

## Book reviews

**Hostile shores: catastrophic events in prehistoric New Zealand and their impact on Maori coastal communities** by Bruce McFadgen. Auckland University Press, Auckland, New Zealand. 2007. 298 p. 194 × 250 mm. NZ\$49.99 (paperback). ISBN 978-1-86940-390-4.

According to the blurb printed in pale blue ink on the back cover, “The Polynesian settlers of New Zealand arrived to a land prone to violent geological disruption by large earthquakes, volcanic eruptions and tsunamis”. The book thus is described as an authoritative, groundbreaking (no pun intended, presumably), and multidisciplinary account of those catastrophic events on the New Zealand coast from the time of earliest Polynesian settlement (c. AD 1250) until European contact. The blurb continues: “... McFadgen describes how the ‘big crunch’ of the fifteenth century, with its increased tsunami activity, was hugely detrimental to coastal communities and precipitated a crisis that led to cultural change and warfare.” In the final chapter of the book, McFadgen claims (p. 229) that “The fifteenth century was a watershed—a cultural boundary—between the early and the late prehistoric periods”. He concludes that (p. 237) “The fifteenth-century tsunamis ... precipitated a crisis that coastal communities were only just beginning to face—too many people and not enough food ... Thus, the catastrophic events triggered culture change by sharply increasing the stress on declining food resources.” His final comment is that “the catastrophic events merely exacerbated and hastened changes that were already under way and most probably inevitable.”

So, in essence, McFadgen firstly assembles detailed evidence of the occurrence and timing of a range of natural events (eruptions, sand-dune advances, earthquakes, and tsunamis) that took place in New Zealand over the past c. 750 years, and notes their likely biophysical impacts. He then documents the archeological and archeometric evidence for responses (if any) by Polynesian/Maori communities to those events and impacts (with emphasis at coastal localities where, he argues, the bulk of the population resided). Finally, he develops a suitably circumspect but nevertheless reasonably compelling image of environmental forcing that helps to explain the late onset of pa building and associated warfare. A key element of McFadgen’s thesis lies in the relatively recent recognition of some deposits along the coastlines as having a tsunami origin, inspired—and appropriately acknowledged—in part by James Goff’s work in this developing field (e.g., Goff & McFadgen 2002).

But, it must be asked, is McFadgen’s final interpretation justifiable on the basis of the data presented? More broadly, how significant is the role of “environmental determinism” (i.e., the impact of physical events) in shaping early societies and their cultural expression? Although “disaster archeology” is undoubtedly growing in importance (e.g., see Leroy et al. 2006a,b), without lifting the lid too much on this rather large

can of worms, the current “status” of environmental determinism might best be described as mixed. On the one hand it has been argued recently that early societies generally coped adequately with many environmental catastrophes (depending partly on proximity and magnitude), and that impacts arising from such events may have been over-interpreted (e.g., Lowe et al. 2002; Torrence & Grattan 2002; Grattan 2006). On the other, rapid environmental change has been seen as an essential determinant in human history in a range of contexts (e.g., Machida 2002; Turney & Brown 2007; Begét et al. 2008; Nunn 2008; Riede 2008). The questions of chronology and thus contemporaneity of possible cause and effect lie at the nub of the arguments, and are central to McFadgen’s thesis. Clearly this potential weakness—the precision and accuracy of the dates for the postulated catastrophic events and the archeological sites—is well recognised and McFadgen is suitably cautious throughout the book (as further insurance, he lists underpinning chronological data in appendices). He acknowledges that most elements of the age models are at the century rather than decadal scale, the notable exception being the Kaharoa tephra isochron dated at AD 1314 ± 12 (95% probability) (Hogg et al. 2003). I wonder, however, if the age modelling could have been improved through much greater use of a Bayesian statistical approach (see p. 59) that can incorporate stratigraphic as well as other data, and identify outliers formally (e.g., Irwin & Jones 2004; Blaauw et al. 2007; Petrie & Torrence 2008). The ways in which radiocarbon dates are best combined (calibrate first then combine, if appropriate—not the other way round) have also been modified in recent years (Buck et al. 2003; Buck 2004; Blockley et al. 2007). Aside from the timing, a second crucial question is that of gauging the actual impact of natural events (tsunamis in particular) on early Maori coastal communities and food resources.

The book is divided into 10 chapters which have some overlap in content. The introductory chapter is entitled “A precarious place to live”. That title in itself might generate debate—for most of the time New Zealand does not seem that precarious except for those who build houses on flood plains or near cliff tops or on slip-prone land, generally speaking. Although, like a tedious game of test cricket enlivened only by the prospect that something might happen, the threat of another large earthquake or eruption or tsunami is always there in New Zealand (and such an event will occur sooner or later, of course). Chapters 2 and 3 deal with the nature and origin of selected natural hazards and with radiocarbon dating, respectively, and these are amalgamated in chapter 4 as “Dating catastrophic events”. In chapters 5 and 6 the nature of archeological sites and their distribution and chronology are examined. Chapter 7, “Tectonic and volcanic processes in an archaeological setting”, leads into two very detailed chapters on the impacts of these processes via circumnavigations, firstly of the North Island (chapter 8) and then the South Island (chapter 9). Finally, the dénouement in chapter 10: “Waves of destruction”.

The text is generally well illustrated with tables and with figures either as line diagrams or maps, some of the latter built on attractive DEM templates, together with photographs mainly of good quality. No figures or photos are in colour—a pity—but captions typically are detailed and helpful. Around 520 references are listed, the most recent dating to 2007, and an index of nine pages forms an important part of the book. The table of contents lists two levels of subheadings as well as the main titles, meaning that specific topics can be found relatively quickly. As noted above, appendices, mainly radiocarbon data with some other information, support the chapters and amount to just under 40 pages.

The book size and layout somehow look slightly old-fashioned. Maybe black or dark red text rather than watery blue would have stood out more on the slightly off-white cover. The cover illustration by Brian Flintoff, described as the “Destruction of Moawhiti by the tidal wave [sic] Tapuarero-utuutu”, is indeed striking (both visually and in what it depicts), but the caption should have been rewritten unless it truly were a “tidal wave” rather than a tsunami. (That is a pedantic point—but surely appropriate here!)

I found initially that I tended to dip into various chapters rather than read them systematically from start to finish, but material in the earlier archeological sections (perhaps because it was less familiar to me) I found especially interesting. The final chapter is a comprehensive synthesis. Some chapters are rather detailed and descriptive, however, and so parts of the book can be rather hard going (e.g., chapters 8 and 9).

There are some minor flaws, some of which are listed below.

- (1) Kaharoa tephra was not erupted from Lake Okataina (p. 28, p. 175); rather it was erupted from Mt Tarawera, which lies within the Okataina Volcanic Centre.
- (2) The volcanological grain-size boundaries (pp. 27–28) are wrong: ash grains are <2 mm (not <4 mm); lapilli are 2–64 mm (not 4–32 mm) in diameter.
- (3) The northern New Zealand plate boundary depicted on p. 16 is not in the correct position (although it is correct on p. 18). On p. 174 the western boundary of the Taupo Volcanic Zone might be better positioned running near the western margin of Maketu Peninsula—but that is only a preference.
- (4) The term “numerical dating” is much better than “absolute dating” (p. 46), which experience shows never is (Colman et al. 1987); “air-fall” (e.g., p. 27) is no longer used (ash-fall or tephra fall are preferable terms) (e.g., see Alloway et al. 2007); and the Holocene (p. 30) encompasses the past c. 11 700 calendar years (equivalent to about 10 000 radiocarbon years) (Roberts 1998; Walker et al. 2008).
- (5) On p. 156 the old-fashioned (pluralised) term “nuées ardentes”, best retired, is incorrectly described as gas-charged “lava” (the terms pyroclastic density currents or pyroclastic flows are preferable).
- (6) The mineralogy of Taupo tephra (noted on p. 28) is not distinctive compared with that of other Taupo-derived eruptives of Holocene age, although the glass major-element composition does stand out.
- (7) The claim that “... fertile, friable soils are widespread” (p. 120) is misleading: New Zealand has only a small percentage of fertile soils (“widely scattered” might be acceptable).

- (8) The model of New Zealand as a Gondwanan “ark” (p. 2) has been somewhat downsized—admittedly in only very recent times (McGlone 2005; Gibbs 2006).
- (9) Some “modern” English traits have crept in. For example, why capitalise the word caesium on p. 92 (where it is not starting a sentence)? Moreover, “calibrated ages” are not so special that every mention requires capitals C and A (p. 52), nor does “conventional radiocarbon age” require any capitals, and Maori “Plaggen Soils” (p. 113) are not formalised in any taxonomy. Yet “northern hemisphere” and “southern hemisphere” as proper nouns should have capital letters.
- (10) I found very few typographical errors (e.g., Keam 1986 should be 1988, p. 134; and “data was” rather than “data were” appears only once, p. xii, as far as I could tell). There are some very minor formatting inconsistencies in the references.

In conclusion, Bruce McFadgen is to be congratulated for his resolve and energy in writing *Hostile shores*. He has invested substantial time (more than 4 years in the writing) and experience in integrating a wide array of material from many different sources, both in the geosciences and social sciences and from the oral tradition. The material is indexed in detail and accessible. It is up to the next generation to test the ideas and interpretations presented by McFadgen, especially the assumed linkage between short-lived environmental events (notably tsunamis) and societal response, and the age models. Certainly not easy and only achievable perhaps via new high-resolution data, both stratigraphic and chronologic, as emphasised, for example, in overseas research by Masse et al. (2006) and Dugmore et al. (2007).

*Hostile shores* is a valuable interdisciplinary reference text for anyone interested in Maori history, archeology, anthropology, and aspects of the geological history and hazards of New Zealand since initial Polynesian settlement c. AD 1250. As the first New Zealand book on “disaster archeology”, it complements the colourful “Te Ara” book of natural hazards in New Zealand (Te Ara editors 2007) and the archeological overview (for example) of Furey & Holdaway (2004). It also forms an excellent companion to Goff et al. (2003), a multi-authored book that deals with the New Zealand coast from a wider perspective.

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**Tectonic geomorphology of mountains: a new approach to paleoseismology** by William B. Bull. Blackwell Publishing, UK. 2007. 316 p. 199 × 259 mm. NZ\$98.20 (hardcover). ISBN 978-1-40515-479-6.

Any textbook that starts: “Earthquakes! Active Tectonics! Evolution of Mountainous Landscapes!” is evidently likely to be a little out of the ordinary. This second book by W. B. Bull (it follows his 1991 *Geomorphic responses to climate change*) fulfils that expectation; it presents, with verve and intensity, a synthesis of the author’s lifetime of observations, thoughts, and conclusions on the role of tectonics and seismicity in forming mountain landscapes. It is intended as a senior undergraduate-to-graduate text, and in my view will serve admirably the needs of a thesis student starting a

study of geomorphology in an active mountain setting—but I suspect it would be a brave instructor who expected even a senior undergraduate class to assimilate significant chunks of it in short order.

The author clearly explains the purpose of the book at the outset: to “introduce, describe and use geomorphic concepts to solve problems in tectonics and seismology”. This is done by first reviewing concepts of tectonic deformation and base-level change in both extensional and contractional settings—with, as is the case throughout the book, numerous field examples to illustrate these concepts. Then the geomorphic concepts applicable to uplifting mountains are set out, providing a set of geodynamic tools for understanding how mountain landforms develop (interestingly, the erosional role of glaciers is not part of this set, particularly in view of

the author's recent extended time in New Zealand; however, climatic change associated with glaciations plays a prominent role in some parts of the book).

The next three sections are devoted to the topographies of uplifting range fronts: a classification is introduced to link tectonic activity to morphology, and detailed consideration of the mechanics of fault-scarp evolution as revealed by many field investigations provides a range of insights into interpretation of field evidence. The final part of the book concentrates on the available methods of inferring prehistoric (though the author prefers the word "prehistorical") seismic shaking, and contains a very thorough exposition of the author's development of lichenometry for dating past rockfalls and, by inference, seismic shaking. For me, this was in some ways the most satisfying part of the book, maybe because the topic is very much the author's own, and the data are extraordinarily convincing and the inferences fascinating—this is certainly a field with a wealth of future potential.

I found this book challenging in a number of ways (but I must acknowledge considerable shortcomings by way of the knowledge of "basic geological principles" recommended in the preface as prerequisites for its enjoyment); it is not an easy, light read by any stretch of the imagination. Indeed, to sit down with the intention of working one's way through it would require some medium-term re-organisation of one's personal diary. If, like me, you like to randomly dip and delve,

be warned; this book demands more serious attention! Having realised that, the investment of additional time and attention is hugely rewarded, and a wealth of insights into mountain landform dynamics awaits the persistent reader.

In many ways this book epitomises Bill Bull. It is, as I said, almost worryingly insightful: how come I never thought of looking at mountain-fronts that way? It takes no prisoners—for example, the reader is told in no uncertain terms the importance of chapter 2: "Get familiar with these principles." I can assure you, you will! Some of the interpretations are personal—the author's explanation of Fig. 2.19, for example, differs from mine, and he and I have an ongoing debate about the relative geomorphic significance of high sediment delivery compared to altered base-level during glaciations. So, like the man himself, this book is sometimes nicely provocative, which in my eyes makes it a whole lot more interesting than most textbooks. And, like the man himself, it burns with intensity and enthusiasm. I most certainly recommend it as an essential briefcase and backpack companion for anyone who wants to think and understand more about mountain landscapes.

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