

While unambiguously supporting the notion of competition in the provision of telecommunications services, Westerway clearly acknowledges that competition is merely a means of meeting social objectives. Unfortunately, many other participants in the current debate see competition as an end in itself.

If there is any shortcoming with the book, it is that it does not adequately deal with the telecommunications policy challenge posed by changes in the broadcasting and cable television industries in North America and Europe. His focus on the needs and interests of large users of telecommunications such as the airline industry and financial institutions, and their impact on policy formation, underestimates the significance of the emerging debate about who should bring broadband services into the home. Clearly the cable television operators and telecommunications providers would like to have the ability to carry each other's services into the home. Here is an archetypical case of convergence at work.

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Toxic Fish and Sewer Surfing by Sharon Beder
(Allen & Unwin, Sydney, 1989), pp. xvii + 176, \$12.95, ISBN 0-04-442112-5 (pbk).

That the beautiful beaches and waterways surrounding Sydney are sometimes polluted will certainly come as no surprise to regular visitors to these areas; however the extent to which this pollution poses a threat to public health would appear to have been greatly underestimated. This book gives an account of the chronic problems which have been associated with Sydney's sewage system, from the time that the first white settlement occurred there, up to the current period of controversy over the wisdom of constructing the extensions to the sewage outfalls at a cost of several hundred million dollars.

Although Beder concentrates on the ramifications for public health of the accumulation of toxins in the food chain and on the deleterious health effects of pollution, the author certainly does not confine herself to the technical details of sewage disposal. Beder has also concerned herself very much with what she considers to be mismanagement by the authorities responsible for the treatment and disposal of Sydney's sewage and industrial waste waters.

What will be of considerable concern to those with a specific interest in the hazards posed by marine pollution, e.g., swimmers and surfers, is the unreliability of faecal coliform bacteria concentration as an indicator of pollution levels. "The Water Board found that 90 per cent of faecal coliforms die off in one to seven hours during the daytime. So sewage that has been at sea for more than an hour will not necessarily contain them. But it may contain something nastier, like viruses" (p. 84). This is extremely important when it is considered that most authorities responsible for water standards around the world, and the Sydney Water board is no exception, rely very heavily on faecal coliform counts to determine whether water is polluted or not. This point is recognised in the scientific literature, e.g., "The isolation of viruses in the absence of faecal

indicator bacteria reinforces previous observations on the inadequacy of these bacteria for predicting the virological quality of water and shellfish.''¹ This reliability of faecal coliform counts is a real worry when it is considered that the standards to be met by the extended sewage outfalls will be based heavily on faecal coliform counts.

It is quite likely that readers will be less surprised about the build-up of toxins such as heavy metals and other chemicals in the bodies of animals living in the immediate vicinity of sewage outfalls. While the build up of such substances certainly poses a potential threat to the environment, and those who consume animals from these areas, the hazards to the general public health is likely to be limited, at least in the short to medium term. What is more likely to be of interest to citizens is the extent to which the Sydney Water Board went to suppress the evidence of the build up of toxins in marine species living close to the sewage outfalls. There is interesting material here on the behaviour of a bureaucracy that presumably acts in 'the public interest'. The book contains statements about the way the bureaucracies responsible for Sydney's sewage have misled the public into a false sense of security with regard to the quality of the bathing waters, which can only be described as highly disturbing. The statements made in the book with regard to the mismanagement of the sewage system are almost unbelievable.

The book is based on the author's PhD thesis. Given that the degree has been awarded, I can only assume that the contents of the book are accurate. I must say however that I at least fully believe in the accuracy and sincerity of the author, and that she has my utmost respect for undertaking the research that she did. It could not have been easy for the author when she encountered as much open hostility to her work as she describes in her book.

I highly recommend this book for those with an interest in the coastal marine habitat around Sydney. I would definitely recommend it to those who regularly fish near sewage outlets especially if they are likely to catch any fish. (Admittedly most amateur fishermen like myself are unlikely to catch enough fish to put themselves or their families in any danger). I also highly recommend this book to the large number of people who regularly swim in the beautiful waters surrounding Sydney. There must be literally hundreds of thousands out of Sydney's close to four million population who regularly bath in waters which are affected by sewage effluent. This book may well be worth a read for those people who swim regularly whether they live in Sydney or not. The risk of viral infection from swimming in infected waters whether they are coastal waters, public or private swimming pools is possibly much greater than generally realised. This book provides many authoritative references, both within the text and in the appendix, to support this view.

In summary then I would thoroughly recommend this book to just about everybody who lives in Sydney, because in one way or another they are touched by the management of Sydney's waste waters and sewage effluent: even if it is merely as a result of increased rates or government charges that relate in one way or another to the cost of sewage disposal. Although this really is a book about Sydney's sewage problems I would consider that ch. 4 of this book, which deals comprehensively with the inadequacy of relying on faecal coliform concentrations for predicting the virological quality of water, is worth a look for most people who spend a considerable time in the water whether it be swimming in private or public swimming pools or in the surf.

REFERENCES

1. S.M. Goyal, W.N. Adams, M.L. O'Malley and D.W. Lear, 'Human pathogenic viruses at sewage sludge disposal sites in the Middle Atlantic Region', *Applied and Environmental Microbiology*, 48, 4, 1984, pp. 758-63.

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Professional Engineers in Australia: Population Analysis by Michael R. Rice and Brian E. Lloyd

(Engineering Labour Force Series No. 2, EPM Consulting Group, in association with the Institution of Engineers, Australia, and the Association of Professional Engineers, Australia, 1990), pp. x + 86, \$A45.00, ISBN 0-646-00759-9.

This book provides a statistical history of the professional engineering labour force in Australia from 1850 to 1990. Its principal objectives are to quantify in a detailed and accurate way this sector of the Australian labour force in each year since 1850, taking into account factors such as education, migration, retirement and other depletions, and to analyse it quantitatively with regard to disciplines, age distribution and employment sectors.

Authors Rice and Lloyd and their consulting group are well-known in Australia for researching, writing and commentating on engineering education and on the engineering profession over many years.¹ This particular book is the second in a series on the engineering labour force which they and their colleagues are preparing.² One of its secondary objectives is to lay the groundwork for a later book in this series which will look at professional engineers in an international context. It is also intended to provide a reliable foundation for policy and further research affecting the engineering profession.

The authors make the distinction between the *professional engineering labour force* — that is, the total number of people in the population with professional engineering qualifications and under the retirement age of 65, regardless of their employment function, and the *professional engineering stock*, that is, the subset of the PE labour force who are actively connected with engineering. They point out that at the beginning of 1990 there were around 90,000 professional engineers in the labour force in Australia. The stock figure, however, was approximately 78,000.

The book begins with a section giving a very brief summary and the main conclusions. Its five chapters begin with an introductory one which lays the groundwork for the analysis that is to follow. The next two deal with the periods 1850-1920 and 1920-1989. The fourth discusses engineering disciplines and functions during the period 1978-1987, and the last one deals with the distribution of engineers by state.

The year 1850 was chosen for the beginning of the study since, prior to the Gold Rushes that began in 1851, there had been little demand for engineering services. The division of the period of the study at 1920 — which just happens to be half way between 1850 and 1990 — was in practical terms determined by the establishment of the Institution of Engineers, Australia in 1919 and by the fact that this led to the formalising of the definition of a 'professional engineer'. Prior to this, the word 'engineer' meant a person engaged in professional engineering and fulfilling the accepted contemporary criteria of