inspiring so many world class experts into compiling such a wide reaching volume aimed at assessing and accounting for our changing climate. The book on climate change answers the basic questions: what can possibly cause global warming and climate change; and what evidence do we have that such changes are taking place?

The first five chapters focus on the possible causes of climate change with the first salvo being fired by Richard Tuckett who has put forward an eloquent chapter on the possible effects of anthropogenic greenhouse gases on the climate. Although we cannot prove conclusively that there is a cause-and-effect correlation between rising global temperature and atmospheric carbon dioxide concentration, the correlation over the past 100 years is very convincing.

To put the whole idea of climate change in perspective, there is a chapter on a Geological History of Climate Change. In this chapter Jan Zalasiewicz and Mark Williams traces the climate of the Earth over the past billion years. One really needs to understand the past in order to assess the present and indeed to attempt to predict the future consequences of climate change.

The remaining 19 chapters focus on a variety of global changes brought about by climate change. These include detailed scientific observations on weather patterns, plants and plant pathogens, lichens, bird, insect and animal ecology, sea temperature and ocean currents, rising sea levels and coastal erosion, and ice sheets. The chapter by Geoff Dixon on the impact of climate change on crop production is highly relevant, particularly in the developing world.

The evidence from the book that global warming and all the resultant changes, is due to human activity makes one appreciate just how fragile our environment is as we spin round the sun and move through space with our galaxy and all the other galaxies. Life was created on earth in an environment with more or less fixed physical properties which include: the level of radiation from the sun; the degree of shielding of the sun's radiation by the atmospheric gases; the level of the Earth's internal heat; and above all, the properties of the atmosphere such as pressure, temperature and gaseous composition. The Earth and its atmosphere form a very fragile system, which is in equilibrium with the life forms it supports. These conditions have developed

over billions of years and any disturbance of this equilibrium could spell disaster to life on earth. The rapid rise of the world's human population, together with the need for more energy, protein rich food, and greater wealth, has led us to a situation in which this equilibrium is now being seriously threatened.

This is not the first time that life on Earth has been responsible for altering the composition of the atmosphere. About 2.45 billion years ago enormous numbers of cyanobacteria began changing the composition of the atmosphere by producing oxygen and hence ozone, and together with later plant life, photosynthetically produced most of the oxygen we now have in our atmosphere. This change led to the demise of many life forms which were unable to live or adapt to an atmosphere rich in oxygen.

Climate Change can be considered as a sequel to Professor Letcher's recent book *Future Energy* (published in 2008, also by Elsevier). Our quest for more energy is strongly linked to the problems of climate change and the bottom line is that we must reduce our dependency on fossil fuels and move to more sustainable and cleaner forms of energy which do not produce carbon dioxide. Both books pose huge questions which this and future generations must focus on.

As the main causes of global warming and climate change are largely chemical in nature it is right that the International Union of Pure and Applied Chemistry should take a lead in highlighting the problem with the hope of directing and influencing governments and world leaders to take a stand in reducing the burning of fossil fuels and the manufacture of other greenhouse gases. IUPAC has supported Professor Letcher's work and the production of the book is indeed a Project done through its Chemistry and the Environment Division (V1). *Climate Change* confirms IUPAC's commitment, as a leading scientific union, to pure and applied science.

This book supports the work done by the Intergovernmental Panel on Climate Change and presents experimental evidence for both the cause of the problem and the problem itself, with little attempt at computer modelling and predicting possible future scenarios. The evidence in this book should alert an anxious population of what is happening and the next step is to close ranks and change our ways. *Climate Change* with its 25 chapters is an excellent source book and will be an important guide for all who wish to know the truth of global warming, global dimming and climate change.

The conclusions to be derived from this book make it abundantly clear that we are challenged to significantly reduce the greenhouse gas emissions from human activity. This is not an easy task especially with our rapidly increasing population and the need for more energy to fuel our growing economies and associated wealth generating projects. Our future and that of our grandchildren will be severely compromised unless we take heed and act now. I believe this book is a shining light in the drive to educate the public in what is really taking place in the world of climate change and will be a beacon for many years to come.

I warmly thank Professor Letcher and his team for making such a phenomenal contribution to one of our greatest challenges. Climate change is a crisis which affects all living species. We have only one globe; let us all care for it.

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