

Book Review

The Waters of the Waikato: ecology of New Zealand's longest river

Kevin J Collier, David P Hamilton, W N (Bill) Vant and Clive Howard-Williams (eds). Environment Waikato and the Centre for Biodiversity and Ecology Research (The University of Waikato), 2010. 308 p. ISBN 978-0-9582940-5-8. Price \$NZ 49.00.

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Large rivers are the last bastions of the freshwater biologist. Because of their size they are difficult to study, especially by the benthic ecologist, and have been neglected in favour of more accessible small streams as research sites. Despite the logistic difficulties posed by such rivers, this book demonstrates that much excellent research has been carried out on the Waikato, and there is a promise of more to come. The Waikato is New Zealand's longest river (442 km) with its origin on the slopes of Mount Ruapehu. It flows into Lake Taupo and from there 336 km to the sea. The large city of Hamilton is on the Waikato, which also has significant geothermal inputs and supports eight hydro-electric dams. Its major tributary, the Waipa, enters at Ngaruawahia, the confluence of the two rivers being the subject of a striking colour plate on page 141.

"The Waters of the Waikato" includes

15 chapters arranged in five parts. Twenty seven authors have contributed to writing of the chapters and another 21 are listed as writers of "feature boxes". The five major sections of the book provide background information on geography, history and river management; physico-chemical conditions; river biology; "connected ecosystems" (lakes, wetlands and floodplains); and an epilogue that makes comparisons with earlier reviews of the river, changing attitudes to water and land management, cultural values, current issues, and future challenges, with emphasis on management. The book concludes with a general index of 7 pages, a taxonomic index (4 pages) and an index of water bodies (4 pages). There are 57 tables, 67 figures and 20 pages of colour plates depicting plants, animals and geographic features as well as eight maps. Clearly, this is not an insubstantial book. Most chapters conclude with valuable discussions of future prospects and emerging issues, followed by a bullet-pointed summary. All conclude with a bibliography of works cited in the text, and include hard-to-get items such as reports, workshop proceedings and theses.

As with many other large rivers there is increasing concern about the deteriorating condition of the Waikato. In Chapter 6 Bill Vant notes that concerns were voiced in the 1950s and that regular water monitoring has been carried out since the 1980s. Nitrogen and phosphorus are the principal nutrients of concern, their main sources being runoff and leaching from areas of developed land, particularly pastoral farmland. The Waikato also receives pulp and paper wastes, urban stormwaters and geothermal inputs including arsenic, which accumulates in plants. Concentrations of both arsenic and mercury have

exceeded New Zealand food standards in the tissues of freshwater mussels taken from some of the hydro-lakes.

A diverse diatom-dominated phytoplankton is found in the river, reflecting the diversity of habitats available. The zooplankton is notable for the number of invasive species including *Daphnia* and the tiny jellyfish *Craspedacusta sowerbyi*. Macrophytes are also conspicuous in the Waikato river system, with introduced species being first seen in the 1960s. Vast rafts of hornwort (*Ceratophyllum demersum*) in particular, have forced the closure of power stations at times, and weed beds in the hydro-lakes, periodically obstruct recreational activities such as rowing. We are also told that nine introduced macroinvertebrates and 12 introduced fish species are known from the river and its impoundments. More than 116 invertebrate taxa have been recorded in total, with populations of shrimps, mysids and New Zealand's only freshwater crab being features of the lower river. In addition to introduced species, 17 native freshwater fish occur in the river's catchment. Smelt and common bullies are widely distributed throughout the river and both longfin and shortfin eels are commonly encountered, although their size and abundance has declined. An interesting feature box by Erina Watene-Rawiri describes the traditional eel fisheries of the lower river. The first fish introduced to the river were goldfish (1871), followed in 1872 by brown trout and rainbows in 1877. Trout form the basis of an important recreational fishery in the hydro reservoirs, while koi carp (an ornamental variant of the common carp *Cyprinus carpio*) now represent about 67% of total fish biomass in the lower reaches. The river and its associated lakes and wetlands support a diverse community of introduced and endemic birds, and provide continuity of

bird habitat from Lake Taupo to the sea. The long-tailed bat also has a strong association with the river within the confines of Hamilton city and is the subject of another interesting feature box by Stuart Parsons and Andrea Dekrout.

"The Waters of the Waikato" is a worthy successor to two previous books with that title, the first appearing in 1971 and the second in 1981. The striking appearance of its deep blue covers is matched by the comprehensive nature of the material between them and the high standard of presentation, editing and readability. The book is a credit to its contributors and editors. It deserves to be widely read by persons interested in the management of rivers, not only for its content and historical perspective, but for the insights it gives into emerging issues that are not necessarily unique to the Waikato, and importantly, how to confront them.

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