Spotlight on…

Critical physical geography

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Introduction

Critical physical geography (CPG) calls for

> *'… the active integration of physical and critical human geography, as demonstrated in the work of geographers who combine critical attention to relations of social power with deep knowledge of a particular field of biophysical science or technology in the service of social and environmental transformation'* (Lave *et al*., 2014, pp. 2–3).

It is a young and emerging concept, first referred to in publication in 2014 by Rebecca Lave and colleagues (Lave *et al*., 2014). The fundamental basis of CPG is that geography is a subject that offers an opportunity to study human-environment interactions in a truly integrative way, and that such integration is fundamental. No discipline other than geography offers a training that can extend from environmental applications of the mass conservation laws derived from fundamental physics through to the emotions surrounding the way in which we relate to the environments we experience. Geographers have shown repeatedly that there is a class of problems (e.g. desertification, soil erosion, river restoration, deforestation, climate change, sea-level rise, environmental pollution) of which our understanding is incomplete without the integration of the different perspectives that come from the social sciences and the natural sciences. Geographers, then, have a contribution to make through integrative work addressing human-environment interactions.

The ideas in Lave *et al*. (2014), aided by a series of workshops, culminated in the *Handbook of Critical Physical Geography* (Lave *et al*., 2018a) The *Handbook* sets out and illustrates the three essential tenets of CPG; briefly that:

(1) we need to study the environment in places where people are present, as much we do places where people are absent, landscapes that we might provocatively describe as 'crappy' (Urban, 2018);
(2) how we relate to such places, as we study them, is not neutral, and cannot be made to be neutral as some scientists would like it to be. Rather, what we do is a product of who we are, where we are and the politics within which we are embroiled. For this reason, we need to be critical of what we do, forensic in questioning the assumptions and hypotheses behind the things we may take for granted; and
(3) our findings have impacts, whether intended or not. For this reason we need to think through the consequences of what we do; and we need to engage in novel kinds of interactions with people that allow our findings, i.e. how we do our research, to be influenced by those for whom our results matter (Lave *et al*., 2018b).

In this article, I reflect upon the kind of integration advocates of CPG envisage. I then expand upon and illustrate the three tenets above using an example from flood risk science. I finish with some reflections upon where CPG will go next.

Integration in geography: a minimal history

To understand CPG, it is necessary to reflect upon the nature of the integration it advocates and what follows is abridged from Lane *et al*. (2018). The notion that geography should embrace some kind of integration between the natural sciences and the social sciences is nothing new. David Livingstone refers to it as the great experiment of modern geography, '… an experiment in keeping nature and culture under the one conceptual

umbrella…' (1992, p. 177). Geography has long been seen as a subject that combines the natural sciences with the study of humanity (Mackinder, 1887) as advocated in the classic text of George Perkins Marsh (1864). The paths taken by modern geography post-Marsh are well-rehearsed. The journey became markedly one-way in the subsequent focus on environmental determinism (human culture as shaped by its environment); and spatially-constrained in the subsequent focus upon regions as units of study.

The focus of the journey shifted from substance to method with the approaches shared between human and physical geography in the quantitative revolution of the 1950s and 1960s, and followed by geography's brief encounter with systems analysis in the 1960s and 1970s. We sometimes perceive that a schism emerged between physical and human geography in the 1970s, as the latter abandoned quantitative methods while physical geography bravely soldiered on. In fact, this schism has origins that can be traced back until at least the 1920s (Castree, 2011). Yet, geographers remain besotted with 'crossing the divide' (e.g. Harrison *et al*., 2008), a concern that is perhaps more than justified given the emerging evidence of the potentially catastrophic impacts of human activities on the environment. In this sense, CPG must be seen as an integrative project, but where the integration advocated is fundamentally different to what has gone before. It explicitly addresses the critique of Johnston (1986) that too much integration in geography is superficial (either humans or environmental processes are overly simplified) and it does so through research that considers three core tenets.

The three tenets of CPG

The first tenet is a critique of how geographers tend to engage with the (natural) science of the environment – one that commonly (but not exclusively) focuses on 'pristine' landscapes (e.g. glaciers, coasts, tropical rain forests) where human activities can either be ignored or reduced to simple drivers (e.g. climate change impacts on glacier recession or sea level rise). Even when less pristine environments are considered (e.g. soil erosion on agricultural land), the sophisticated study of process that the geographer can bring is commonly coupled with a highly unsophisticated treatment of humans, who are reduced to simple descriptors like 'population density'. This is not only a critique of the failure of physical geographers to take people seriously, but also a critique of the failure of human geographers to treat the environment as anything more than a space in which human activity occurs. For example, in the 1970s and 1980s, geographers reacted to the shallow depth of treatment of humans in studies of human-environment interactions by developing the field of political ecology (e.g. Blaikie, 1995). Political ecology built sophisticated understanding of the politics and economics of environments and environmental degradation and, initially, engaged in a serious way with the environmental processes studied. However, this evolved to focus more on representations of nature, with the environment being progressively reduced to a template upon which human activities played out. The first tenet sits within this context and is somewhat provocatively labelled the challenge of 'crappy landscapes' (Urban, 2018). It describes the need to build physical geographies of the places where people live, ones that give a proper attention to both the human geography and the physical geography of the places being studied.

The second tenet is perhaps where the sense of being critical comes from. The study of the practices of scientists ('Science-Technology-Studies') is now a major academic field. Such study, notably with respect to environmental questions (e.g. Lane, 2014), has shown that some of the assumptions made of and by scientists, which are integral to giving science predominance in decision-making, do not hold. For instance, scientists make decisions as to what they study and how they study it. Such decisions are influenced not only by the subject of their study (e.g. a river) but also by a range of others, including the academy (e.g. academic definitions of how a river should be studied) and, increasingly, government and industry (e.g. funding of research into natural flood management). The power to influence what a scientist does is not distributed equally between people and organisations. This raises the question as to who is able to influence what scientists do, and what the inevitability of such influence means for the knowledge produced. This is the sense in which CPG advocates an approach that is critical through actively and reflexively challenging the assumptions and directives we take for granted. By being critical, the idea is that we slow down reasoning and open up different kinds of problems and solutions to those problems (Lane, 2017).

The third tenet recognises that the research that we carry out has impacts, intended or not. Even research undertaken in 'pristine' environments (e.g. rates of glacier recession) has implications that can travel (e.g. to impact policies to mitigate human-induced climate change) and so cannot be seen to be neutral. Rather than naively assuming

that we should exclude consideration of the consequences of our research for the world around us, the third tenet argues that we need to be more sensitive to them, and the ethical issues that follow. Human geographers are much more advanced in this sense with ways of doing research 'with people' rather than 'on people' (see e.g. Pain (2004) on participatory action research). Thinking about the consequences of what we do, and even deciding not to do what we plan when we have thought through those consequences, becomes increasingly important as the academy is required evermore to do research that has impacts beyond the academy itself reaching people and the environment in which they live.

Example: understanding environmental knowledge controversies

Some of these points may seem obscure, and so in the next section I seek to illustrate them. Between 2007 and 2011 I had the privilege to be involved in a project that (though I did not realise it at the time) was an example of CPG in practice. The project has been written up elsewhere as an experiment in radical scientific method (e.g. Lane *et al*., 2011a). In brief, we wanted to develop a new way of doing flood risk science, focusing on two towns – Pickering (in Yorkshire) and Uckfield (in Sussex) – where flood risk reduction had proved challenging under the flood risk management policies adopted by government agencies. This was the sense in which we engaged with the first CPG tenet. When we started the project, flood risk modelling was still dominated by the study of landscapes with few people. Quantifying the geometry of urbanised floodplains had only just become feasible (the late 1990s) with the availability of airborne remote sensing datasets. The mathematical basis of the models used to predict flood inundation still treated people's homes as sites of momentum loss on the floodplain, ones that influenced the propagation of flood waves: homes were represented by locally increasing roughness parameters in flood inundation models. The prediction was motivated by the need to account financially for possible flood losses so as to justify investment in interventions like flood walls (Lane *et al*., 2011a), a system that had led to both Pickering and Uckfield having flood risk reduction proposals that failed cost-benefit analyses. Central to our work, following the first tenet, was to displace our focus into the two study locations, where large numbers of people remained unprotected from floods that occurred with a relatively high frequency.

Second, we aimed to create a way of working that forced us to re-orient the focus of the project away from our 'normal' networks of scientific practice,

A woody debris dam – natural flood risk management above Pickering, UK. Photo: curved-light/Alamy.

towards the communities and environments we were working with. We used 'environmental competency groups' as spaces for people, for whom flooding was a matter of concern, to meet to rethink the issue and how it should be studied. In order to move beyond discourse around the problem of flooding as it was, we used 'things' (field visits, maps, data, photographs and computer models) to create new competencies. The reorientation of our focus was followed and documented (Landström *et al.*, 2011). It showed how by working with people who were connected to flooding in the towns we were working in, we, and particularly the two natural scientists in the project, reoriented our work away from the models and approaches that were the academic norm. We developed a focus upon new kinds of data and new kinds of models that were more sensitive to the places in which we were working. Behind this, though, was a second and more fundamental reorientation, especially in Pickering, away from the underpinning framework for flood risk reduction in England and Wales. We questioned the assumption that measures should protect the most frequently flooded properties first, something that rendered upstream flood storage too expensive in cost-benefit terms given the level of protection it could deliver. The group encouraged the combination of flood proofing for higher-frequency lower-magnitude floods with the design of upstream storage that captured the peaks of floods of lower frequency but higher magnitude. This solution was adopted by the range of government agencies involved in Pickering, thus producing a fundamentally different kind of flood risk reduction founded on other assumptions as to who to protect and when.

Third, in both locations, we made interventions that had impacts. Early on in the process local members of environmental competency groups became clear that they wanted this to be the case. They wanted to make an intervention. In both cases, we had to think about how, where and when to make that intervention and to do so in ways that might support the flood risk reduction that the communities wanted. The interventions we made differed between the two towns. In Pickering, we went 'public' in an exhibition in October 2008, captured by the local media in the phrase 'Together we'll make it work' (Coles, 2008). Pickering went on to become a Defra National Demonstration project, taken forward jointly by the Forestry Commission and the Environment Agency of England and Wales. In Uckfield, the Sussex Wildlife Trust took forward the results from the work in a project 'TrUck – Using Trees for flood alleviation on the Uck'. Both of these initiatives shared the characteristic of being led initially by our groups, then developed further by local members who had, themselves, become experts in flood risk reduction.

Where next for critical physical geography

In the Handbook (Lave *et al.*, 2018b) we sought to assemble a set of case examples of CPG in practice, along with some reflections of the challenges of doing CPG in the academy, such as for early career researchers. When we looked back upon the book, we were struck by the extent to which some (but by no means all) case examples provided excellent reasons as to why CPG is needed, but struggled to put CPG's tenets into practice. The challenge now is to build the capacity for researchers to practice CPG, and we are currently thinking about the resources and support needed to meet this challenge.

The second challenge is giving CPG traction. In North America, this is well advanced and there are even examples of academic posts being advertised in CPG. Other regions of the world are some way behind. In the UK, for instance, very few examples of serious collaborations between human and physical geographers exist compared with the size of the discipline. This perhaps says something about what we have come to value as 'acceptable' geographical research in the 21st century and the constraining effect of the political economy that exists within our own discipline (see Pain, 2004, for similar debates in relation to human geography).

Third, we believe that CPG is not just a development for geography. Many of the challenges it tackles reflect challenges that apply equally in other disciplines, such as Environmental Sciences. The inherent difficulty that we have in separating nature from culture in the 21st century means we need an intellectual space that is policed not by disciplines but by the nature of the things that we study. Indeed, we could argue that the great failing of all disciplines that claim to study human-environment interactions is the disciplinary baggage they bring with them. Geography is uniquely placed for being anti-disciplinary, through the fluidity with which it can, if it so wishes, allow the subjects of its studies to 'speak back' in determining how it is we study them. Other disciplines concerned with human-environment interactions, such as Environmental Science, do not always have this advantage to the same extent. This is a real opportunity for geographical enquiry to lead an approach to understanding the world that seems to be evermore needed.

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