

A Personal Perspective on the Methodological Practices of an Applied Fluvial Geomorphologist

Uma Perspectiva Pessoal sobre Práticas Metodológicas em Geomorfologia Fluvial Aplicada

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Abstract: What is useful geomorphology? How do we do it (what methods do we use)? How can we help ensure that it is used, and it is used effectively? Here I share a few thoughts from the perspective of an applied fluvial geomorphologist. This is very much a personal, reflective contribution. Now at the 'senior' end of professorial status (more than 10 years a full professor), I think it is interesting to reflect upon how methodological practices that I have used have changed during my career. In a sense, this is very much a record of my own journey, outlining decisions made along the way, and providing an account of some of the outcomes.

Keywords: Applied Fluvial Geomorphology; Methodological Practices; Full Professor.

Resumo: O que é geomorfologia aplicada? Como podemos fazê-la (quais métodos usamos)? Como podemos ajudar a garantir que seja usada e que seja utilizada de forma eficaz? Aqui eu compartilho alguns pensamentos a partir da perspectiva de um pesquisador em geomorfologia fluvial aplicada. Esta é muito mais uma contribuição pessoal, reflexiva. Agora, no final sênior do status profissional (mais de 10 anos professor titular), acho interessante refletir sobre as práticas metodológicas que usei e sobre as que mudaram durante a minha carreira. Em certo sentido, isso é muito mais um registro da minha própria jornada, delineando as decisões tomadas ao longo do caminho, e contribuindo com alguns dos resultados.

Palavras-Chave: Geomorfologia Fluvial Aplicada; Práticas Metodológicas; Professor Titular.

Before I provide a record of my own methodological journey, I think it is important to offer comment on my own research goals and aspirations – in a sense, the motivation for my work. I am passionate about, and committed to, the quest for healthy rivers in a manner that respects diversity and variability, and works with the emergent world of

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evolutionary traits (e.g. BRIERLEY and FRYIRS, 2005, 2008, 2009, 2016; BRIERLEY and HOOKE, 2015). To me, effective management practices ‘work with’ nature, bringing together knowledge of a given river in a manner that is appropriately contextualized in relation to regional and theoretical understandings (BRIERLEY et al., 2013). From this, we are able to give careful consideration to the transferability of understandings from one situation to another, from one river to another. We want/need to compare apples with apples, lemons with lemons, in applying the most appropriate procedures (what is most likely to work where). We need a coherent information base to do this. Landscape platforms (geomorphic knowledge) provide an integrative physical basis for such analyses. Among many things, the intent of such framings is to ensure that river management activities are strategic and proactive, moving beyond reactive (ad-hoc) practices. Generation of a coherent information base that incorporates understandings of catchment-scale patterns of rivers, and analyses of their behavioural and evolutionary traits, is key to such endeavours. To me, it’s hard to envisage how effective scientifically-informed practices can be developed and implemented independent from this understanding. So, how did I get to work on such things?

I had the enormous privilege of superb high school training in Geography. As a teenager at Bury Grammar School in northwest England I was taught core principles of geography in an inspired way, with lots of field trips alongside challenging in-class sessions. Several years after high I completed high school, one of my teachers (M.G. Hart) wrote a text book (1986) entitled “Geomorphology: Pure and Applied”. He set incredible essays, having me examine mechanisms of hillslope-valley floor connectivity in 1978! Subsequently, an amazing set of undergraduate teachers at Durham University in northeast England prioritized the importance of asking good questions as the foundation of enquiry. They also promoted a remarkable spirit of independent learning. At this time (late 1970s), the science of geomorphology was largely concerned with the measurement of physical processes. This was the age of ‘if it moves, measure it’. All too often, such undertakings lacked a well-defined sense of purpose and context. In a sense, the reaction to undue emphasis upon description of geomorphic form had gone too far. In focussing upon landforms, what about the evolutionary context of landscape-scale enquiry and concerns for patterns in landscapes? These issues were eloquently captured in the paper by Baker and Twidale (1992). In my own case, undergraduate field trips to various parts of the UK, along with superb ventures in the arid landscapes of Tunisia, supported a personal ‘spirit of enquiry’ that was desperate to understand river and landscape diversity, and how those different component parts came together to create the landscape as a whole. The interplay of spatial and temporal considerations across multiple scales was firmly etched in my mind. We were taught to seek those pieces of evidence that helped to craft a story in efforts to make sense of any given landscape. From this emerged my own take on methods in geomorphology, viewing enquiry as a form of detective-style investigation, in which a particular piece of evidence can transform a story (in a sense, I view geomorphology as a form of forensic science!). Experiences were thoroughly re-inforced during my Honours field work on semi-arid systems in Palestine. I’m not sure my undergraduate teachers always appreciated that darned student who always asked, ‘but couldn’t it be this way? How do you know the landscape was formed this way?’ Negotiating between

the empirical and the theoretical is so much fun. On leaving the UK and moving to Canada for postgraduate work (Simon Fraser University in Vancouver), I was awarded the undergraduate prize for 'theoretical fecundity'. That spirit lingers long.

My Masters and PhD work was pretty much 'straight science' at the interface of geomorphology and sedimentology. My supervisor was fantastic. He adopted a 'hands off' approach, but he was always happy to talk and pull me in to line if I wandered 'too far' off course. He allowed me to make my own mistakes, which is surely the best way never to make them again! He promoted independent thinking, helping me to contextualize perspectives on landscapes through experience, yet steering as required.

Despite all this encouragement and prompting, a matter of months after completion of my PhD I decided that the kind of work I was doing was not enough for me. The only people who may have potentially benefited from the findings of my PhD work were in the oil industry – a sector of society that isn't closest to my own personal interests. I wanted to do something environmental, applied, and of benefit to society. A Post-Doctoral position at the Australian National University provided the springboard for this in my subsequent career at Macquarie University in Sydney and at The University of Auckland in New Zealand.

Not long after arriving in Australia, a few things became quite obvious to me. This landmass – its landscapes, climate and ecosystems – was quite different to what I had experienced previously. Supplementary experiences in glaciated landscapes of New Zealand were more similar to me, with distinct parallels with British Columbia. But the tropical landscapes of Papua New Guinea, Fiji and North Australia all held surprises. That spirit of enquiry was alive and well. Exploring new places and finding out new things was an absolute joy. It quickly became evident, however, that the approaches to managing river systems in these different places were not as I expected. Rather than truly reflecting values of a given place, procedures were being taken from elsewhere and either mis-applied or applied inappropriately. We didn't really have the toolkits in-hand to 'work with nature'. Various postgraduate collaborators had done an outstanding job demonstrating the variability of Australian rivers and their responses to human disturbance. Work with one of these individuals, Kirstie Fryirs, brought about development of a river management toolkit to address some of these concerns: the River Styles Framework was born (BRIERLEY and FRYIRS, 2005). Applications of this toolkit employ a suite of methodological procedures and experiences encountered through my career to date. Importantly, the framework provides an open-ended, interpretative approach to geomorphic analysis of river systems. In a sense, it tries to give a voice to the landscape itself, while providing practical and coherent guidance as an underpinning landscape layer with which to approach environmental decision-making, planning, implementation and monitoring. Geographic concerns for place are at the forefront of enquiry. In simple terms, Geography and History matter.

To me, landscapes and river systems are the perfect integrating platform with which to develop coherent and proactive approaches to environmental management. As noted by Sauer (1956), in his wonderfully evocative contribution entitled "The education of a geographer", geographers are ultimately and innately informed by field-based understandings. As geographers, we respect the diversity of place. We are forever contextua-

lizing similarities and differences with other places and experiences. In the catalogues of our mind, and the memories sometimes captured in our collections of photographs, we make sense of the world, relating one place to another as a basis to consider the transferability of knowledge (e.g. what management techniques are likely to work where, and why?). For example, geomorphologists often have 'an innate eye for 'pattern and process'. Countless sets of procedures are available to us to support efforts at observation and measurement, but ultimately instinct and flair come to the fore in our efforts to 'read a landscape' (FRYIRS and BRIERLEY, 2013; BRIERLEY and FRYIRS, 2014). I love the sense of perspective that comes from contemplating vistas from mountain tops or 'high spots' of a landscape. Such an overview helps to frame perspective and context. However, there nothing quite like being 'in the river itself' to truly try to come to terms with what's going on. In a sense, this has parallels with top-down and bottom-up learning, as we negotiate through hierarchical scales of enquiry that are integral parts of geomorphic analysis of river systems (i.e. catchment, landscape unit, reach, geomorphic unit (landform), hydraulic unit (flow-sediment interaction) scales; BRIERLEY and FRYIRS, 2005).

Just as important as 'high spot' experiences, and far more accessible to all, is the 'window on the world' that is available to us through Google Earth, satellite images and aerial photographs, and the ability to 'zoom-in, zoom-out' pretty much everywhere across our planet. Add to this the increasingly recurrent, finer and finer resolution imagery, and emerging practices such as 'structure from motion', and we have a critical library with which to assess diversity, variability and change. Increasingly, this is how we come to know the world. Perhaps scarily, in a sense, automated change detection procedures increasingly do the work for us. While this presents an enormous opportunity to democratize knowledge on the one hand (making information on landscape change available to all, thereby providing an independent basis to inform management decision-making), concerns could perhaps be raised about 'who writes the rules and the algorithms' with which we inform these assessments. For example, in mapping exercises and in applications of GIS, what conceptual model underpins the framework through which the work has been designed and implemented (see Cullum et al., 2016)? Enormous concerns for social and environmental justice are yet to be addressed in moves towards the democratization of knowledge and the emergence of citizen science. Importantly, this points to the critical importance of 'awareness' of the inherent politics of practice in choosing the methodological and research tools we apply (and develop) as geographers. These concerns are captured in recent moves towards a 'critical physical geography' (see, for example, BLUE and BRIERLEY, 2016).

It is widely recognized that 'managing the environment' is far less about managing the physical environment and far more about managing people. Geography provides a perfect methodological vehicle within which to tackle these 'physical' and 'human' concerns in a united sense. In my own career, particular students and colleagues have instigated, prompted, pushed and ultimately delivered on a host of cross- or trans-disciplinary initiatives and interventions. Inevitably, such steps require substantive co-supervisory arrangements. Consideration of socio-economic and cultural perspectives on environmental management or concerns for environmental justice and governance and institutional arrangements requires engagement with the world of qualitative enquiry. Ethics approval

and engagement with diverse literatures brings together a wide range of skillsets. These are truly shared investigations, for which effective teamwork is critical.

Ultimately, my perspective in such engagements has built on the perspective that 'science doesn't matter unless we find a decent way to make use of it'. This has led to recent work on 'biophysical-and-cultural' landscapes (ethnogeomorphic perspectives that challenge the space-time division; see WILCOCK *et al.*, 2013). Ongoing collaborative research endeavour to find the 'voice of the river', listening and sharing perspectives with a wide range of colleagues and river practitioners to support the co-production of knowledge about any given river system. While it would be disingenuous to not mention the challenges of teamwork, careful management of arrangements can engender stimulating and somewhat unexpected outputs (e.g. a cross-disciplinary river rehabilitation project in Australia; BRIERLEY and FRYIRS, 2008; a science-arts dance initiative in New Zealand; LONGLEY *et al.*, 2013).

Sharing perspectives in efforts to communicate prospects of 'seeing and making the world differently' draws attention to the critical importance of complementary skillsets in our efforts at environmental education and science communication. The variable and changing fortunes of environmental science and management in different parts of the world present a range of threats and opportunities for geographers. Prospectively, we have the capacity to work within differing institutional arrangements that promote emerging forms of knowledge generation (and use) to create new forms of employment relating to environmental communication, incorporating particular sets of negotiation and facilitation skills. The tried and tested capacity for geographers to appropriately situate diverse understandings derived from differing approaches to enquiry (captured under the term 'specialist-generalist synthesis') presents enormous prospects for employment in negotiating environmental futures. Just as importantly, the perspectives within which we approach enquiry and frame our research increasingly recognize and engage with the inherent politics of practices, in some instances trying to change what we do and how we go about it. This world of 'Performative Action Research' prospectively presents a wide range of opportunities for geographic enquiry (TADAKI *et al.*, 2015).

If there's a lesson in here, perhaps it's something like this. Research is about informed questioning. Informed questions are appropriately contextualized (i.e. built upon and framed in relation to what we think we know, and associated literatures that seek to capture and convey that knowledge). In many instances, and if socio-politically acceptable, it pays to question our so-called "Masters", advisors and supervisors. Knowledge moves on. So do approaches to enquiry. Having said this, it pays to undertake such questioning with careful consideration, preparing a well-justified 'defence' for perspectives that are taken. The scientific world of paradigm shifts moves on through questioning of previously held conventions and their associated authorities. In the research world, thinking independently, thinking critically, and thinking creatively is vital. In other words, 'Engage thy Brain'. If you've been given a gift, use it! As yet, we don't live in a robotic world of artificial intelligence. Make your own path. Don't be scared to push boundaries. There are lots of talented people out there. Choose supervisors carefully, and don't be scared to change the make-up of the committee if it isn't working. Put interesting teams together to address interesting questions in interesting ways. We have a remarkable potential (perhaps a res-

possibility) to challenge convention through our work. I love the topic of a recent Masters student here at The University of Auckland. Through qualitative research (interviews with river management), the student sought to examine the extent to which contemporary river management practices could be viewed through a 'more than human' lens, looking at restoration 'through the eyes of a fish'. Conventional outlooks engender conventional lives which promote conventional outcomes (plus ça change, plus c'est la même chose). I guess if you feel we're living on this Earth and respecting our planet appropriately, you may feel our job is done. If not, I dare suggest that there's a lot to do! Imagine the world as it could be, and seek to make it happen.

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