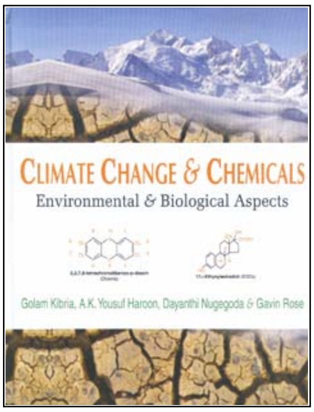


Climate Change and Chemicals: Environmental and Biological Aspects. Golam Kibria, A. K. Yousuf Haroon, Dayanthi Nugegoda and Gavin Rose. New India Publishing Agency, New Delhi. 2010. 460 pp. Price: Rs 3600.

The planet Earth has been undergoing several changes in the geological time-scale. The changes have been abrupt and devastative in the recent past, some due to natural factors and others due to several anthropurgic activities. Of these, climate change and the contamination of our environment by chemicals and pollutants are the ones that are much talked about in recent times due to several reasons. Both these alterations in the environment, i.e. as a result of green house gases (GHGs) and chemicals, are anthropogenic. Climate change refers to any alteration in the composition of the global atmosphere due to the growing GHG emissions on account of increasing human activities, and this is in addition to the natural climate variability observed over comparable time periods[1]. Climate change, although a natural geological phenomenon, has recently been accelerated by a number of human pursuits. Agricultural, industrial and mining actions release pollutants and contaminate several environmental matrices such as air, water and soil. Each of these modifications have their own ramifications and the impacts are on abiotic as well as biotic components.

The first impression about the book, upon reading the title, was very encouraging. It is a rare compilation of both climate change and chemical contamination issues. This book has 13 chapters in total comprising of 5 chapters on climate change and 8 chapters on the environmental and biological impacts of chemicals in the environment. The table of contents seems to be imbalanced in terms of the number of chapters, as one would expect the book to have put equal emphasis on various issues related to climate change and chemicals, and one chapter discussing the linkages between them. The chapters are written in a simple and comprehensive manner so as to make the reader understand the issues properly. The uniqueness of this book is that it is a blend of text book style presentation including the basics of the topics and (critical) reviews of the existing knowledge on the same. The issues related to climate change are presented logically, with the first chapter describing the findings by the Intergovernmental Panel on Climate Change (IPCC)[2]. The following chapters explain the impact of climate change on various natural support systems such as freshwater resources including fisheries and aquatic ecosystems, on agriculture and livestock, and on human health.

The second part of the book describes the nature and properties of different chemicals and their biological and environmental impacts. The authors have wisely considered discussing both inorganic and organic chemicals. The chapter on Arsenic (As) presents itself in a very straightforward manner about the sources and effects of As on the environment including biota. I am sure it will be much easier for the readers to understand the cases of groundwater contamination of As due to natural, mining and geothermal occurrences across the globe as presented in figure 7.2. Although section 7.3 discusses As speciation and toxicity, one obvious omission is that of Kumaresan and Riyazuddin[3]. The speciation chemistry of As needs more description and discussion as it is very important for researchers in analytical and environmental chemistry. There are some mistakes such as the one on page no. 135: section 7.4, line 1: ‘based on 2001’. This is incomplete, and I believe it should have been ‘based on the IPCS 2001’. The authors have presented a comparison of Arsenic and Mercury (Hg) in seafood in Box 7.1. Nevertheless, Hg being one of the most toxic contaminants in the environment it has not been given due emphasis. There should have been a separate chapter on Hg describing its chemistry, speciation, toxicity and environmental impacts. It is nice to see section 7.6 talk about As contamination in various environmental matrices in Bangladesh as a case study. However, readers would naturally expect a book of this stature to include case studies from other countries as well, and the authors should keep a note of this while publishing the next revised edition of this book. Nonetheless, they have rightly brought out the details on alternate As safe drinking water in Bangladesh, which will have a larger impact in terms of benefits to the society and better health condition of Bangladeshi citizens.

Table 8.1 aptly presents the basics about certain toxic heavy metals, but what is apparent is the exclusion of Nickel (Ni) which has several industrial sources as in the case of the other metals listed in the table, especially the electroplating and ferroalloy industries. There are several sections in chapter 8 describing various issues regarding Hg; however, Hg deserves special attention in view of its wide ranging toxicological impacts and previous ecological disasters such as the Minamata disease – mass-fish mortality due to Hg poisoning in Minamata Bay in Japan during 1956. While describing the speciation chemistry of many metals, the authors have missed out important aspects such as types of speciation of heavy metals in different environmental matrices, metal bioavailability and ageing, and the role of bioreporters and biosensors in metal speciation studies. Computer based chemical models also hold promise in this regard and many researchers are attempting to address speciation of metals in sediment and water using such models. Even though the authors have suitably described and referred the works by Florence *et al.*[4] and Förstner and Wittmann[5], the glaring omission is that of Tessier *et al.*[6] with respect to his works on speciation of particulate metals in sediments. They have also not included the paper by Florence[7], which is one of the classical papers in speciation chemistry.

From chapter 6 onwards, the impacts of chemicals in the environment are described, but the header in chapters 6–10 still reads as ‘climate impacts’; it should have been ‘chemical impacts’. This is probably a formatting problem which should have been taken care of while publishing the book. Akin to the inorganic chemicals, organic chemicals are also discussed in different chapters (chapters 9–13). The accounts on different types of pesticides, dioxins, furans and polychlorinated biphenyls (PCBs), endocrine disrupting chemicals, pharmaceutical drugs, and biotoxins are noteworthy. Chemical pesticides and pharmaceutical drugs such as diclofenac are in the centre of debate now-a-days for their notorious effect on wildlife, especially on avifauna, across the globe. Whilst the part played by chemical pesticides in wildlife poisoning has been well established, the role of certain non-steroidal anti-inflammatory drugs (NSAID) such as diclofenac in the decline of vulture populations in South Asian countries was a debatable topic. No straight correlation could be established between the level of diclofenac in vulture tissue and the mortality rate. Many reviews attribute the vulture population decline to other factors as well. Hence, a special section critically reviewing all these issues in the next edition of the book would be a welcome step.

Earlier, the issue of increasing dioxin levels in the environment was more concentrated in the developed world, but currently even developing countries are facing the threat of dioxin poisoning in several environmental matrices. Moreover, long range aerial dispersion of this chemical contributes significantly to the increased levels in developing countries in addition to several anthropogenic causes in the developing world itself. The Stockholm Convention on Persistent Organic Pollutants (POPs) during 1995 was a major step forward in world history wherein world leaders came to a single platform to discuss the way out and to reduce the use of dioxins, furans, PCBs and nine different pesticides (aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, hexachlorobenzene and toxaphene). The authors have fittingly pointed out these matters in specific chapters.

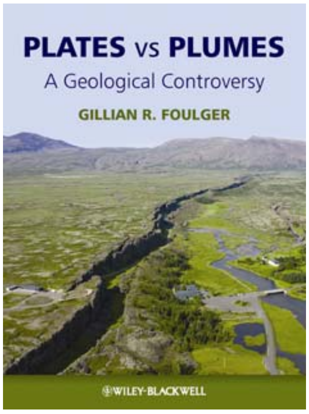
The book also discusses the usage pattern of pesticides and levels of toxic metals in some of the systems such as water; but, this needs to be revised. The next edition of the book must bring out a comparison of usage pattern of chemical pesticides across the globe and not restrict it to one or two countries and/or continents. There is a need for including heavy metal levels in all possible environmental matrices as published in several peer-reviewed journals. Also, several formatting problems exist in the reference sections.

Reading the book evoked nostalgia, a sense of reading a typical text book, as is reinforced by the key facts presented in boxes in each chapter along with acronyms and a glossary which are of great benefit to readers. Overall, the book is a good attempt by the authors to explain the fundamentals and essence of the environmental and biological impacts of climate change and chemicals.

1. The United Nations Framework Convention on Climate Change, United Nations, UNFCCC, New York, 1992.
2. Parry, M. L. *et al.* (eds), Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK, 2007.
3. Kumaresan, M. and Riyazuddin, P., *Curr. Sci.*, 2001, **80**(7), 837–846.
4. Florence, T. M., Morrison, G. M. and Stauber, J. L., *Sci. Total Environ.*, 1992, **125**, 1–13.
5. Förstner, U. and Wittmann, G. T. W., *Metal Pollution in the Aquatic Environment*, Springer Verlag, Berlin, 1983.
6. Tessier, A., Campbell, P. G. C. and Bission, M., *Anal. Chem.*, 1979, **51**, 844–850.
7. Florence, T. M., *Talanta*, 1982, **29**, 345–364.

B. ANJAN KUMAR PRUSTY

Environmental Impact Assessment Division,
Sálim Ali Centre for Ornithology and Natural History,
Anaikatty (PO),
Coimbatore 641 108, India
e-mail: anjaneia@gmail.com



Plates vs Plumes: A Geological Controversy. Gillian R. Foulger. Chichester, West Sussex, UK. 2010. 328 pp. Price: US$ 89.95.

Most of the terrestrial volcanism occurs along divergent and convergent plate boundaries, but intraplate 'hotspot' volcanism has usually been explained with deep mantle plumes. Typical signatures of plumes are thought to include excess temperature, a low seismic velocity region within the mantle, fixity, an age-progressive volcanic track on the plate, a bathymetric swell, high heat flow, non-MORB geochemistry and high $^3He/^4He$ ratios of the magmas. Recent years have however witnessed a great debate over the existence of mantle plumes, led by Gillian Foulger, the author of this book. The ongoing debate owes itself to a multitude of perplexing observations: Global hotspots do not constitute a fixed reference frame. They do not have the required high heat flow. Most ocean island/seamount chains are not age-progressive and those which are (e.g. Hawaii–Emperor) can no longer be explained by a fixed plume, due to varying palaeolatitudes. The claimed deep mantle plume under Iceland has not been found, despite extensive searching, and the low-velocity seismic anomaly there is confined to the upper mantle. Experimental petrology suggests that primary hotspot magmas are no hotter than primary MORB magmas. Predicted pre-volcanic lithospheric uplift is lacking at even the largest flood basalt provinces (Ontong Java and Siberia).

To discuss and debate the mantle plume model and non-plume mechanisms of intraplate volcanism, Foulger launched a website (www.mantleplumes.org) in March 2003 in collaboration with some colleagues. This ever-growing website, swelled by contributions from over 500 scientists, has become an exhaustive and invaluable resource for thousands of professionals and students worldwide. Since the launch of the website, two major conferences[1,2] have been held, and two massive (telephone directory-size) research volumes[3,4] have been edited by Foulger and her colleagues. This book is her latest contribution to this subject of fundamental importance in the solid earth sciences.

The book begins with an historical account of continental drift, plate tectonics, and plumes. The meteorologist Alfred Wegener, originator of the continental drift hypothesis, is mentioned as a hero with whom the geological community dealt unfairly. This seems somewhat overdone. Foulger states (p. 5): 'The case presented by Wegener was enormously strong and brilliantly cross-disciplinary'. Instead, many readers would accept that