

Environmental politics: The Asian brown cloud

'Until recently, North America and Europe dominated the use of fossil fuels, resulting in strong carbon dioxide emissions and global warming. The fossil energy-related CO₂ release per capita in Asia is nearly an order of magnitude smaller than in North America and Europe. However, Asia is catching up.' These are the somewhat ominously worded opening sentences of a paper by an international cast of authors (*Science*, 2001, **291**, 1031), summarizing the results of the Indian Ocean Experiment (INDOEX) which highlights 'widespread air pollution from South and Southeast Asia. Using data gathered 'during the dry monsoon season in January–March 1999' the authors conclude that 'the pollution build-up will be strongest in the winter monsoon under large-scale subsidence and cloud-free conditions'. While the references to the 'dry' and 'winter' monsoons are calculated to bewilder ordinary readers, the concluding sentence is unambiguous, clear and forbidding: 'Unless international control measures are taken, air pollution in the Northern Hemisphere will continue to grow into a global plume across the developed and the developing world'. The authors note that 'the growing pollution in this region gives rise to extensive air quality degradation with local, regional and global implications, including a reduction of the oxidizing power of the atmosphere'. The appearance of a well-documented article, in a highly visible journal, authored by an impressive group of authors from over half a dozen countries including three from India appears, at first glance, to be a major contribution to the assessment of environmental pollution in the Indian Ocean region. But the interpretation of the results of the INDOEX campaign acquires a new dimension following a poorly worded news release of the United Nations Environment Programme (UNEP), which begins melodramatically: 'A vast blanket of pollution across South Asia is damaging agriculture, modifying rainfall patterns including those of the mighty Monsoon and putting hundreds of thousands of people at risk a new study suggests'. The press release quotes the Executive Director of UNEP as saying that 'the haze is the result of forest fires, the burning of agricultural wastes, dramatic increases in the burning of fossil fuels in vehicles,

industries and power stations and emissions from millions of inefficient cookers, burning wood, cow dung and other biofuels'. To add an alarmist note, presumably directed at a Western audience, the UNEP official is quoted as saying: 'There are also global implications not least because a pollution parcel like this, which stretches three kilometres high, can travel half way round the globe in a week'. Coming on the eve of the World Summit on Sustainable Development due to begin in Johannesburg on 26 August, the UNEP's public interpretation of the INDOEX studies may be dictated as much by political compulsions as scientific facts. The science of the UNEP report, 'The South Asian Brown Cloud', still needs to be assessed; but the international agency's popular interpretations may be completely ill founded. A general reader of the press release cannot but help come away with the feeling, that unless checked, the burgeoning human populations of South and Southeast Asia constitute the most important current threat to the global environment.

Understanding the factors that damage our environment is a legitimate concern of science. The development of technologies that mitigate, minimize and even abolish the effects of environmental pollution are undoubtedly necessary and desirable. But efforts to control and limit environmental degradation acquire complex dimensions because of the imperatives of local and international politics. The issue of 'global warming' provides an excellent example of the science and politics of the environment. Discussions of the 'greenhouse effect' began over a century ago, when the Swedish chemist, Svante Arrhenius, better known for his theory of electrolytes, worried about the 'influence of carbonic acid in the air upon the temperature of the ground' (Arrhenius, S., *Philosophical Magazine*, 1896, **251**, 8; Rodhe, H., Charlson, R. and Crawford, E., *Ambio*, 1997, **26**, 2). Crudely put, as the concentration of infrared absorbing gases (Arrhenius considered only carbon dioxide and water vapour) increases the atmosphere becomes warmer.

In the years since Arrhenius, the number of greenhouse gases has increased; methane, nitrous oxide and ozone among them. Growing populations and the dra-

matic changes in human activity, fuelled by successive technological revolutions, have increased the 'carbon burden' of the atmosphere. The most imaginative doomsday scenarios predict a melting of the polar ice-caps and a rise of the ocean levels, in an apocalyptic future. At the other end of the spectrum are the 'conservatives', who dismiss all environmental concerns as vastly exaggerated. The global warming discussions are further muddled by suggestions that a focus on carbon dioxide emissions may be misplaced, with non-CO₂ greenhouse gases and aerosols being ascribed a more critical role (Hansen, J. *et al.*, *Proc. Natl. Acad. Sci. USA*, 2000, **97**, 9875). But, regardless of the precise causes and mechanisms, there is a general perception that CO₂ emissions must be cut worldwide. Carbon is burned in many facets of human activity and some off-the-cuff estimates suggest 'that the average American is responsible for about 25 times more CO₂ than the average Indian' (Gelbspan, R., *Sierra Magazine*, May/June 2001). Clearly, the major contributions to the global atmospheric carbon burden must come from the developed world. But 'progress' will ensure that poorer countries enhance their contributions to the CO₂ load. Reductions in emissions must then be accompanied by some level of 'national austerity' and self control; a path which appears completely unacceptable to the United States. Indeed, the Kyoto Treaty, so emphatically repudiated by the US, was remarkable for the unanimity of opinion it engendered amongst American politicians. The mandatory ceiling on carbon emissions by developed countries, suggested by the Kyoto protocol, was clearly perceived as a major threat to the US economy and way of life. No ceilings were imposed for developing countries under the Kyoto agreements, an acknowledgement that the path to a higher standard of living, applying existing technologies, must necessarily demand a higher carbon emission threshold. The global politics of the environment clearly involve complex issues of national self-interest and global equity. Even within nations, and India is a prime example, uneven development leads to stark disparities. Preaching austerity and self-restraint to the economically powerful is hardly likely to be a rewarding exercise.

The science and politics of environmental pollution can be complex and puzzling to casual observers. The Swedish Academy, almost exactly a century after Arrhenius, recognized the field of atmospheric chemistry, particularly 'the formation and decomposition of

ozone', by awarding the 1995 Nobel Prize in chemistry to Paul Crutzen (coincidentally one of the discoverers of the Asian Brown Cloud), Mario Molina and Sherwood Rowland. The Nobel committee hailed the recognition that the ozone layer, 'the Achilles heel of the biosphere' is sensitive 'to the influence of anthropogenic emissions of certain compounds'. Chlorofluorocarbons (CFCs), better known as 'freons', primarily used in refrigerants, were identified as major culprits. The scientific work was published in the early 1970s but international agreements to restrict, limit and eventually ban CFCs came into being with the Montreal protocol of 1987. Here again, the total ban on the 'most dangerous' gases requires the use of CFC substitutes; with the developed world at a clear advantage in being able to switch to substitutes at little economic cost.

From Montreal to Rio de Janeiro, to Kyoto, to Bonn to Johannesburg, the conferences on environmental politics circle the globe at a much faster rate and with a greater longevity than the Asian Brown Cloud. Viewed in the context of the impending Johannesburg summit, one cannot escape the feeling that the UNEP's sudden concern for the Asian Brown Cloud and its global implications may be motivated more by politics than science. It is also a matter of some concern that the scientific study upon which the conclusions are based, INDOEX, is the product of an international collaboration involving a sizable participation of scientists from India (*Current Science*, Supplement, 10 April 2001). Several conclusions drawn in the UNEP press release may not stand scientific scrutiny. The transportation of aerosols across the globe, the existence of the 'brown cloud' as a permanent feature and the cause-effect relationship between the haze and an apparently failed monsoon, may not be supported by hard evidence. While the motivation for the timing of the UNEP press release is obscure, it is evident that politics takes precedence over science in discussions of the environment. There is little doubt that every effort is needed across the country in cleaning up our environment. But, the agenda for action must be based on careful assessments made within the country. Like in many other areas, where science and technology impinge on international politics and business, the advice of international agencies must be carefully weighed and viewed through the, sometimes distorting, prism of national self-interest.

P. Balaram