



Access to coastal waters by research vessels is being restricted by nations who exert ownership rights.

## OCEANS

# The blue frontier

A collection of essays highlights the pressing challenges of managing global waters, finds **Clive Schofield**.

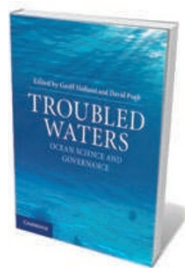
As science-fiction author Arthur C. Clarke noted, it is “inappropriate to call this planet Earth when it is quite clearly Ocean”. Crucially important to the global environment, oceans are threatened by escalating pollution, population and coastal development on land. Global climate change is contributing to sea-level rise, warming and acidification. Marine biodiversity is falling, while occurrences of cyclones and storm surges are rising. Yet the oceans also offer tremendous promise for our future resource needs.

In this context, *Troubled Waters* is timely. A diverse collection of essays by international experts in the science and policy of marine protection, its publication marks the 50th anniversary of the Intergovernmental Oceanographic Commission (IOC), a programme of the United Nations Educational, Scientific and Cultural Organization (UNESCO).

Although great progress has been made in marine science and ocean governance, the authors emphasize that advances are inadequate given the scale, complexity and urgency of the challenge. Future pressures will

exacerbate threats and opportunities, calling for even greater understanding of the seas.

The authors highlight achievements as well as problems, including shortcomings of the IOC. Longevity and success has led to the body being termed a “permanent miracle” by one contributor. But the IOC’s lack of independence from governments and the UN is a source of ambiguity and tension. Authors note the difficulty of maintaining financial commitment from participating nations, and the IOC’s lack of power to force countries to implement its recommendations. According to one account, the commission’s own successful ocean-mapping programme is “facing extermination” because of funding reductions by some member states.



### Troubled Waters: Ocean Science and Governance

EDITED BY GEOFF  
HOLLAND AND DAVID  
PUGH  
Cambridge University  
Press: 2010. 330 pp.  
£30

Oceans can be hostile neighbours, as highlighted by disasters such as the 2004 Boxing Day tsunami in the Indian Ocean and the November 1970 cyclone in East Pakistan (now Bangladesh), in which a 9-metre-high storm surge inundated the low-lying islands of the Ganges delta and caused more than 300,000 deaths. Thoughtful contributions in the book address efforts to build local marine-science capacity in developing countries in order to better detect and adapt to such threats, and describe how responses to marine hazards and early warning systems might be improved.

A theme throughout is the culture clash between scientists, who deal in probabilities, and policy-makers, who desire certainty. The book includes practical tales from scholars and practitioners who have attempted to translate ocean science into better governance. The transnational nature of marine governance is a major issue.

Several chapters refer to the oceans as a global commons that provides essential ecosystem services to support life on Earth. Yet access to large areas is being restricted. Those parts of the ocean along coasts fall under national jurisdiction as part of the territorial sea (usually extending 22 kilometres or 12 nautical miles from shore) or are defined as exclusive economic zones (EEZs). These extend 370 kilometres (200 nautical miles) from the coast, in accordance with the UN Convention on the Law of the Sea (UNCLOS), which came into force in 1994. The book acknowledges this dramatic shift in rights — the largest twentieth-century transfer of property from international to national regimes — yet more could have been said about the rising tensions between marine researchers and coastal states regarding access to the EEZs.

Coastal states increasingly impose controls in what they regard as their own waters. Scientific activity, including marine research and analogous surveys undertaken by unarmed military research vessels, has led to incidents at sea. For example, in March 2009, USS *Impeccable*, a surveillance vessel of the US Navy, was confronted by several Chinese ships off the coast of China. In 2001, India protested over the activities in its EEZ of the UK Royal Navy survey ship HMS *Scott*; the ship went on to conduct the first survey of the sea floor around the epicentre of the earthquake that caused the Boxing Day tsunami.

Similar tensions have arisen in trying to distinguish between pure and commercial marine scientific research; for exam-

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ple, whether marine bioprospecting is a scientific or exploitative activity. Coastal states have rights over the resources within

their EEZs. But scientific and bioprospecting activities are indistinguishable at the early sample-collecting stage. Only later, if research leads to discoveries such as drugs derived from marine genetic material, can a distinction be made. Unfortunately, this volume does not deal with these controversies in depth.

Looking to the future, *Troubled Waters* explains the high likelihood of continuing sea-level rise, increasing ocean acidification and warming oceans. This is coupled with increasing pollution and contamination of maritime spaces and the continuing collapse of marine biodiversity. Contributors suggest new strategies to deal with sea-level rise, including the creation of more habitable space through reclamation, artificial islands and even mobile human habitats.

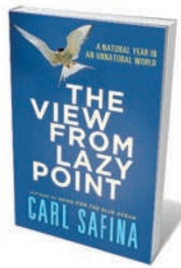
The economic worth of oceans is clearly growing. For example, the combined value of Australia's marine industries was recently found to exceed the gross value of its agricultural production. The global economy is already reliant on sea-borne trade, with more than 80% of trade by volume being carried by sea. Traditional marine resources such as fisheries and sea-bed hydrocarbons remain vital — fisheries provide the primary protein needs of hundreds of millions of people, and around 60% of global oil supplies come from offshore sources.

Exploitation of the oceans is likely to accelerate as new marine opportunities are realized, such as genetic resources, sea-floor minerals and gas hydrates. Other growth areas include ecotourism, ocean energy production and initiatives to mitigate climate change, including sequestration of carbon dioxide. Consequently, the oceans are becoming more intensively used. Activities will compete with one another in the same marine spaces, requiring enhanced governance of the oceans.

This greater economic and social interest demands increased knowledge of the oceans. The quality and quantity of ocean observations, including of relatively unexplored deep areas, should rise as technology advances. But the key to managing the seas will be turning good information into meaningful policies. In that regard, *Troubled Waters* is an excellent resource. ■

**Clive Schofield** is director of research at the Australian National Centre for Ocean Resources and Security (ANCORS) at the University of Wollongong, New South Wales 2522, Australia.  
e-mail: [clives@uow.edu.au](mailto:clives@uow.edu.au)

## Books in brief



**The View from Lazy Point: A Natural Year in an Unnatural World**  
Carl Safina HENRY HOLT 416 pp. \$32 (2011)

Beginning his journey in a kayak on the waters outside his Long Island beach house in New York, ocean conservationist Carl Safina witnesses the migrations of living things across the globe. Travelling from pole to pole and across the tropics during the four seasons, he brings back tales of environmental change in our seas. Although the news isn't good — reef ecosystems are being destroyed by fishing, and penguins and migrating shorebirds are starving as their food webs unravel — he remains struck by nature's beauty and versatility.



**A Century of Eugenics in America: From the Indiana Experiment to the Human Genome Era (Bioethics and the Humanities)**

Edited by Paul A. Lombardo INDIANA UNIVERSITY PRESS 268 pp. \$24.95 (2011)

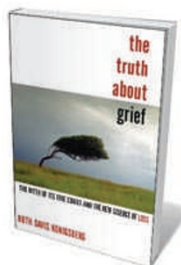
As a nation with lofty ambitions, the United States has had a mixed relationship with eugenics. The first country to prohibit procreation by criminals and 'idiots' — in the state of Indiana in 1907 — today it embraces the Human Genome Project and the possibility of genetic enhancement. Law professor Paul Lombardo examines US legislation and attitudes to human selection in the past century, and the likelihood of such pressures arising again in modern genetics.



**Engaging the Public with Climate Change: Behaviour Change and Communication**

Edited by Lorraine Whitmarsh, Saffron O'Neill and Irene Lorenzoni EARTHSCAN 288 pp. \$84.95 (2011)

Communicating climate science is difficult and politically fraught. A volume edited by scientists from the Tyndall Centre for Climate Change Research at the University of East Anglia, UK, examines what works, what doesn't and why. It highlights best practice from around the world using a collection of case studies from academics and practitioners, who share their advice on how to get the climate message to the public and how to promote behaviour change.



**The Truth About Grief: The Myth of Its Five Stages and the New Science of Loss**

Ruth Davis Konigsberg SIMON & SCHUSTER 272 pp. \$26 (2011)

Grief is often described, after psychiatrist Elisabeth Kübler-Ross, as following five stages: denial, anger, bargaining, depression and acceptance. Journalist Ruth Davis Konigsberg takes issue with this sequence and proposes a broader assessment. She points out that grieving includes positive emotions, and that we have a capacity for resilience to loss. Drawing on scientific research, she examines how people cope with grief, concluding that although psychotherapy offers support, it does not alleviate the distress experienced.



**The Great White Bear: A Natural and Unnatural History of the Polar Bear**

Kieran Mulvaney HOUGHTON MIFFLIN HARCOURT 272 pp. \$26 (2011)

Polar bears are as fascinating as they are striking. Born in snowdrifts, they have white fur yet black skin; they struggle to keep cool in the Arctic climate; they are massive yet pad silently on the ice; and they can wander thousands of miles in a year. Through a blend of fact, cultural history and personal experience, writer Kieran Mulvaney celebrates the paradoxical charm of polar bears, and highlights their uncertain fate as a consequence of hunting and receding sea ice.