

Southern oceans. The second is how *similar* the polar regions are, namely to what extent the so-called 'bi-polar approach' can provide a regulation of environmental concerns taking place in both areas.

In his paper on globalism and regionalism in the protection of the marine environment, A. Boyle examines the different models of regionalism, one restrictive and the other more liberal, and the consequent advantages and disadvantages. He concludes that nothing prevents the making of regional arrangements, provided that the area of application of any new legal regime is precisely defined (which is not yet the case in the polar seas). But the real test of such arrangements is the existence of institutions with the political will and scientific input to make them work effectively. Addressing the issue of the 1982 United Nations Convention on the Law of the Sea (UNCLOS) and the polar marine environment, B. Vukas points out that all provisions of the law of the sea that do not relate to the unresolved problem of the status of Antarctica are applicable also to marine areas of the Southern Ocean. However, the drafting history of Article 234 of the UNCLOS ('Ice-covered areas') and the fact that it is based on the notions of 'coastal State' and 'exclusive economic zone' show that its applicability to Antarctica is still a controversial issue. The review of global environmental instruments, especially in the fields of ship-sourced pollution, dumping at sea, land-based pollution, maritime emergencies, and marine protected areas, leads D.R. Rothwell to conclude that marine protection of the polar regions is no longer the responsibility of the polar states alone, but is increasingly becoming a truly global concern.

Other contributions deal with recent aspects of polar regional and sub-regional cooperation, such as the 1991 Protocol on Environmental Protection to the Antarctic Treaty (paper by C.C. Joyner), the environmental co-operation in the Barents Sea (by O. Schram Stokke), and the domestic perspectives of three of the most active countries in the polar areas (Australia, Canada, and the United States; by Rothwell and Joyner). Some selected issues where environmental concerns are growing as a result of existing or planned human activities are also specifically considered: land-based marine pollution in the Arctic (by D. VanderZwaag), the dumping of radioactive waste in the Barents and Kara seas (by O. Schram Stokke), navigation in the Northern Sea Route (by R.D. Brubaker), and the emerging International Polar Navigation Code (by L.W. Brigham). Worth noting are two remarks made in the last two papers: that most of the requirements of the Russian legislation on navigation in Arctic waters, which is often considered as 'straining' existing international law, have their counterparts in the legislation of both Canada and the United States; and that the initial development of a bi-polar code of navigation has met a very uncertain future.

The main responses to the questions asked in the volume are given in the contribution by the editor of the volume, who is the director of the polar programme at the Fridtjof Nansen Institute. According to Davor Vidas, the

international instruments and institutional arrangements for environmental protection of the two polar oceans reveal a somewhat paradoxical situation. In the Southern Ocean, where the overall threat of pollution appears generally low, a comprehensive environmental protection treaty has been adopted, which also includes a special annex on the prevention of marine pollution. In Arctic waters, where the studies published within the framework of the Arctic Environmental Protection Strategy confirm the existence of serious actual and potential sources of pollution, no specific multilateral instrument for the protection of the marine environment has so far been concluded. Besides the two obvious explanations (is marine environmental protection in the Arctic underestimated? or is it overestimated in the Antarctic?), there is also another possibility, as Vidas rightly supposes: that the issue is neither solely, nor even primarily, a matter of environmental needs, but rather of various other concerns, mostly of political and strategic nature.

After the failure of the Convention on the Regulation of Antarctic Mineral Resource Activities, the Consultative Parties to the Antarctic Treaty System had substantial political incentives that prompted them to agree expeditiously on issues relating to environmental protection. These incentives were basically the need to react to the challenge to their legitimacy in governing the Antarctic, coming from subjects external to the system, and the goal to maintain internal cohesion and balance within the system, especially as regards the Pandora's box of the sovereignty issue. In the Arctic, where no sovereignty questions on land territories are today open, the vital strategic interests of the major powers, beginning with the United States, still prevent the conclusion of a legally binding instrument in the sphere of the marine environment that could limit naval mobility. This consideration can explain why, in the Arctic, environmental co-operation, in the form of soft-law instruments, has mostly addressed the problems of land-based marine pollution, the regulation of which is the least threatening to the interests of the maritime fleets. More generally, this consideration also explains why the bi-polar approach is unlikely to become an effective tool to address polar problems.

In conclusion, the volume recommends itself for combining updated information with thought-provoking analysis, as was to be expected from the leading legal authorities in polar or marine issues who contributed to it. A last remark may be addressed to the elegant jacket illustration, which shows a polar bear in the vicinity of Nansen's vessel *Fram* bound by ice during its Arctic drift. (Tullio Scovazzi, University of Milano-Bicocca, Piazza dell'Ateneo Nuovo 1, 20126 Milan, Italy.)

GLOBAL WARMING: THE HARD SCIENCE. L.D. Danny Harvey. 2000. London: Prentice Hall. xxvi + 336 p, illustrated, soft cover. ISBN 0-582-38167-3. £18.99.

It is difficult to be entirely dispassionate about the topic of 'global warming,' and it has generated a substantial, and at times probably unhelpful, polarisation of attitudes. The

orthodox majority believes that the global climate has altered measurably and significantly over the last hundred years or so, that the reason for this alteration is industrial activity (primarily burning things) by mankind, and that if we do not mend our ways pretty soon, we will wreak great and irreversible harm on our planet. Dissenters from this orthodoxy are sometimes accused of being in the pockets of big business, or at least those parts of big business seen as having a short-term commercial interest in perpetuating this state of affairs, while the dissenters (perhaps it is not too fanciful to use a religious analogy and refer to them as heretics) have been known to accuse the orthodox of scaremongering for a variety of reasons, ranging from anti-capitalism to seeking research grants.

Clearly, anything that brings cool reason into this sometimes overheated arena is to be welcomed. Harvey's book is by no means the first of these, but it is an exceptionally good one. It is written at a level appropriate for advanced undergraduates or graduate students, and the author claims for it, with some justification, that it is 'intended for individuals who want an objective, critical and thorough introduction to the science underlying the global warming issue.' I suspect that a non-technical reader might find it rather hard going — indeed, the subtitle 'the hard science' contains a deliberate ambiguity, implying both the hard science that is distinct from the soft or social sciences, and the science that is not easy. (Readers looking for something less technical might want to turn to John Houghton's book instead.) Thorough the book certainly is. It is divided into three parts. The first of these describes how the global climate system works, the physics of the so-called 'greenhouse effect' (as Harvey points out, and many have done before him, greenhouses don't work like that), the factors that drive the emissions of 'greenhouse gases' into the atmosphere, and the evidence of change provided by a large range of climatic variables, including land- and sea-surface temperatures, atmospheric temperatures measured by balloons and satellites, precipitation, the extent of ice and snow, sea level, atmospheric ozone concentrations, and so on. This is, by any standards, an extensive and detailed piece of work. The second part of the book discusses mathematical modelling of the climate system, and the final part, on the 'science-policy interface', presents a fairly brief but still very detailed discussion of possible future scenarios of climate change, and what Harvey calls 'prospects for surprises' — more or less abrupt variations in the climate system, such as, for example, the sudden die-back of forests.

The book is very well presented and extensively illustrated with diagrams, graphs, and tables. There are remarkably few errors (I did discover an interesting new molecule, CO₄, on page 7), and the style is generally accessible. The author is rather fond of acronyms and abbreviations, so that capital letters tend to proliferate on the page in a manner that can be rather off-putting and sometimes quite close to code, for example, 'V compiled their NH data independently of J.' A more serious criticism could be that the book does not quite live up to the author's

claims of objectivity and criticality. I am insufficiently expert to be sure about this, but it seems to me that, in places, the more respectable arguments advanced by the global-warming heretics are not presented with sufficient detail to qualify as having been considered objectively. For example, I would have liked to have seen fuller discussions of the discrepancies between the land surface (including the so-called 'urban heat island effect'), sea surface, balloon and satellite temperature measurements, the role of variability in the solar luminosity (including the remarkable correlations that have been reported between solar cycle length and global mean temperature), and the relevance of climate dynamics during the onset of ice ages. In places, the rebuttal of heretical ideas has a faint flavour of catechism. But I think these are not important criticisms of the book, merely expressions of my 'wish list' for a book that this is not, and does not really purport to be. As a thorough, up-to-date, and extremely detailed presentation of the orthodox view of global warming, with more than a nod towards some of the alternative viewpoints, I think this book is hard to beat. I expect to use my copy heavily over the next few years. (Gareth Rees, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER.)

SCIENCE AND TECHNOLOGY IN HISTORIC PRESERVATION. Ray A. Williamson and Paul R. Nickens (Editors). 2000. Dordrecht: Kluwer Academic Publishers. xxii + 357 p, hard cover. ISBN 0-306-46212-5. £58.75; US\$85.00; NLG200.

This book is the fourth volume of the 'Advances in archaeological and museum science' series, produced with the stated aim of encouraging interdisciplinary collaboration between archaeologists and scientists to provide overviews of developments in practices in archaeology, preservation of historic sites, and museum conservation. I am a museum conservator, also extensively involved in interdisciplinary research on preservation of historic sites in Antarctica. Thus it was of considerable interest to me to put this book to practical use in my work and in particular to judge if it may be useful for heritage professionals, managers, and those with general interests in the subject.

The introduction of this book highlights the public policy issues of heritage and the opportunities inherent in advances in digital technology. This is followed by six chapters covering various analytical techniques used to document the history and materials of heritage sites, two chapters on 'restoration and conservation,' and five chapters covering site management, maintenance, and protection. The scope is unusually broad, which offers considerable benefit to those interested in the management of heritage projects who need one central reference rather than a series of specialist publications. The preface of the book acknowledges the political support given to the project by two US Congressmen and that the publication is a means of 'focussing congressional attention on the technical and administrative issues of preserving America's historic