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Tooth, Stephen; Viles, Heather A.

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Equality, diversity, inclusion: ensuring a resilient future for geomorphology

(Running title: EDI in geomorphology)

Stephen Tooth^{1*} and Heather A. Viles²

¹Department of Geography and Earth Sciences, Aberystwyth University, Aberystwyth, UK

²School of Geography and the Environment, University of Oxford, Oxford, UK

*Correspondence to: Stephen Tooth, Earth Surface Processes Research Group, Department of Geography and Earth Sciences, Aberystwyth University, Aberystwyth, SY23 3DB, Wales, UK. E-mail: set@aber.ac.uk

Equality, diversity, inclusion: ensuring a resilient future for geomorphology

Stephen Tooth¹ and Heather A. Viles²

¹Department of Geography and Earth Sciences, Aberystwyth University, Aberystwyth, UK

²School of Geography and the Environment, University of Oxford, Oxford, UK

Abstract

Within and beyond academia, debates around equality, diversity and inclusion (EDI) have been gathering pace. We focus on EDI and geomorphology and address four main questions: 1) why does EDI matter for geomorphology?; 2) what are the barriers to greater EDI in geomorphology?; 3) how can we address these EDI barriers?; and 4) can we ensure a resilient future for geomorphology by addressing EDI? At a time of critical environmental, social and economic transition, we contend that addressing EDI is essential for ensuring a resilient geomorphology, defined here as a discipline that is seen to be adapting to these changing external circumstances so that it remains relevant, vibrant and accessible to a wide cross society of society. Not doing so will limit the intellectual development of geomorphology, incur reputational risk for geomorphological groups and organisations like the British Society for Geomorphology, and ensure that the many potential benefits of geomorphology for science and society remain underutilised at best.

Introduction

We are living through a particularly challenging time for geomorphology, geomorphologists, and wider society. At the time of writing (mid 2020), we face at least three prominent challenges to many established ways of thinking, living and working: the climate and wider environmental crisis, the coronavirus pandemic, and the Black Lives Matter (BLM) movement. The BLM movement perhaps can be seen as the current spearhead for broader debates around equality, diversity and inclusion (EDI) that have been gathering pace, including within geomorphology, physical geography, and the geosciences. Although all three challenges are partly interlinked, in this commentary we focus on EDI and geomorphology. We address four main questions: 1) why does EDI matter for geomorphology?; 2) what are the barriers to greater EDI in geomorphology?; 3) how can we address these EDI barriers?; and 4) can we ensure a resilient future for geomorphology by addressing EDI? At a time of critical environmental, social and economic transition, our overarching contention is that without addressing EDI, attempts to promote geomorphology's relevance, vibrancy and accessibility will be constrained. Not addressing EDI will limit the intellectual development of geomorphology, perpetuate the discipline's lack of visibility in key policy arenas (Tooth, 2009), and perhaps even heighten a risk of 'sleepwalking into oblivion' (Woodward, 2015).

Perspective, context, and background

We are writing partly from the perspective of our current roles as the Chair (2019-20) and President (2019-2024) of the British Society for Geomorphology (BSG). Although shaped and informed by conversations with BSG members and other geomorphologists, we are largely expressing personal perspectives and opinions, and we acknowledge that as White, mid- to late-career academics (one male, one female) within the UK system we bring our own biases and gaps in understanding. Our roles as university educators and our overseas collaborations indicate that much of what follows also applies to many other countries,

including groups or organisations that contain titular terms like ‘geomorphology’, ‘geomorphologists’, ‘geomorphological’ or their non-English equivalents.

From the BSG’s perspective, questions about EDI are timely in view of the fact that 2020 is generally regarded as the 60th anniversary of the establishment of what became the British Geomorphological Research Group (BGRG), the forerunner of today’s BSG (Brunsden, 2007). We can celebrate past achievements by the BGRG/BSG’s pioneers while continuing to adapt Society activities to address the challenges faced. But above all, we can contemplate the future. What do we want the scope and contributions of our science to entail? What do we want the BSG and the wider body of geomorphologists to look like in 5, 10, 20 or another 60 years’ time?

In recent years, geomorphology, physical geography, and the wider geosciences have been addressing EDI. Some progress has been made in addressing gender inequalities, recognising the needs of the differentially abled, and tackling overt discrimination on the grounds of race, ethnicity, culture, sexuality, or other characteristics (e.g. Marshall and Thatcher, 2019; Dzombak, 2020; Bell, 2020). By contrast, on the complex issues of representations of race and ethnicity among student and staff profiles in relevant university departments or professional groups/organisations, geomorphology, physical geography and the geosciences have been relatively quiet, at least until recently (e.g. López and Cesspooch, 2019; Dengler, 2020; Dutt, 2019, 2020; Bell, 2020).

As a university subject, geomorphology tends to be taught as part of broader physical geography, geology, or earth science curricula. In the UK and many other parts of Europe, North America, and the Antipodes, the profiles of undergraduate student cohorts studying such curricula are becoming more gender balanced (Holmes, 2015; Thomas et al., 2017; Sexton et al., 2018; Fisher and Boulton, 2019; American Geosciences Institute, 2019; Handley et al., 2020) but remain dominantly White. For example, in the UK, relatively few physical geography students are drawn from BAME (Black, Asian, and Minority Ethnic)¹ communities in the four countries of the union (England, Northern Ireland, Scotland, Wales) or overseas (Thomas et al., 2017). Given that these UK undergraduate cohorts are the primary feeders for postgraduate, university academic and other professional geomorphological positions, these undergraduate profiles ultimately are broadly mirrored in the BSG’s membership profile. The BSG deliberately does not ask for information on race or ethnicity from joining members, nor for information on other personal characteristics, although new members can volunteer their gender if they so wish. Even without hard data, however, it is clear that while the Society is roughly gender balanced, especially among postgraduate and early career members, the membership is overwhelmingly White, with few members coming from BAME communities in the UK or overseas. This finding would probably apply to many other national and international geomorphology groupings worldwide, where indigenous (e.g. First Nations) peoples and other marginalised communities would also be underrepresented. Within the geosciences more generally, particularly within academia (López and Cesspooch, 2019; Dutt, 2019, 2020; Pérez-Díaz, 2020), similar findings likely widely apply. As one example, Dutt (2020) highlights how the geosciences are among the least diverse science, technology, engineering and mathematics (STEM) fields in the United States, with almost 90% of doctoral degrees awarded to White people (see also Wilson, 2019).

At the heart of the BSG Statement of Strategy (Table 1) is the promotion of geomorphological research, geomorphological educational and outreach, and professional geomorphology in practice. Collectively, these activities aim to ensure a resilient society “in the coming decades” (Table 1, point 4). The provision of communications for BSG members and the wider public is an explicit part of the strategy (Table 1, point 5). In recent years, various approaches to communication have been advocated, trialled and promoted, including the re-design of academic meetings (Gregory et al., 2014), producing a colour brochure that conveys the essence of geomorphology and its importance for society (Tooth and Viles, 2014), and trialling the use of the arts as alternative communication channels (Tooth et al., 2016, 2019). Other activities include attendance at science fairs, media engagement, and greater liaison with geographical organisations (e.g. Clarke et al., 2017). In these approaches and activities, the important consideration of to whom we are communicating and why has been raised (e.g. Tooth et al., 2016; Clarke et al., 2017). To date, communication has largely separated around two poles: to specialist geomorphologists (BSG members and others) and to a largely undifferentiated ‘wider public’. If any internal differentiation is applied to the latter category, then it tends to split along a ‘schoolchildren’ versus ‘interested layperson’ axis.

Table 1 The British Society for Geomorphology Statement of Strategy 2018-2022

The BSG, as the professional British organisation for geomorphologists, will advance the science of geomorphology, and provide a community and services for those involved in teaching, research or practice in geomorphology. It will continue to foster excellence and seek increased support for geomorphology through five main strands:

1. The promotion of **geomorphological research** through supporting the community by sponsoring co-operative and pump-priming research projects and the publication of the results of such research, training of early-career researchers and postgraduates, and supporting and organizing focused meetings and workshops. The BSG also aims to maintain and strengthen research partnerships, specifically through links with the Geological Society and the Royal Geographical Society (RGS-IBG), and enhance our co-operation on an international stage, with European and other international organizations, and with the IAG.
2. The promotion of **educational activities** and the wider public understanding of the science of geomorphology and its contribution to society, its presence in schools, by the preparation and dissemination of training and teaching materials, and the organization of conferences and courses and of related outreach activities.
3. The promotion of **professional geomorphology** by supporting the accreditation of geomorphologists via the CGeog (Geomorph) and other routes, the organization of workshops and conferences for practising geomorphologists, and the development of geomorphological guidance in relation to practice and policy.
4. The strengthening of the **Society’s Financial base** so that it can better carry out 1-3, and ensure resilience of the Society in the coming decades.
5. The provision of **communications** in appropriate formats, for both members and the wider public, in relation to 1-3 and to further ensure 4.

The key point is that the BSG’s communication approaches and related activities typically have not been explicitly designed around addressing EDI, and few specific data are available for an examination of our reach into different communities. Consequently, we do not know fully whether our approaches and activities are actually reaching and benefitting as wide a cross section of the ‘wider public’ as possible. We could be missing entire sections of this public, including people from BAME and other marginalised communities for whom geomorphological knowledge might prove insightful (e.g. in addressing local environmental issues that contribute to physical and mental wellbeing, such as in the design of flood

protection or 'access to nature' schemes), or for whom geomorphology may offer potential study and career opportunities. Certainly, this latter point is strongly suggested by the overwhelmingly White profiles of relevant student cohorts and the BSG membership.

Why does EDI matter for geomorphology?

In the UK, organisations to which the BSG is affiliated have recently released EDI statements that summarise their approaches and activities (Royal Geographical Society (with the Institute of British Geographers), 2020; The Geological Society of London, 2020). In other countries, similar statements have been made by relevant professional organisations (e.g. White and Bell, 2019) and many positive initiatives are underway (American Geophysical Union, 2018), including changes to traditional admissions requirements for USA geoscience graduate programmes (Gewin, 2020). We suggest that the BSG needs to contribute to this debate. Without greater EDI consideration, the discipline of geomorphology may be impoverished, even weakened, for at least three, interrelated, reasons.

First, throughout geomorphology, physical geography and the geosciences, there is growing awareness that different perspectives matter when it comes to identifying and framing topics. What specific aspects of, say, the climate and environmental crisis do we choose to study and why? How do we study those problems, who defines the answers, and who controls the resulting data and information? Critical physical geography is emerging as a distinct approach that, *inter alia*, pays attention to how scientific knowledge is constructed, including by challenging the common assumption that science can ever be politically neutral and by highlighting that the power to influence what scientists study is not distributed equally between people or environments (e.g. Lave et al., 2018; King and Tadaki, 2018). These considerations overlap with new geomorphological subdisciplinary themes such as ethnogeomorphology (e.g. Wilcock et al., 2013) and sociogeomorphology (e.g. Ashmore, 2015; Mould et al., 2018). In the present context, the main implication is that if key topics are to be identified and framed in the most socioenvironmentally equitable manner, then we need input from geomorphologists with backgrounds (e.g. racial, ethnic, cultural) that cover a diverse cross section of society.

Second, tackling identified geomorphological topics depends on recruiting and retaining the very best scientific and social scientific minds, some of which will be found in BAME communities. This is particularly the case for the climate and environmental crisis, where many geomorphologically-relevant topics can be deemed 'wicked problems' owing to their complex, multidimensional (environmental, social, economic) aspects, and the lack of simple 'right' and 'wrong' solutions (Rittel and Weber, 1973). Successful analysis and management of, say, UK upland soil erosion and downstream flooding or Sahelian desertification demands diverse perspectives and approaches that are more likely to come from soliciting high-quality, specialist input from as wide a cross section of society as possible. If we are inadvertently missing or deliberately excluding many sections of society in garnering such input, then our chances of successfully addressing identified problems in the most effective, efficient, and equitable manner are almost inevitably diminished.

Third, different perspectives also matter in situations where geomorphologists rub shoulders with non-academics. For instance, in addressing local or regional environmental issues, there is a growing trend for projects that adopt social-ecological systems frameworks

to facilitate problem co-identification and knowledge co-production. Geomorphologists and other academics may work alongside non-academic stakeholders (e.g. environmental regulators, local community representatives) to establish governance principles that include the voices of resident communities (e.g. Lane et al., 2011; Whitman et al., 2015; Fabricius et al., 2016; Chaffin and Scown, 2018). Clearly, such projects require an ability to listen to, empathise, and establish meaningful dialogue with the environmental concerns of marginalised communities, including respect for indigenous knowledge that may be associated with alternative worldviews (Mould et al., 2018; Daniel, 2019; Wilkinson et al., 2020; Singha et al., 2020). Consequently, greater involvement of geomorphologists with backgrounds in these hitherto underrepresented communities would prove highly beneficial.

What are the barriers to greater EDI in geomorphology?

In the UK and beyond, why is there such underrepresentation in geomorphology from certain sections of society, most notably BAME communities? Similar to the ways in which barriers to equal gender representation in study programmes, university staff profiles, industry, and academic societies have been identified (e.g. childminding responsibilities impacting disproportionately on female careers) and are starting to be addressed, we can identify a number of barriers (defined broadly to include disincentives) to the greater involvement of BAME communities with geomorphology. These barriers start with entry to undergraduate degree programmes but carry through to postgraduate study and beyond, thereby ultimately influencing membership of the BSG and other similar organisations. They may also impact on the level of engagement with other education and outreach activities. The following list is undoubtedly not comprehensive but merely indicative.

1) Histories of the discipline. Whether intentional or not, many histories of geomorphology may be seen as exclusionary, incomplete or alienating, particularly because of the problematic early development of many aspects of the science in the exploration, colonisation, land (mis)use and/or resource exploitation of many parts of the so-called 'New World'. The discipline's main histories are remarkably silent on these issues, although some do explore the influence of colonial and post-colonial settings on geomorphological research in countries such as Nigeria and Papua New Guinea (e.g. Faniran and Jeje, 1993; Sullivan et al., 1993). In dryland Australia, work in the 1950s and 1960s by government bodies such as the Commonwealth Scientific and Industrial Research Organisation (CSIRO) established regional geological and terrain-mapping surveys (Tooth and Nanson, 1995) and thus the platform for the development of benchmark desert geomorphology textbooks (e.g. Mabbutt, 1977), but many surveys took place over appropriated indigenous lands, some now returned to traditional owners/custodians. This arguably 'uncomfortable past' of geomorphology is something that may be difficult to acknowledge, but we can be open and honest about the groundbreaking, pioneering geomorphological work that was done under challenging circumstances while also acknowledging any past injustices, some of which may continue to resonate today. As importantly, while such histories tend to focus primarily on the White men that were engaged in pioneering geomorphology (e.g. Davies, 1968; Chorley et al., 1964, 1973; Kennedy, 2006; Burt et al., 2008), we can ask whether there are any 'hidden figures' whose contribution to the discipline's history has been marginalised or ignored. Most indigenous peoples have been curious observers and descriptors of their natural environments, including landforms and surface processes, and their knowledge may

have contributed to the discipline's development. For example, in central Australia, Aboriginal knowledge and an innate ability to 'read the landscape' (e.g. locating water sources) were pivotal in the first scientific expedition to cross the northern Simpson Desert in the late 1930s (Madigan, 1946), an expedition that laid the foundations for later work into the origins and development of the aeolian dunefields and ephemeral rivers. Hence, a re-analysis of the contributors to early, pioneering geomorphological studies might prove instructive as a way of enhancing, rather than rewriting, the discipline's history. The 5th volume of *The History of the Study of Landforms* (Burt et al., forthcoming) will address the lack of diversity in geomorphological histories for the 1960s to 2000s timeframe, but undoubtedly many other diverse histories can and should be explored.

2) *'Parachute science'*. The legacy of the arguably 'uncomfortable past' of geomorphology may permeate the present. 'Parachute science' (Harris, 2004) or 'helicopter research' (Evans, 2018) denotes a situation where researchers from developed nations conduct fieldwork in lesser developed nations, after which they return home to generate publications without involving in-country scientists as co-authors. North et al.'s (2020) analysis of the representation and contribution of African authors on African topics published in high-ranking geoscience journals (including many geomorphologically-relevant journals) indicates that African geoscientists are disproportionately impacted by such publication practices. Such practices are problematic because they marginalise the prospects of host country geoscientists and restrict development of the next generation of African researchers (North et al., 2020). Similar practices are replicated in some other lesser developed parts of the world, albeit not to the same extent. Assuming that such practices impact predominantly on non-White researchers, then this provides another barrier to EDI in geomorphology and the wider geosciences.

3) *Privileging study topics and knowledge*. As the critical physical geography, ethnogeomorphology and sociogeomorphology approaches/themes illustrate (Wilcock et al., 2013; Ashmore, 2015; Mould et al., 2018; Lave et al., 2018), geomorphology may be prone to privileging certain study topics and forms of knowledge. Such privileging may be entirely unintended – for example, emphasising particular types of landscape over other landscape types – but nonetheless may lead to a sense of alienation among underrepresented communities. For example, in our BSG-sponsored colour booklet to promote geomorphology to a wider public (Tooth and Viles, 2014), we tended to emphasise remote, near-pristine landscapes rather than the urban, more heavily modified, landscapes that may be more familiar to some underrepresented communities. We did mention human landscape modification in a putative Anthropocene, a theme that we and other geomorphologists have explored more widely (Brown et al., 2013, 2017; Dixon et al., 2018) but are we really communicating effectively to marginalised, underrepresented communities who may have more experience with channelised rivers and engineered slopes than with more natural landforms? Returning to the critical physical geography theme, should we be paying more attention to the 'crappy landscapes' (Urban, 2018), where landscapes meet people and the full complexities of human-environment interactions are played out?

4) *Perceptions, anxieties, and experiences*. Other barriers include various perceptions and anxieties about geomorphology, or experiences within geomorphology. For some, there

may be a perceived lack of career opportunities for people from marginalised, underrepresented communities, something that is perhaps reinforced by a lack of role models in histories of the discipline or in high-level positions in academia, industry, or academic societies. The recent 'I am a geographer' campaign by the Royal Geographical Society is starting to address these perceptions through diverse case studies of geographical career role models, but more geomorphologists are needed (Royal Geographical Society (with the Institute of British Geographers), no date). For others, there may be anxieties around the discipline's traditional emphasis on remote area fieldwork (The Guardian, 2018; Finney, 2020; Noor, 2020), particularly if this involves travelling to regions or countries hostile to certain sections of society (Pickrell, 2020). As a discipline, we may also wish to examine carefully the culture of fieldwork and other activities (e.g. conferences, meetings) to make sure that we generate positive rather than negative experiences for any geomorphologists from marginalised, underrepresented communities (cf. Clancy et al., 2014; King et al., 2018; Handley et al., 2020). Like other organisations, the BSG has developed a Meetings Code of Conduct and a Professional Ethics Policy to deter any harassment, bullying and discrimination, but there may be other actions that can be taken to further engender a welcoming, inclusive culture in geomorphology (cf. Fernandez et al., 2020).

How can we address the EDI barriers?

If the above is an accurate, albeit partial, identification of barriers to greater representation from BAME communities, then what can the BSG and discipline more generally do to address the issues? Some we cannot address by ourselves, as they require wider shifts in societal attitudes. But others we can address, rolling them into a wider effort to improve the recruitment and retention of a more diverse body of geomorphologists. A possible analogy is with approaches to address female underrepresentation in science, technology, engineering and maths (STEM) subjects at university level through positive gender actions in the UK's schools and universities (e.g. Athena SWAN); ultimately, these approaches may have positive effects on the recruitment and retention of female geomorphologists with implications for the gender profile in senior positions in organisations like the BSG. The UK's Race Equality Charter has similar goals to Athena SWAN and should have positive effects in future for racial equality in organisations like the BSG. Nevertheless, subject-specific actions are also needed. Commentaries and statements on EDI are being released by organisations such as the Royal Geographical Society (with the Institute of British Geographers) (2020), The Geological Society of London (2020), and the American Geophysical Union (2018; see also White and Bell, 2019), and similar conversations are taking place in other disciplines (e.g. White and Draycott, 2020; Royal Society of Chemistry, no date). Assuming such statements translate into practical initiatives in the way outlined by individual geography and geosciences departments (for examples, see Dartmouth College, Department of Geography, 2020 and Dartmouth College, Department of Earth Sciences, 2020), there is much that the BSG and geomorphology can both benefit and learn from. As one example, the International Association of Geomorphologists (IAG) provides grant support for young geomorphologists from less developed countries to attend the four yearly IAG conference or other regional meetings, which contributes to greater EDI in networking and knowledge exchange. Other examples of practical actions that could address some of the barriers highlighted above are outlined in Table 2 but undoubtedly this list is not exhaustive.

Table 2 Possible practical actions to address barriers to greater EDI in geomorphology

Barrier	Possible practical actions
Histories of geomorphology	<ul style="list-style-type: none"> • being honest about potentially problematic aspects of early disciplinary practices (e.g. in student lectures and public talks), while still recognising the scientific advances that were made • commissioning reviews of female, LGBTQ+, Black, Asian, Indigenous or other underrepresented community contributions to geomorphology • engaging constructively with any proposed moves for the renaming of geomorphologically important and culturally significant landscapes (e.g. geomorphosites) and the needs for greater cultural sensitivity in our interactions with those landscapes
'Parachute science'	<ul style="list-style-type: none"> • strongly encouraging, wherever possible, geomorphologists undertaking overseas fieldwork in lower and middle income countries to collaborate fairly with host country scientists, including by reflecting those collaborations in project outputs
Privileging study topics and knowledge	<ul style="list-style-type: none"> • looking more at landscapes within the realm of everyday experiences of marginalised, underrepresented communities e.g. urban landscapes, 'crappy landscapes'
Perceptions, anxieties, and experiences	<ul style="list-style-type: none"> • being mindful of the choice of fieldwork locations • while emphasising the importance of fieldwork, highlighting alternative opportunities in geomorphology that don't rely primarily on fieldwork (e.g. remote sensing, computational modelling, laboratory experimentations, virtual fieldwork) • making time and space to listen to underrepresented communities for ways to develop targeted strategies to best promote the importance of geomorphology and its career opportunities to those communities • identifying and mentoring of geomorphologists from underrepresented communities to serve as a liaison between the BSG and those communities • mentoring and support for geomorphologists in academic and industry positions who can serve as role models to encourage greater participation from underrepresented communities

Can we ensure a resilient future for geomorphology by addressing EDI?

We realise that many BSG members and other geomorphologists may feel that the issues raised in this commentary are uncomfortable, even confrontational. Others may feel that we have not gone far enough. But we hope to have demonstrated that addressing EDI is essential for ensuring a resilient geomorphology, defined here as a discipline that is seen to be adapting to changing external circumstances so that it remains relevant, vibrant and accessible to a wide cross society of society. At a time of critical environmental, social and economic transition, not doing so will limit the intellectual development of a key science of the Anthropocene (Brown et al., 2017; Koppes and King, 2020), incur reputational risk for groups and organisations like the BSG, and ensure that the many potential benefits of the discipline for science and society remain essentially invisible or, at best, underutilised (Tooth, 2009; Woodward, 2015; Clarke et al., 2017; Gardner, 2019). For 60 years the BSG has contributed to the development of geomorphology, a distinct discipline that has advanced the corpus of scientific knowledge and its application. Ensuring that the BSG and the wider discipline make similar advances over the next 5, 10, 20 or 60 years requires us to address current EDI shortcomings. We have proposed some possible actions but undoubtedly there are many more that could be identified. We call on BSG members and other geomorphologists to join the conversation and help enact the necessary changes.

Footnote:

¹ In the UK context, the BAME initialism is widely used. In the USA, BIPOC is widely used to refer to Black, Indigenous, and People of Color. We recognise that such terms and implied groupings may be seen as problematic (e.g. Garcia, 2020).

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Conflicts of interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data availability

Any data that underpin the arguments made in this article will be shared upon reasonable request to the corresponding author.

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