Institution: University of Brighton

Unit of assessment: C14 Geography and Environmental Studies

1. Unit context and structure, research and impact strategy

1.1. Context and structure

This document presents Geography research at the University of Brighton (UoB) as a single submission for the first time since RAE2001. Over the census period, we have strategically refocused our staff base and reoriented our mission: to produce multi- and interdisciplinary research at the interface of society and environment and translate this into impact in all its forms. We have grown research income by 31% and increased the RCUK/UKRI proportion from 13% to 48%; invested £1.32m in new laboratory provision; strengthened research support; enhanced our training environment for postgraduate research students (PGRs); increased PhD awards by 40%; and expanded the range of partnerships, networks and intellectual leadership roles involving our staff. UoB is now positioned to produce research that influences Geography as a discipline, capitalises on synergies with archaeology and the geosciences, and addresses major global environmental and societal challenges.

Staff in the UoA are based within two Schools (Environment & Technology [SET; 31FTE]; Pharmacy & Biomolecular Sciences [PaBS; 7.6FTE]), which are responsible for appointments, staff development and administering local funding for research support. Central to research strategy is the organisation of research under cross-School, multidisciplinary *Centres of Research & Enterprise Excellence* (COREs) and UoA-based *Research & Enterprise Groups* (REGs). COREs and REGs act as intellectual hubs and have porous boundaries to promote interdisciplinary working; 23 staff in the UoA are allied to more than one Centre or Group:

- Research on *water science*, *aquatic ecosystems* and the *human uses of waterscapes* takes place in the Centre for Aquatic Environments (CAE), where UoA staff constitute 24 of the 29 Centre members;
- Research at the intersections of *feminist geographies*, *political ecology* and *social justice* takes place in the Centre for Spatial, Environmental & Cultural Politics (CSECP), where UoA staff constitute 12 of 47 members;
- Research in *environmental change* and *geoarchaeology* takes place in the Past Human & Environment Dynamics REG (7 members); in *terrestrial biogeography* in the Ecology, Conservation & Zoonosis REG (9 members); in *pollution and waste management* in the Environment & Public Health REG (8 members); and in *geo-resources* and *geological processes* in the Applied Geosciences REG (9 members).

1.2. Research and impact strategy

1.2.1. Achievement of our strategic aims for research

In REF2014, 15 physical geographers, geologists and environmental scientists were submitted to UoA7 and 6 human geographers to 3 other UoAs. Following the decision in 2015 to reorient our mission, the research and impact goals identified in these 4 submissions were reviewed and aligned with the UoB Research & Enterprise Strategic Plan. The resultant aims for research, and evidence of their achievement, are outlined below:

1. Invest in our research themes and emerging areas of multidisciplinary research. Research in the CAE has been strengthened by 5 appointments (see 2.1.2), 17 UoB/School PGR studentships, the establishment of an Environmental Genomics Laboratory (3.3.1), the expansion of hydraulic flume facilities and purchase of 5 Unmanned Aerial Systems (UAS or drones). Four ECR appointments and 12 UoB/School PGR studentships have supported social and cultural geography research in the CSECP. Infrastructure for geochemistry research in the Applied Geosciences REG has been expanded through investment in a new Surface Analysis Laboratory and ICP-MS, with 2 strategic appointments bridging geomorphology and geology and 4 UoB/School studentships in this area.

2. Optimise internal structures to deliver the Concordat to Support the Career Development of Researchers (hereafter termed the Research Concordat). We have enhanced support for junior colleagues by extending our mentoring provision, ring-fencing seed-funds, introducing new strands of development activity and formalising ECR representation on all decision-making committees (see 2.1.3). We have made permanent the contracts of all fixed-term lectureship appointments (2.1.2). We have optimised structures to encourage staff to reach out externally, with junior colleagues winning their first UKRI grants (3.1) and awards from learned societies (4.4), and senior staff taking up major intellectual leadership roles (4.1). Reflecting our commitment to equality, diversity and inclusivity (EDI), our Schools attained Athena SWAN Silver (PaBS) and Bronze (SET) awards in 2018.

3. Enhance the research environment through recruitment of high-quality PGRs. We have enriched our PGR training environment through membership of 4 new UKRI Doctoral Training Partnerships (DTPs) and a Horizon-2020 Marie Skłodowska-Curie Innovative Training Network (ITN): the ESRC South Coast DTP (lead: Southampton); AHRC Techné DTP (lead: Royal Holloway); EPSRC Science & Engineering in Arts, Heritage & Archaeology (SEAHA) DTP (lead: UCL); an EPSRC DTP; and WEGO (Well-being, Ecology, Gender & cOmmunity) ITN (lead: Erasmus University Rotterdam). PGR awards have increased from 29.5 to 49FTE.

1.2.2. Intellectual achievements

Delivery on our strategic aims has led to research outcomes that have shaped intellectual agendas in Geography and cognate disciplines. We have published 438 papers, 69 book chapters and 13 books, including 20 articles in *Transactions*, *Environment & Planning* and *Science/Nature-family* journals.

Staff in the CAE have undertaken research at the leading edge of water science, aquatic ecosystem change and human conceptualisations of waterscapes, with papers in *Science*, *Scientific Reports* and *Environment & Planning*:

- Human geographers have developed new theorisations of hydrocitizenship to explain how emergent forms of water governance are shaped through increasingly restrictive access to water resources (**Church, Gearey**); and created a new conceptual definition of cultural ecosystem services (**Church**, **Ravenscroft**), incorporated into methodological frameworks used by the UN Intergovernmental Science-Policy Platform on Biodiversity & Ecosystem Services to analyse the non-material benefits of nature.
- Water and sanitation researchers have produced a hydrated lime-based alternative to chlorine treatment that better protects humanitarian staff and patients from cholera- and Ebola-laden human excreta, deployed globally by Médecins Sans Frontières and included in World Health Organisation (WHO) guidelines (**Ebdon, Gomes Da Silva, Taylor**; see Impact Case Study [*ICS_WaterSanitation*]); and developed novel bacteriophage-based tools to improve drinking water quality (**Ebdon, Purnell, Taylor**; [*ICS_DomesticWater*]).
- Fluvial geomorphologists have used advanced inertial sensors to provide the first evidence for upscaling measured Lagrangian metrics in natural sediment transport conditions (**Maniatis**); demonstrated that inter-flood frequency is a key variable determining sediment and contaminant flux through gravel-bed rivers (**Ockelford**); and shown that large rivers evolving under contrasting hydrological regimes may have similar morphologies but marked differences in stratigraphy (**Ashworth**).
- Biogeographers have provided the first evidence of microplastics in the brain of any crustacean species (**Crooks, Pernetta**); shown that phenethyl isothiocyanate derived from watercress farming can be lethal to fish and affect fish communities (**Crooks, Joyce, Pernetta**); and demonstrated that increasing temperatures in the last 100 years are associated with increased carbon sequestration in Arctic coastal wetlands (**Ward**).

Staff in the CSECP have made interventions in feminist geographies and political ecology, taking human geography to interdisciplinary audiences through papers in the *Journal of Human Rights*, *Journal of Peasant Studies* and *European Journal of Public Health* in addition to mainstream Geography journals:

- Researchers working on lived experiences of enclosure, authority and precarity have produced empirically-grounded theorisations focusing on anxieties around austerity and indebtedness in the UK (**Dawney, Bonner-Thompson**); and developed an intersectional feminist political ecology analysis of contested community impacts of oil palm extractivism in Indonesia with policy and NGO actors (**Elmhirst**).
- Researchers working on geographies of sexualities have advanced agendas on what makes LGBTQ lives liveable within the limits of equalities laws and transnational resistances (**Browne, McGlynn**); developed insights on materiality and affect in the street activisms of racialised sexual and gender minorities (**Lim**); and devised relational geographies of LGBTQ lives in embodied relationships with digital technologies (**Bonner-Thompson**).

Staff in our REGs have made significant contributions in physical geography and cognate disciplines, with papers in *Nature Communications*, *Science Advances* and *Scientific Reports*:

- In the Past Human & Environment Dynamics REG, researchers have identified the main source of the sarsen megaliths at Stonehenge (**Nash, Ciborowski, Maniatis, Ullyott**); and developed the first calorific template for the human body (**Cole**), leading to a re-evaluation of the motives for human cannibalism across European archaeological sites. These papers have attracted considerable public interest, with the Altmetric Attention Scores for both in the top 0.01% of >17.2m outputs analysed.
- In the Ecology, Conservation & Zoonosis REG, researchers have combined field survey and citizen science to generate the first data on UK-wide urban fox populations in 30 years, revealing an increase in fox density and a range expansion into northern cities (**Scott, Berg, Tolhurst**; [*ICS_Coexistence*]); used global species-level data to quantify the influence of land elevation on extinction risk in birds (**White**); and demonstrated that including forest structural information is crucial to establishing relationships between biomass and synthetic aperture radar backscatter (**Brolly**).
- In the Environment & Public Health REG, researchers have demonstrated, in response to a Defra COVID-19 Urgency Call, that whilst atmospheric NOx levels fell across the southeast UK during the first period of lockdown, other pollutants including ozone increased (**Wyche, Smallbone**); and through studies in Shanghai, shown the importance of personal interactions with volunteers in maximising levels of domestic waste recycling (**Harder, Woodard**; [*ICS_FoodWaste*]).
- In the Applied Geosciences REG, researchers have used sedimentology and cosmogenic nuclides to model uplift in the Andes, showing that the western Cordillera attained much of its elevation before 14 Myr (**Evenstar**); established an integrated formational model for the worlds' largest rare earth element (REE) resource (Bayan Obo, China; **Smith**); and shown that sediment concentrations in giant submarine gravity flows are orders of magnitude higher than directly-measured smaller-volume flows in river deltas and submarine canyons (**Georgiopoulou**).

1.2.3. Enabling interdisciplinary research

Underpinning our research success is an ethos of interdisciplinary working. This is facilitated by (i) multidisciplinary membership of COREs and (ii) the porous boundaries between COREs and REGs, which promote the cross-fertilisation of ideas, combined with (iii) internal and external sandpits (eg with the Institute for Development Studies) to promote collaboration and (iv) investment in laboratory instruments with multidisciplinary applications (see 3.3.1). Our interdisciplinary vision and capacity is evidenced by: geomorphologists and geochemists co-developing methods for provenancing archaeological raw materials in Botswana and the UK (**Ciborowski, Hopkinson, Maniatis, Nash, Smith, Ullyott**; British Academy); physical geographers co-creating historical climate chronologies for southern Africa with environmental historians (**Nash, Ashworth**; NERC, Leverhulme); geomorphologists, geochemists and microbiologists co-researching processes of marine steel corrosion (**Burgess, Caplin, Moles, Smith**; industry-funded); human geographers, with activists and health practitioners, co-developing new approaches to LGBTQ well-being (in Canada, India, UK) and healthcare provision (Europe-wide) (**Browne, McGlynn**; ESRC, EU); and remote-sensing experts and geoarchaeologists co-supervising SEAHA DTP students with heritage practitioners (**Brolly, Burnside, Carey**).

1.2.4. Achievement of our strategic aims for impact

In our submissions to REF2014, we emphasised our approach to impact through problem-to-solution partnerships with national and international industries, agencies, charities, NGOs and activists. This approach has continued and underpins our 4 ICSs. As with our goals for research, common strategic aims for impact have been identified within these submissions:

1. Increase engagement and generate links with new non-HEI partners. Since 2014, UoA staff have worked with 26 non-HEI partners on funded projects, ranging from the global (eg Kenya Medical Research Institute on the £240k MRC One Health project; **Gomes Da Silva**) to the regional (Southern Water on the £206k Water Reuse Applications Phase II; **Ebdon**, **Mayor-Smith**). We have expanded our networks via 3 UoB partnership hubs (Community-University Partnership Programme; Green Growth Platform; Clean Growth UK; see 4.2, REF5a), events organised by our COREs, and focussed staff development (2.1.2). New partners include: South East Water, to assess health risks associated with the augmentation of drinking water supplies by treated wastewater (**Purnell**; *[ICS_DomesticWater]*); Chinese authorities and NGOs, to inform policies that have achieved 78% recycling rates for food waste in Shanghai (**Harder, Woodard**; *[ICS_FoodWaste]*); and the National Institute of Cholera & Enteric Diseases (India), to identify typhoid transmission routes in Kolkata (**Ebdon**; *[ICS_WaterSanitation]*).

2. Disseminate and publicise the impact of our research. Impact Policy Officers have led workshops for COREs and REGs on strategies to link with audiences. We have engaged TV viewers with urban ecology research through content design and appearances on 8 BBC wildlife series (**Scott, Tolhurst**; see 4.6, *[ICS_Coexistence]*), written pieces for *The Conversation* attracting 191k readers in >20 countries (**Bilotta, Ciocan, Cole, Nash, Scott**), and co-authored articles with partners in industry- and public-facing publications including *Water* (**Ebdon, Gomes Da Silva**), *Institute of Water* magazine (**Purnell**) and *British Archaeology* (**Nash, Ullyott**).

3. Support staff to engage with knowledge exchange. We have used workshops to encourage knowledge exchange. Successes include: **Bilotta** won two NERC Knowledge Exchange Fellowships that generated papers with Prof. Ian Boyd (Defra), then Chief Scientific Advisor, on improving the policy impact of research and with Environment Agency staff on the impact of hydroelectric schemes on riverine biodiversity; **Ockelford** participated in the Royal Society Pairing Scheme (2018-19); **Berg** is Co-I on a £229k Knowledge Transfer Partnership with Medisort to develop waste material recovery processes in the healthcare sector.

1.3. Open research environment and research integrity

In delivering our research and impact strategies, the Unit has made significant progress towards an open research environment. We have taken positive action to share research findings and data in line with UoB Open Access and Data Management policies. Advice on open access publishing and open data is provided through university-wide and UoA-specific workshops. Open access compliance within the UoA for journal articles accepted since April 2016 is 95%. In line with the Concordat on Open Research Data, all externally-funded projects by current staff that were completed since funders' policies on data sharing were introduced (and for which we are able to make the data available) have shared their datasets through the Brighton Open Research repository and/or an external data centre.

Ethics and integrity are integrated within everyday practice to ensure that all researchers engage with policies and ethics management systems. Staff obligations are set out in UoB policies on Research Integrity and Research Ethics and procedures for Research Misconduct. Deputy Heads (Research & Enterprise) in both Schools work with Ethics & Governance Managers to promote the Concordat to Support Research Integrity via workshops and awayday sessions. Training on research integrity is compulsory for PGRs and new PIs and is part of induction for all new staff. UoB operates a three-tier ethics review system and maintains a 'Code of Good Practice in Research' and 'Guide to Good Practice in Research Ethics & Governance' (reviewed annually by the University Ethics & Governance Committee). UoA staff participate in ethics reviews in their Schools, influencing and implementing best practices.

1.4. Research strategy to 2025

Capitalising on synergies between our disciplines, SET and PaBS will be merging in August 2021 to form the 109FTE School of Applied Sciences. In this context (and aligned with UoB's 'Brighton 2025' strategic goals; see REF5a), we identify 4 objectives to develop our research base, grow our international influence, and enhance research areas with the strongest potential to deliver environmental and societal gains. These objectives will be facilitated via our staffing and staff development strategies (see 2.1) and mechanisms for PGR support (2.2):

1. Develop the next generation of research leaders. We will enhance research, training and career development opportunities for Post-Doctoral Research Fellows (PDRFs) and junior academics by: (i) embedding UoB Leadership Programmes for women and BAME staff into our mentoring provision; (ii) enhancing internal peer review processes and staff development initiatives (see 2.1.3) to maximise funding and publication success; (iii) using mentoring and workshops during UoB 'ECR Development Month' to promote global leadership opportunities (eg membership of AGU/EGU/RGS-IBG committees, leadership of international networks).

2. Training the next generation of researchers. We will expand and develop our PGR community through: (i) applications for new DTPs (eg to reflect our growing NERC-facing portfolio; see 3.1), the addition of a human geography pathway to the ESRC South Coast DTP, and, in line with UoB strategy, targeted investment to promote new access opportunities for PGRs with protected characteristics; (ii) creating new MRes programmes aligned with areas of research excellence (eg riverine/estuarine processes, environmental politics); (iii) enhancing the provision of internships by COREs to strengthen the pathway from undergraduate to PhD; (iv) developing PGR placements to enable students to visit overseas groups or laboratories.

3. Enhance our research sustainability. We will retain critical mass to support our research activities by continuing to grow high quality (eg UKRI, EU) funding through: (i) mentoring staff to apply for individual scholarship awards (eg fellowships); (ii) streaming a proportion of Quality Research (QR) income awarded to Schools and COREs to support international academic partnership development; (iii) promoting opportunities for ECRs to develop bid-writing and award management experience as Co-Is on major grants alongside senior colleagues.

4. Maximise the benefits of our research. We will enhance our already successful portfolio of engagement with organisations and communities beyond HE by: (i) deepening our relationships with key partners (eg in the environment and water sectors); and developing new national and international partnerships by (ii) increasing the number of externally-facing events organised by our COREs, and (iii) working with the UoB Media & Communications team to develop multi-media materials to further publicise the impact of our research.

2. People

2.1. Staffing and staff development

2.1.1. Staff profile

Category A submitted staff include 22% Professors/Senior Managers, 39% Readers/Principal Lecturers/Principal Research Fellows, 31% Senior Lecturers/Senior Research Fellows and 8% Lecturers/Research Fellows. 97% are on permanent contracts; 81% work full-time; 17% are ECRs; 37% female; 8% BAME; 13% declare a disability; and the median age range is 41-50. This profile aligns with the Advance HE sector average for gender (40% female), but includes a higher proportion of full-time staff (sector: 68%) and staff with disabilities (sector: 5%), a lower proportion of BAME staff (sector: 12%) and is older than the sector median age range (31-40).

2.1.2. Staffing strategy

Since 2014, the Unit has delivered on 2 strategic goals for staffing:

1. To recruit outstanding researchers with the potential to become intellectual leaders. We have appointed high calibre new and replacement staff to strategically reorient the research focus of the UoA whilst ensuring expertise to deliver our taught courses:

- In the CAE, staff have been recruited to strengthen established areas of excellence (eg water science) and build interdisciplinary capacity. ECR **Maniatis** and **Ockelford** have enhanced research on the impacts of fluvial processes on pollutant transport and riparian ecosystems; **Mayor-Smith**, recruited from the water sector, has added expertise in water treatment to existing strengths in aquatic pollution; **Gearey** has strengthened research in emergent forms of water governance and **Joseph** in urban flood resilience.
- In the CSECP, human geography ECRs **Bonner-Thompson** and **McGlynn** (a former UoB PDRF) have extended strengths in the geographies of sexualities through explorations of spaces beyond major cities and in embodied relationships with digital technology; and ECRs **Gilbert** and **Jenkins** in political ecology and environmental justice.
- ECR **Wyche** has expanded air quality expertise within the Environment & Public Health REG; **Georgiopoulou** and ECR **Evenstar** have strengthened research at the interface of geomorphology and geology in the Applied Geosciences REG; and former UoB PGR student **Penny** has enhanced research into large mammal biogeography and conservation in the Ecology, Conservation & Zoonosis REG.

2. To retain talented staff in areas of research strength and develop research leaders. We follow a policy of nurturing and retaining our staff (eg ECR **Wyche**, appointed Research Officer, now Principal Lecturer); and, as part of longer-term succession planning, of supporting staff to develop their intellectual leadership profiles (eg **Burnside, Ebdon, Elmhirst, Smith** promoted to Reader, **Browne, Ebdon, Elmhirst, Joyce, Scott, Smith** to Professor; see enabling mechanisms in 2.1.3). We strive to minimise the use of fixed-term contracts. All 4 fixed-term lectureship appointments since 2014 have had their contracts made permanent, and all fixed-term PDRFs are offered redeployment. Reflecting our commitment to our technical team, UoB became a signatory to the Science Council Technician Commitment in 2020.

Colleagues who have moved to academic posts elsewhere have always left to take up more senior positions: **Dawney** (to Exeter); **Gilbert** (Sussex); **Jenkins** (Edinburgh); **Browne** (Chair, University College Dublin); **Cundy** (Chair, Southampton); **Firth** (Dean, Canterbury Christ Church); **Scott** (Head of School, Keele); **Ravenscroft** (Pro-Vice Chancellor, Royal Agricultural College). **Ashworth** and **Church** were promoted to Associate Pro-Vice Chancellor at UoB but maintain significant research profiles in addition to their leadership roles. The census period has also seen the retirement of **Awcock, Bilotta, Caplin** and **Teasdale** and passing of **Taylor**.

2.1.3. Staff development

Under our commitment to the Research Concordat, we recognise the primacy of staff development for enhancing individual and collective research. Our approaches used to support staff (including PDRFs) acknowledge that individuals may have different emphases on research and teaching in their roles:

1. Career development and mentoring. Staffing policy, underpinned by a transparent workload model, ensures equity of teaching and administration. Staff have 20% of their workload ring-fenced for research, with externally-funded time allocated on top of this allowance. University policies on research integrity, ethics, open data and open access publishing are introduced during induction, with ongoing training provided through the UoB Researcher Development Programme. All staff have an annual Staff Development Review. Five senior colleagues in the UoA (**Ebdon, Elmhirst, Joyce, Moles, Smith**) have benefitted from University leadership programmes, with four promoted to Personal Chairs subsequently. Directorship of COREs and REGs is rotated to provide research leadership experience.

In line with the UoB Research Mentoring Framework, all new staff benefit from a mentor; 19 colleagues in this UoA received ≥1 year of mentoring support during their early years of tenure. Since 2020, BAME staff can also access central mentoring and allyship programmes. Targeted mentoring has driven a sharp increase in the proportion of bids submitted by female staff, from

11% (2014) to 40% (2020). Each year, 20-25 staff are supported to attend conferences. All staff with ≥1 years' service can apply for a research sabbatical, with ~£10k awarded to cover teaching replacement and direct costs. Thirteen staff (7 female) have benefited from sabbatical leave since 2014, including 3 then-ECRs. Sabbaticals have been used to complete strategic outputs and funding applications. **Ockelford**'s sabbatical, for example, underpinned a NERC Global Partnerships award (2020) to develop an international network on the use of wood as a management tool in rivers, with partners including the US Geological Survey.

2. Rewarding talent. UoB promotion procedures recognise talent at all levels. Support for applications is provided by Schools' promotions-readiness workshops and mentoring by staff with experience on promotions panels. BAME staff can also access bespoke workshops. Since 2014, 67% of submitted female staff (compared to 58% male) have been promoted by at least one grade. Staff have been recognised through UoB Excellence in Research & Enterprise awards for Outstanding Project (**Cole**, 2018, for Palaeolithic cannibalism research) and Impact (**Ebdon, Gomes Da Silva**, 2019, for interventions in water, sanitation and hygiene).

3. Stimulating innovation through investment of QR and HEIF. At UoB, QR funds are invested directly to underpin a suite of researcher development initiatives; all staff, including PDRFs on fixed-term contracts, can apply to every scheme. Twenty-three staff (11 female) in the UoA have received central support: Rising Stars awards of £10k/project, targeted at ECRs, to 15 staff (8 female); Impact & Knowledge Exchange awards (£3k) to 4 staff; Proof-of-Concept awards (£10k, underpinned by HEIF) to 5 staff; and a Brighton-Sussex Collaborative Fund award (£10k) to **Joyce** to identify emerging priorities in aquatic research. These awards have led to publications, UKRI, Royal Society and industry funding (eg **Purnell**'s 2015 Rising Stars research leveraged £82k from Southern Water, with this follow-on project nominated for the Water Institute Innovation Award, 2018; *[ICS_DomesticWater]*) and generated data on human-carnivore coexistence in South Africa to underpin *[ICS_Coexistence]*.

QR is also allocated directly by Schools, with ~40% prioritised for ECRs. Schools' Research Investment Funds (~£60k annually to staff in this UoA) provide support for innovation; 10% of the 2020-2021 budgets was ring-fenced to support staff whose research was impacted by COVID-19, including funding a 3-month contract extension for a Southern Water project. Output Enhancement awards (£6k annually) support the completion of publications and funding bids. Together, these schemes have supported 7% of the outputs in REF2, including novel studies of microplastics in aeolian and fluvial systems (**Ebdon, Ockelford**) and air pollution by 'black carbon' (ECR **Wyche**). QR underpins seminar series, writing retreats and 'Lunch & Learn' sessions where Research Services staff lead workshops and PGRs provide progress updates. It also covers 0.2FTE of CORE Directors' salaries and funds CORE-specific events (eg the annual CAE Lecture Series) and partnership development.

4. Support for ECRs and PDRFs. UoB provides a skills-enhancement programme for ECRs (including PDRFs), incorporating training in bid-writing and grant management, and a biennial 'Futures Bright' conference. It operates a successful ECR Network coordinated by an ECR Ambassador who sits on all University-level research committees. **Ockelford** holds this post (2019-2021), with 20% workload relief to allow her to develop ECR activities. ECRs are given a reduced teaching load (~75% of the median) and no significant administrative responsibility during the first 2 years in post. ECRs are paired with established supervisors to develop mentored PGR supervisory experience. PDRFs are provided with tailored career development mentoring and teaching opportunities, including fieldwork, to expand their portfolios. The success of this approach is shown by NERC PDRFs **Estrade** and **Villanova de Benavent** taking up lectureships at Université de Toulouse III and University of Barcelona, respectively.

2.2. Research Students

PGR students in the Unit are consistently the most satisfied at UoB, evidenced by a 96% satisfaction score for supervision in our latest Postgraduate Student Experience Survey (PRES) results. Each benefits from the resources of the Brighton Doctoral College (BDC), with local support provided by Schools' PGR Coordinators. PGRs sit on Schools' Research & Enterprise

Committees and CORE Management Boards and help shape the research environment, eg human geography PGRs in CSECP have led staff/PGR reading groups (*Climate Change* and *Planetary Humanities*), external symposia (*Infrastructure for Troubled Times*, 2018) and public events (*Refugee & Migration Film Festival*, 2019).

2.2.1. PGR recruitment and progression

Since REF2014, we have supervised 62 students to completion (49FTE; Table 1); at end-July 2020, our PGR community comprised 38 students (15 in CAE, 13 in CSECP, 10 in REGs). BDC staff oversee recruitment and monitor EDI-related aspects of selection. Over the census period, the proportion of female PGRs has risen from 32% to 45% and BAME PGRs from 32% to 36%. Students have been supported by 14 studentships linked to RCUK/UKRI projects and DTPs, 2 from the WEGO-ITN and 13 from overseas governments (including Brazil, Iraq, Nigeria, Saudi Arabia). Links to industry (eg water and viticulture sectors) and government bodies (eg Environment Agency) have yielded 5 studentships and enabled knowledge exchange. UoB/Schools have invested in 37 studentships to support the UoA. Each PGR receives 90 hours minimum supervision per year (pro-rata), with annual reviews to ensure progress (documented via the PhD Manager online system). Stipends were made available in 2020 to students impacted by COVID-19, including grants to assist home-working (see discussion of COVID-19 support in REF5a).

Table 1: PhD awards by year (note: Professional Doctorates are not offered in the UoA)

	Year	Awards (FTE)
	2013-14	4.50
	2014-15	7.50
	2015-16	7.50
	2016-17	7.83
	2017-18	10.67
	2018-19	6.67
	2019-20	4.25
Total		**48.92**

2.2.2. Skills development and support

We operate equitable policies on training and access to resources. All new PGRs (including part-time) have their training-needs assessed against the Vitae Researcher Development Framework and monitored via annual progress reviews. Methods and impact training are provided by the BDC Postgraduate Researcher Development Programme. Advanced training and networking are provided by DTP/ITN cohort activities, eg students on the SEAHA DTP have a co-supervisor from the heritage sector to embed impact, receive interdisciplinary training in heritage sciences and take part in field courses and public engagement events. Latest PRES results indicate 89% satisfaction with Research Training.

The UoB PGR community meets annually for the Festival of Postgraduate Research. Students are supported to disseminate their work and, where appropriate, co-publish with supervisors; 19% of the outputs in REF2 are co-authored with PGRs. Conference attendance is facilitated by the BDC Research Student Conference Support Fund, which has assisted 25 (mainly self-funded) students to present their work at national and international meetings. Students can also benefit from a central BAME mentoring scheme. PGRs are encouraged to take part in national competitions, eg a CAE student was selected to present her research on riverine microplastics at the House of Commons 'STEM for Britain' event (2019). Full membership of COREs, shared office spaces and cross-UoA supervision ensure that all students (including part-time) are embedded in everyday research life. Latest PRES results indicate 87% satisfaction with Professional Development opportunities.

The career destinations of our PGRs demonstrate that our support strategies are working. UoB graduates hold lectureships (in Afghanistan, Brazil, Canada, Nigeria, UK) and research posts (Brazil, Portugal, UK, USA), and senior roles in industry and the environment sector (eg Proctor & Gamble, Southern Water). This diaspora has enhanced existing non-HEI contacts (eg strengthening links with UK water companies) and, through sustained supervisor contact, opened new opportunities (eg contracts for water science research in Brazil).

2.3. Ensuring equality, diversity and inclusion

UoB is one of only 17 HEIs to hold a Bronze Race Equality Charter, is a Disability Confident Level 2 employer, holds Athena SWAN institutional Bronze, and, in its latest submission, was in the Stonewall Top 100. Measures are in place from University- to UoA-level to promote inclusion and deliver the University EDI Strategic Plan and Race Equality Action Plan. EDI aspects of appointments, including for internal research leadership roles (eg CORE Directors), are overseen by Human Resources. Alternative working arrangements can be negotiated under the UoB Flexible Working Policy; of the 8 part-time staff (7 female) in the UoA, 6 work flexibly. Promotion processes consider the research profiles of part-time staff so that they are not disadvantaged; 63% of part-time staff (compared with 61% full-time) achieved promotion since 2014. As noted in 2.1.2, we work to minimise the use of fixed-term contracts, offering redeployment if posts cannot be made permanent. All central research initiatives (eg Rising Stars, sabbaticals, impact) have been monitored via annual Equality Impact Assessments (EIA) for gender, ethnicity and contract status since 2017.

Progress towards our Athena SWAN action plans are overseen by Schools' Equality & Diversity Committees (EDCs), reporting to School Management Groups. **Burgess** leads Athena SWAN implementation in SET; the School will be applying for a Silver award in May 2021 to ensure that the new School of Applied Sciences has Silver status for all disciplines. EDC membership comprises academic, administrative and technical staff and PGRs. All major committees are representative in terms of seniority and gender, with membership scrutinised by EDCs. Equalities impacts are assessed for all policies developed by these committees and for all research support allocations. Staff development activities run during core hours and rotate across days of the week so that part-time staff and those with caring responsibilities are not disadvantaged. Seminar series are required to have a gender-neutral blend of speakers.

Both Schools offer a 'Returning to Research' Fund, with awards of £3k to support staff returning from an extended period of parental leave or ill health; 4 female staff have been supported through this fund to attend training courses, purchase equipment and take part in a field meeting with their partner in attendance to share childcare. Women who have taken career breaks have been supported into academic posts, eg **Gearey** joined SET as a Daphne Jackson Fellow and was appointed Senior Lecturer in 2019. SET is also acting as guarantor for a female BAME PGR student on the WEGO-ITN to allow her to bring her young family into the UK. Support for staff with disabilities has been provided via workplace adjustments, including the identification of an 'academic buddy' for a colleague with autism.

Our inclusive workplace culture demands that staff receive EDI training and that equalities issues are discussed openly. Staff undertake mandatory online training (including *Dignity at Work*, *Unconscious Bias*, *Interviewing & Recruitment*, *Managing Diversity*) with compliance monitored by Heads of School. UoB also provides bespoke training on, for example, LGBTQ, race and disability awareness. The wellbeing of our staff and PGRs is at the centre of everything we do. Schools have held campaigns to encourage discussion of mental health and all-staff awayday sessions on resilience. During the COVID-19 pandemic, celebratory events, seminars and training workshops moved online. Support was provided to promote healthy remote-working, including home workspace assessments and 'wellbeing check-ins' by line-managers and PGR supervisors. A return-to-campus questionnaire was used to profile COVID-19-related risks to staff and PGRs and identify other concerns.

This Environment Statement was developed by a Leadership Team with a representative gender balance, drawn from all disciplines in the UoA, and was circulated for comment to all staff. The

selection of 4 ICSs was made by the same team; 3 of these ICSs are led by women. In line with the UoB Code of Practice, the primary criterion used to select outputs was their quality as identified through a process agreed with UCU (2017). An EIA on the outputs in REF2 showed that they reflect gender balance (36% allocated to female staff) and career stage (eg 16% to ECRs) in the UoA and are distributed proportionately across COREs and REGs. Staff declaring a disability were more likely to have ≥2 outputs included in REF2 than non-disabled colleagues (40% versus 27%).

3. Income, infrastructure and facilities

3.1. Research funding and strategies for income generation

Sustaining a balanced funding portfolio is critical to the growth of our research and impact activities. Since 2014, we have sought to reduce our reliance on EU funding, our largest income source in REF2014 (45% of grant spend). Working through our COREs and REGs and supported by mentoring, we have encouraged staff to apply to a wider range of funding sources, with an emphasis on RCUK/UKRI applications with external partners. This strategy has contributed to a sustained record of securing competitive funding, embracing all COREs and REGs and staff at all career stages.

Grant spend during this REF cycle was £6.07m (including £253k NERC/STFC in-kind awards), a 31% increase on the £4.64m reported for UoB geographers, geologists and environmental scientists in REF2014. Our award portfolio includes 36 RCUK/UKRI/Royal Society/British Academy grants totalling £2.91m (UoB share), 17 EU grants totalling £1.17m, and significant income from central and local government (£442k), industry (£570k) and charities (£979k); this investment has underpinned the intellectual achievements described in 1.2.2.

The most notable change in our award portfolio since 2014 is the upward trajectory in RCUK/UKRI funding, which is now our primary income source (48% of spend compared with 13% at REF2014). The emphasis on multidisciplinarity within our COREs has enabled us to secure funding from multiple research councils (AHRC, EPSRC, ESRC, NERC, MRC), and take part in projects not traditionally accessed by geographers. These include **Harder**'s role as Work-Package Lead in the £18.2m GCRF Action Against Stunting Hub, a UK-Indonesia-Senegal collaboration to understand the factors driving child under-nutrition, and **Church**'s Co-I role in the £455k UKRI International Investment Initiative Fund 3DMed project, an Anglo-Canadian collaboration on medical interface science.

Our NERC-facing income has seen the greatest growth, reflecting both strategic shifts in expertise through new and replacement appointments (see 2.1.1) and continued success for established staff. At end-2020, 6 staff (**Ashworth**, ECR **Maniatis, Ockelford, Smallbone**, **Ward**, ECR **Wyche**) held 5 NERC awards; aside from Ashworth, these grants represent their first UKRI funding as PI/Co-I. The breadth of NERC-funded projects demonstrates the success of research efforts in: geo-resources (eg £3.3m award, of which £346k to UoB, **Smith** as Co-I), wetlands (GCRF £381k [£197k to UoB], **Ward** Co-I), river dynamics (£742k [£271k to UoB], **Ashworth** Co-I; £84k [£15k to UoB], **Ockelford** Co-I) and air quality (COVID-19 Response [£53k to UoB], **Wyche** PI, **Smallbone, Maniatis** Co-Is). **Ashworth** has received near-continuous NERC funding to investigate the morphodynamics of the world's largest rivers, including the Columbia (PI), South Saskatchewan (Co-I) and Amazon (Co-I). He has also started as Co-I on a 5-year Large Grant (£3m, £301k to UoB) modelling global flooding and population response.

The census period has seen our first MRC award (£240k to **Gomes Da Silva** [Co-I] with Kenyan partners quantifying microbial contamination pathways between livestock and drinking-water). We have won additional GCRF grants to investigate faecal-sludge management in India and Nepal, building on co-leadership within the British Council Water Initiative South Asia (ESRC-GCRF £1.9m [£305k to UoB], **Church** Co-I), and drought resilience in South Africa (NERC-GCRF £180k to UoB, **Ashworth, Church, Nash** Co-Is). We have also received significant support for research on the geographies of LGBTQ equalities (ESRC £159k, **Browne** PI) and the socio-ecological value of wetlands for wellbeing (UKRI £1.05m [£176k to UoB], **Church, Ravenscroft** Co-Is).

EU funding remains an important revenue stream (19% of spend). Major awards include: the Framework 7 WASCLEAN project (€2.4m [€420k to UoB], **Cundy** Co-I) that developed novel technologies for the remediation of contaminated soils; the Interreg JOAQUIN project (€8.9m [€381k to UoB], **Smallbone** Co-I) that identified cost-effective measures to decrease public exposure to air pollution; and the Interreg RedPol project (€2.8m [€414k to UoB], **Ciocan** Co-I), which aims to identify endocrine disrupter compounds in the environment and facilitate their elimination at source. EU funding supports the WEGO-ITN (€3.9m [€547k to UoB], **Elmhirst** Co-I), a trans-national network with a research and training agenda to educate the next generation of social-environmental scientists on feminist political ecology.

Industry support has risen from 7 to 9% and charity income from 11 to 16% of spend, both driven by a broadening and deepening of collaborations with non-HEI partners (see 4.2). This includes grants totalling £868k from Bill & Melinda Gates Foundation, Médecins Sans Frontières, Southern Water, South East Water and Thames Water (to **Ebdon, Gomes Da Silva, Mayor-Smith, Purnell, Taylor**), supporting water and sanitation research in the CAE and underpinning *[ICS_WaterSanitation]* and *[ICS_DomesticWater]*.

3.2. Organisational infrastructure supporting research and impact

Research Services play a pivotal role in assisting staff to secure funding commensurate with career stage, by providing bid-writing support, identifying commercial opportunities, sourcing non-HEI partners, administering projects and facilitating workshops. Research management in the UoA is supported by Schools' Research & Enterprise Committees (SRECs), each chaired by a Deputy Head (Research & Enterprise). Membership is inclusive in terms of gender and career stage and includes the Head of School, REG leads, plus CORE, ECR, PDRF and PGR representatives. SRECs administer QR funds devolved to Schools and manage research integrity, researcher development and local delivery of the Research Concordat. CORE Management Boards comprise a Director plus elected representatives from research themes, ECR and PGR communities, and manage Centre activities and funding allocation.

3.3. Investment in research infrastructure and facilities

We sustain our research excellence by providing state-of-the-art facilities, including high-specification workstations for remote sensing, GIS and environmental modelling. Researchers have access to field equipment for coring, land surveying, ecological survey and soil, sediment and water analysis. Human geographers have utilised the UoB Creative Methods Lab and Brighton Waste House, a low energy building constructed from >90% waste material used for cross-disciplinary research on waste management. Field and laboratory support specific to the UoA is provided by 4.7FTE technicians and technical instructors. The strategic development of research infrastructure is considered at SRECs and, with School Technical Managers, by School Management Groups.

3.3.1. Research laboratories and facilities

We have made major investments to support emerging research areas: (1) An Environmental Genomics Laboratory used by CAE staff for pollution source-tracking, funded by a NERC Environmental Sciences Capital grant (£383k; PIs **Taylor/Ashworth**), £98k HEFCE Research Capital Award and £100k industrial support (GlaxoSmithKline); (2) A Surface Analysis Laboratory, equipped with state-of-the-art XPS Focussed Beam and Monochromator, used by Applied Geosciences REG members for critical metals and marine corrosion research, funded by a second NERC Environmental Sciences Capital grant (£233k; Co-I **Smith**) and £369k from UoB/HEFCE. This investment has stimulated interdisciplinary projects and begun to leverage income and generate impact. For example, XPS and genomic data were combined in an industry-funded project to identify the chemistry of corrosion products and the microbiology associated with microbially-influenced corrosion of marine steel structures (**Burgess, Caplin, Smith**). This established the methodology for the EU Interreg SOCORRO project (€5.45m [£222k to UoB], **Burgess, Moles, Smith** Co-Is), which, in collaboration with 8 HEI and 5 non-HEI partners, is developing tools to assess marine corrosion risk.

A further £89k from NERC grants, HEFCE RCIF funding and reinvestment of consultancy income has been used to purchase 5 fixed-wing and multi-rotor UAS (plus sensors) and a 3D laser scanner for geomorphological and ecological surveys. This investment has driven innovations in remote sensing through collaborations between the CAE, Ecology, Conservation & Zoonosis REG and external partners. Advances in fluvial geomorphology include the novel combination of data from repeat UAS surveys, aeroplane sorties and satellites to quantify bedform dynamics and sediment flux in sandy braided rivers in Canada, with 5 UK universities and NERC funding (**Ashworth**). Advances in biogeography include: new mapping approaches for fine-scale changes in coastal plant communities threatened by sea-level rise (in Estonia, with University of Life Sciences, Tartu; **Burnside, Joyce, Ward**); and assessing foodscapes for large herbivores (in Spain, with Autonomous University of Barcelona; **Brolly, Burnside**).

We have begun to commercialise these facilities to take advantage of opportunities for staff reward under the UoB Consultancy Policy (2019). The XPS instrument has supported collaborations with India, Kazakhstan, Peru, Thailand and the USA and generated contracts with Surrey Nano System, CeresPower and PowderTech Surface Science. Our drone survey and analytical capabilities have been used to leverage 3 PGR studentships (with the Environment Agency, Historic England). We are training a staff member and 2 technicians as CAA-approved UAS pilots to expand this capability.

The new facilities complement our existing laboratories:

- Environment & Public Health Laboratory with membrane filtration, flocculation jars, UV spectrophotometers, incubation suite and genetic detection systems, used to underpin [*ICS_DomesticWater]* and [*ICS_WaterSanitation*].
- Image Analysis Suite with Zeiss Sigma Field Emission Gun SEM, Zeiss EVO-LS-15 Environmental SEM and geological research microscopes.
- Environmental Geochemistry Laboratory with ICP-OES, XRD, ED-XRF, portable XRFs and laser particle size analysers, with £138k QR invested in a new ICP-MS to support applied geochemistry research.
- Hydraulics Laboratory with 8m wave flume, 8m recirculating flume with calibrated flow system and variable bed slope (extended and instrumented in 2018 using £12k Royal Society funding to **Ockelford** plus £38k QR) and smaller recirculating flumes.
- Ecology Suite with greenhouse facilities, and Fish Laboratory with 40 aquariums for marine and freshwater microplastics and ecotoxicology research (equipped with a behavioural observation chamber in 2019 using £15k Royal Society funding to **Crooks**).
- Radiometric Dating Facility for ^{210}Pb and ^{137}Cs dating.

All but emergency access to these facilities was disrupted during the first COVID-19 lockdown (2020). The initial return to laboratories was priority-based and risk-assessed, with full access allowed only once buildings were COVID-19-secure. Experience gained during the pandemic has increased our resilience to future emergencies by improving laboratory access protocols and internal policies for ordering and stockpiling key consumables.

3.3.2. Cross-HEI use of research infrastructure and major research facilities

Researchers have benefited from access to external facilities. In-kind awards include £88k for use of the I18 Microfocus Beamline Spectrometer at the STFC-supported Diamond Light Source (**Smith**), with a *Nature Communications* study of REEs in regolith-hosted clays from this research chosen as best I18 paper in the Diamond *Annual Review 2020*. Awards totalling £165k were received from the NERC Isotope Geosciences Laboratory, supporting direct access and non-UKRI-funded projects (**Moles, Smith**). We share our laboratories with the University Alliance mission group and advertise instruments on the EPSRC/Jisc open portal *equipment.data*. The Environmental Genomics lab is commissioned to work on joint research and run samples for the University of Sussex and GlaxoSmithKline.

3.3.3. Field stations

We operate environmental monitoring stations for our research on air quality (JOAQUIN Advanced Air Quality Research Station, Brighton, enhanced using £12k QR in 2016), wetlands (Amberley, with the RSPB), intertidal sediment dynamics (Medmerry, with the Environment Agency; Cwm Ivy with the National Trust, Natural Resources Wales) and freshwater ecosystems (UK-wide). Ecology research is further facilitated by memoranda of understanding with Mankwe Wildlife Reserve (South Africa), the Association of Inshore Fisheries & Conservation Authorities and Hastings Blue Reef Aquarium (Sussex, UK). The MOU with Mankwe has generated £197k of Earthwatch funding since 2015 (*[ICS_Coexistence]*) and provided infrastructure for 3 field-based PGRs, whilst that with Blue Reef has generated 2 papers co-published with PGRs. An EU-INTERACT funded collaboration with the Kola Science Centre supports field-based glacial reconstruction research in Arctic Russia.

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

UoA staff continue to contribute to the research community, economy and society, both nationally and internationally. As with all our work, our contributions stem from our ethos of mutually beneficial partnership.

4.1. Collaborating with academic colleagues at other HEIs

Collaboration with academic partners is facilitated through mentoring and Staff Development Reviews, where staff are encouraged to develop leadership roles in research networks and professional bodies. Numbers of international academic partners are monitored annually, with central seed-funding available for overseas partnership development. COREs include external academic Associate Members, who help identify opportunities for cross-disciplinary collaboration. The CSECP, for example, has Associate Members from UK/EU HEIs in disciplines including media studies, politics and social science. COREs offer seed-funding to build new partnerships and, using QR-GCRF allocations, grants for International Fellowships to support exchanges with Development Assistance Committee list countries. Support for collaboration with the University of Sussex is enabled via the Brighton-Sussex Collaborative Fund and, from 2020, a £50k QR-Strategic Priorities Fund.

The success of these arrangements, and our national and international influence, can be seen in the volume of publications with academic partners. Of the 97 outputs in REF2, 82% are co-authored with external academics; 48% involve collaborations with non-UK academics across 39 countries. All 41 submitted staff have led or contributed to projects or networks with other HEIs. Among these, 25 are involved in cross-disciplinary collaborations that have shaped national and international research agendas and achieved impact; notable examples include:

- **Church** was Coordinating Lead Author on the UN Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Europe-Central Asia Regional Assessment, leading 15 international partners assessing ‘Nature’s contributions to people and quality of life’ for a major IPBES report and 2018 article in *Science*.
- **Nash** led the PAGES (PAst Global changES) Africa-2k Working Group (2011-18), evaluating evidence of environmental change across Africa over the last 2,000 years, producing a synthesis in *Quaternary Science Reviews* (2016) and data for the PAGES-2k Consortium study in *Scientific Data* (2017).
- **Cole** co-led the pan-European AHRC ‘Coping with Climate: the Legacy of *Homo heidelbergensis*’ Network, linking researchers across archaeology, palaeoenvironmental studies and anthropology, leading to a special issue in *Quaternary Science Reviews* (2019).
- **Ravenscroft** led UK academics on the European Waterways Heritage Project, collaborating with HEI and non-HEI partners from 3 EU states on research to reconnect communities with the cultural heritage of their waterways, including the development of digital heritage trails.
- **Elmhirst** is the lead UK academic on the 20-partner WEGO-ITN (2017-21), which uses a feminist political ecology framework to develop community strategies for building equitable and sustainable futures.

- **Smith** was Work-Package Lead in the NERC SoS-RARE consortium involving geoscientists from 6 UK universities and 10 industry partners to improve understanding of how REEs are concentrated in natural systems, leading to 35 papers and a Royal Society meeting (2019).

4.2. Relationships with research users and how these enrich the research environment

The identification of non-HEI partners is facilitated by Research Services and 3 university-based partnership hubs: the *Community-University Partnership Programme*, core-funded by UoB since 2005; and the HEFCE-funded *Green Growth Platform*, a network of >1,500 businesses that is now a regional hub for the Research England-funded *Clean Growth UK* (see REF5a). Associate Membership of CORES is used to sustain partnerships, eg the CAE includes Associate Members from the Environment Agency, Public Health England, South Downs National Park and South East Water. We nurture these partnerships by hosting user-facing meetings, eg the *Adapting to change: Considerations for water recycling and desalination to address future water supply challenges* conference (2019) that attracted key stakeholders including Defra, OFWAT, Environment Agency, Natural England, Public Health England, Water Resources South East and 8 UK water companies.

Researchers interact with audiences through several routes. Examples and benefits to the economy, environment and society not captured in our ICSs include:

- Working directly with government agencies to co-define problems and devise solutions, including with NASA to develop ecosystem science requirements, and inform applications, of the GEDI spaceborne waveform lidar and NISAR radar missions (**Brolly**); with Natural England to revise guidance on the translocation of water voles to mitigate development impacts (now included in National Water Vole Mitigation Guidelines; **Scott**); and with the Environment Agency to develop the E-PSI biomonitoring tool used UK-wide to assess the impacts of sediment pollution on freshwater invertebrate communities (**Bilotta**) and a genetic marker to detect the presence of critically endangered water snails (**Zeisset**).
- Working directly with industry partners, including with mining companies to embed landscape evolution models into copper exploration practice (**Evenstar**, with BHP) and develop processes to reduce the environmental impacts of REE extraction (**Smith**; with Namibia Critical Metals, Mkango Resources [Malawi] and Tanbreez [Greenland]); and with Vitacress Ltd, Europe's largest watercress grower, to develop guidelines to mitigate the impacts of production on aquatic ecosystems (**Crooks, Joyce, Pernetta**).
- Undertaking contract research, including for the Environment Agency to develop protocols for the use of UAS to detect invasive wetland plants (**Burnside, Joyce**) and monitor coastal managed realignment projects (**Burgess, Burnside**); and for Historic England to provide guidelines on deposit modelling methods to map buried sequences of archaeological interest, implemented across the planning process in England since 2019 (**Carey**).
- Co-designing and co-publishing research with NGOs, charities and activists, including with CIFOR and Rights & Resources on the gendered impacts of large-scale land investments in Southeast Asia (**Elmhirst**); and with Sappho for Equality (Kolkata) on LGBTQ equalities and the International Lesbian, Gay, Bisexual and Intersex Association and Mind Out (Brighton) on improving LGBTQ-facing healthcare provision across EU states (**Browne, McGlynn**).

Of the outputs in REF2, 39% are co-authored with non-academic partners. Embedding partners in research design and implementation means we are well-equipped to identify opportunities and priorities. Collaborations centred around real-world challenges help stimulate rapid research innovation (eg work by **Ebdon, Gomes Da Silva, Taylor** to develop methods for treating infectious human excreta during humanitarian crises; *[ICS_WaterSanitation]*). Non-HEI partners also provide our PGRs with field sites and valuable training experience (3.3.3).

4.3. Contributions to our disciplines and responses to national/international priorities

In addition to the examples in 4.1, staff have provided intellectual leadership to the committees of professional associations and research networks/initiatives:

- Three have shaped agendas at the RGS-IBG; **Ashworth** as Council Member, Trustee and Research & Higher Education Committee member (2014-17); **McGlynn** as Secretary (2017-)

to the Space, Sexuality & Queer Research Group; and **Lim** as committee member (2017-) of the Race Working Group.

- **Ashworth** was one of 4 authors of the RGS-IBG-commissioned *International Benchmarking Review of UK Physical Geography*, providing evidence on the standing of the sub-discipline.
- Physical geographers have provided leadership to: the British Society for Geomorphology (**Ockelford**: Chair, Outreach & Education Committee; Member, Executive Committee; 2015-18); the INQUA Terrestrial Processes, Deposits and History Commission (**Linch**: Advisory Board Member; 2015-); and the Institution of Civil Engineers (**Burgess**: Coastal, Maritime and Offshore Expert Panel Member; 2018-).
- Human geographer **Elmhirst** is Node Coordinator of the Political Ecology Network (2014-).
- ECRs **Mayor-Smith** and **Wyche** are, respectively, Co-Vice President for Europe of the International Ultraviolet Association (2016-) and member of the Governing Committee of the Institute of Air Quality Management (2018-).
- Staff have leadership roles in the British Ecological Society (**Scott**, Council Member and member of Personnel and Education committees [2015-18]; **White**, member of Public Engagement Working Group [2018-]). **White** is elected Vice-Chair and Governing Board Member of the International Network of Next-Generation Ecologists (2014-).
- Geohazards specialist **Georgiopoulou** was Co-Chair (2015-20) of the UNESCO IGCP 640 programme 'Significance of Modern and Ancient Submarine Slope Landslides'.
- Geologist **Smith** and archaeologist **Cole** are Council Members of the Mineralogical Society (2019-) and Prehistoric Society (2020-24), respectively.

4.4. Wider influence, contributions to and recognition by the research base

Journal editorship is recognised by the UoA as an important vehicle for extending intellectual leadership to our disciplines. Four staff (**Browne, Cundy, Elmhirst, Pernetta**) have been editors of international journals. Colleagues have been editorial board members of a further 16 journals and have guest-edited 11 journal special issues.

Staff have provided expert review for all 7 UKRI Councils, the EU and national funding bodies in 13 additional countries. Ten have chaired or been members of *major grants committees* for UKRI Councils: **Church** was Invited Chair of the Network and Follow-on Funding calls for the AHRC Landscape Decisions Strategic Programme (2019) and chaired the AHRC monthly grants panel (2020); **Ashworth** was Invited Chair of the NERC Pool of Panel Chairs (2010-14), has chaired 7 NERC panels that have distributed £16.5m (2014-19) and was Deputy Chair for 2 UKRI Future Leaders Fellowships Rounds (2019-20). Five staff are UKRI Peer Review College members, while 8 others have sat on UKRI strategic funding and fellowship panels. Staff are members of the British Ecological Society Review College (**Berg, Pernetta, Tolhurst, White**) and European Science Foundation College of Expert Reviewers (**Browne**), and are expert evaluators for EU Marie Skłodowska-Curie Fellowships (**Ciocan, Georgiopoulou**).

UoA staff have demonstrated intellectual leadership through high-level *contributions as advisors* to government bodies, charities and international organisations. In addition to advice given to Médecins Sans Frontières, Defra, Historic England and the Environment Agency (see 1.3, 4.2), examples include: **Taylor** (invited by USAID) provided guidance to the WHO/UNICEF during the 2014 West Africa Ebola crisis on the survival of the virus in human excreta (see *[ICS_WaterSanitation]*); **Berg, Cole, Joyce, White** provided advice on research priorities for The Living Coast UNESCO Biosphere Reserve (2016-; **Joyce, Cole** as Chairs of the Biosphere Research Committee); **Ashworth** advised NERC on policy changes for the International Opportunities Fund (re-launched as the Global Partnerships Fund), and priorities for NERC-funded Services and Facilities (as a cross-science review panel member, 2017); **Wyche** is briefing the UK Chief Scientific Adviser on air quality-related impacts of COVID-19 through membership of the 'Data & Connectivity' National Core Study.

As evidence of the international profile of the UoA, staff have held funded *external fellowships* (eg **Harder**, China National Thousand Talents Professorship, Fudan University, Shanghai, 2011-21; **Church**, Guest Professor, University of Natural Resources & Life Sciences, Vienna, 2016-17; **Georgiopoulou**, Research Residence, National Institute of Water & Atmospheric Research,

Wellington, 2019) and *senior honorary positions* at overseas institutions (eg **Nash**, Honorary Research Fellow, University of the Witwatersrand, Johannesburg, 2009-). Our research environment has been enriched by hosting >25 visiting academics and PGRs from 18 countries for periods of >1 month.

Recognition for contributions to the research base include *prizes and awards* to: **Ashworth**, awarded Fellow of the British Society for Geomorphology (2014), reserved for 10% of the membership; **Browne**, appointed Geography President of the British Science Festival (2017); **Cole**, awarded an Ig Nobel Prize (2018) for research on Palaeolithic cannibalism; **Harder**, presented with the Magnolia Silver Award by Shanghai Municipality (2016) for research on recycling (see *[ICS_FoodWaste]*), one of only 50 awarded annually to non-Chinese nationals for contributions to the city; **Joyce**, presented with a Society of Wetland Scientists 40th Anniversary Award for high-level research contributions (2020); **Maidment**, presented with the Palaeontological Association Hodson Award (2016) and Geological Society Lyell Fund (2017) for world-leading publications; **Ockelford**, presented with the EGU Katia & Maurice Krafft Award for outreach and education (2020).

UoA staff have demonstrated national and international research leadership by convening >40 *conferences and conference sessions*. Meetings that were interdisciplinary and/or engaged non-academic audiences include: the *Lesbian Lives* conferences (2015, 2017), organised by **Browne**, enabled academics, activists and performers to network across international and professional boundaries; the Royal Anthropological Institute-sponsored *Landscapes of Evolution* conference, co-organised by **Cole** (2020), drew academics working at the interface of geography, archaeology and anthropology; the *Climate, Oceans and Coastal Communities* conference (2019), co-hosted by the CAE and United Nations Association, highlighted the impacts of climate change on communities and ecosystems; and the *Connecting children and teenagers with local nature* event (2019), organised by **White**, drew academics, practitioners, politicians and artists to consider ways to engage young people with nature.

4.5. Collaborative arrangements for PGR training

Our membership of 4 UKRI DTPs and the WEGO-ITN involves cooperation and co-supervision with partners at 14 UK, 8 mainland-European, plus US, Australian, South American and Asian HEIs, and provides hubs for PGR training and networking. UoA members contribute to this training through, for example, methods masterclasses for the South Coast DTP and week-long training visits to Pisa for the SEAHA DTP. UoB also hosted the first WEGO-ITN Training Lab (2019) and third annual SEAHA residential meeting (2018).

4.6. Engagement with diverse communities and publics

Staff are committed to engaging the public with research, eg **Scott, Tolhurst** designed citizen science content for features on urban ecology over 8 series of *Springwatch*, *Autumnwatch* and *Winterwatch* (BBC, 2014-19), reaching 3m viewers per episode (*[ICS_Coexistence]*); **Ockelford** designed teaching materials on flood risk for the RGS-IBG and Geographical Association to support learning for UK schoolchildren; **Cole** acted as consultant for the redesign of the archaeology gallery at Brighton & Hove Museum (2017-18); **Elmhirst** collaborated on the *Extracting Us* and *Forest Communities and Oil Palm Landscapes* exhibitions with the ONCA Gallery, Brighton (2019-20); the CAE coordinated the *Microplastics in Chichester Harbour* symposium (2019) with Chichester Harbour Conservancy, attended by members of the public and representatives from the apparel, regulation and utilities sectors; 8 staff gave talks during the British Science Festival (Brighton, 2017), with **Ockelford** now coordinating the Geography section of the Festival; and 24 staff have engaged in research-related outreach, including public and school/college talks, national science fairs, and RGS-IBG workshops for teachers.

Summary

This submission has demonstrated a strong upward trajectory in research at the interface of Geography, environment and society at UoB since 2014. We base this claim on: the growth in our UKRI income; our approach to staff development that has enhanced, and will sustain, an inclusive

research environment; the improved training infrastructure for our PGR students; and our contributions to our disciplines and audiences. All submitted staff have contributed to this success and all are named in this document. Our intellectual strengths in water science, applied geosciences and feminist geographies, coupled with our commitment to partnership and sharing narratives of our impact, mean that UoB Geography is well-placed to address global research challenges into the future.