The Avon Heathcote Estuary – Ihutai

In the late 70s I completed a PhD at the University of Canterbury, New Zealand called The Environmental Geology of the Avon-Heathcote estuary.

I came to some surprising, counter-intuitive, conclusions, and published a couple of papers based on my research in the mainstream earth science peer-reviewed literature.

It was an innovative, richly ideated piece of work. Reviewing it, all these years later, I believe it still deserves to be taken seriously. It stands up well.

It was hand-done (pre-computer, pretty much), but detailed and meticulous.

I came to the project with a lot of field and earth science project management experience, having spent six years working as a geologist between my Post Grad Dip (with credit – Hons 1 equivalent) at Otago and the PhD Teaching Fellowship at Canterbury. I was an experienced professional with special interests and an aptitude in sedimentology and paleoecology, not a recent graduate on a mission.

Later workers – Findlay on his own, Findlay and Kirk together, and the geochemist Deely – contested my findings, and their views – recycled through the literature – have contaminated the topic ever since.

I recall an event in Christchurch, I think at the regional council building in Tuam Street, in the early 90s, when Jo Deely did a presentation on her thesis. Bob Kirk (who had been on my PhD assessment panel) was there. I'd had no warning about the story she was about to tell, and was taken aback. I do think she toned down her presentation; hadn't expected me to be there. I can see now why she'd have been … what, uneasy? Dr Jim Robb, who had been one of my research enablers as the CDB's biologist, was visibly disappointed when I lamely made a comment about being overtaken by later work, or something. I can see, now, why he was. He and I were both interested in the truth.

I wasn't aware of the detail of her thesis at the time. It was embargoed, apparently. And anyway I wasn't in a position to redress the balance. You could say that it didn't really matter. But it has meant that some key aspects of my work were devalued or dismissed, and its overall significance diminished. Valuable research opportunities have been missed. Key insights have been overlooked. And in the back of my mind, there's been this nagging sense that I was shafted.

But that was then. This is now. We've all moved on, right?

Yes, but for the Christchurch earthquakes
With increased flood risk, significant new investment in research, the prospects of mechanical intervention (tidal barrier, dredging), and the development of a sophisticated model of the estuary with powerful predictive capability (and the publication of NIWA's beautiful estuary map), it has become important again to clarify the impact of the city on the estuary, to understand as well as we can what the

sub-surface sediments tell us, and to review what we know about estuary dynamics and energetics. What I recorded, way back then, has a fresh relevance.

The mid to late twentieth century, pre-earthquake, estuary that I spent three years watching, sampling, wading through and thinking about was settling into a stable equilibrium, quite different to the place it would have been without Christchurch right next door. Quake perturbations have 'restarted the clock', offering unique research opportunities. Understanding what new work tells us depends on what we know about the estuary's natural history.

Revision

I've been reviewing Deely's PhD thesis, now available on line, and find it genuinely disturbing. She misunderstood and misinterpreted my careful and detailed subsurface stratigraphy, simplifying it to a fault, and based her dismissal of my observations on sparse inexpert lay anecdotes, on just six cores (against my 47), and on the problematic dating (using ^{210}lead) of only one core.

Her very young dates for muddy sediment on the northern shoreward edge of the Heathcote Basin may be right for what she sampled (even if my quick literature review casts doubt on her methodology – there are no 'undisturbed' sediments in this, or any, estuary, and some commentators say this means ^{210}lead dating is impossible), but she has misunderstood what she was dating (she got her stratigraphy wrong). Her dates do not contradict my narrative, and more to the point, do not support hers.

She also used carbon 14 to date some shells from another core, and because the date didn't support her conclusions, dismissed it. In fact, it may have been right (at 450 years old, for mid pre-European estuarine sediment, it makes sense).

I'm not so bothered about geographers Findlay and Kirk's re-evaluation of historical changes at the estuary mouth. They assembled more historical observations, and constructed a more elaborate story. They also largely ignored or misunderstood the geology. But the essential conclusion – that the tidal compartment increased from early in the twentieth century, and that the estuary mouth responded to this change – remains, and is fundamentally significant. I'll come back to this in a future analysis.

So it's time to put the record straight, and rebut at least some of the work that followed mine. There's a case that a solid, agreed, version of the history of this estuary will better inform new research.

The traditional approach would be to publish something in the relevant peer-reviewed literature, but I don't have access to institutional resources, and I'm not an academic – I don't need the publication credit. Social media will do – all that I'm interested in is setting the record straight.

Back to the home page for more.

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