

Commentary

Comprehensive research in geography

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Addressing human–environment problems requires contributions from those who study both human and biophysical systems (O'Brien and Leichenko 2003; Castree 2012; Harden 2012). Historically, the scientific community has been content to try to explain the behaviour of the human–Earth system by separating the parts from the whole, interrogating them, pausing on occasion to scrutinise their analyses, and contrasting findings against the bigger picture. Such partial explanations are useful but niche approaches cannot account for real-world behaviours that arise from the interplay between the parts. Today, as human impacts on the planet become more and more apparent, solutions require a sophisticated blend of specialist and integrative research – what we call 'comprehensive research'.

In our view, comprehensive research differs from interdisciplinary research in that it considers the interactions of important biophysical and human processes across all relevant spatial and temporal scales. Geography would therefore seem an appropriate home for comprehensive research to flourish (Douglas 1986; Skole 2004; Marston 2006). The integration of geography with interdisciplinary research has a long history (Bracken and Oughton 2006), which is perhaps best exemplified by Sauer (1925). Students are now arriving at geography after sampling other disciplines that are lacking in the ability to question and explain human–Earth dynamics in a meaningful way. Many seek both specialist and generalist skills that will allow them to do comprehensive research. These two demands are not, and should not be, mutually exclusive. Unfortunately, fragmentation threatens to make geography no more effective at addressing complicated human–Earth systems than any specialised discipline (Robbins 2011). Worrisome is that students may now be less pre-

pared than their predecessors to tackle these types of problems holistically (Demeritt 2009).

Fragmentation is not surprising given the specialisation needed to make significant advances in the underlying science (Stoddart 1987; Demeritt 2009). Specialisation is by no means unproductive. It has forced many physical geographers to integrate with other fields (e.g. biogeography and biology, process geomorphology and geology and physics, applied hydrology and climatology and civil engineering). Many human geographers are also collaborating with political scientists, sociologists and area studies scholars to develop broader research objectives. However, when it comes to conducting comprehensive research effectively, geography has stayed at the middle of the pack despite the 'closeness' of human and physical geographers (Demeritt 2009). Perhaps this is telling of the growing distance between the sub-disciplines, regardless of close proximity of individuals on the same floor of a building, and regardless of recognition of the compatibility between the physical and human geography sub-disciplines (cf. Stallins 2012; Tadaki *et al.* 2012).

We cannot necessarily dwell on the possible failure of any one discipline because specialist-only momentum drives university research at an institutional level. All higher education institutions face a catch-22 situation: complex problems require a combination of specialist and integrative research, yet complexity inhibits integration, re-enforcing specialist research. Recent calls for integration via cross-disciplinary research projects are laudable, but to date have little effect on mainstream research. Specialist-only research dominates at a time when holistic approaches are needed to address complex problems such as climate disruption and impacts, hazard

vulnerability and public health issues (cf. Curtis and Owen 2012; Seager *et al.* 2012; Willis *et al.* 2012).

There are encouraging examples of calls for comprehensive research efforts across academia (Clark and Dickson 2003; Kates *et al.* 2001; Sui 2011). Examples include the Rural Economy and Land Use programme (<http://www.relu.ac.uk/>), ESRC/NERC Interdisciplinary Studentships (<http://www.nerc.ac.uk>) and the various initiatives of the National Science Foundation in the US (<https://www.nsf.gov/>). Nevertheless, the domination of specialist-only research continues at all levels, including undergraduate education. In a recent research-oriented field-based geography course for undergraduate majors, human and physical geography students were teamed to investigate the issue of environmental and livelihood threats caused by dam building on the Mekong River. Owing to the pressure of time restrictions, the more vocal faction in the group persuaded the others to abandon a mixed approach for a specialist one, for which the final paper could be written comfortably and drawn from specialist knowledge learned in prior class room settings. As a consequence, the final papers, although excellent, failed to yield any new discoveries.

At the graduate level, cross-disciplinary research is given lip service but attention to small details and carving out a specialist niche continues to maintain a stronger presence. In a recent example, a first-class honours student nearly failed admission into one of our graduate programmes because the proposed hybrid human–physical geography project, written in a simple style crafted to speak to both audiences, was determined to be neither intellectual (on the human side) nor quantitative (on the physical side) enough to warrant admittance.

Ideally complex topics should be supervised by mentors who are able to see both the detail and the ‘big picture’. At least one member of a supervisory panel should be a specialist-generalist to balance with other specialists – and they need flexibility to fit in. Finding examiners who can see past the material in their own area of specialisation and judge the thesis on the basis of the whole is also a challenge (cf. Blackmore and Nesbitt 2008). Too often in our experience the thesis is judged on the quality of a specialist part. This also applies to the review of grant proposals and academic journal articles.

These examples, which appear generic because they are commonplace in all universities, are indicative of lack of commitment of the entire academic research community to conduct comprehensive research. Figure 1 depicts the ‘success to the successful’ system archetype (Meadows 2008), which we see as inherent in the university research system, perpetuating specialist-only research. Based on the systems-dynamics interpretations, arrows in the figure represent cause–effect links indicating either an increase/decrease (sign) in the value of the vari-

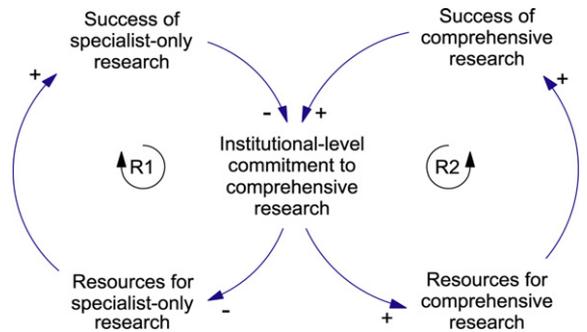


Figure 1 A heuristic depicting our hypothesis that a dominant feedback structure in the university research-policy system perpetuates specialist-only research

able at the head of the arrow, if the variable at the tail increases (all else being equal). The labels R1 and R2 indicate that the loops are reinforcing (positive) feedback loops. The university research-policy system is currently locked into the specialist-only research mode (R1), whereby success reinforces continuation by decreasing institutional commitment to do comprehensive research. Breaking out of this mode would require commitment to comprehensive research by the university research community as a whole to increase to the point that it overrides the success of doing specialist-only research. Currently the policy system in most universities is locked into a mode where specialist-only approaches garner the bulk of available resources, thereby ensuring their success and continued dominance. Here, success is judged largely through publishing and patents – tangible things that are good for branding institutional success, but not necessarily indicative of advancement toward holistic solutions to complex problems.

Moving the system to support comprehensive research, characterised by a productive balance between specialist and integrative approaches, requires a significant redistribution of resources, accompanied by an appropriate incentive system. Given the reinforcing feedbacks within university research-policy systems, uncoordinated efforts will not be enough to produce the required shift in emphasis from specialist-only approaches. Instead we need to identify ‘leverage points’ where achievable interventions will be sufficient to transform the way we do research. Our belief is that, given the inherent feedbacks, a paradigm-level intervention is required to change information flows, rules and goals. Such an intervention would move the global research-system over the threshold into a new state where comprehensive research is more common.

We believe the efforts of governments, university leadership and funding agencies need to integrate. They need to start thinking comprehensively themselves and train

skilled facilitators. We are not talking about simply providing more funding opportunities, or creating high-profile programmes called institutes for sustainability research, which remain fundamentally flawed as long as they are built within a specialist-only research framework. We are talking about adopting a new attitude that reduces the risks for scholars who attempt comprehensive research.

Geographers should also recognise our role in perpetuating the specialist mode of research through failure to work together and communicate effectively to wide audiences – despite our advantage of great diversity within one discipline (Bracken and Oughton 2006). We must ask what our role is in society, not just in a niche-area of academia. We live in a world where environmental and public health issues are escalating regardless of new scientific/engineering solutions that are meant to address them.

We could contribute more to the solutions by uniting our specialties on a common geographical front. This would require removing unnecessary divides in thought and communication – divides that are artificial and perpetuate specialist-only approaches. Only through a common language that increases participation, not limits it, can the commitment of geographers increase enough to make comprehensive approaches more mainstream. This would represent a humble starting point for fostering comprehensive research across all disciplines.

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