

Institution: University of Brighton
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Unit of Assessment: B7 Earth Systems and Environmental Sciences
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a. Overview

During the census period, earth and environmental science research at the University of Brighton (UoB) has pursued a strategy to strengthen and broaden its research base. Its mission is to deliver translational research with local, regional and international benefits. The UoB research environment has been enriched by an additional investment of £8.8m in research sabbaticals, doctoral studentships, early career researcher support schemes and innovation grants, as well as an investment of £6.75m in the offices and laboratories that house B7 activity. UoA B7 staff have used this investment to deliver a 53% increase in grant expenditure and a 71% increase in Post-Graduate Researcher (PGR) completions since RAE2008. Research is organised into two linked and multidisciplinary themes, hosted within the School of Environment and Technology (SET):

- *Applied Geosciences* (ASHWORTH, BARDOS, CAREY, CUNDY, FIRTH, HOPKINSON, LINCH, NASH and SMITH), which delivers novel risk-management strategies for contaminated land, advanced sedimentological models for the world's largest rivers, new geological and geomorphological records to assess landscape response to past environmental change, characterisation of critical metal deposits, and understanding of new carbonate-CO₂ reaction pathways, and;
- *Aquatic Research* (BILOTTA, CHURCH, CIOCAN, EBDON, TAYLOR and WHITBY), which delivers original approaches for pollution detection and control, molecular tools to assess aquatic ecosystem health, advanced nano-based methods for remediating problem water contaminants, and which also informs policy and planning guidance in water access and freshwater ecosystem management.

b. Research strategy

RAE2008 and key research objectives: Our primary aim since RAE2001 has been to develop UoB as an acknowledged centre of excellence in the geo- and environmental sciences. We continue to be driven by our mission to produce applied, multi-disciplinary research that informs policy and practice. Our submission to UoA B17 in RAE2008 demonstrated our maturing research base in applied geosciences with a related human geography strand. This submission to REF2014 strengthens and expands our earth and environmental science research base whilst our human geography colleagues are now submitted to Panels C and D.

Post-2008 we prioritised four research aims to advance the next phase of our research ambitions:

- RA1 to strengthen and exploit areas of excellence with industry and international partners
- RA2 to broaden our research base through new appointments and expertise
- RA3 to support proactively the development of early career researchers (ECRs) to ensure their research reaches international levels of excellence
- RA4 to promote multidisciplinary and interdisciplinary research activity that fosters international and national collaboration.

Research progress since RAE2008: Over the last five years our progress towards meeting these aims has resulted in significant advances in both the infrastructure supporting our research (section d) and our research performance. During the REF census period we increased our external funding from £3m to £4.6m (an 84% increase per capita to £323k/FTE), increased international student recruitment and the number of funded studentships from industry, European and RCUK sources, and increased PGR completions from 17.25 to 29.5.

During the census period, research highlights include:

- identifying previously unrecorded nanoscale effects (hyperstoichiometry) on aqueous contaminant removal
- constraining niobium mineralisation processes at the world-class Bayan Obo ore deposit
- discovering the controls on the styles of anabranching in the world's largest sand-bed rivers
- predicting environment-specific water quality guidelines for suspended particulate matter
- sourcing the origins of silcrete artefacts preserved from the African Middle Stone Age
- identifying the specific human component of faecal pollution in surface waters

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Specific achievements mapped against our research aims have been:

RA1 – exploiting areas of excellence: We have invested over £500k to support a new *Centre of Aquatic Research* that draws together applied research on water quality and management. The centre has been supported through the appointment of new ECRs (BILOTTA, CIOCAN), the allocation of university and school studentships (to TAYLOR, EBDON and FIRTH) and the purchase of new ICP-MS and associated facilities. Since 2008, staff have developed sustained partnerships with research users through commissioned projects and contract research (eg ASHWORTH, four successive contracts with ExxonMobil), secondments and other collaborative working (eg WHITBY with SME FutureCarbon) and development and joint commercialisation of IP (eg CUNDY with SME MAST Carbon), while we have informed policy, shared expertise (eg via KTPs, staff secondments and industry-academia projects worth >£2.5m) and fostered new links with international NGOs (eg TAYLOR and EBDON with WaterAid) (detailed in our REF3a and REF3b documents).

RA2 – broadening research base: Our appointment of ECRs LINCH and CAREY has expanded activity into glacial-related sediment deformation and geophysical and palaeoarchaeological interpretation of fluvial landscapes, and ECRs BILOTTA and CIOCAN have enabled us to integrate expert knowledge on aquatic processes into water and ecosystem-quality applications. The appointment of BARDOS has extended our contaminated land research into sustainable and green remediation, while integration of WHITBY has expanded our pollution research into the fields of environmental nanotechnologies and smart nanomaterials.

RA3 – developing our early career researchers: ECRs are supported directly by reduced teaching loads, research mentoring, re-investment of School of Environment and Technology (SET) QR funds for new equipment and seed-corn research projects, and access to ring-fenced ECR support schemes in the university. We track the progress of ECRs, provide support for grant applications and journal submissions and reward ECRs with stable career pathways and accelerated promotion prospects (see section c.i).

RA4 – promoting collaborative research across disciplines: In 2013, the university awarded £0.4m of strategic funding for equipment and research studentships to underpin the emerging multidisciplinary research groups, *Smart NanoMaterials* (led by WHITBY, arising from work on nanomaterials and nanoremediation) and *Critical Metals* (led by SMITH, arising from work on mineral exploration and contaminant cycling). Further details are given in section d.

Supporting management structures: The university manages its research through three disciplinary areas: *Life and Physical Sciences*; *Social Sciences*; *Arts and Humanities*. Each area is led by a Director for Research and Development (DRD), who reports to the PVC Research. The DRD monitors each school's research performance and progress against university-agreed Key Performance Indicators. The UoA B7 research strategy is owned and managed by the SET Research Strategy Committee (SETRSC), identifies strategic research priorities, monitors achievements and administers the distribution of QR streamed as an outcome of RAE2008. It is also responsible for research staff development and delivery of the UoB Research Concordat Action Plan (section c.i).

Research strategy for the next five years: Building on our achievements since 2008, and reflecting the expansion of both our research base and the impact of our research, our future strategic aims are to:

SA1 – Invest in our research themes and in emerging multidisciplinary research groups: We will continue to invest in staff and infrastructure that strengthen our two research themes (via strategies detailed in sections c and d) and develop our emerging research groups in *Smart NanoMaterials* and *Critical Metals* into self-sustained centres of excellence using contract and grant income.

SA2 – Optimise internal structures to deliver the university's Research Concordat Action Plan: We will ensure that our processes for the allocation of research support and reward remain transparent and that the principles of Athena SWAN are embedded within all our activities (see section c.i). We will continue to provide employment security and opportunity for new ECRs and the university will ring-fence financial support for ECR development, first grants and conference participation.

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SA3 – Strengthen our framework for delivering impact: We will invest in research areas that can generate primary impact, monitor and facilitate impact, and embed impact into our research training. The university will recruit an impact policy officer for *Life and Physical Sciences*. Enabling mechanisms are described further in REF 3a.

SA4 – Enhance the research environment through targeted recruitment of high-quality research students: This builds on the expansion in our PGR activity, and the establishment of the Brighton Doctoral College (BDC) (section c.II). We plan to expand PGR numbers over the next five years by 50% through strategic investment, third-stream funding and new international partnerships.

c. People, including:

I. Staffing strategy and staff development

Staffing strategy and its relationship to our research ambitions: We have continued to invest significantly in the intellectual and creative capital of our research community by prioritising the following strategic aims that map onto our current and future ambitions (section b):

- SS1 to retain and reward talented staff who are central to our core areas of research strength (RA1, SA1)
- SS2 to recruit outstanding researchers who bring fresh ideas and insights (RA2, SA1, SA4)
- SS3 to provide a research environment that stimulates innovation and minimises constraints (RA4, SA3)
- SS4 to ensure fairness and transparency in the allocation of support (RA3, SA2).

We have followed a long-term policy of recruiting and retaining high-quality ECRs (eg EBDON, ECR in RAE2008 and now Principal Lecturer), and of supporting more senior staff in developing their international profiles within our research themes (eg TAYLOR, awarded a personal chair in Microbial Ecology; NASH, awarded a personal chair in Physical Geography).

Career development support: All staff are supported to develop their research careers through sabbaticals, personal research strategy reviews, conference support, pump-priming funds and studentships. School-approved teaching relief (a total of six semesters granted in the census period) is agreed through a peer-review process managed by the SET Sabbatical Committee. In addition, six staff have been awarded centrally funded (up to £20k) competitive, semester-long university sabbaticals that have been used to secure new research initiatives (eg NASH in South Africa via a Leverhulme Award; TAYLOR developing international water and sanitation research impact networks; ASHWORTH writing successful grants to NERC and ExxonMobil; BILOTTA in framing water policy with Defra). The university also supports industrial sabbaticals (up to £15k) to support commercial research opportunities with external partners (eg CUNDY's work on nanotechnology and water clean-up with Protista AB and MAST Carbon International, and Anglian Water, resulting in two patent applications), and a Research Challenges initiative, which awards up to £50k to fund work of an innovative and cross-disciplinary nature (£44k to NASH and HOPKINSON to support development of geochemical provenancing tools for African Stone Age artefacts; £26k to EBDON and TAYLOR on novel treatment of wastewaters in cholera emergencies (REF3b [1])). A weekly research seminar series involves both leading external researchers and practitioners and internal staff (including research staff and PGRs). All academic and permanent research staff are eligible for up to £1.2k annual support for conference attendance from the university and SET, as well as further internal support from the SET Staff Development Fund (£32k pa). 20% of SET's share of grant indirect costs are returned to individuals to pump-prime further activities and promote research dissemination. One-to-one research support and management to support the career development of staff is undertaken in the Personal Research Strategy (PRS) process, whereby senior researchers work with individual staff to exchange research experience and build researcher confidence. This biennial process is in place for all staff, and has been a model of good practice now adopted across the university.

Support for ECRs: For their first two years, ECR staff are provided with a reduced teaching and administrative load (50% reduction in year 1, 30% in year 2). ECRs also access a mentoring scheme, where they work with a more senior staff member to develop research ideas, funding sources and outputs, and contribute to research strategy development via an ECR representative on the SETRSC. Initial research needs for ECRs are met by SET, with ECRs expected to bid for

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ring-fenced staff development funding (total £228k allocated over the REF period) to support costs to employ RAs or pump-prime new laboratory and other research facilities (eg £11k field magnetometer, CAREY). Other funds are awarded to ECRs via a University 'Rising-Stars' initiative (£6k awarded to LINCH in 2012 to support collaborative work on ice-keel scour processes). ECRs attend university training sessions (eg postgraduate supervision, grant writing), including the university's annual *Future's Bright* research conference aimed specifically at promoting the professional, personal and career development of ECRs. ECRs are supported in grant application development by (a) university Grant Support Panel, which scrutinises proposals prior to submission; (b) the Research Office, who provide costing and drafting support from inception to submission, and (c) a business development managers (BDMs) who explore linkages with industry.

Implementation of the Concordat to support the career development of researchers: The ethos and values of our commitment to researcher development has been advanced by the university's *Research Concordat Action Plan*. This has been designed to implement the UK's *Concordat to Support the Career Development of Researchers*, which is aligned with the *European Charter for Researchers and Code of Conduct for their Recruitment*. Our action plan has been recognised by the European Commission through a *European HR Excellence in Research Award* in 2012. The Action Plan is delivered by schools and is monitored by the PVC Research. One broad set of indicators for the impact of our Action Plan is provided by the 2013 Careers in Research Online Survey (CROS; 46% return rate from UoB compared to 26% nationally), that shows: 91% of respondents are integrated into the research community (78% nationally); 96% of respondents have the opportunity to present work at conferences (81% nationally); 57% of respondents are treated equally compared with other staff in relation to promotion and progression (37% nationally); and 64% of respondents engage with policy makers and end-users (30% nationally).

The institution ensures representation of research staff on formal committees (including SETRSC) and on the university staff development group (SDG). In 2012, the university appointed an ECR Ambassador to co-ordinate and promote a support network for ECRs across all faculties. Locally, fixed-term contract researchers participate in our PRS process (see 'Career development support'), and are provided with bridging funds to maintain continuity between projects (eg Purnell with TAYLOR and EBDON).

Staff with personal research fellowships won in open competition: Staff are encouraged to apply for research fellowships, particularly those that facilitate engagement with research end-users. BILOTTA was awarded a Defra/NERC Knowledge Exchange Fellowship to conduct horizon-scanning activities with Defra and examine evidence needs for environmental policy decisions. Marie Curie Visiting Fellowships have been awarded to Savina (from the University of Lund), Katok (from the Ukrainian Academy of Sciences) and Busquets (from the University of Barcelona) to work with CUNDY and WHITBY on novel water clean-up technologies. These staff bring additional skills and experience that generate key outputs [WHITBY, 3], patents [Savina and Busquets] and further research funding.

International staff appointments, international recruitment and visiting scholars: Permanent and short-term visiting staff collaborate with existing staff to develop research outputs (eg [HOPKINSON, 2]), international networks for funding applications (eg €2.4m EU FP7 industry:academic *WasClean* project on land contamination, led by former Marie Curie fellow Vaclavikova with the university as a partner) and support PGRs and industry collaboration (eg Kalogeropoulos, ex-scientific director of the IGME (Greece) appointed to a Visiting Chair and external PhD supervisory role in support of SMITH and CUNDY in bauxite exploration projects).

Support for equalities and diversity: All appointments adhere to the university's Equality and Diversity Policy, and all staff must take part in an online training programme in equality and diversity. In April 2013, the university was awarded the Athena SWAN Bronze Award and SET is currently compiling its application for Bronze status. Equality and diversity issues are discussed at the SET Equality and Diversity Committee and then upwards via the SETRSC. Fixed-term contract and hourly paid staff are employed to facilitate flexible working and cover staff on maternity/paternity leave. The 2013 CROS Survey showed that 91% of UoB respondents considered the university to be committed to equality and diversity (compared to 86% nationally).

c. II. Research students

The UoB has taken significant steps to enhance the experience of our research students as our contribution to developing the next generation of researchers. All PGRs are now based within the Brighton Doctoral College (BDC) that was established in 2011 under the leadership of a new Dean who is responsible for postgraduate research. Our QAA report in March 2013 noted '*since its [BDC] establishment the trajectory of almost all success indicators has been upward*'. Two Directors of Postgraduate Studies (1.5FTE total) oversee the application-to-graduation process for all PhD students in the Science and Engineering Doctoral Centre, which is currently home to 158 PGR students.

PGR recruitment: PGR recruitment over the census period has been supported by studentships from RCUK (NERC, EPSRC and AHRC), European regional development programmes (Interreg) and industrial links (fully [eg CUNDY and SMITH, Greek bauxites] and through KTPs). In comparison to the rest of the university, B7 attracts a large proportion of international PGRs (24%), and is engaged in programmes such as Brazil's 'Science without Borders' (two studentships) and the Iraqi PhD Scholarship Scheme (two starts in 2013). In addition, the university and SET have invested in eight fully-funded PhD studentships in the last two years to support B7 activity. During the census period there have been 50 new registrations and 29.5 completions, with 62 students currently registered in SET.

Training and support mechanisms: The BDC has ownership and overview of the research learning environment and manages all applications and recruitment, monitors progress, and contributes to and organises university-wide training programmes. All new students receive training needs analysis to establish their skills profile which is then mapped against the Vitae Researcher Development Framework (RDF). Formal training is provided through the university RDF within the BDC, and all new PGRs are required to demonstrate learning on research methods, communication, engagement with partners and IP. Further developmental opportunities arise through participation in the BDC's annual science and engineering conference, which is student-led and organised (98 attendees in 2013 and co-ordinated by three PGRs from SET). PGRs are supported from SET and university funds, including access to a £15k ring-fenced PGR Conference Support Fund to attend national and international conferences. On graduation, PGRs have entered academia (eg Adamson, King's College London), government bodies (eg Diston, Ministry of Health, Switzerland; Noble, ESRC, UK) and industry (eg Faulkner, Klohn Crippen Berger, Australia; Hawkins, Santa Fe Metals, Canada).

Progress monitoring: All research students have at least two supervisors and a thesis panel to monitor progress. Full-time research students receive a minimum of 90 hours (pro-rata) of supervisors' time per year. Supervision is complemented by a series of checkpoints, following established BDC procedures, ensuring that satisfactory progress is taking place and the supervisory team is fulfilling its responsibilities. The first checkpoint is research plan approval, occurring 4–6 months into the research degree. This is followed by annual progression reviews that are designed to ensure that the needs of the student and project are being met. Students are expected to submit a thesis completion plan and three completed draft chapters after 30 months of study. UoA B7 has achieved a 71% increase in PGR completions since RAE2008.

d. Income, infrastructure and facilities

Provision and operation of specialist infrastructure and facilities: SET operate continuous environmental monitoring stations for our research on wetlands (Amberley, with the RSPB), coastal sedimentation (eg Medmerry, with the Environment Agency) and freshwater ecosystems (UK-wide). Field and laboratory facilities are used to support activities across our research themes, but are also used by visiting scholars and industry for collaborative projects and consultancy. For example, our ^{210}Pb and ^{137}Cs radiometric dating facility supports collaboration with UK and overseas universities (eg visiting scholars from Sicily and Mexico), our portable Raman facility is used to support ongoing research and consultancy through the Minerals Industry Research Organisation (MIRO), and our PXRF facility underpins ongoing collaborations with SMEs, and a major Greek supplier of bauxite minerals.

Investments (both current and planned) in infrastructure and facilities: During the past five years, the university has invested over £1m to augment our research equipment infrastructure,

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including an in-field PXRF (£40k), sediment flumes (£98k), Leica Microscopy Suite (£20k), portable infra-red Raman facility (£75k), laser facility to examine carbon sequestration processes (£30k, funded via a philanthropic donation) and hydrogeological equipment (£59k, funded from external sources). Current investments in ICP-MS and XPS suites (total £394k, including two linked PhD studentships) are supporting our new *Critical Metals* and *Smart NanoMaterials* research clusters. Nanotechnology and (geo)chemistry research use new laboratory space and microscopy facilities (SEM, AFM, funded through £500k university investment) in the recently completed £24m Huxley Building. Further specialist facilities are available through staff links with external bodies (eg the Natural History Museum, SMITH; Cefas, TAYLOR and EBDON; Toyo University, Japan, WHITBY). £6.75m of investment in the refurbishment of B7 accommodation is currently taking place with the creation of new high-quality dedicated analytical research laboratories (290m²) and new staff offices.

Research funding portfolio: Research expenditure during the census period was £4.6m. RCUK grants make up 13% of the funded total (eg ASHWORTH, large rivers and tidal projects), while other staff lead major (>€1m) collaborative EU-funded projects (eg AquaManche and RiskManche, TAYLOR; CLIMAWAT, SMITH; Carbosorb, CUNDY). Our diverse sources of funding reflect our international collaborative links (eg EU and Leverhulme funding), and close engagement with industrial partners and other end-users (eg Defra, UNEP, UNICEF, Natural England, MIRO, ExxonMobil). External funding is used to leverage additional infrastructure, for example large-scale geotechnical centrifuge (EU SETARMS project, HOPKINSON), ion chromatograph (EU CLIMAWAT project, SMITH). In the future, through investment, studentships and mentoring, we will extend support for ECRs to become co-investigators on major international research projects in HORIZON 2020, set aside time for staff who have a track-record of RCUK success to lead large and consortium grant applications, and encourage industrial and NGO partners to access and add value to our emerging areas of excellence in *Smart NanoMaterials* and *Critical Metals*.

Consultancies and professional services: UoA B7 research provides a service to business and commerce through the university's Economic and Social Engagement Department (REF3a). Activities include: consultancy and contract research that frequently builds into longer-term research partnerships (eg HOPKINSON through MIRO; FIRTH with East Sussex County Council; TAYLOR and EBDON with Thames Water Services); KTPs (15 KTPs are supervised by SET staff); collaborative projects related to economic, community and sustainable development (eg CHURCH and Sussex Inshore Fisheries Conservation Authority); IP management; and; CPD courses (eg IEMA - accredited Environmental Auditing). Exemplars include CUNDY and HOPKINSON's KTP with AWE PLC, which led to the first full-scale test of electrokinetic remediation for nuclear site wastes, and which was the *national* KTP award winner for Most Successful Partnership Funded by the NERC (2010), and the £2.98m HEFCE Catalyst-funded Green Growth Platform (2013–2018) which will link the knowledge assets of the university with 1,000 environmental sector SME and other partners in areas including recycling, waste and water (REF3a).

e. Collaboration and contribution to the discipline or research base

Research collaborations: Staff engage with a range of partners as noted in section b. Of submitted outputs 90% are co-authored with external academic or industrial partners, while 46% are co-authored with non-UK-based partners from over 20 different countries. Staff lead a number of large RCUK, EU and NGO-funded international collaborative research programmes: for example ASHWORTH, NERC-supported large rivers and river-tidal projects with partners in five universities (including the USA) and oil MNCs; TAYLOR and EBDON working with universities, research institutions and environmental protection agencies from Europe, Africa, South America and the Caribbean on control of waterborne contaminants; WHITBY, EU FP7 International Research Staff Exchange Scheme Project ENSOR on nanomaterial technologies with Hungary, Japan and Russia, and SMITH, EU Interreg IVA-funded hydrogeological research with French universities and the CNRS.

Support for and exemplars of interdisciplinary research: Our research themes are strongly interdisciplinary, with *Aquatic Research* in particular bringing together staff from microbiology, river basin modelling, water treatment technology, chemistry, nanoscience, molecular and freshwater ecology and social science to address key pollution and water resource issues.

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Strategic investment is used to stimulate and cement emerging interdisciplinary activity: for example in our *Smart NanoMaterials* cluster (£274k in XPS facility and linked studentships, led by WHITBY and bringing together chemistry, environment, engineering and art and design staff; see section b), and through a £44k University Research Challenges award to NASH to develop geochemical provenancing tools for African Stone Age artefacts with archaeologists and human evolution specialists [NASH, 2]. Multidisciplinary research that included social and natural scientists was led by CHURCH as co-ordinating lead author for the cultural ecosystem services chapter of the UK National Ecosystem Assessment 2011. CHURCH is also the PI for a £134k project on developing indicators of cultural ecosystem services in the National Ecosystem Assessment Follow-On Phase.

How collaborations have informed research activities and strategy: Our research activities are focused strongly on collaboration with industry, government and other users of our research. A number of large projects involve these groups either as key project partners or as members of project steering committees (eg EU FP7 Industry-Academia Partnerships and Pathways projects Carbosorb and UNCOS; EU Interreg IVA CLIMAWAT). These collaborations not only help to develop sustained external research partnerships (eg the EU-supported AquaManche (2009–2012) project with water companies, regulators and water users in the UK and France, which led to the award of the €4.5m RiskManche (2012–2015) project), but also identify opportunities for research exploitation through licensing and IP development (eg CUNDY with the Ministry of Defence and MAST Carbon International), and inform future research directions (eg ASHWORTH with ExxonMobil). Further detail is given in REF 3a. These interactions inform our research strategy formally through our area BDM, who is a member of the SETRSC.

Leadership in the academic community: In addition to the activities above, B7 staff lead on a number of initiatives and professional activities as demonstrated by:

Expert panel service: ASHWORTH is one of only 14 UK scientists selected by NERC to chair all their responsive mode grant panels (2010–2014). He also Chaired the NERC Peer Review College Review (2013), the £3.5m Flooding From Intense Rainfall Call and the £6.5m Environmental Sciences Capital Equipment Call (2013). CUNDY, TAYLOR, CHURCH and WHITBY also serve on RCUK peer-review colleges or commissioning panels. Staff have served on a range of industry, learned society and government expert panels (eg Defra expert panel on *Establishing a national soil erosion monitoring framework*; Geohazards Committee of the International Geoscience Programme (IUGS and UNESCO); expert panel for the UK National Ecosystem Assessment and the Valuing Nature Network; World Health Organisation (WHO) Sanitation Safety Planning expert panel; Steering Group, Sustainable Remediation Forum UK).

Professional activities: Staff participate regularly in peer review (for both funders and journals). WHITBY is Editor-in-Chief of the journal *Nanomaterials and the Environment*, and staff serve as journal editors for special issues (eg SMITH guest editing *Ore Geology Reviews*). Staff serve on committees of the Geological Society (London), the RGS, the Mineralogical Society and the British Carbon Group. BARDOS manages the EUGRIS web portal for soil and water information that currently receives 14,000 visits per week. ASHWORTH was Research Committee Chair (2009–2012) and is Deputy Chair (2012–14) of the British Society for Geomorphology; FIRTH was Secretary of the International Quaternary Association Commission on Coastal and Marine Processes, 2007–2011; NASH chairs (2010–2014) the Past Global Changes Africa2K network; CUNDY is Vice-Chair (Europe) of the Society for Environmental Geochemistry and Health [2010-]; TAYLOR, Vice-Chair of the International Water Association Water Safety Planning Group [2011-].

Conference activities and international visiting positions: Staff have hosted seven international conferences and workshops at the university within the census period, or have organised external conferences (eg the 10th International Fluvial Sedimentology Conference 2013, ASHWORTH, Vice-Chair), and ten staff have been invited to give keynote lectures or have convened international conference sessions in Europe, the former Soviet Union, South America, Africa, Australia, China, Japan, Canada, and the USA, leading international academic debate in areas such as environmental nanotechnologies, large river dynamics, brownfield regeneration, waterborne disease, ecosystem assessment and climate reconstruction. Staff also hold senior visiting research positions at overseas universities (WHITBY, Toyo University Visiting Professor; CUNDY, University of Palermo Visiting Professor, NASH University of the Witwatersrand Honorary Research Fellow).