

Institution:	University of Bristol
Unit of Assessment:	17 – Geography, Environmental Studies and Archaeology
<p>a. Context</p> <p>Research undertaken in the School of Geographical Sciences is of the highest calibre and ranges from that driven by curiosity to that applied to needs. Our research strategy supports effective leadership, team-building and collaboration to enable outstanding academic ambitions to be translated into plans, that are then funded, co-ordinated and carried through into research publications and other outputs that have real impact. Beneficiaries of our research range from major multinationals (including Exxon, Willis Re, BP), small and medium size enterprises both in the UK and overseas (such as HR Wallingford Ltd., Risk Management Solutions, Getech), major global Non-Governmental organisations (e.g. World Bank, IPCC and the Antarctic Treaty System), numerous National Governments and civil services (e.g. Jamaican Government, DEFRA), and the global general public (through accessible software, websites, installations and exhibitions).</p> <p>The School consists of seven formal research groups who range in interest from science (Hydrology, Bristol Glaciology Centre, Bristol Research Initiative for the Dynamic Global Environment) to the humanities (Historical and Cultural) and social science (Geographies of Political Economy, Personal Finance Research Centre, Spatial Modelling). Our research excellence is due in part to long term stability in research-group configuration, strategy and staffing. This stability has allowed research groups to develop knowledge transfer activities over long time scales and to build relationships with interested parties and end users. The quality of our research, and its breadth, lead to a wide range of impacts outside of their immediate academic arenas including: (1) the development of tools, algorithms and knowledge relevant to end users which we validate and place in the public domain via International peer-reviewed literature; (2) expert advice to companies, governments and NGOs with a demonstrable impact on policy or commercial activity; (3) engagement with the public through mainstream and social media, developing websites, museum displays and ancillary accessible resources aimed at adults and young learners alike; (4) improvements in professional standards and practice; (5) contributions to Continuing Professional Development; and (6) the development and provision of state-of-the-art software through both free/shareware and commercial routes for uptake by extensive user communities in such diverse fields as flood modelling, landslide prediction and spatial statistics.</p> <p>Within Bristol, the School has built the interdisciplinary Cabot Institute for environmental research, which was founded by the University during the current REF period as a vehicle for generating impact. The Cabot Institute, whose foundational Director was Professor Paul Bates, promotes links between academics and research end users and is a key part of our long-term strategy for embedding and further developing research impact. More recently the University has also established the Elizabeth Blackwell Institute for Health Research to undertake a similar role for the medical and health sciences, and members of the School (Sabel, Fannin, Jones) are involved.</p>	
<p>b. Approach to impact</p> <p>Over the assessment period we have developed policies to: (1) enable academics to interact with key beneficiaries, users and audiences; (2) support School members to achieve impact from their research; and (3) provide access to university resources to achieve impact. These policies are described below.</p> <p><i>Interaction with key beneficiaries, users and audiences</i></p> <p>The School encourages interaction with an extremely wide range of end users through formal Memoranda of Understanding, major research projects, the organisation of workshops, conferences and meetings to bring academics and research beneficiaries together, and one to one connections between academics and end users. The School facilitates such interactions through: (1) workload management, allowing staff time to develop end user connections; (2) the appointment of an Impact Director for the School (Bates) to advise and mentor staff; and (3) the provision of space, time, funds and administrative support to make such connections happen. We encourage academics to engage with end users at an early stage in the development of research to identify fundamental questions whose solution will lead to major impact and benefit. A key example here is the ~£2M NERC CREDIBLE consortium (2012-14, to Freer and Bates). Here,</p>	

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during bid development, the PIs identified and developed relationships with 17 commercial and NGO research end users, including RMS Ltd and the British Geological Survey among others. This process was supported explicitly by the School through travel funding and administrative support. The organisations involved have contributed ~£1.7M in additional support and have strongly influenced the science now taking place to ensure that it leads to outcomes of relevance to them.

End users with whom the School has long established relationships include:

- Financial services providers (both for-profit and not-for-profit), civil society organisations and parliamentarians who benefit from insights into consumer behaviour and attitudes disseminated by the Personal Finance Research Centre (Collard, Finney). These insights are shared through industry working groups and seminars; responses to major consultations; and relevant All-Party Parliamentary Groups e.g. Debt and Personal Finance; Credit Unions; Financial Education.
- Multinational oil companies such as Exxon and BP and their consultants for whom we develop geological analyses and interpretations (Flecker), groundwater flow and chemistry models (Smart) and paleo-climate analyses (Valdes, Lunt). This work has significantly enhanced resource prospecting by these organisations, saving costs and increasing success rates.
- The global general public via mainstream and social media. For example, among numerous media contributions by staff, Joy Singarayer (Lecturer 2007-2013) co-presented the 2009 four part Channel 4 series 'Man on Earth', which broadcast to 1.4M people, and Tamsin Edwards (a post doctoral researcher) advances public understanding of science through social media. Edwards writes the influential blog 'All models are wrong', which gains ~2-3000 unique visitors per month, has >2600 followers on Twitter and is a regular contributor to the Cheltenham Science Festival. From December 2012 'All models are wrong' has been hosted by the US-based Public Library of Science (monthly audience of over 200,000) as their climate blog. Taken as a whole our media activity has had a substantial impact on the public's understanding of key science issues and arises directly from the research being undertaken within the School.
- Audiences for Continuing Professional Development, notably through the online LEMMA course; 1000+ participants), but also through the Cabot Institute's annual Risk Summer School (commenced 2011, ~30 participants p.a.) and twice yearly 3-day intensive workshops on multilevel modelling attracting an international audience of around 60 a year held both in the School and also run overseas by Jones (for example two week-long advanced workshops at Penn State and UC Santa Barbara fully funded by the US Government).
- Wide user communities for the software developed by members of the School (e.g. the MLwiN spatial statistics software with >18,000 registered users worldwide including the UK Department of Education, the AQA Examination Board and HEFCE, and the >8000 users of the Centre for Multi-level Modelling (co-Director Jones) on-line training environment).
- The global insurance industry through participation in the Willis and Lighthill Risk Networks (Bates), and links to numerous insurance firms and their specialized consultants including Ambiantal Ltd., Risk Management Solutions Ltd., Mitsui Sumitomo Insurance Ltd. and Catlin Ltd. This engagement has led to the development of a company (SSBN Ltd.) to provide risk products to insurers and re-insurers.
- Flood industry risk managers and consultants through both phases of the EPSRC-led Flood Risk Management Research Consortium (2004-2012). This has led to strong links with the Environment Agency of England and Wales, HR Wallingford Ltd., Halcrow Ltd., Capita Symonds and JBA Ltd among others. In particular, state-of-the-art numerical modelling algorithms developed in the School are now used widely throughout the insurance and flood risk industries (see LISFLOOD-FP case study) as a result of these linkages.
- Public intellectual life through museums in the UK (Glasgow's Hunterian Museum, Bristol Museum and Art Gallery), Canada (Royal Alberta Museum) and Australia (Maitland Gallery, New South Wales) through the work of Patchett and Jackson. This work has developed not only "conventional" exhibitions, but also travelling audio-visual installations (notably in liaison with City University New York), and ancillary websites (e.g. the atlas digitisation project with University of Bristol Special Collections). These efforts also draw on the skills of artists and photographers to engage the general public with issues from social justice through resource extraction (with the Cabot Institute) to urban design (the last in liaison with the City and Regional Studies Centre, Alberta).

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- National Governments (including the UK, Jamaica, St. Lucia, States of Jersey) through provision of advice on matters ranging from elections (Johnson) to landslides (Anderson) and widening University participation (Hoare, Lecturer til 2010, now Visiting Fellow), through assistance in the preparation of electoral legislation in the UK (Johnson), and the UK National Ecosystem Assessment Report (Freer).
- National and International Non-Governmental Organisations, including the Scientific Committee on Antarctic Research and the Antarctic Treaty System (Siegert), the World Bank (Anderson), the Rowntree Foundation (Jones), the Intergovernmental Panel on Climate Change (Payne is lead editor on Chapter 13 on sea level, Bamber is a review editor and Lunt and House are reviewers), Citizens Advice and the Money Advice Trust (Collard), Asian Development Bank and the Center for Global Development, Washington DC (Dixon).

Our impact on research beneficiaries has been recognized through the award of a number of important prizes including the 2011 Political Communicator of the Year (to Johnson), the 2012 Lloyd's Science of Risk prize for Natural Hazards (to Bates) and the 2013 Martha T. Muse Prize on Antarctic Research and Policy (to Siegert).

Support to staff for achieving research impact

We use numerous mechanisms to help staff achieve impact from their research, including:

- Enabling access to staff and student development opportunities targeted at enhancing research impact including leadership and management programmes, media and networking training, non-executive director training, and coaching in research commercialisation.
- A promotions system in which applied research leading to impact is valued highly.
- Flexibility in scheduling Fellowships and Secondments aimed at developing research impact to enable staff to benefit from such opportunities.
- Appointment of a senior academic to the role of Impact Director for the School to advise and mentor staff in developing impact.
- Employing a Research Development Manager (Lisa Hill) early in the current REF cycle (2008) to document impact and further develop connections between researchers and users.
- Enabling connections to external organisations via close working with the University's Research and Enterprise Development Office (RED). RED consists of >80 staff working with academics and researchers to sustain and grow research activities. This includes identifying funding opportunities, advising on development of research proposals, co-ordinating large collaborative bids, negotiating research and consultancy contracts, management of large projects, and improving impact and commercialisation of research by working with business.
- Supporting staff and student entries to the University of Bristol New Enterprise Competition (Bates, Neal and PhD students Sampson and Smith were finalists in 2013).

Use of University resources to support impact

We access a wide variety of University resources to support impact development including:

- Access to ~£300k in internal and external impact development funds over the REF period, including: the Higher Education Impact Fund, Alumni and Faculty funds made available through the Cabot Institute and PolicyBristol (to Fairbrother, Anderson, Valdes and Wang among others); EPSRC Institutional Support funds for work on sustainable energy (Fairbrother); University funds to support impact development in Global Change (Valdes, Lunt), Water (Anderson) and Risk (Bates); and NERC Impact Accelerator funds to support the formation of SSBN Ltd. (Bates, Neal). These funds are competitively awarded and used to strategically support Bristol's approach to impact.
- The University's Research Commercialization team (e.g. to support formation of SSBN Ltd.).
- Expertise from Bristol's Centre for Public Engagement and the Cabot Institute to realize impact through public engagement (Dewsbury).
- Support from RED and the Cabot Institute in the preparation of grant proposals, pathways to impact plans and the development of strategic partnerships with industry and NGOs.
- Training and mentoring for student business start up and entrepreneurship via the University of Bristol initiated BaseCamp organisation, which provides free office space, advice and seed funding for student business ideas.

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- Practical advice for business acceleration and development by the University's business incubator unit and the Bristol SETSquared centre.

c. Strategy and plans

Our strategy for the period 2014-2020 will be to develop impact by: (1) appointing a senior member of the School to the post of Impact Development Director to champion research impact within the School and mentor staff in impact development; (2) planning for each member of staff to consider, plan and deliver significant and measurable impact from their individual research activities; (3) to encourage and support this within the School by setting up new mechanisms to identify, track, fund, nurture and reward impact activities; (4) further enhancing engagement with end users, including identification of new partners and undertaking actions to support the development of new and existing relationships; and (5) by encouraging entrepreneurship within the undergraduate and postgraduate cohorts, where this relates to on-going research within the School, by enabling better student access to training, support and facilities for business start up and acceleration. To realise the strategy our specific plans are to:

- Undertake a review of the research of each staff member to help identify impacts for their research and provide a tailored plan for their development.
- Enable staff to achieve impact of reach and significance through workload management, training and development opportunities, and access to funding.
- Use the staff annual review process to assist development of impact for each Faculty member.
- Use University mechanisms (for example the Vice Chancellor's Impact Award and additional pay increments) to reward staff for developing impact.
- Build impact as a consideration into all of the School's retention and recruitment decisions.
- Instigate a series of impact development workshops and drop-in clinics, facilitated by the Impact Development Director and run by RED.
- Work with staff to access available impact development funds both within (e.g. Enterprise and Impact Development fund and New Enterprise Competition) and external to the University (e.g. NERC, ESRC and EPSRC impact accelerator funds).
- Develop an online system to record impacts as they occur using the University's PURE research output management platform.
- Instigate an annual Industry day to showcase the huge variety of research on-going within the School to local, national and international industry.
- Work with the Cabot and Elizabeth Blackwell Institutes, and the University's Research and Enterprise Development Office to develop collaborative strategic alliances with industry and NGOs. The Cabot Institute in particular with its environment-society remit is central to the School's future plans for impact development. For example, through the Cabot Institute School of Geographical Sciences staff have helped develop MoUs with organisations including Arup and the Food and Environment Research Agency (FERA), and in the future we will use this mechanism to foster further new relationships.
- To provide better access to training and support for student entrepreneurship (Business BaseCamp, Bristol SETSquared etc) where this links to on-going research within the School.

d. Relationship to case studies

The variety of impacts in the submitted case studies reflects the diversity of research undertaken in Geographical Sciences at Bristol, and demonstrates that we successfully translate our research outside of its academic origins across the breadth of activities we undertake. The submitted case studies indicate the success of specific policies implemented by Bristol over the current REF period that support diverse routes to impact including through: (1) long term and rigorous academic research leading to unique and highly valued expertise (Parliamentary boundary, MoSSaiC and Antarctic Treaty System case studies); (2) intensive user engagement at the outset of research planning and our reputation for quality leading to bespoke commissioned work with far reaching consequences (Personal Finance case studies); and (3) development of long term research partnerships with Industry leading to scientific achievements that meet critical business needs (LISFLOOD-FP case study). Through these cases, and as a consequence of the support we give to enable research impact, we are able to show that the School engages with users of its research proactively, effectively and successfully.