

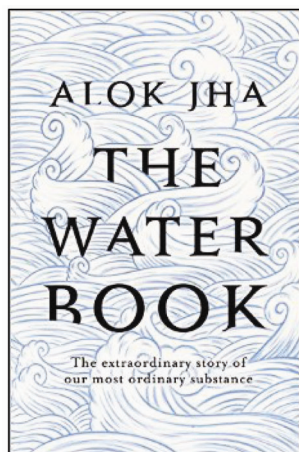
BOOK REVIEWS

functions and in extreme cases, the patient goes into coma. One of the serious dilemmas that the doctor faces is to know if the patient is conscious or not, and the degree of consciousness. The review by Gosseries *et al.* deals with the clinical assessment of consciousness, its neural correlates and the integrated information theory of consciousness which considers that it is related to the capacity of the brain for information integration.

This volume has an interesting breadth of coverage of the different aspects of neuroscience. It should be useful to experimental neuroscientists and clinicians interested in the science of brain disorders. I like the hard-bound volume, which I hope they will continue to publish in the era of e-books.

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The Water Book: The Extraordinary Story of Our Most Ordinary Substance. Alok Jha. Headline Publishing Group, An Hachette UK Company, 338 Euston Road, London NW1 3BH. 2015. 376 pages. Price: Rs 499.

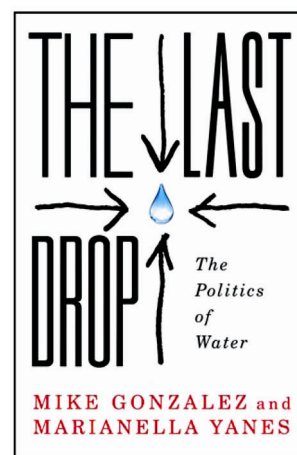
How would you fathom a contrasting situation when one is fighting crises of water supply at home and a distant friend

has gone shopping for a fishing gear to exploit the small stream flowing through his coffee farm? Envious undoubtedly; what is 'fish out of water' for one is 'catch a fish' opportunity for the other. That is what water does under differing situations, perhaps a grim reminder on its undisputed value for human existence, and more importantly, for being human. We seem to value the universal liquid when it is in short supply, but do we understand it well?

'Of all known liquids,' wrote the great water chemist Felix Franks, 'water is probably the most studied and least understood'. Taking cue, Alok Jha has set out to write a biography on this wonder molecule, and has come out with an exhaustive treatise on the subject. Of all mysterious properties of water, the dielectric constant sets it apart from other naturally occurring materials. At an incredible value of 80, its large dielectric constant breaks affinity between other molecules with ionic bonds and earns itself the title of a universal solvent. No wonder, whenever one thinks of a liquid, one is thinking of water with a small amount of other things dissolved or suspended within it. Could this be one of the reasons for its omnipresence on this planet?

Water has invented humans, and indeed sustains all other life forms on the Earth. Paradoxically, however, a liquid that is part of life is also one of fear and death. Some of the most dreaded creatures live under water, carrying on eternal war amidst them by preying on each other. There is nothing softer and weaker than water, and yet nothing as hard and strong too. Jha journeys through the hydrosphere, biosphere and cryosphere to capture the nature and properties of the second most abundant molecule in the universe.

Putting the works of several philosophers, chemists and hydrologists into perspective, the author marvels at the way the water molecule acts like a hawala system of informal cash transaction in transferring energy at impossible speed. Just as the hawala system works on trust and word of mouth, so do networks of hydrogen-bonded water molecules in carrying the charge of protons from one part of a cell to another. This book captures all this and much more, but is a trifle too long. While it is a useful addition to water literature, it could be worthy as a textbook.



The Last Drop: The Politics of Water. Mike Gonzalez and Marianella Yanés. Pluto Press, 345 Archway Road, London N6 5AA. 2015. 224 pages. Price: Rs 1357.

This book offers a study in contrast. Focusing on the trade and politics of water, the professor-journalist duo of Mike Gonzalez and Marianella Yanés lament the growing insanity of identifying with bottled water as a social drink – consumed by elegant people in elegant bars. It is no surprise therefore that some nine billion bottles of water are sold annually across the world. The massive expansion of the private water industry, including the bottled water industry, is an outcome of commitment of neo-liberalism to the privatization of all public services and public goods. Outwardly it may seem to be the only way out to address the issue of access and quality. The reality is that big corporations with turnover exceeding US\$ 40 billion annually have contributed literally nothing to the resolution of the water problem. This is not surprising when one learns that 34% of water and sewerage privatizations have failed across the world, with as many as 180 cities having re-municipalized their water operations.

Citing real-case stories of predatory privatization, from Mexico to Kerala and from Laos to Bolivia, the authors contend that capitalism is anything but blind to ecology. It transforms nature into commodities, homogenizing it into products which can be traded for profit. Calling for a new world water order, the book seeks collective engagement of all small movements in big picture change in favour of water peace, as opposed to the widely publicized prediction of

possible 'water wars'. Simply put, the struggle over water is not only about water; it is also about land and more extensively, about democracy and rights.

Examining corporate control over water and the ensuing struggle for water resources worldwide, Gonzalez and Yanes join the activists in saving water from overt and covert privatization. This book is a grim reminder and a wake-up call to liberate water from the predominant notion that 'whoever controls water controls society'. Exposing the complex arguments surrounding water, the book makes technical and scientific case for pushing back the market fundamentalism in favour of equity and social justice. All this is present in a single drop of water.

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Annual Review of Earth and Planetary Sciences, 2015. Raymond Jeanloz and Katherine H. Freeman (eds). Annual Reviews, 4139, El Camino Way, P.O. Box 10139, Palo Alto, CA94303-0139, USA. Vol. 43, xiii + 649 pp. Price: US\$ 105.

'Philosophers are people who know less and less about more and more, until they know nothing about everything. Scientists are people who know more and more about less and less, until they know everything about nothing.'

– Konrad Lorenz

Recently I happened to read an article written by Gavin Schmidt (in a book entitled *What's Next*, Quercus, London, 2009), a climatologist and presently the Director of NASA's Goddard Institute of Space Studies in New York. The article discusses the increasing tendency in modern science to balkanize itself into smaller sub-disciplines often discouraging cross-cutting synthetic research. Schmidt develops this theme from his turf of interdisciplinary field of climate – study of an interactive system consisting of atmosphere, oceans, land and ice – their dynamics, chemistry and composition. The author exemplifies the critique by pointing at the study of ocean drill

cores (a branch called palaeoceanography), which actually provides a 'time sequence at a specific point, and they can be difficult to compare in detail with other cores, because of the uncertainties in assigning an age to any particular depth'. Thus, Schmidt says, 'the vast bulk of papers in the field discuss transient changes at specific locations rather than making much more difficult assessment of the geographical patterns of changes at any one time'. The problem here is that of verticality – how the data from a vertical core translate into a study of changes in a horizontal way. Palaeoclimatologists might disagree with this critique, but the point made here is valid in understanding how a sub-discipline (which applies to many branches of science) gets cocooned over the period with its hardened band of practitioners, isolated sub-culture defined by specific jargon and language, making it difficult for others outside the field to interact. Schmidt likens this to 'tragedy of commons' in economics – 'the collective impact of rational individual decisions can lead to undesirable outcomes'. There are many more examples like this in Earth Sciences: for example, the mantle geochemistry and the mantle geophysics, and never the twain shall meet. The fabled Indian story of blind men describing the elephant is apposite in this context. These thoughts rushed back to me when I saw this book under review, whose stated objective is to 'encourage cross-disciplinary research while helping scholars keep up with the flurry of new developments across our field'. True to their mission statement, some of the articles in the volume make excellent synthesis of the significant developments in various sub-disciplines in Earth and planetary systems to develop a cogent picture of our seemingly disparate knowledge encompassing the dynamic, chemical, physical and biological processes of the Earth, extending to other planets.

The first scientific article in this volume that follows the prefatory article (an in-depth interview) on James Morgan, a pioneering scholar of water chemistry, in fact offers a befitting solution to the issue of need for interdisciplinary linkages, raised earlier, specifically on climate studies. This review is a masterful example of how the quantitative studies of modern monsoon and palaeoclimate reconstructions from various parts of the globe are integrated to develop robust

models of global monsoon variability across various spatial and temporal scales. Written mostly by Chinese scholars led by An Zhisheng (a palaeoclimatologist), this review goes through a wide spectrum of cross-disciplinary climatic studies (including contributions from Indian researchers like Sulochana Gadgil, J. Srinivasan, R. S. Nanjundiah, A. Chakraborty, B. N. Goswami, among them), to understand global monsoon dynamics. The greatest challenge in this field now is to understand the future global monsoon behaviour in view of the new bully on the block – the human impacts on ocean and atmosphere energy budgets, and their negative consequences on global monsoon system. Besides the anthropogenic influence on monsoon dynamics, there is increasing evidence that the human activities also lead to accelerated glacial shrinkage both on the north and south pole regions. Alley and co-authors (Sridhar Anandkrishnan, Penn State, among them) summarize the geophysical and computational database to isolate the feedback constraints on the forcing of polar ice-loss, which will have dramatic consequences on the global sea level. For instance, calculations show that a loss of most of the West Antarctic ice sheet may cause >3 m of sea level rise for the coming century – a worrisome scenario, indeed. The culprit identified here is the warming ocean water that melts the underbelly of the continental ice, but the greater challenge is to know whether the threshold of melting is already reached or not.

Evolution of early humans in Africa was linked to the long-term tectonic, environmental and climatic variables. These factors in combination shaped the selection pressures on early humans and thereby acted as drivers of evolution of our ancestors. How did the vegetarian apes living on trees make a transition to ground-dwelling meat-eating hominids, about 4.5 million years ago? Naomi Levin addresses this question and reviews the linkages of tectonism and climatic evolution in developing the local hydrologic and ecological niches in the development of human traits. One of the first papers that needed my curiosity early in my career about the relation between tectonic environment and human evolution was published in the *Journal of Geophysical Research* back in 1994. Geoffrey King, Geoffrey Bailey and Derek Sturdy published this study on