

Chapter 8

8 CONCLUSION AND PROSPECT

It is an obvious but unequivocal and necessary statement that carbon in all its combinations is ubiquitous and a fundamental component of planet Earth. In view of its pivotal role in the past, present and future of the Earth, any highlighting of its qualities, distribution and importance is invidious, not least because carbon as the element is relatively rare and unreactive and because it is carbon's role in mobilizing other elements that is the all important link within and between environmental systems. Alone it is innocuous; in combination it is a dynamic force. The versatility of carbon chemically is but one of its strengths and this, in turn, is linked to the highlight of carbon's central role in all life forms. From bacteria to plants and animals, the wonder of carbon as life and its history is daunting. The organic and inorganic are united through carbon and the continuous interplay between the two is the backbone of Earth's geological history through the intermediary of atmospheric change. This relationship is the essence of Earth's past, present and future. It hinges on the biogeochemical cycling and sequestration of carbon in the Earth's crust and biosphere through geological time and the efforts of one of carbon's manifestations, modern humans, to reverse that process via the unquenchable thirst of society for biomass-based resources and energy.

This latter constitutes the domestication of carbon. As discussed in Chapter 5, this can be considered as a developmental process with several thresholds: the domestication of fire involving the use of wood for fuel, the harnessing of specific plants and animals for agriculture with attendant loss of natural ecosystems, the exploitation of fossil fuels, and modern biotechnology. Such developments have occurred at different times and at different intensities throughout the world and have involved carbon flows within and between regions/countries. This domestication has altered the Earth's surface to such an extent that there is little manifestation of its pre-human-intervention state. It has also led to considerable inequities in access to wealth over time. There are two ways to assess this condition as it is manifest in the opening decade of the twenty-first century. Either it has led to an interplay of natural, semi-natural and cultural landscapes within which almost 6.4×10^9 people (data from Population Reference Bureau, 2004) live. The achievements, over and above that of the sustenance of so many of a single species, include the urban-industrial landscapes of the past and present. Archaeological sites attest to the aspirations and achievements of former civilizations and their cultural apogees, while modern cities, many

with an ancient past, bear witness to the industriousness, in its broadest sense, of society in the process of wealth generation, much of which is the economic face of contemporary carbon flows worldwide. Spin-offs to such past and present activities include art, theatre, literature, music, sport, etc. Alternatively, the loss of so much 'Nature' and the transformation of the Earth's surface, which is associated with the appropriation by humans of such a large proportion of the biosphere's primary productivity (see Section 6.4), is considered a matter of grave concern; rather than representing the achievement of human endeavour, it represents the profligacy and poor stewardship of their environment by human communities. Rather than constituting the sacrifices necessary for humans to manipulate or subjugate nature in order to achieve industrial and cultural apogees, the outcomes of this profligacy are the many environmental problems of today, notably global climatic change, biodiversity loss, pollution etc. These two scenarios are examined below; though both are indisputable, the final analysis rests on philosophical viewpoints and whether or not humans reign supreme (within limits); a key question is whether they can continue to reign supreme by maintaining the adequacy of biogeochemical services for such supremacy.

So what of the future prospect? How can development continue with little or no further impairment of the biosphere and atmosphere? How can the intimately-coupled society and carbon-based resources be uncoupled? How can such bonds be broken? And how can technology be brought to bear on environmental problems created by the domestication of carbon? It is unlikely that any major shifts in energy sources will occur in the near future so it remains to be seen what affect carbon taxes, trading and international agreements curbing carbon emissions have on limiting global warming. In the longer term, breaking the bond with fossil and probably most carbon-based fuels will become essential; renewable fuels such as wind, solar and tidal power require research and development because they are less polluting, and even the much-debated nuclear energy might prove to be more acceptable than fossil fuels. Given that world population will continue to increase in the next 20 years, how will these people be adequately fed? That carbon-processing system which is agriculture will need to adjust. Should existing agricultural systems be intensified, or should more of the biosphere be converted into agricultural land? Moreover, new developments in biotechnology offer promise for improving agricultural productivity and for environmental remediation. Is this, however, too little too late? Moreover, uneven development, i.e. uneven carbon domestication which has given rise to uneven access to and control of carbon, has generated a world pattern of wealth and poverty. Can and should this situation persist and what bearing does this pattern have on carbon flows? These are just some of the issues facing the world community today.