

Institution: University of Cambridge
Unit of Assessment: UoA 14 (Geography)
<p>1. Unit context and structure, research and impact strategy</p> <p><u>Research Structure</u></p> <p>The Geography Department at Cambridge nurtures research excellence, plays a prominent role in shaping the discipline, and is ranked consistently among the top three Geography Departments internationally (QS World Ranking by subject over the past five years). Our research environment is structured to promote engagement with many of the world's most important challenges – climate change, biodiversity conservation, environmental hazards and risk, ice-sheet melting, global inequalities, urban life – and across these geographical domains we can demonstrate academic leadership and influence, research innovation, quality and impact.</p> <ul style="list-style-type: none"> • Six members of staff are Fellows of the British Academy, seven are Fellows of the Academy of Social Sciences and one a foreign member of the Russian Academy of Sciences. In the census period, four staff were awarded RGS medals and awards. • Since 2014, we have made 14 staff appointments of which 1.5 are new established posts. We have opened new laboratories for tree-ring and tephra research and re-built our experimental flume facility; • We currently support five ERC grants, totalling €8.4M, across both physical and human geography; • We have a thriving postgraduate school of c.100 research students each year. Of the 139 doctorates awarded over the census period, 32 have secured academic posts, and 54 postdoctoral positions, in 23 different countries; • Our research engages actively with governmental policy-makers and industrial leaders, in arenas including the World Economic Forum in Davos (2014 and 2019), the United Nations Forum on Forests (2015 and 2017), a White House Ministerial on the future of the Arctic (2016), at the 2018 Nobel Dialogues in Stockholm, and to the House of Commons Defence and Environmental Audit Committees and International Development Select Committee (2017-2018); • Our Impact Case Studies demonstrate not only direct policy engagement but also wider, creative imaginings of past, present and future worlds as expressed through the production of films, theatre plays and exhibitions in museums and public spaces, including work with artists in residence. <p>To secure these achievements, research in the Department is managed by a Research Policy Committee and organised around six Thematic Research Groups (TRGs) and two Research Institutes.</p> <p>The six TRGs are:</p> <p>1) Biogeography and Biogeomorphology (BB)</p> <p>Comprising six returned staff and £2.34M HESA funding (NERC, EU FP7, EU H2020, and EU MSC) plus £127k from Cambridge University sources (to 31 July 2020), this group explores</p>

interactions between biological, physical and chemical processes on the Earth's surface in the context of global environmental change. Research uses large-scale empirical and remotely sensed datasets, laboratory experimentation and computational modelling. The TRG has three sub-themes. *Coasts*, led by the long-established Cambridge Coastal Research Unit, studies the dynamics of biologically-mediated coastal landforms, both through global-scale modelling, showing significantly lower global wetland loss rates under global environmental change than previously modelled, and large scale flume experiments, demonstrating wetlands survive, and act as natural coastal protection, even under extreme storm surge conditions. Research has fed into coastal flood risk policies (see Impact Case Study: **Spencer**, Möller). *Ecosystems processes* focuses on interactions between physical processes and ecosystems to understand spatio-temporal variations and change (**Allen**), demonstrating the crucial importance of non-photosynthetic processes for the terrestrial carbon balance and developing a new mechanistic approach to tree growth (**Friend**) and showing that Arctic forest climate change response differs from previous assumptions (**Rees**). *Complexity in socioecological and environmental systems* applies machine learning and artificial intelligence to simulate all life on Earth (**Bithell**) and models the interconnected dynamics of acute events (natural hazards) and chronic (sea level) changes on ecosystems, landforms and the effects of human occupancy (**Bithell**, Möller, **Palaima**, Reef, **Rees**, **Spencer**).

2) Climate and Environment Dynamics (CED)

With nine returned staff, CED has received £2.7M in HESA research income and £47k in-kind support (to 31 July 2020). The group focuses on understanding processes and impacts of past, present and future environmental variability through a combination of experiments, modelling and field observations. Five returned staff appointments since 2014 have strengthened expertise and inter-departmental collaboration in palaeoclimatology, palaeoceanography, palaeoenvironments, volcanology and atmospheric modelling. Two new laboratory facilities have been established – for tephra and tree-ring studies – extending and establishing community initiatives and international research collaborations (e.g. **Lane** chaired (2014-19) the INTIMATE research network, which reconstructed past abrupt climate changes to understand the mechanisms and impacts of change; **Büntgen** (with **Krusic**) led the COSMIC initiative that integrated worldwide tree-ring databases from 76 partners, establishing the global signature of solar particle events). CED is involved in two NERC Highlight Topic projects concerned with volcanic cloud observations, models and impacts (V-PLUS and R4ASH: **Herzog**, **Oppenheimer**, **Schmidt**, with related projects from **Aubry**, **Vidal**). With ParaCon (joint NERC and Met Office programme), **Herzog** is developing a new convective cloud field model to improve numerical weather forecasting and increase confidence in climate predictions. **Muschitiello** has contributed to two international research programmes in the fast-warming Arctic, including ERC Synergy project Ice2Ice in which he has helped to determine the central role of sea-ice loss in driving abrupt global climate shifts and variability in the Greenland Ice Sheet's contribution to sea level rise.

3) Glaciology and Glacial Geology (GGG)

GGG, based in the Scott Polar Research Institute (SPRI), includes five returned staff, supported by £2.59M of HESA research income, from NERC (including PI leadership in the International Thwaites Glacier Collaboration co-funded with NSF plus multiple 'blue skies' grants), EU (ERC, MSC), industrial (Boeing) and philanthropic (Leverhulme, Flotilla Foundation) sources. GGG focuses on the contemporary state of Earth's large ice sheets as well as their past and future

dynamics. Observational data from innovative remote sensing and geophysical techniques are combined with novel 3D numerical ice-sheet models to understand how glacial processes operate and change through time, and why large ice sheets are increasing their contribution to global sea-level rise. Research under the theme *Glaciology and Climate Change* has contributed to new understandings of atmospheric drivers of melting, meltwater pathways on ice sheets, glacial lake drainage, basal drainage efficiency, and ice-ocean interactions that further amplify impacts of climate change. This research includes the most comprehensive existing physical characterisation of a large marine-terminating outlet glacier system in Greenland, the first record of basal melting from beneath Earth's largest ice shelf, the first direct measurements of ice shelf flexure, and the first identification of subglacial lakes outside Antarctica (**Arnold, Bougamont, Christoffersen, Dowdeswell, Willis**). A second theme, *Glacier-influenced Marine Environments*, focuses on sediment transport and deposition processes in modern glacimarine systems and the reconstruction of past ice sheets (**Dowdeswell**). The *Atlas of Submarine Glacial Landforms* (2016; 612pp), edited by **Dowdeswell** et al., is the definitive academic and industry reference work on this topic.

4) Geographies of Knowledge (GoK)

Involving nine returned staff, GoK has secured £2.04M of HESA research income (ERC, AHRC, Leverhulme, ESRC, RGS) plus £34k from Cambridge University sources (to 31 July 2020; GoK research reveals the spatially differentiated ways in which culturally situated and contested knowledges emerge, acquire authority, and travel within policy discourses, frameworks and processes. GoK's interdisciplinary approach bridges science and technology studies, cultural and historical geography, and geographies of the history and production of science. We have advanced geographical knowledge around three sub-themes: (a) *The Politics of Environmental Knowledges*, explaining the inclusions, exclusions, and the political consequence of specific forms of expertise in national and global assessments of environmental risk (**Bravo, Donovan, Ferraz de Oliveira, Hulme, Owens**); (b) *Polar Knowledges*, showing how cosmologies and ontologies of the northern regions are integral to global geographical imaginations (**Bravo**), and elucidating the construction of indigenous and western cultures in and of the Arctic (**Powell**); (c) *Knowledges for Development*, advancing new post/de-colonial and 'Southern' critiques of (international) development knowledges and practices (**Cullen, Donovan, Hulme, Sanchez-Lopez, Siddiqi**), in particular pioneering new knowledge exchange processes between UK, India and third country partners (**Mawdsley**). Group members have published research monographs that make major contributions to understanding UK science advisory processes (Owens), the cultural dimensions of climate (**Hulme** and as Editor-in-Chief of Wiley Interdisciplinary Reviews (WIREs) Climate Change), studying Arctic knowledges as forms of emergent social and material practice (**Bravo, Powell, Vitebsky**), and the production and circulation of geological knowledges through the material culture of the Anthropocene (**Donovan**).

5) Infrastructural Geographies (IG)

Comprising nine returned staff, IG has been awarded £3.22M HESA research funding with £106k from Cambridge University sources (to 31 July 2020). IG is concerned with the materialities that mould, constrain, and influence human endeavour, including the provisioning networks, institutional arrangements, and technological forces shaping society and space. Drawing comparative insights from Europe (East and West), North America, Latin America, sub-

Saharan Africa and South and East Asia, IG's work explores three sub- themes; (a) *the 'infrastructural turn'*, with leading work including **Amin's** *Seeing Like a City* and **Lemanski's** prize-winning *Citizenship and Infrastructure* and *Hybrid Gentrification* (and see also **Gandy's** *The Fabric of Space* that explores how socio-technical systems sustain city life and enact social difference); (b) contributions on *state infrastructures*, in particular how legal, service and welfare infrastructures differentiate, segregate and subjugate peoples and places (in particular **Jeffrey's** *The Edge of Law* and publications by **Barford, Gray, and Kusiak**), and are implicated in both austerity and care (**Amin's**, **Martin's** and **Strong's** publications, **Gray** and **Susan Smith's** interactive forum theatre 'The Great Austerity Debate' with Menagerie Theatre and Arts Council); and (c) work on *post- to de-colonial development*, critically examining the epistemic infrastructures of 'development' and demonstrating the necessity of a de-colonial perspective (**Radcliffe** *Dilemmas of Difference*).

6) Vital Geographies (VG)

VG considers the complex interplay of human and nonhuman lives, with a focus on the fortunes of entangled naturecultures, the vital history of human populations, and the power relations implicated in the governance of living things. Involving eleven returned staff, VG members have produced 16 books and been awarded £6.85M HESA research funding (Wellcome, ESRC, ERC, GCRF) with £455k Cambridge University income (to 31 July 2020). The strength of this work is exemplified in (a) *Geographies of agriculture, food and nutrition*, exploring food production and security, and embodied attachments between people and land, in the context of pressing environmental challenges (Beckingham, **Howell, Nally, Vira**); (b) *Demography, health and wellbeing*, building on the global reputation of the Cambridge Group for the History of Population and Social Structure (recognised in 2015 as one of the ESRC's 50 'achievements and landmark research contributions' of the last 50 years) to reconstruct historical demographies (**Davenport, Reid**); (c) *More-than-human geographies, political ecologies, and novel naturecultures*, engaging directly with non-human animals (**Barua, Howell, Petri**) and plants (**Gandy, Nally**), and epistemic implications of conservation science concerns (**Adams, Apostolopoulou, Sandbrook, Vira**). VG is particularly active in the Cambridge Conservation Initiative (CCI) and contributes to policy and practice and public understanding beyond the academy, such as **Gandy's** prize-winning documentary *Natura Urbana*, on the post-war history of Berlin through its plants, **Reid's** interactive online atlas of population (populationspast.org), and **Vira's** major photographic exhibition with prize-winning photographer Toby Smith on the Himalayan water crisis (see **Vira** Impact Case Study).

The Department also hosts two internationally renowned **research institutes**. Geography has taken a leading role in both establishing and delivering the **University of Cambridge Conservation Research Institute** in the iconic David Attenborough Building, an innovative venture in interdisciplinary and engaged research on biodiversity conservation and its social context. The quality and impact of our research is exemplified through our **Scott Polar Research Institute** which combines long-held academic excellence with public outreach and policy impact.

1) The **University of Cambridge Conservation Research Institute** (UCCRI), created in 2013 with **Vira** as founding Director and, since 2016, formally established by the University as the first of its Interdisciplinary Research Centres. A network of over 150 researchers across Cambridge brings academics together across disciplines to develop and implement collaborative

programmes on biodiversity conservation and social dimensions of human-nature interactions. UCCRI addresses urgent societal challenges, including: sustainable ways to feed human populations without 'costing the earth' (with the Frank Jackson Foundation); the contributions of nature to the delivery of the UN's Sustainable Development Goals (with the CCI Collaborative Fund and ESRC IAA); strategies for future human and planetary prosperity with natural capital principles (funded by Isaac Newton Trust, A G Leventis Foundation, Luc Hoffmann Institute and Prince Albert II of Monaco Foundation); and evidence-based solutions to ecological collapse and climate disruption that threaten socio-ecological systems (Arcadia Fund). It builds capacity for ECRs through training and mentoring, and is closely associated with the Department's MPhil in Conservation Leadership, which has trained 179 postgraduates from 80 countries since opening in 2010 – the majority now fill prominent conservation leadership roles in countries worldwide.

2) The **Scott Polar Research Institute** (SPRI) is the world's oldest (established 1920) dedicated polar research institute. Under **Dowdeswell's** Directorship, it is an internationally recognised centre of excellence in the study of the Arctic and Antarctic; it has a dedicated building, a mix of science and social science/humanities expertise and an interdisciplinary, collaborative ethos. Seven of Geography's returned staff, nine PDRAs and 15 doctoral students are based in SPRI, which also hosts the research-based MPhil in Polar Studies. The Institute offers regular advice to the Foreign and Commonwealth Office and hosts the secretariat of the Scientific Committee for Antarctic Research (SCAR), which advises the Antarctic Treaty System. SPRI holds the world's premier Polar Library, extensive historic archival, photographic and object collections of international importance, and an embedded Polar Museum with displays on Arctic and Antarctic history and contemporary significance (c. 50,000 visitors/yr; £1M funding from HLF; Impact Case Study: **Dowdeswell et al.**). Its research, information and outreach activities are supported by endowments of £4M+. In the review period, SPRI has organised external events ranging from major art exhibitions at Bonhams, London (2014, 2016, 2018), to a commemorative service for Shackleton and companions at Westminster Abbey (2016).

In addition, the Department's environment is enriched by a prominent role in several cross-**University initiatives**: the Cambridge Centres for Science and Policy (CSaP), Latin American, Asian and African Studies, Earth Observation, Existential Risk, Climate Science, and the University's response to climate change, Cambridge Zero. Academic and research staff are able to interact directly with Government and industry policy fellows through CSaP's research briefings and to feed research findings into influential Government committees, such as the Cabinet Office team leading the preparations for COP26 in 2021.

Research Objectives

The Department's primary research objectives are to: (i) shape the discipline of Geography through rigorous, original, well-evidenced inquiry across a wide range of sub-disciplines; (ii) address new scholarly and societal challenges through collaborative, interdisciplinary working; (iii) recruit outstanding staff internationally and support them to realise their potential at every career step; and (iv) maximise scholarly, policy and public impact through a wide-ranging dissemination and engagement strategy. To meet these objectives, we have:

- *Taken steps to ensure that research income is sufficient to support ambitions* (objective (i)). Since REF2014, the Director of Research has closely monitored grant income by individual, TRG, and source. We now allocate time and resource for applications for

larger / more complex grants, encourage a larger pool of staff to apply for grants and are seeking out a greater range of funding sources. These changes have been incentivised through a workload model and undertaken with targeted support from our research office.

- *Built international and inter-disciplinary collaborations to produce world-leading research on global issues* (objective (ii)). Internationally, we have adopted a project-driven approach, supporting individual researchers and TRGs to collaborate with their counterparts as routine practice, with new initiatives facilitated by internal (Departmental and University) seed-corn funding. During the census period, our collaborations and engagements with leading researchers extended across the Global North and South. The creative research activities of our TRGs reach beyond specialist frontiers, into University-wide interdisciplinary ventures, challenge-led funding opportunities such as GCRF (**Sandbrook**: *The China, East Africa and UK Development Corridors Partnership* with UNEP-WCMC; **Reid**: *AHRC-MRC Pictures of ageing in Africa*; **Vira**: *Transforming India's Green Revolution by Research and Empowerment for Sustainable Food Supplies*, TIGR2ESS) and ODA-related interdisciplinary schemes, and collaborative symposia such as that on *Shrinking Commons* in 2014 (featuring 23 international speakers, and generating the edited volume **Amin and Howell**, 2016, *Releasing the Commons*).
- *Supported and expanded a vibrant and growing early career research (ECR) community* (objective (iii)). Over 40 postdoctoral researchers associated with the Department attended our 'research away day' in 2019. We have actively sought funding for ECRs through EC FP7 MC and EC H2020 MSC, NERC, ESRC, Leverhulme Trust, British Academy, Royal Society and the Commonwealth Scholarship Commission. All five of our current ERC grants include postdoctoral fellows. Our 'Geographies of Knowledge' TRG is the hub for a cross-Cambridge network for ECRs in disaster studies and we lead on the setting up of a national network, via the ERC IMAGINE website, for ECRs working at the interface of human and physical approaches to disaster risk. The 'Vital Geographies' TRG hosts the Political Ecology Group which is an important forum for ECRs in the Department.
- *Enacted strategic staffing decisions to maintain breadth and depth in research excellence* (objective (iv)). Building on opportunities arising from Departmental retirements, harnessing the momentum of the past decade, and following a University-level Strategic Research Review (SRR) in 2017, a 2018-25 staffing strategy is now in place to preserve and enhance the human resource base that underpins our research excellence (see Section 2).
- *Maintained a vibrant research culture and thriving intellectual environment* (objective (iv)). Since 2014, the Department has run an average of eight flagship seminars a year delivered by leading national and international scholars addressing topics across human and physical geography, and over 420 TRG seminars in total (up to June 2019). Our international Distinguished Visiting Fellows programme attracts two guests annually to deliver public lectures, seminars, and postgraduate masterclasses, and to explore future research collaborations. In order of visit, we have hosted: Paul Robbins, Nick Blomley, Diana Liverman, AbdouMaliq Simone, Tania Li, Don Mitchell, Didier Fassin, Ananya Roy, Dorthe Dahl-Jensen, Rebecca Lave, and James Scott. Since 2014, through our Visiting Scholar programme, we have hosted 57 visitors from 24 countries (as of July 2019) to work collaboratively with Department staff. In 2019, celebrating 100 years of teaching Geography at Cambridge, we invited leading geographical scholars, all Department alumni, for our centenary lecture series (Harriet Bulkeley, Derek Gregory, Stuart Lane,

Linda McDowell), and organised a public panel at the RGS on the Spirit and Purpose of Geography which attracted an audience of 550 people.

Impact

We have developed, through the appointment of a dedicated administrator, a comprehensive Departmental communications and engagement strategy and we collaborate with the University communications team on a regular basis. The SRR (2017) recognised the Department's 'exceptional achievements in impact and outreach, which provide a model of best practice which others may wish to emulate'. Our approach has been to promote impact in a wide range of ways with a broad spectrum of stakeholders, as demonstrated by our Impact Case Studies: media productions (**Oppenheimer**), policy interventions (**Spencer** and Möller, **Vira**), and a dedicated Museum (the Polar Museum) with over 350,000 visitors over the census period (**Dowdeswell**).

We actively contribute to University engagement activities, with annual contributions to its Alumni Festivals, Festival of Ideas, and Science Festival, including events on coastal research, climate science, the Arctic and Antarctic and dendrochronology regularly attracting over 300 participants. A number of staff have served as key advisors on governmental initiatives including: HMG BEIS (**Lemanski** served as Expert Panel Member, Digital Built Britain Working Group); UK Government Office for Science Foresight Programme on the Future of Cities (Martin, lead expert); UK Government Committee for Climate Change, Adaptation Sub-Committee and UK Government Climate Change Risk Assessment (Möller); and UK Government's Civil Contingencies Secretariat on long-range impacts of Icelandic volcanism (**Oppenheimer**); and parliamentary advisory and select committees (see Section 4).

Interdisciplinary research

In addition to our leadership of, and contributions to, University interdisciplinary initiatives described earlier, Geography is the lead department in the interdisciplinary research group Global Energy Nexus in Urban Settlements (GENUS), established and convened by **Lemanski** since 2017. GENUS brings together researchers from the Cambridge University Departments of Geography, Architecture, Engineering, Politics and the Judge Business School to undertake interdisciplinary research on sustainable energy for urban dwellers, with a particular focus on the global South. GENUS has secured research funding from the British Academy, the ESRC and CRASSH, and hosted an interdisciplinary design workshop for the Cambridge Festival of Ideas (2019). **Reid** collaborates with the MRC Epidemiology Unit and the Department of Public Health, Cambridge on issues of ageing, health and urban infrastructure. **Hulme's** Leverhulme Major Grant on the *geographies and histories of climate change* links Geography and the Department of History and Philosophy of Science. **Schmidt's** post is shared with the Department of Chemistry to promote interdisciplinary atmospheric science; she leads a NERC Highlight Topic *Volcanic plume understanding and forecasting models* project across Geography, Chemistry and Earth Sciences in Cambridge.

Open research environment

The Department complies enthusiastically with EU, UKRI, Trust, Foundation, and University level policies on Open Access research, the latter being centrally managed and coordinated by

the University's Open Access Service. This service provides the infrastructure (institutional repository); mechanisms (active engagement with publishers to negotiate offsetting deals focused on cost efficiencies whilst preserving the researchers' and University's interests); and administrative expertise to support researchers in disseminating their outputs as widely as possible to advance societal and academic development, whilst complying with funders' Open Access policies. Additionally, staff have developed pioneering open-access (and access on request) cross-institution research resources, such as **Reid** and CamPop's demographic, economic and political datasets (including as described above). **Büntgen** has been instrumental in promoting open access databases for palaeo-climatology (Lead, Past Global Changes PAGES working group Euro-Med2k) and global databases for tree-ring measurements (International Tree-Ring Data Bank) and annual radiocarbon measurements for early medieval times (PI, COSMIC consortium).

Research integrity

All research in the Department is subject to ethical scrutiny; every project (including undergraduate and postgraduate research) requires a priori formal approval from the Departmental Ethics Review Panel. The process of ethical scrutiny is regularly reviewed, conforming with best subject-specific practice for the UK and internationally; reference is made as appropriate to the School of Humanities and Social Science ethics panel, and the University's ethics committee. It is recognised that ethical principles – such as consent – are a process: researchers are encouraged to seek advice when ethical concerns arise; new approvals are required for all ethically-sensitive adjustments to research-in-progress.

2. People

Staff Development

Energetic, enthusiastic staff working in a supportive, inclusive environment are key to research excellence and we attend carefully to staff development at every career step. *Induction* of new academic staff and independent researchers includes meetings with the Head of Department and Director of Research to discuss integration into TRG activities, identify development opportunities, and provide assurance of our commitment to recognition, respect and accreditation for scholarly ideas and achievements. We have a formal *mentoring* programme and we have signed the Research Concordat to support the Career Development of Researchers. Additionally, the Department's training and Research Advice Scheme provides formal and informal opportunities at least once a year, to all staff, on research planning and grant-writing, impact opportunities, and preparing publications for peer-review. We strongly promote *training opportunities* whether delivered by the University (which has an extensive programme for all staff) or through bespoke TRG training on technical needs, such as in environmental monitoring and modelling, or best practice seminars for overseas fieldwork. Most recently, during the Covid-19 pandemic, the Department curated an open access document to support remote research in Human Geography as a collective response to mitigate the disruption to primary fieldwork. There is a formal *appraisal* for all academic staff biannually; a 2018 University Staff Survey found that 97% of Geography respondents thought their appraisal useful. Further recognition of leadership and excellence comes through the University's annual Senior Academic Promotions exercise. The Head of Department and senior staff act as promotion mentors reviewing draft applications. Geography staff have been particularly successful in promotions during this census period with Professorships for Bayliss-Smith, **Spencer** and **Vira**, Readerships for **Christoffersen**, **Herzog***, **Howell**, **Jeffrey**, **Lemanski***, **Mawdsley**, Möller, **Powell***, **Reid*** and **Willis** (* indicates 2020 promotions). Finally, post-retirement research-active colleagues (e.g. Martin, Owens, Vitebsky) remain part of the Department's research culture, through use of the University Voluntary Research Agreements scheme.

To balance research needs with teaching and administrative demands, we introduced a workload model in 2017, enabling us to protect the 40% of academic workload allocated to research across the University. The model recognises the needs of staff at different career stages, and with specific personal circumstances, and allows for long-term project planning and research buy-out, thus supporting academic and research staff at all career stages to take on ambitious and substantive research initiatives. Staff are encouraged to take up prestigious fellowships and visiting positions; see Section 4.

The Department has undergone substantial change in staffing since 2014 with the retirement of eight Professors (Owens, Gibbard, Graf, Martin, Richards, Haining, Bayliss-Smith, Leader-Williams) and one Assistant Director of Research (Vitebsky). An ambitious and creative recruitment strategy to ensure the long-term sustainability of our research excellence has resulted in a number of strategic appointments being made through the census period:

- **Charlotte Lemanski** (2014): Lecturer (now Reader*), broadening the Department's specialism in Urban Geography with a focus on India and South Africa

Unit-level environment template (REF5b)

- Iris Möller (2014): Lecturer (Reader-elect) reinforcing Departmental excellence in coastal geomorphology (since 2019, Chair in Physical Geography and, since 2020, Head of Department, Trinity College Dublin)
- **Alice Reid** (2014): Lecturer (now Reader*), expanding Departmental expertise in historical demography and population studies
- **Matthew Gandy** (2016): Professor of Cultural and Historical Geography, strengthening leadership in cultural, urban and environmental Geography through his ERC Advanced Grant 'Rethinking Urban Nature'
- **Christine Lane** (2016): 1993 Professor of Geography, strengthening expertise in past climatic change and explosive volcanism, bringing her NERC project Deep-CHALLA and leadership of the INTIMATE network
- **Ulf Büntgen** (2017): Professor of Environmental Systems Analysis, bringing expertise in dendrochronology and palaeoclimatology
- **Mike Hulme** (2017): Professor of Human Geography, strengthening leadership in Geographies of Knowledge and expanding the Department's research into the human geography of climate change
- **Chris Sandbrook** (2017): Senior Lecturer, furthering Departmental interests in biodiversity conservation and its relationship with society and, as Director, securing the Department's long-term commitment to the MPhil in Conservation Leadership
- **Richard Powell** (2017): Lecturer (now Reader*), strengthening Departmental and SPRI excellence in the cultural and political geography of the circumpolar Arctic through his ERC Consolidator Grant 'Arctic Cultures'
- **Maan Barua** (2018): Lecturer in Human Geography, reinforcing our expertise in urban ecology and biodiversity conservation, with his ERC Starting Grant 'Urban Ecologies'
- **Francesco Muschitiello** (2018): Lecturer in Physical Geography, expanding Departmental excellence in palaeoclimatology
- **Anja Schmidt** (2018): Interdisciplinary Lecturer in Climate Modelling (shared appointment with Department of Chemistry), and winner, 2018 Arne Richter EGU award for outstanding early career scientist, expanding expertise in atmospheric science and volcanology
- **Amy Donovan** (2019): Lecturer in Geography, holder of ERC Starting Grant IMAGINE, (Geographical Imaginations and the (geo)politics of volcanic risk: cultures, knowledges, actions)
- **Ayesha Siddiqi** (January 2020): Lecturer in Geography, specialist in politics of post-disaster recovery in the global south

*Reader effective from 1 October 2020

The Möller replacement appointment, joining the Biogeography and Biogeomorphology TRG, will take up their post in October 2020 (Emily Lines). Succession planning in relation to the retirement of **Adams** (conservation) in 2020 and the retirements of three further professors (**Amin** (urban studies), **Spencer** (coastal dynamics) and **Dowdeswell** (glacial geology)) after 2022 is anticipated in the 2018-25 staffing strategy. We envisage not only continuity in key areas of distinction but also innovation around new emerging challenges.

Supporting Early Career Researchers (ECRs)

ECRs regularly serve as co-convenors on TRGs, placing them at the heart of our research culture and giving them, and other ECR TRG members, important experience in hosting/chairing

seminars. TRG-specific workshops provide regular sessions for ECRs, give peer-to-peer support and methodological discussions, and include mentoring from senior academic staff. A senior member of staff acts as the Director of Postdoctoral Affairs and all research staff and research-active College staff benefit from Departmental support, including participation in 'research away days' the ECR mentoring scheme, and professional and career development opportunities (including with the University's Postdoc Academy). ECRs are supported to develop grant proposals (often with established staff), write lead publications, apply for fellowship positions and provide PhD supervision when appropriate. Of fifteen ECRs leaving the Department in the census period, nine have gone on to academic posts.

Research, impact leave/sabbatical leave

See study leave arrangements, and Equality, Diversity and Inclusivity statements, below.

Procedures for exchanges between academia and business, industry or public or third sector bodies

An affiliate member of the GoK TRG (Doubleday) is Executive Director of the Cambridge Centre for Science & Policy (CSaP) where **Vira** is a member of the Management Committee. Supported by CSaP, Geography staff held 135 meetings with civil servants and policy makers over the census period. For the period 2019-22, **Mawdsley** is seconded to DfID's UK-India Global Partnership on Development. Through our Research Institute UCCRI, and the Cambridge Conservation Initiative (where **Vira** and **Sandbrook** have been Council members), academic and research staff collaborate with partners from nine major conservation and biodiversity INGOs and policy organisations co-located in the David Attenborough Building, which hosts the largest cluster of conservation organisations in the world. Returned staff (**Adams, Barford, Vira**) work closely with industry through programmes run by the Cambridge Institute for Sustainability Leadership (where **Adams** is a member of the Management Board). Through Cambridge Enterprise, the commercialisation arm of Cambridge University, the Department supports returned staff to undertake consultancy with non-academic and industrial partners (e.g. **Spencer** with The National Trust, RSPB / Birdlife International; **Dowdeswell** with Boeing Aircraft Corporation, Viking Cruises).

Recognition for carrying out research and achieving impact

Please refer to Section 1 – Impact. Carrying out research is strongly weighted in the University's annual Senior Academic Promotions exercise. Both research and impact activities are recognised and scored within our Departmental workload model. Over the census period, eleven staff were funded £191k specifically for impact and outreach activities arising from their research under the University's ESRC Impact Acceleration Account (**Vira** is currently academic lead for the Cambridge ESRC IAA).

Recruitment of doctoral research students

We engage vigorously with the widest possible range of postgraduate funding opportunities, including UKRI NERC ESS DTP, C-Clear DTP and DREAM CDT; UKRI AI4ER CDT; ESRC DTP and KES studentships co-funded by ESRC and industrial partners, Open-Oxford-Cambridge AHRC DTP, AHRC Collaborative Doctoral Partnership (Cambridge, RGS (with IBG)

Unit-level environment template (REF5b)

and Royal Society), GATES and Cambridge Trusts, the Nippon Foundation 'Nereus' Programme and government scholarships from across Latin America. Doctoral student recruitment averaged 22 annually in 2014-19, rising over the period. Over half (53%, 2014-19) of doctoral students were recruited from beyond the UK. The Department expanded its postgraduate recruitment activities over the census period, taking an active part in the University's Postgraduate Open Day, filming introductory talks for the Department website, and creating the new role of Director of Postgraduate Admissions. All applications are reviewed by three academic staff, successful candidates are then interviewed by two academic staff before final approval by the Director of Postgraduate Admissions. We ensure that all involved in recruitment and admissions have undertaken equality, diversity and inclusivity training. Through our Athena Swan programme, we review postgraduate admissions data by protected characteristics annually and remain vigilant against the possible influences of implicit bias and micro-aggressions on recruitment and admissions processes.

Studentships from major funding bodies

Aside from the 26 PhD students self-funding, or funding unidentified, of the remaining 115 PhDs 35% of studentships have been funded by UKRI (ESRC 19%; NERC 10%; EPSRC 3%, AHRC 3%), 26% by Cambridge University central funds and Cambridge Trusts (including Cambridge Commonwealth Trust), 9% by foundations and industrial scholarships, 8% by Cambridge College studentships, and 8% by overseas governments and scholarships.

Monitoring and supporting students to successful completion

All doctoral students are provided with office space, desktop computers and access to Departmental research facilities. Our rigorous monitoring system centres on regular meetings between supervisors and students and full compliance with the Postgraduate Feedback and Reporting System which ensures that all supervisors write termly reports evaluating student progress. These reports are reviewed by the Director of Postgraduate Studies in Geography, the Secretary to the Faculty Degree Committee, and a member of Student Registry. The student is able to comment on and respond to any report. If concerns are raised, the Director of Postgraduate Studies meets with both the student and supervisor(s). In the First Year, the student presents research plans to staff and fellow students at a one-day Department Forum, then meets with their advisory committee for feedback. After eight months they submit a 10,000-word First Year Report, accompanied by research ethics plans and risk assessments, and then discuss it with the advisory committee. In the second year, regular meetings and termly progress reporting continue. Third year students present their research at a one-day Departmental conference and receive feedback from academic and research staff and fellow students. There is a lively Postgraduate Student Committee, with representatives from all years, that meets termly to discuss issues related to progress and welfare. In this census period, the Department has put increased resource into improving submission rates, introducing closer monitoring of submission plans, exploring new opportunities for project co-supervision, and facilitating constructive discussion involving the student, supervisor and Director of the Postgraduate School when timely completion is at risk. This is reflected in improving rates of completion within four years, from just over half in 2013/14 to over two-thirds by 2019.

To aid career development, our Postgraduate School delivers a Skills and Research training programme including sessions on writing up, viva voce examination, developing academic CVs,

postdoctoral funding, getting published, and managing wellbeing. There is also a generous Departmental fund for undertaking research-specific training, fieldwork and conference presentations. As full members of TRGs, research students have opportunities to convene and take part in reading groups, seminars, symposia and workshops, often with international scholars. TRGs also offer postgraduate-specific training activities and PhD students regularly present their findings as part of TRG programmes.

Our PhD researchers benefit from multidisciplinary training environments offered by the University's Researcher Development programme, UKRI research council DTPs and CDTs, including professional development training and academic skills in the physical and biological sciences; the ESRC DTP supported Social Science Research Methods Programme (to which Geography staff contribute); and the AHRC DTP's training programme in research methods and academic leadership for ECRs. We have supported our PhD students to undertake environmental NGO internships (Deltares, Netherlands Institute of Sea Research (NL) and GeoEcoMar (RO)) and placements with industry (Arup) and UK policy organisations (CSaP, FCO, The Treasury). In the census period, five students have been on CASE studentships involving industrial placement support.

Equality, Diversity and Inclusivity (EDI)

The Department of Geography is committed to operating in a welcoming environment where we celebrate our differences and support each other as an equal and inclusive community. Our Equality, Diversity and Inclusion (EDI) Committee has a diverse membership of academic staff, research staff, support staff and students, working together to ensure that best practices in EDI are implemented throughout the Department. Since 2016-17, a cross-department team (academics, ECRs, PhD students, undergraduates), led by a senior academic (**Radcliffe**), has devised an agenda for decolonizing the Department (including student recruitment and widening participation, teaching, research and staffing), currently in the process of implementation. Central to this agenda is the active encouragement of ethnic minority staff recruitment and promotion, and full support for ethnic minority staff in post and amongst the ECR community. In 2019, the Department received an Athena SWAN Bronze Award for its efforts in breaking down barriers to gender equality.

Study leave arrangements

The Department takes full advantage of the University's generous sabbatical leave policy of one term of study leave after six terms of teaching and administration, applicable to all tenured staff and fixed-term lecturers whose contract lasts for more than two years (part-time staff pro-rata). Over the census period, 31 members of staff benefitted from a total of 87 terms of sabbatical leave.

Supporting flexible and/or remote working

The Department supports applications for flexible working and is proud to have a 100% success rate in delivering on formal applications to work flexibly. Since March 2020, we have been organising online fora to discuss ways of undertaking remote research amongst staff, postdoctoral researchers and PhD students.

Career pathways for part-time and fixed-term staff

Academic staff on fixed-term and part-time contracts are given the same access as full-time permanent staff to career development, mentorship and appraisal programmes. We have been successful in developing the career pathways of our fixed-term staff; four of the eight such staff since 2014 have progressed to permanent lectureships (UCL, KCL, St. Andrews, Cambridge), one has been extended at Cambridge and two have secured long-term postdoctoral positions (Cambridge, Durham).

Supporting those with caring responsibilities to attend conferences

Following successful award of Athena Swan Bronze (2019), the Department created a fund to support those with caring responsibilities, covering costs needed to enable fieldwork. The Department is committed to providing childcare facilities for academic staff attending conferences over more than one day. A collaboration with the organisation 'My Family Care' provides all staff with two sessions of emergency care per year to cover unforeseen circumstances outside of normal working hours.

EDI considerations in research support

The Department's EDI Committee reviews all internal support services and EDI is a standing item on all Departmental committees, including the Research Policy Committee. EDI awareness is thus built into all aspects of research activities and staff development. Within the promotions process, staff are able to declare contextual circumstances and all Senior Academic Promotions (SAP) panels undertake unconscious bias training. The Department is moving to a core hours policy to ensure that all key business takes place between 10am and 4pm, with at least 50% of TRG and Departmental seminars and research events over lunchtime to facilitate attendance by staff with flexible or part-time working arrangements, and those with caring responsibilities.

Support for staff and research students returning from periods of leave

Staff are encouraged to apply for the University's Returning Carers' Scheme, which funds research by those returning from a period of care-related leave. The University also supports staff with caring responsibilities through the Supporting Parents and Carers at Cambridge (SPACE) network and childcare salary exchange schemes. In the Department, we run a mentoring scheme for staff returning from parental leave, alongside a 20% reduction in their workload during the first six months to provide additional time to restart research. Staff managing a return to work following ill health or managing long-term illness meet with the Department's safety manager to ensure they are provided with accessible research facilities.

Support for staff with protected characteristics

The Department is committed to being an accessible and welcoming working environment for all. To nurture a supportive environment for staff with protected characteristics, staff training includes sessions on dignity at work. Priorities for training are set by our commitment to EDI, and our decolonizing agenda. Additionally, our Assistant Department Administrator takes a lead on EDI issues, working closely with the EDI committee (chaired by the Head of Department) and collaborating with the University's Disability Resource Centre and other central services to ensure that the research and working environment supports staff with protected characteristics.

Supporting the wellbeing of staff and research students

The Department's Wellbeing Committee fosters a sense of community for all staff, including research students. It arranges a number of social events and other dedicated activities throughout the year including daily tea/coffee, weekly yoga and regular local visits (e.g. to University Museums and Botanic Garden). Regular online bulletins and noticeboards advertise events and provide information on support services. PhD students receive training in managing their wellbeing and PIs are trained in support for research staff. All members of the Department have access to the University's Counselling Service which offers wide-ranging wellbeing support. Since March 2020, specific Covid-19 related support and advice have been made available to staff and researchers via the Department Intranet, and through the University's central services.

EDI in the construction of the REF submission

All returned staff (and some leavers) are mentioned in this environment template; all have been regularly kept informed of the development of the submission and invited to comment on drafts. We have followed the University of Cambridge's Code of Practice closely, inviting individuals to self-nominate outputs for submission, reviewed by a minimum of two Committee members, seeking external advice where required. We participate in the University's Equality Impact Assessments after each selection round to ensure that no group of individuals has been discriminated against. Our outputs come from the full breadth of our Departmental specialisms. All REF Committee members have undertaken equality and diversity and unconscious and implicit bias training. The REF Committee has two nominated leads for EDI who ensure that the Committee is vigilant in mitigating against any possible sources of implicit bias.

3. Income, infrastructure and facilities

Research funding and strategies for generating research income

With a full-time research administrator, we now allocate time and resource for applications for larger / more complex grants, encourage a larger pool of staff to apply for grants and are seeking out a greater range of funding sources. These policies have brought considerable success. In the period 2013-20, the Department was awarded £19.7M in HESA funding, an increase of 106% over the REF2014 census period (£9.6M). Of the 200 grants in total, 28 were for over £100k, eight over £250k, five over £500k and four over £1M. Whilst growth in UKRI grants (45%) and income from UK-based charities (18%) resulted in a stable proportion of income over the two census periods, the most noticeable rise in income was from EU-funded research, at £6.2M an almost three-fold increase on the REF2014 reporting period. To this HESA income can be added income received from Cambridge University sources, totalling £759k (to 31 July 2020), and including 16 grants to the Department from the Cambridge Conservation Initiative and 15 grants from the Cambridge Humanities Research Grant scheme. In May 2020, SPRI held an endowment income of £4M.

Organisational infrastructure supporting research and impact

Significant investment in state-of-the-art laboratory facilities, technical and research staff since 2016 means that the Department now houses: (i) the Tree-Ring Unit, specialising in dendroclimatology and dendrochronology and (ii) the Cambridge Tephra Laboratory, which unites palaeoclimate and volcanology researchers. The Geography Science Laboratories have been awarded platinum in the University's Green Impact Awards since 2016-17, recognising best practice in sustainable laboratory management. These developments sit alongside our established research units (Cambridge Coastal Research Unit, Cambridge Group for the History of Population and Social Structure) with co-located staff and PhD students, and the research clusters associated with our five ERC-funded projects. The nearby David Attenborough Building houses UCCRI, providing meeting rooms and social spaces to draw researchers together with conservation-focused NGOs and policy groups. We employ a full-time research administrator; following an administrative review and reallocation of duties, we have secured more capacity to better support the grant cycle, from conception to delivery.

Operational and scholarly infrastructure

The Department benefits from world class library resources, both within its main building and at SPRI, with full access for all members to the University's main copyright library and its satellite libraries – containing over eight million books and journals, a research resource of global significance. The recent affiliation of the Geography Library to the wider Cambridge Libraries Network has expanded existing connections to services, staff and resources leading to collaborative projects including tailored researcher training options, direct access to key e-resources which support researcher output, and improved accessibility options through reinigorated online library facilities that benefit remote working.

The Department has up-to-date and fully supported computing and IT services, complementing the central services of the University (for email, site-wide WiFi, software licences, reporting systems). Geography contributes to, and derives substantial benefits from, the £14M EPSRC/STFC-DiRAC /industry Cambridge Service for Data Driven Discovery (CSD3) High

Unit-level environment template (REF5b)

Performance Computing facility which has 50,000 cores. It particularly aids the modelling work of **Bithell, Bougamont, Christoffersen, Friend** and **Herzog** (and new appointment Lines). The Department also benefits from the West Cambridge Data Centre, which provides access to energy efficient centralised storage and cloud services. The Department's team of five IT staff (including a Website Developer and Geomatics Technician) supports desktop computers, laptops, three major operating systems, networking, and high-performance local hardware for computational simulations; workstations have recently been upgraded to include expanded memory and solid-state disk. Audio-visual facilities support 4K video, and remote video conferencing, with 80" low-energy touch screens in seminar rooms. 2020 DAFNI demonstrator funding now adds a geo-data virtual reality suite. Fileservers provide access to data from any location, including a local cloud service, and automated backup. Software, including state-of-the-art packages such as ARCGIS, QGIS, R, and Matlab, are available for specialist needs in human and physical geography. The Department has a 40-seat computing suite.

EDI in research funding support and access to infrastructure

Refer to Equality, Diversity and Inclusivity in Section 2. The EDI systems in place in the Department ensure access to support in research grant preparation and access to infrastructure for all staff, including those with protected characteristics.

Infrastructure, facilities and expertise are utilised in relation to impact activities

The Department regularly opens its laboratories and uses its space intensely during the annual University Science Festival and Festival of Ideas weekends and the Alumni week, inviting the public to a variety of demonstrations, workshops and lectures by Departmental staff and PhD students. The SPRI Polar Museum offers exceptional opportunities to deliver research impact, with a dedicated museum team working closely with polar researchers on a rolling programme of exhibitions and outreach (see Impact Case Study **Dowdeswell et al.**). In 2015, we hosted photographer Toby Smith as Leverhulme Trust funded Artist-in-Residence at UCCRI, leading to a programme of exhibitions and collaborative projects with UCCRI researchers.

The nature, quality, provision and operation of specialist research infrastructure and facilities

The SPRI archives, and Cambridge Group for the History of Population and Social Structure databases, and their respective visitor spaces, are in high demand from national and international researchers. The Department also holds the Cambridge University Collection of Aerial Photography, a unique archive of half a million images searchable via an online interface.

Evidence of cross-HEI shared or collaborative use of research infrastructure

The Department facilities and infrastructure are used by external partners. The Department flume has been used for FAST, BLUECoast and RESIST projects (European and UKRI partners), while CSD3 is used by researchers for ecosystem modelling. Many international visiting scholars have made use of our new dendrochronology laboratory. In turn, Departmental research collaborations make use of research facilities around the world. **Rees** has used Arctic field stations through the EU-INTERACT scheme three times since 2014. The British Antarctic Survey's Collaborative Gearing Scheme provided logistical support for **Rees's** deployment to Antarctica and the US Antarctic Program and Koplean Polar Research Institute supported **Oppenheimer** on three Antarctic missions in the census period. See also Section 4.

Significance of major benefits-in-kind

Oppenheimer received in-kind STFC support for beamline time at Diamond Light Source for XANES studies of mantle oxidation state. **Lane** was supported by UKRI (NERC) Isotope Geosciences facilities for improved dating of modern human evolution in the Middle - Late Pleistocene, East Africa. The use of the UKRI (NERC) Field Spectroscopy Facility (**Rees, Möller**) has made ground referencing of remotely sensed imagery possible. The use of geotechnical testing facilities at the British Geological Survey, under NERC CASE Studentship arrangements, has allowed first assessments to be made of the stability of wetland sediments. The Hydralab and Hydralab+ RESIST projects (**Spencer, Möller**) included in-kind funding to cover the running costs of the Large Wave Flume (GWK) facility in Hannover, giving the ability to test saltmarsh response to true-to-scale storm wave and storm surge impacts.

4. Collaboration and contribution to the research base, economy and society

Research collaborations, networks and partnerships

In addition to SPRI and UCCRI collaborations, significant networks and partnerships include:

- **Büntgen's** wide ranging collaborations with 67 partners from 57 institutions around the world in dendrochronological research.
- **Christoffersen** acts as a UK Lead PI on UKRI (NERC) – NSF US\$23 M International Thwaites Glacier Collaboration, one of the largest scientific collaborations ever to be undertaken in Antarctica.
- **Christoffersen's** UKRI (NERC) (SAFIRE) and ERC (RESPONDER) collaborative projects to Store Glacier, Greenland with Stanford University, USA, British Antarctic Survey and Universities of Aberystwyth and Leeds.
- **Donovan's** lead on 'science in society' in UKRI £20M 'Tomorrow's Cities' research hub, working with over 200 institutions worldwide and with centres in Istanbul, Kathmandu, Quito and Nairobi, to reduce disaster risk, particularly among the urban poor.
- **Donovan's** key role in UKRI NERC- DfID LANDSLIP project, working with the Geological Survey of India, UK Met Office and British Geological Survey to produce an early warning system for landslides in India.
- **Dowdeswell's** academic leadership on international collaborative scientific expeditions to the Weddell Sea, Antarctica, using novel high-resolution AUV technology to investigate sea-ice basal processes, bottom-water formation and seafloor landforms.
- **Friend's** collaborations with Northern Arizona University, Harvard University, Polish Academy of Sciences and WSL, Switzerland on observations, experimentation and modelling of tree growth and carbon cycling, including NSF– UKRI (NERC) collaborative project.
- The Urban Salon (**Gandy**, founding member), a London-wide series of seminars and events that link LSE, UCL, Kings, Goldsmiths, Brunel, Cambridge and Leicester.
- Margaret Anstee Centre for Global Studies, initiated in 2018, located at Newnham College and directed by **Mawdsley**, employing four postdoctoral fellows and focussing on international relations and development.
- **Lane's** chairing of the INTIMATE network of paleoclimate researchers. Global membership of >250 researchers, known to have established new methods and approaches in paleoclimate research, including the widely used Greenland event stratigraphy and open access INTchron tool.
- **Oppenheimer and Donovan's** co-leadership of the Mount Paektu Geoscientific Group (now Mount Paektu Research Centre), in collaboration with colleagues in DPR Korea, enabling conferences and research programmes involving geoscientists from DPRK, RoK and China.
- **Rees's** long-term collaboration with Geography Faculty, Moscow State University, expanded in 2017 to include the Institute of Geography and Institute of Space Science of the Russian Academy of Science, as well as British Antarctic Survey. This collaborative network is funded at Ministerial level in Russia and by the British Council and Foreign and Commonwealth Office.
- In demography, **Reid's** collaborations with the Universities of Leicester, Edinburgh and Oxford (as Co-I, £10M Leverhulme Centre for Demographic Science).

- **Susan Smith's** enduring collaboration with RMIT University, Melbourne and, more recently, Curtin University, Perth, and UCLA using three national panel surveys to track changes in housing wealth and mortgage debt at the edges of home ownership, funded from 2019 by the Australian Research Council.
- **Spencer's** collaborations on global wetland futures (Universities of Lincoln, Southampton, Kiel, Antwerp, Humboldt, Macquarie, Monash and UNEP-WCMC, Global Climate Forum, Virginia Institute of Marine Science, United States Geological Survey) and nature-based coastal protection and urban flood risk (UC Berkeley, National University of Singapore).
- **Willis' collaborations** on ice-sheet and glacier hydrology with ETH Zurich, Universities of Chicago, Colorado, Columbia, USA and Oxford, UK.

Engagement with key research users, beneficiaries or audiences

Interactions have included:

- **Adams' research** on large scale conservation in the UK funded by DEFRA, which led to a review with Natural England of conservation in England, Scotland and Wales, shaping UK nature conservation policy on rewilding and landscape-scale restoration;
- **Donovan's** membership of the UN Office for Disaster Risk Reduction (UNDRR) working groups for the Global Risk Assessment Framework;
- **Oppenheimer's** collaboration with USGS Hawaiian Volcano Observatory in R&D of volcano monitoring equipment and support of ongoing surveillance of gas emissions;
- **Radcliffe's** British Academy Project on the Sustainable Development Goals' Leave No One Behind Agenda 2016-18, engaged Ecuador's Ministry of Economic and Social Inclusion, five Equality Councils, the Secretariat for National Development Planning, Office of Plurinational Affairs, and Secretariat for Public Management, and culminated in a July 2018 workshop. A follow-up UK workshop disseminated findings to the ODI, DfID and Save the Children;
- **Martin's** ESRC Cities Economic Performance project which has been disseminated widely through presentations to HM Treasury, Department of Business, Energy, Innovation and Skills, the UK Core Cities Group, the UK Key Cities Group and the European Commission;
- **Sandbrook's** work with conservation professionals around the world, including direct contribution to strategic plans for organisational change with environmental NGOs;
- **Vira's role** as Chair, Global Forest Expert Panel on Forest and Food (2015) and his membership of the High-Level Panel of Experts, Committee on World Food Security's report on Sustainable Forestry for Food Security and Nutrition (2017). He presented findings at the United Nations Forum on Forests in New York (2015 and 2017) and at the Conference of the Parties (CoP) meeting of the United Nations Convention to Combat Desertification (UNCCD, Ankara, 2017).

Wider contributions to the economy and society

Consultation

- **Dowdeswell and Christoffersen** are working with divisions of the Boeing Aircraft Corporation on the development of scientific payloads for Unmanned Airborne and Autonomous Underwater Vehicles to make systematic measurements of otherwise inaccessible parts of the cryosphere.

- **Hulme** served as expert reviewer of IPCC and IPBES reports as well as special advisor to the Church of England working group on fossil fuel divestment.
- **Mawdsley** has given both oral and written evidence to the International Development Select Committee on the definition and governance of Overseas Development Assistance.
- **Mawdsley** has been involved in shaping research policy for development, and allocation of funding, for the Norwegian Government Ministry of Foreign Affairs as a member of the NORGLOBAL project board.
- **Powell** was an Oral Witness before the House of Commons Environmental Audit Committee on 'The Changing Arctic' and has submitted written evidence to both the House of Commons Environmental Audit Committee and the House of Commons Defence sub-Committee, 'Defence in the Arctic'.
- **Radcliffe** serves on the external advisory group to the Santo Domingo Centre of Excellence for Latin American Research, British Museum.
- **Susan Smith** has engaged with innovation in equity finance for housing, gave invited advice to the Rightmove Business Strategy Review Board and presented at Future Build for Design England in the Excel Centre, March 2019.
- **Spencer** served as expert reviewer for the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (2018) and is Contributing Author, IPCC Assessment Report 6, Working Group 2 (2020-date).
- **Vira** has served from November 2018 as a member of the Economic Advisory Panel to the Chief Economist at DEFRA.

Engagement with diverse communities and the public through its research

Department staff are champions of Geography as a discipline within public discourse; they appear regularly and frequently within major media outlets, including BBC Radio 4 (e.g. In Our Time, Infinite Monkey Cage, Inside Science, Museum of Curiosity, Midweek, Today, The World at One), the BBC World Service, CNN, The *Guardian*, Al Jazeera, The Conversation, BBC TV news and Sky News. Examples of engagement with diverse communities include:

- **Bravo's** Pan-Inuit Trials Atlas, with Dalhousie and Carleton Universities, Canada, where digital mapping has changed the way the Inuit Arctic is visualised in academic and popular culture;
- **Donovan's** 'in conversation' on 'political geologies' with artist in residence Rachel Pimm, Whitechapel Gallery, London, February 2020;
- **Gray** and **Susan Smith's** Arts Council-funded forum theatre production 'The Great Austerity Debate' toured the UK in 2018, reaching audiences of over 1,500 in 25 unconventional venues (including a former miners' reading room, a community centre and a trade union office);
- **Lemanski's** workshops with community groups and housing and infrastructure policymakers to discuss housing strategies in the city of Cape Town;
- **Oppenheimer** featured on Radio 4's Life Scientific in December 2018 on the 'volcanic offerings of our angry earth' (see Impact Case Study);

- The outreach website www.populationspast.org allows users to trace the geographical distribution of population change over time. Developed by **Reid** in consultation with teachers, it has several hundred visits daily since launching in April 2018;
- **Vira's** collaboration with photojournalist Toby Smith resulted in the exhibition *Pani Pahar* (water research in the Himalayas – see Impact Case Study) featured as a photo essay in *The Guardian*, and in one of Delhi's premier cultural and intellectual hubs, the India Habitat Centre.

Contribution to the sustainability of the discipline

Cambridge is a national and international champion of the discipline of Geography. Our research and research training refresh the discipline and its impact and our professional service to Geography and cognate disciplines is expressed through many venues, including:

- **Amin's** serving as Foreign Secretary to the British Academy 2015-19, an important role in promoting the humanities and social sciences at national and international level, and overseeing c. £20M of international grant funding on topics centrally relevant to Geography;
- **Arnold's** membership, NERC Peer Review College (2012-date);
- **Bravo** as UK representative, International Arctic Science Committee, Social and Human Working Group (2014-20);
- **Christoffersen** as UK representative, International Arctic Science Committee, Cryosphere Working Group (2016-date);
- **Donovan** as founding member, steering committee, UK Alliance for Disaster Research (2016-date);
- **Friend** as Vice-Chair, EC H2020 Marie-Sklodowska-Curie Initial Training Networks - Environment Panel (2016);
- **Jeffrey's** collaborative project with the RGS, Royal Holloway and Oxford on Geographical Expertise in Legal Settings, leading to training guides (2018-present) and a collaborative session at the RGS-IBG Annual Conference (2019);
- **Martin's** Presidency of the Regional Studies Association (2015-20);
- **Mawdsley's** elected Council membership of the RGS-IBG (2014-17);
- **Powell's** service on the UK Arctic and Antarctic Partnership Steering Committee, only the second social scientist ever to be appointed to the Committee (2017-date);
- **Radcliffe's** election to Chair of the Royal Geographical Society-IBG annual conference in 2017, and service as a Member of Council, and Research and Higher Education Committee (2016-18);
- **Reid's** Presidency of the European Society for Historical Demography (2016-19);
- **Spencer's** membership of the NERC Strategic Policy Advisory Group (2017-19) and NERC Advisory Network (2019-date);
- **Willis** as Council Member and Treasurer, International Glaciological Society (2013-18).

Indicators of wider influence

Journal editorship

Departmental staff serve as coordinating, executive or consulting/associate editors on 22 significant-, and on the editorial boards of a further 20, leading international journals, as well as on book series for RGS-IBG, AAG Wiley-Blackwell Encyclopaedia of Geography and Geopolitical Bodies, Material Worlds, Rowman and Littlefield International.

Participation on grants committees and university reviews

Staff have served on 12 UK research grants committees and ten international grants committees, including peer review colleges for the NERC (and Large Grants Moderating Panel), AHRC, ESRC, as well as chairing the international evaluation panel on the Centre for Demographic Studies, Barcelona (**Reid**, 2017), serving as a member of the European Research Council, Advanced Grant Panel SH3 (**Amin**, 2013-16) and chairing a number of the British Academy's international research programmes and fellowship schemes (**Amin**, 2015-19). They have also delivered a number of University reviews including for the Faculty of Life and Environmental Sciences, University of Iceland (**Adams**, 2015), the International Institute for Applied Systems Analysis (**Friend**, 2017), the School of Geography and Environment, University of Oxford (**Amin**, 2015) and the School of Geography, University of Nottingham (**Amin**, 2017).

Fellowships

During the census period, staff have held Fellowships and Visiting positions at South China University of Technology, Technical University of Berlin, Universidade Federal de Minas Gerais - Belo Horizonte, Brazil (**Amin**); Masaryk University, Czech Republic, Swiss Federal Research Institute WSL (**Büntgen**); University of Canterbury, New Zealand (**Christoffersen**, **Dowdeswell**); Pacific Adventist University, Papua New Guinea (**Cullen**); Montana State University, USA (**Friend**); University of Johannesburg, RSA (**Lemanski**); The Arctic University of Norway (**Rees**); Curtin University, Perth and RMIT University, Melbourne, Australia (**Susan Smith**); University of Boulder, Colorado, USA (**Willis**).

Prizes and honours

Awards to staff (in descending date order) in the census period include:

- Fellow of the British Academy (**Radcliffe**, 2020; **Gandy**, 2016)
- Swedish Research Council's annual Olaf Palme Visiting Professorship for 2021, awarded 12/2019 to **Amin**
- Lyell Medal Geological Society of London (**Dowdeswell**, 2018)
- RGS Busk Medal (**Vira**, 2018)
- EGU Arne Richter Award for Outstanding Early Career Scientists (**Schmidt**, 2018)
- Fellow of the Learned Society of Wales (**Dowdeswell**, 2016)
- RGS Victoria Medal (**Martin**, 2016)
- RGS Gill Memorial Award for early-career achievement (**Lemanski**, 2015)
- Commander of the British Empire (CBE) for services to social sciences (**Amin**, 2014)
- IASC Medal of the International Arctic Science Committee (**Dowdeswell**, 2014)
- RGS Victoria Medal (**Susan Smith**, 2014)
- AAG Meridian Book Award for Outstanding Scholarly Work in Geography (**Gandy**, *The Fabric of Space*, 2014)
- International Planning History Society Award (**Gandy**, *The Fabric of Space*, 2014)

Membership of research council or similar national and international committees

Staff are members of 37 research council and other scholarly committees.

Invited keynotes, lectures and/or performances, or conference chair roles

Staff have delivered numerous invited keynote lectures around the world. A small selection of these include: the 2020 Silas Peirce Distinguished Lecture in the Humanities 2020 (**Bravo**), Cultural Geographies Annual Lecture, AAG (**Gandy**), 55th Annual Nobel Conference at Gustavus Adolphus (**Hulme**), Summer Institute in Urban Studies Plenary Lecture, Singapore 2018 (**Lemanski**), Centre of Cities Horizon Keynote Lecture (Martin), the 2016 Plenary Lecture, Society for the Study of Nineteenth century Ireland (**Nally**), Charla magistral, Futures Congress, Santiago, Chile (**Oppenheimer**), the Goldsmith Lecture, Australian National University (**Reid**), the George Armstrong Lecture at the Royal College of Paediatrics and Child Health Annual Conference (**Reid**), the 2016 William Smith Lecture at the Geological Society of London (**Dowdeswell**), and the Doran Fund Annual Lecture 2014 (**Vira**). Our staff have also served as conference chairs for a number of prestigious conference events, for example the EGU Galileo Conference on the Anatomy of Abrupt Climate Change, 2018 (**Lane**), the Annual Conference of RGS-IBG, 2017 (**Radcliffe**), and the British Association of South Asian Studies Annual Conference 2016 (**Vira**).

Refereeing academic publications or research proposals

Staff peer review for well over 100 leading journals. We also act as reviewers for 45 funding organisations, including the British Academy, the Leverhulme Trust, Nuffield Foundation, UKRI and Wellcome Trust, and many international organisations.

Cooperation and collaborative arrangements for PGR training

- **Bithell** and **Spencer** were PIs, Nippon Foundation's Nereus Program, a multi-centre international US\$ 3M research programme on ocean futures co-ordinated from the University of British Columbia, Canada, with responsibility for PhD training and postdoctoral researcher supervision in Cambridge, with UNEP-WCMC partner.
- **Bithell** and **Spencer** have served as Cambridge Centre Directors, NERC CDT DREAM (Data, Risk and Environmental Analytical Methods consortium; with Cranfield, Newcastle, Cambridge and Birmingham Universities) with PhD student management across Cambridge Departments and local organizers, DREAM Symposium, 2017 and 'Challenge Week' September 2019.
- **Lane** organises the INTIMATE research training school in paleoclimate which has run four summer schools since 2013, attended by 20 ECRs and co-organised with local hosts and a core team from The Netherlands, UK and Germany.
- **Lane** has served on the management committee of the NERC-funded C-CLEAR (Cambridge Climate Life and Earth) DTP, with particular responsibility for postgraduate admissions.
- **Vira** is Chair of the Management Executive Group, Cambridge ESRC DTP.