Institution: University of Portsmouth

Unit of Assessment: 17 Geography, Environmental Studies and Archaeology

a. Overview

The 11 individuals submitted to UoA 17 contribute to the three research groups in the Department of Geography:-

- *Boston, Cunningham, Hardiman, Inkpen* and *Pepin* - **Environmental Processes and Change (EPC)**
- *Ekinsmyth, Southall, Twigg* and *Woodyer* - **Geographies of Health, Well-being and Lifecourse (GHWL)**
- *Jones, Healey* and *Southall* - **Historical Geography and Spatial Analysis (HGSA)**.

The groupings are similar to the research themes described in RAE2008 except that the Geography of Health and Well-being and the Environment- Society Interactions themes from 2008 are now clustered within the **GHWL** group.

b. Research strategy

The University's overall research strategy is to '*address fundamental and strategically important questions and to deliver economic, social and cultural impact at regional, national and international levels*'. In Geography, we have addressed this strategy by developing world-leading research strengths in areas covered by our three research groups:-

1. **Environmental Processes and Change (EPC)**

The 2008 RAE sub-profile made particular note of the high quality outputs arising from the EPC group. Strengthening and developing the substantive focus on paleo-environmental and climate research has been a strategic aim, with specific reference to three key agendas:-

- The understanding of spatial patterns and impacts of more recent climate change, particularly in mountain and arctic, and urban/heritage environments. Research has quantified the impacts of climate change in mountain regions, particularly whether high mountain areas show enhanced warming in comparison to the rest of the globe.
- The validation and development of novel proxies and analytical techniques for terrestrial and marine sediment archives, including research on the use of X-ray fluorescence **(**XRF**),** infrared spectroscopy and other core scanning technologies for interpreting past environmental changes. Importantly, this work identifies shortcomings of other approaches. Research has also furthered the application of traditional diatom and charcoal analysis, and the conceptual basis of such reconstructions.
- The identification of limits and dynamics of ice masses via detailed geomorphological mapping and sedimentology, and understanding mass balance through current climate measurement and modelling. Understanding the response of the cryosphere to climate change is a critical component for understanding the response of the planet to past and present radiative forcing.

2. Geographies of Health, Well-being and Lifecourse (GHWL)

The 2008 sub-profile also made note of the high quality outputs surrounding the health and well-being agenda. Our strategy has been to build on this international excellence by creating more nuanced understandings of socio-spatial configurations of health-related behaviours and outcomes, to have a deeper appreciation of lifecourse/longitudinal aspects of well-being and to maintain policy relevance. These objectives have been achieved by:-

- Focussing attention on more realistic definitions of risk behaviours; an acknowledgement of important co-behaviours and by broadening the conceptual understanding of well-being through an explicit focus on perceptions of community. This work has also developed and enhanced the multilevel small area synthetic estimation (MLSASE) techniques to address user-needs for small area data.
- Strengthening the focus on 'lifecourse' through innovative integration of longitudinal health and demographic datasets and through two new internationally recognised research agendas. First, empirically-grounded research on 'Ludic Geographies' argues that play is a lifecourse process and has critical and ethical potential for making the ways in which our everyday social

worlds are constructed and enacted more visible. Second, the lifecourse agenda has been strengthened by research which concentrates on the life stages of entrepreneurial mothers ('mumpreneurs') - a key target group for economic/work policy makers.
- Engaging with end-users in designing, interpreting and reporting on our policy-relevant research, thus guaranteeing its real world applicability.

3. Historical Geography and Spatial Analysis (HGSA)

Formerly Historical and Contemporary Geographical Information Systems (GIS), this group was renamed to reflect common underpinning approaches and research goals associated with the compilation, analysis, storage and visualisation of large, complex historical datasets. The research strategy has been to focus on the themes of geo-semantic approaches to information management and resource discovery; railroads and regional industrial development in the 19th century USA; history of cartographic representations; military geography and quantitative 'public historical geography'. The key achievements of this group are evidenced by:-

- An extension of the existing railroad GIS for part of the North East USA to cover major eastern trunk lines, and the creation of a full scale data warehouse (DW) for 450 million data items from the US 1880 census.
- Identifying fundamental flaws in 19th century US population and manufacturing censuses, which involve coding, reporting and classification problems. These data discoveries and the development of resources above are facilitating new analyses that challenge the Krugman and Fogel models of US economic development.
- The addition of historical electoral boundaries to the acclaimed Vision of Britain (VoB) on-line system, and an extension to parts of Europe.
- Introducing a new usability theme to the group by focusing on open source GIS and geo-visualization tools. The 'Bombsight' web resource (www.bombsight.org) for example, developed with the National Archives, has witnessed major public engagement and media interest.

Since RAE2008 we have been able to focus and develop excellence across these three research themes. The 11 individuals submitted in this REF have produced over 80 peer-reviewed journal publications. Opportunities provided by staff turnover have allowed us to appoint internationally excellent researchers that align and build on our research ambitions. The strong internal and focused support for grant applications (see below) has enabled us to create a sustainable funding base. Internal investment of funds and targeted advertising has led to a healthy and successful portfolio of PGRs associated with each group.

Future plans and strategies

Our overarching strategic aims for the period 2014-2020 seek to grow the internationally recognised research across the three groups and to establish a long-term sustainable, thriving research environment. These aims will be achieved through several key objectives:-

- To increase the international recognition of research active staff aligned with each group. We will achieve this through strategic recruitment of new staff and through nurturing and mentoring existing, less experienced researchers.
- To increase our collaborative and interdisciplinary funding applications to the range of sources that address key strategic priorities laid down by Research Councils UK (RCUK) - notably *Living with Environmental Change, Global Uncertainties* and *Lifelong Health and Wellbeing,* as well as other relevant funding bodies *(e.g.* National Health Service/ National Institute of Health Research - NHS/NIHR public health calls).
- To exploit our unique access, and methodological expertise, relating to large, longitudinal, complex data records concerning socio-economic and environmental change. We are well-placed to address the challenges of *Big Data* and to continue to *build capacity in quantitative social science*, a key priority of the Economic and Social Research Council. We will therefore develop more nuanced understandings of place effects on health, novel and effective applications of MLSASE, and formulate novel inductive theories of regional economic growth and labour migration using advanced GIS/database methods and the linkage of historical census and non-census datasets. We will also capitalise on our specific expertise in the development of detailed geochronological models to understand past and future environmental change, particularly in alpine and arctic contexts. We will focus on the

development of cutting edge technologies for quantifying environmental change in sediments, glaciers and the global temperature record.
- To continue to strengthen the vitality of the UoA by growing the number of postgraduate researchers (PGRS) and post-doctoral researchers that are aligned with our research groups (see section ii below).

c. People

i Staffing strategy and staff development

Research is the major driver in staff recruitment and all new appointments add or complement existing research strengths. The goal has been, and continues to be, the recruitment of academic staff with international research recognition as well as early career researchers (ECRs) on a trajectory to such recognition. During the REF period we have been able to recruit five new staff, four of which are returned as ECRs.

Three ECRs have been strategic appointments to develop critical mass in the area of climate change in the EPC group. We have specifically focused on this area to strengthen our already strong track record in this globally important research. Staff turnover and strategic investment of internal funds have allowed us to focus attention of recruiting staff with specific expertise in monitoring, modelling and reconstructing past environments that complement the expertise of existing staff. This has resulted in the creation of a group that is well-placed to publish and compete for research funds. Enhancing 'lifecourse' approaches to the GHWL group was another strategic aim and we have grown and strengthened this area by recruiting a world class expert on 'Ludic Geographies'. ESRC monies have already been secured by this ECR (£492,508 from November, 2013) to employ a post-doctoral research fellow (PDRA) to help expand the academic influence and impact of her research. The fifth new member of staff, appointed from the Centre for Advanced Spatial Analysis, (University College, London) was recruited to help achieve strategic aims around 'usability' and visualisation for the HGSA group and was successful in attracting competitive JISC funds to develop this work soon after her arrival.

New academic staff receive a research seedbed fund and protected time to establish their research presence in Portsmouth. All staff are supported by a mentor who is an experienced and established researcher. We believe that successful mentoring relies on the development of a supportive and trusting relationship between the mentor and mentee and mentors are therefore chosen carefully and appropriately. A mentor's duties are wide and will vary according to the mentee's career stage, but all will advise on research management, funding, publication and impact, through activities such as commenting on drafts of papers, providing advice on publishing plans, and on accessing research support and training. In collaboration with the Head of Department (HoD), mentors also help with career development plans. All staff pursue training opportunities as identified through their Professional Development Review (PDR) with the HoD, which includes explicit discussion of research, professional development plans and ambitions. Personal research plans are also discussed at research group level to monitor progress against strategic research aims and objectives and to confirm that they align with Department, Faculty and University strategies.

The Department currently employs one full-time Senior Research Associate (SRA) and one part-time Research Associate who are also mentored. We are fully committed to the Concordat to ensure effective development opportunities for all levels of research-active staff. The University Research Staff Forum is also a source of advice, guidance and information to researchers and regularly hosts visiting speakers on a range of topics such as leadership in research and career opportunities. As a result of career development mentoring, the SRA has recently registered to undertake part-time doctoral research, closely aligned to her research duties associated with the *Vision of Britain* research.

An important aspect of our staffing strategy over the next REF period is to continue to develop research leadership. During this last REF cycle, one Principal Lecturer has been promoted to Reader and we now have a total of two Readers and one Professor. The HoD and other senior staff are currently encouraging and facilitating the engagement of appropriate staff in research-related Continuing Professional Development (CPD) opportunities to achieve Readership level

(with an initial target of one such promotion by December 2013 and another by early summer 2014). We are particularly committed to actively promoting the role of women (6 from 11 submitted staff are women). The University is currently developing a submission to seek Athena SWAN Bronze award by 2014 which recognises commitment to advancing women's careers in science, technology, engineering, maths and medicine (STEMM). The University has also been awarded the European Commission HR Excellence in Research Award.

The University operates a sabbatical leave policy for all academic staff and submissions to the University's Research Development Fund (see below) can also include a 3-month research leave element. Additional support at Department level includes research funding support schemes and timetable adjustments to support concentrated research activity. Individuals can also apply to the Department for internal funds to support research activities (e.g. for networking, conferences, support for invited scholars etc). Each bid is reviewed by the Departmental Research Committee to maintain strategic focus and to ensure that activities lead to grant applications or outputs commensurate with career stage. This committee is chaired by the Departmental lead for research (who also reports back to Faculty via the Faculty Research Committee). Other members include the HoD, the PGR tutor, a knowledge exchange lead, a representative from each of the research groups, an ECR representative and a representative from research staff. The primary task of this committee is to monitor and develop research strategy against the backdrop of objectives set at Faculty and University level and it works closely with the HoD and the research groups to align PDR plans accordingly.

ii. Research students

Due to small numbers at the start of the REF period, our returned postgraduate (PGR) completion numbers are modest at six, but since the submission of REF PGR data, we have increased the rate of success with three more completions. Providing a supportive environment for an increasing number of PGRs has been one of our main strategic aims since RAE2008, and will continue to be a key strategy from 2014-2020. We have worked creatively to increase our registrations from 1.5 in 2008 to 12 in July 2013. We have achieved this by providing internally funded bursaries to our most excellent applicants and providing informal support to nurture excellent undergraduates who wish to pursue PGR studies. We always advertise bursary opportunities nationally and always ensure we appoint the best candidates. We have also been successful in the ESRC Open Competition and we have received PGRs from Nigeria (supported by the Petroleum Technology Development Fund) and from Malta, supported by their national government. The increase in PGRs has allowed us to broaden supervisory experience. The welfare and progress of research students is the responsibility of the PGR tutor who works closely with the supervisory team to ensure all PGRs are making good progress. All new supervisors are required to undergo training via an induction course run by the Graduate School (see below) and a supervisory team always includes an experienced member of staff who is able to act as a mentor to less experienced supervisors. All supervisors are invited to attend the wider Research Supervision Events programme (approximately 10 events a year). Irrespective of Geographical subject matter, all PGRs (with supervisory guidance) must consider the ethics of their research soon after initial registration: all research is reviewed by the Faculty Ethics Committee and, if appropriate, is referred to the University Ethics Committee for approval.

In 2011 the university-wide Portsmouth Graduate School was created with its own dedicated building and staff to lead and coordinate support for PGRs and supervisors. All PGRs are members of this School and attend the equivalent of 10 days (5 days for PT students) researcher development training per year. General research and transferable career training skills as recommended by Vitae and RCUK are delivered; staff from UoA17 contribute several of these sessions. More specialist training is delivered in-house or, where appropriate, students engage with external provision (e.g. via the Southampton University node of the National Centre for Research Methods, the Centre for Multilevel Modelling at the University of Bristol , Royal Geographical Society research group training and the Environmental Change Research Centre at UCL). Students can apply to the Faculty and Department for monies to support essential external research training. Training is discussed and agreed between the PGR and supervisory team, and is recorded, alongside agreed summaries of regular supervision meetings, via the SkillsForge

system (an online system adopted by a number of institutions to record supervisory meetings and monitor training and other relevant activities of postgraduates). Progress and training is appraised annually and a major review is undertaken at the end of the first year of study to ensure that work is of appropriate doctoral standard.

Since the last RAE, we have created a dedicated PGR room and all PGRs have their own IT equipped workspace. All contribute to, and attend, our Departmental research seminar series, presenting their work at least twice during their studies. Students are also invited to work with members of staff on expeditions, fieldwork and on research projects, and all PGRs are given the opportunity to teach, but only after developing their teaching skills through our in-house Graduate Student Professional Development (GPROF) programme. All of our recently graduated PGR students have either secured fellowship positions or are in temporary lecturing posts whilst seeking fellowship or full-time lecturing positions.

d. Income, infrastructure and facilities

Over the current REF period approximately £521,000 of research income has been secured from research councils, charities, government bodies, UK and non-EU industrial bodies. An additional £412,000 of income has been awarded from JISC via competitive, peer reviewed bids (JISC is a UK non-departmental public body funded by all UK higher-education funding councils and income from this source is not recorded in REF4b). Grant income-in-kind has been obtained from NERC for the use of radio carbon dating laboratory services. Our income generation is less than that returned in 2008, reflecting the replacement of established, externally supported senior staff with ECRs who are still developing their funding base. The funding that we have received has facilitated high quality publications and has provided a sustained funding base for many of our research activities. Funding obtained from the Royal Society, Lapland Atmosphere Biosphere Facility (LAPBIAT2), EU- INTERACT and US National Science Funding, for example, has supported essential field studies in the Pyrenees, Sweden, Finland and the US to understand cold air drainage and allow quantification of mountain climate decoupling from larger scale free-air forcing. NERC and Royal Geographical Society funding has enabled expansion of the EPC group's unique network of moisture sensors on Mt Kilimanjaro where nine years of continuing observations allow investigation of free-air forcing and deforestation to ice-field decline. ESRC monies have supported testing the viability of the value-added MLSASE technique to the Crime Survey for England and Wales to replace highly expensive existing local surveys of antisocial behaviour. The importance of this work has been recognised by the ESRC through the Secondary Data Analysis Initiative where the technique is being scoped to replace health and well-being data traditionally sourced from the census. ESRC and JISC monies have supported the important work that challenges existing paradigms of 19th century economic and railroad development across the US. JISC has also been paramount in facilitating research to solve the semantic database challenges underpinning the Great Britain Historical GIS and the associated, and massively influential, Vision of Britain website. ESRC funds have also enabled us to challenge controversial rhetoric concerning the negative effects of ethnic heterogeneity on perceptions of community well-being.

As outlined above, new grant successes are beginning to address the recent reduction in funding. Securing additional research funds is one of our main priorities for the period 2014-2020. A strong infrastructure of support across the University has developed over the REF period which is specifically designed to increase grant success. The University's Research and Innovation Service (RIS) staff focus on matching opportunities to appropriate researchers, their representatives attend Faculty Research Committees and are able to provide one-to-one support in this area. RIS also coordinate CPD relating to research, including grant writing workshops and individual mentoring delivered by those with track record (and RCUK Peer Review College experience) via the University's Peer Review College. Individuals or groups can also apply to the University's Research Development Fund to support networking and other activities that specially focus on building capacity and interdisciplinary links exhibiting a clear pathway to grant application and output generation. For example *Twigg* and a colleague from the Global Health and Social Care Unit (submitted under UoA 2) have very recently been awarded funds to build capacity and develop international collaboration to research the drivers and wider social

consequences of low fertility in developing countries, especially on older, dependent family members. This work is also being supported by the University of Portsmouth Ageing Network (UPAN), which has been established to address challenges and opportunities offered by population ageing. UPAN promotes cross-departmental and cross-faculty collaborations, as well as those with external organisations, businesses, academia, and the wider social community.

Our researchers are also supported by the University-wide Environment Network (UPEN), which draws together over 40 Principal Investigators and postdoctoral researchers, as well as 70 research students to provide a critical mass of expertise. The main aims of UPEN are to: 1) promote and facilitate excellence in environment-related research, across all areas of the University, and 2) strengthen environment-related collaborations within the University community and help to develop new links between academics, businesses and communities at local, national and international levels. The network comprises three themes: 'Sustainable Society'; 'Hazards, Environment and Risk' and 'Ecosystem Complexity and Environmental Change'. Many of our researchers are linked to this network, but the themes are most closely linked to the activities of our EPC research group. The Hazards, Environment and Risk theme is headed by one of the EPC members. Our researchers have benefitted by capitalising on the interdisciplinary opportunities afforded by UPEN in terms of grant applications, publications and collaborative supervision of PGRs.

The Department specialises in equipment for measurement and monitoring environmental processes, both in the real world, and through laboratory simulation. The Environmental Monitoring and Modelling laboratory contains an extensive pool of dataloggers and sensors (Campbell Scientific, Onset) including an automatic weather station, sonic anemometer, and radiometers. This is regularly employed in environments from the Arctic to the tropics, enabling creation of large real-time environmental datasets. The Physical Geography Laboratory contains extensive analytical and experimental equipment (e.g. atomic absorption spectrophotometer, laser particle size analyser, ion chromatographer) and tools for laboratory simulation (flume, rainfall simulator). Since RAE2008, considerable investment in this aspect of research infrastructure has been made, both labs having undergone a major refurbishment. Internal funds have matched some of the external monies awarded to purchase data loggers for *Pepin's* work on the climate of Kilimanjaro. Faculty has also invested in an environment cabinet to support *Inkpen's* work on stone weathering. A key tool for analysis of temporal and spatial patterns of environmental change is GIS. Thus we have invested in specialist GIS/digital photogrammetry equipment, including a 5 micron Vexcel Ultrascan photogrammetric scanner, a scanning total station, 2 differential GPS and a 20 micron 3D digitising laser scanner. Photogrammetric software includes BAE Systems Socet Set, the Leica Suite, and extensive GIS and image processing tools. To support historical GIS work, an Enterprise Class ORACLE database implementation, with full data warehousing and data mining capabilities, runs in a virtual server environment on the University's 'private cloud', interfaced to an ultra-high-performance fibre channel disk array. Additional standard and virtual servers host the *Vison of Britian* and *Bombsight* 'public-facing' services. The Department also has access to equipment elsewhere within the University, including a scanning electron microscope with energy dispersive X-ray spectroscopy, Inductively-Coupled Plasma Mass Spectrometer (with laser ablation capacity), X-Ray Fluorescence Spectrometer, QuAAtro nutrient autoanalyser and Gamma-Ray Spectroscopy, SEM equipped with EDS and CL. We also have access to a rock mechanics laboratory for geomorphological applications

e. Collaboration or contribution to the discipline or research base

National and international collaborative work underpins approximately 40% of our grants and 70% of the outputs submitted in this REF include external collaborators as authors. Many of the collaborations amongst the senior staff in Geography are longstanding and reflect recognition of our expertise and track record in our specialist areas. We seek out partnerships with others who are also world-leading in their respective fields. This ensures a sustainable, solid research culture within a relatively small department and helps promote our global standing across our research areas. Portsmouth researchers provide added value to collaborations because of subject expertise and their accumulation of unique research data sources. For example, *Inkpen* has

access to established field locations and has developed fruitful collaborative work with colleagues from Oxford, Cambridge, Sussex and York. *Pepin's* work on global temperature trends in mountain regions has of necessity been in collaboration with leading scientists in the U.S. (funded by Royal Society) and China, facilitating access to both global and regional temperature datasets. Field studies have involved collaboration with local scientists in a) Trondheim and Turku (funded by EU-INTERACT) b) Servei Meteorològic de Catalunya in Barcelona and c) Kilimanjaro (funded by RGS and NERC) in collaboration with Tanzania Wildlife Research Institute, Kilimanjaro National Park Authority, and Environmental Protection and Management Services. Likewise for the GHWL group, *Twigg's* expertise in modelling complex data and understanding of place effects on individual and community well-being were essential in the ESRC UPTAP collaborative work with the University of Southampton, in AHRC-funded work on Big Society with colleagues in Liverpool, Glasgow and Edinburgh and in the NHS/NIHR English National Study of Compulsory Admissions (ENSCA) involving clinicians from three UK medical schools. The ENSCA collaboration has recently been extended to work on and submit an NHS/NIHR Programme Area Applied Research Grant proposal to develop and evaluate interventions to reduce rates of mental health compulsory admission. If successful, *Twigg*, alongside a PDRA will lead the longitudinal work programme to model impact of the intervention. In addition, plans to work alongside the University of Southampton, ASH Wales and Hampshire Tobacco Alliance are in preparation to develop and evaluate youth smoking interventions involving social media and social norm awareness. *Healey's* production of innovative datasets, funded by the JISC/National Endowment for the Humanities (NEH) Digging into Data Challenge, has resulted in collaborations with the University of Nebraska and likewise *Southall's* historical GIS research, funded through the ESRC's Healthy Ageing Across the Lifecourse (HALCYON) project, has been essential in collaborations with social epidemiologists from UCL, University of Bristol and the Royal Free Medical School and historians at the University of Pittsburgh. The ECRs in our submission have already established fruitful and excellent collaborations as evidenced in their submitted outputs, Furthermore, *Woodyer* 's 2013 ESRC-funded work will build on her collaborative work with the Victoria and Albert Museum of Childhood, the Center for Children and Childhood Studies, Rutgers (US) and the Royal Armories, and colleagues from Royal Holloway and Exeter. Most of our collaborative work is supported by external funding but Departmental and University funds are available for networking events and meetings to help develop collaborative links.

In addition to publications and collaborative work, contributions to the discipline are also being made via other routes. Three of the submitted staff are members of RCUK peer review panels (*Pepin*: NERC; *Twigg* and *Healey*: ESRC) and others have reviewed applications for AHRC, ESF, NSF, Danish Ministry of Foreign Affairs and DOE (US). *Pepin* is on the editorial board of *Weather* and *Arctic, Antarctic and Alpine Research*; *Inkpen* is on the editorial board of *Geomorphology.* Individuals have been invited to speak at national and international meetings (e.g. *Pepin*: American Geophysical Union; *Healey*: Pennsylvania Historical and Museum Society; *Ekinsmyth*: The Institute of Small Business Economics; *Woodyer*: Royal Geographical Society), organise and host research meetings (*Jones*: Portsmouth GISRUK). Most individuals contribute to the discipline as members/Fellows of learned societies and with some serving as Committee members (e.g. *Woodyer*: RGS Social and Cultural Geography Research Group). Chapter contributions to the *Wiley-Blackwell Companion Series* have been made by *Twigg* (Companion to Health and Medical Geography), and *Woodyer* (Companion to Economic Geography) and chapters have also been provided for the Encyclopaedia of Consumer Culture *(Woodyer)* and the *International Encyclopaedia of Human Geography* (*Southall* and *Twigg*). Individuals have also been visiting scholars (*Woodyer*: Rutgers; *Twigg*: Auckland; *Ekinsmyth*: Uppsala). Academic advice and expertise is also provided via invited membership of several other academic and non-academic organisations (*Woodyer*: Play England; International Toy Research Association; *Inkpen*: Heritage Stone Task Group; *Jones*: Programme Development Group Member for National Institute for Clinical Excellence's Spatial Planning for Health; *Southall*: Belgian National Archives Historical GIS Project; Denmark National Archives Dig-Dag project; member of Executive Committee of Center for Historical Information and Analysis, University of Pittsburgh.