

<p><b>Institution: University of Liverpool</b></p> <hr/> <p><b>Unit of Assessment: 17A Geography and Environmental Studies</b></p> <hr/> <p><b>a. Overview</b></p> <p>The Department of Geography and Planning (DPG) comprises 37 academic staff (nine professors, five readers, eight senior lecturers, 15 lecturers), seven teaching and scholarship staff, 18 externally funded fixed-term researchers and more than 25 honorary staff, emeritus and visitors. Since the RAE2008, the Department of Geography has undergone a significant transformation in structure and staffing that has strengthened research activity and focus, as well as increased the capacity for impact. The Department was merged with the Department of Civic Design to become part of the School of Environmental Sciences. The School, established in 2010, provides an integrated and collaborative research environment across the Environmental Sciences, covering a spectrum from fundamental and experimental science through to theoretical and applied social science and policy-making.</p> <p>The School has more than 70 academic staff in two Departments: (1) DGP and (2) the Department of Earth, Ocean and Ecological Sciences (returned to UoA7). The DGP consists of four research groups: (1) Earth Surface Processes and Environmental Change (<u>ESPEC</u>); (2) Modelling, Population and Geocomputation (<u>MPaG</u>); (3) Power, Space and Cultural Change (<u>PSCC</u>); and (4) Spatial Planning and Impact Assessment (<u>SPIA</u>). This transformation has placed research in Geography and Environmental Studies at the heart of interdisciplinary collaborations in academic exploration and knowledge exchange.</p> <hr/> <p><b>b. Research strategy</b></p> <p>Our research objective is to make key contributions to academic and wider societal debates, in particular with regard to the RCUK grand challenges ‘Living with Environmental Change’ and ‘Lifelong Health and Wellbeing’. In parallel, we focus on providing essential information to policy makers and other stakeholders on issues that link to globally important research agendas. Since RAE2008, the activities of the five research groups then submitted (Globalisation, Development &amp; Place; Population, Health &amp; Life Course; Sustainable Ecosystems &amp; Societies; Palaeoecology; and Sedimentary &amp; Morphological Records of Environmental Change) have continued to thrive in the re-organised research groupings described above.</p> <p>A key aim has been to continue to strengthen world-leading research across a number of core themes that build on our RAE2008 submission, and an important strategic objective is to advance these further over the next five years. These themes are addressed within and across our four research groups as follows: (a) <i>Water and marine</i> (<u>ESPEC</u> and <u>SPIA</u>), outputs of global excellence have been produced by e.g. <b>Boyle #1</b> and <b>Macdonald #1</b> (these and subsequent names and numbers refer to outputs from REF2); (b) <i>Health</i> (covered in all four groups), e.g. <b>Evans #4</b>; (c) <i>Population and migration</i> (<u>MPaG</u> and <u>PSCC</u>), e.g. <b>Kulu #2</b>; (d) <i>Influencing environmentally sustainable decisions</i> (<u>SPIA</u> and <u>PSCC</u>), e.g. <b>Sykes #4</b>; (e) <i>Environmental, climate and societal change</i> (<u>ESPEC</u>, <u>SPIA</u> and <u>PSCC</u>), e.g. <b>Bradshaw #1</b>; <b>Chiverrell #4</b>; <b>Marshall #4</b>; <b>Marret-Davies #3</b>; <b>Riley #1</b>; (f) <i>Geocomputation and Geodemographics</i> (<u>MPaG</u>), e.g. <b>Brunsdon #2</b>; <b>Lloyd #1</b>; and (g) <i>Town and country planning</i> research (<u>SPIA</u>), e.g. <b>Sturzaker #1</b>.</p> <p>In order to continue supporting and enabling existing research strengths to develop further, a strategic aim for the next five years is to develop two priority themes in which we are emerging as global leaders and for which we are currently forming dedicated and coherent research centres for wider visibility, namely (1) <b>Maritime Integrated Planning and Assessment</b> as part of a School initiative to develop a <b>Centre for Coasts and Oceans</b> with the National Oceanography Centre – NOC, and (2) a <b>Centre for Geographic Data Science</b>, focussing on both methodological developments and applications in the areas of health and wellbeing, population and migration, environmental, climate and societal change. Each Centre will have a director and steering board (consisting of Head of School, HoD, a visiting professor, and external advisors). Strategic goals</p>
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and annual monitoring and evaluation plans will be developed. It is anticipated that about 60-70% of DGP research income (mostly from RCUK and EU funding sources), fixed term staff and PhD students will be associated with these Centres.

Whilst some strategic priorities outlined in our RAE2008 submission are core ('champion growth and excellence' and 'long-term career development'), the priorities listed above have emerged in the REF period. These have added impetus to our strategy to increase income, the quality and impact of outputs, PGR student numbers and other activities, such as hosting/organising academic conferences and sessions and hosting visiting academic colleagues. Whilst a consolidation phase had been anticipated in 2008 for the then Department of Geography, DGP has continued to grow, partly through the merger with Civic Design, but also as a result of growing research income (resulting in an additional 30% of fixed term research staff) and student numbers (20%+, resulting in 10% growth of academic staff).

The REF period has seen many important successes with research grant income and PhD student numbers having more than doubled. The following core achievements demonstrate our success in research activities, grant income, PGR numbers, engagement with stakeholders and investment in the context of the goals outlined in RAE2008:

(1) Over the period of the REF review, academic staff have published more than 450 papers in peer-reviewed journals (over two thirds of the co-authored papers were with international partners). This is an improvement of more than 20% over the RAE2008 period, thus meeting our 2008 'champion and growth' goal. Furthermore, around 200 chapters and books were published, and several hundred conference papers given. Staff included in REF are at all stages of their career, but most are early to mid-career, including eight Early Career Researchers (ECRs; **Cooper, Davies, Jha Thakur, Morrissey, Potter, Sturzaker, Mell, Smith**). These new appointments have led to a vibrant and ambitious environment where staff are both encouraged and supported in gaining academic and wider global recognition in their research and knowledge exchange endeavours. Research that is leading international debates and setting new agendas is evident across DGP. Notable examples relating to four key criteria - large grants (see section d), wider influence beyond academia (see section e and REF3b), research outputs (see REF2), and indicators of esteem (see section e) - include **Morse** on operational modelling of climate change and disease, **Plater** on connecting sedimentary and geomorphic evidence of coastal environmental change to modelling in support of sustainable resource management, **Bradshaw** on long-term vegetation dynamics and landscape change, **Fischer** on environmental assessment (EA) and **Chiverrell** on temporally constrained, high-resolution palaeo-environmental archives of geomorphic response to climate change and human impact. Leaders in emerging areas who have already started to meet the above criteria include **Kidd** and **Jay** on marine spatial planning, **Boyle** on validating models of mineral weathering and nutrient flux using sedimentary evidence and **Singleton** on geographic data science. There are a range of other DGP successes that have contributed significantly to the Geography discipline as evidenced by our submitted research outputs and impact cases (REF3a). Successes are, in part, based on the RAE2008 strategy (e.g. from those mentioned above **Boyle, Bradshaw, Chiverrell, Morse, Plater**) and partly a result of new developmental research (**Fischer, Jay, Kidd, Singleton**).

(2) The upward trajectory in research grant income, flagged in RAE2008, has continued with approx. £4.5M (spend) in the REF period (over 70% increase compared with the RAE2008 period) from various funders. We have increased our research council funding by more than 250% and EU income by more than 400%. This is mainly explained by a sharp increase in the value of awards. Furthermore, it is the result of a rigorous project proposal review process. Our aim is to double research grant income over the next five years. This is realistic, as recently awarded grants are associated with an income which is already above the REF research income (spend) figure.

(3) We have more than doubled research student numbers. The rate of successfully completed PhDs pa in DGP has also more than doubled from four pa in the RAE2008 period to an average of ca. nine pa over the REF period. Our aim is to double this again over the next five years (see also section c below 'research students') in line with our current and projected growth in PhD numbers.

(4) Regarding our aim to continue to develop research of relevance to a wide range of stakeholders and users, we have contributed extensively to policy debates on issues in which we have research strengths and evidenced impact, including those cases presented in REF3b, i.e. strategic environmental assessment, resource management, climate change and health as well as societal change. Additional KE and impact is evident through collaborations with private and Third Sector stakeholders and local authorities (e.g. **Plater's** Centre for Global Eco-innovation <http://www.cgeinnovation.org/> created in 2012 and funded by the European Research Development Fund in collaboration with the University of Lancaster, **North** and **Potter's** ESRC/NERC KE awards, as well as our other ESRC-NWDTC and NERC CASE awards).

(5) The institutional restructuring has led to a significant increase in investment in research infrastructure, particularly laboratory facilities, enabling us to meet RAE2008 objectives with regards to supporting lab-based research. This has seen a five-fold increase in investment in comparison to the RAE2008 period (over £5M). Details are provided in section d.

With regard to our key strategic RAE2008 objective to advance activity in our research groups, this has taken the following format:

(a) Building on our RAE2008 research in *Palaeoecology and Sedimentary and Morphological Records of Environmental Change*, the ESPEC group has further advanced the Department's expertise in geomorphology and global environmental change (represented by **Boyle, Bradshaw, Chiverell, Cooper, Hooke, Lang, Macdonald, Marret-Davies, Mauz, Morse, Plater, Smith and Marshall**). Core scientific contributions (as evidenced through our research outputs) have been made to knowledge and understanding in relation to evidence for and forcing of environmental changes in varied depositional and geomorphic settings. Development of new research technologies has continued, both for dating and for tracing of sediment. The group's focus on catchments and fluvial systems has been further strengthened through new appointments (**Cooper and Smith**), bringing renewed emphasis on hydrological and sedimentary processes, and the transport and fate of eroded soil, radionuclides and pollutants. Research activity in health and sustainability has taken forward the priorities of the RAE2008 *Sustainable Ecosystems and Societies* research group.

(b) Activities in the MPaG research group have developed on the basis of our strengths in *Population, Health & Life Course*, continuing the department's expertise in population studies. A key ambition of the group is to make critical interventions, considering the politics of the manipulation of geographic information. New appointments have expanded and strengthened the expertise in this area considerably (**Brunsdon, Lloyd, Morrissey, Singleton**). MPAG has three key research foci, including; (i) Population Modelling and Analysis (**Kulu, Morrissey, Catney**); (ii) Geodemographics (**Singleton**) and (iii) Spatial Analysis and Geocomputation (**Brunsdon, Lloyd**).

(c) Our RAE 2008 focus on political and economic geography (*Globalisation, Development and Place*) has been strengthened within the PSCC group through new appointments (**Burrell, Davies, Evans, Riley, Wong**). These appointments have broadened the focus of research to address new social and cultural geographies alongside political and economic change. Significant contributions have been made in terms of theorising resistance and spatial politics (**Davies**), reconfiguring current economics (**North**), migration and material cultures (**Burrell**), new critical geographies of fatness (**Evans**) and temporal dynamics of farming cultures (**Riley**). Collectively, the group is also producing key contributions to geographical knowledge on lifecourse, temporality, ageing and memory. Collectively, the group is producing key contributions to critical geographies, geographical knowledge on lifecourse, temporality, ageing and memory and is advancing participatory geographies, knowledge exchange and new qualitative methodologies.

(d) Our RAE2008 specialism of *Sustainable Ecosystems and Societies and Planning* has been advanced further through the SPIA research group, strengthening DPG's emphasis on policy and practice and globally leading applied research. Environmental assessment research has been strengthened through new appointments (**Jay, Jha-Thakur**, adding to the work of **Fischer**) and the group is developing an internationally recognised position in the emerging field of marine spatial

planning (**Kidd**) and water policy planning (new appointment **Potter**). The group's research on spatial policy and planning within UK, European and emerging economies has also been strengthened through other appointments (**Sturzaker, Mell, Green**, adding to the work of **Lord** and **Sykes**).

Our research objectives for the next five years are: (1) to continue advancing current areas of research expertise, especially in our two strategic priority themes, and to conduct research that is societally relevant. We aim for global excellence as expressed through high quality outputs and indicators of esteem (e.g. achievement awards and prestigious invitations - including visiting professorships); (2) to increase our research income to an average of £2M per annum (which during the REF period was just below £1M per annum compared to £0.4M per annum during the RAE2008 period); and (3) to increase the number of research students to an average of 2.5 students per research active academic DGP FTE (from nearly 1.5 in 2013 with eight ECRs, compared to <1 in 2008). These objectives will be reviewed regularly by our School's Management Team. We will continue to support new and developing research initiatives, enabling these to be established and produce widely visible outputs, e.g. by freeing up teaching and administrative staff time and by enabling research leave. Internal research support funding will remain an important development mechanism.

### c. People, including:

#### i. Staffing strategy and staff development

Over the past five years our staffing policy has been based upon the principle that (a) existing research strengths should be supported and developed and that (b) emerging and promising areas and expertise receive encouragement and strong support. Our research excellence is important for growing our HEFCE funded academic staff. 37 academic members of staff hold permanent contracts, including 17 recruits since 2008. Of our seven teaching and scholarship staff, four are permanent and support research active staff by enabling reduced teaching loads. We have eight ECRs (see section b) and two staff members who will retire in 2014, for whom succession planning is underway. **Catney** (Leverhulme Trust Fellow) will become a permanent academic member of staff from January 2014 as part of our retention strategy.

Our management strategy and practice focuses on a supportive Professional Development Review (PDR) process (with the HoD or Head of School), ensuring careful monitoring and allocation of staff time commitments and responsibilities, thus facilitating research time. Evidence of this success lies in nine successful promotions (two to professors – **Fischer, Morse**; four to readers – **Chiverrell, Kulu, Marret-Davies, North**; three to SLs – **Evans, Lord, Macdonald**) based on research excellence since RAE 2008. Research income per annum has been around 50% higher since 2012 than before School restructuring in 2009 (see section b).

DGP prioritises the creation of an enabling environment for excellent research. This is supported through the provision of light teaching loads for ECRs, a research leave system of one semester in seven, a research support budget available to all academic staff (typically £500 per annum per FTE) and the provision of start-up funds for newly appointed early career (typically £5,000) and professorial staff (minimum £40k). Pump-priming funds are available at both School (£45k won by DGP since 2010) and University (over £100K pa available) levels. Collectively, start-up and pump-priming funds have supported more than a third of our academic staff. New staff are assigned personal mentors (a more senior staff member) who provide advice on how to maintain and develop research profile whilst adjusting to administrative and teaching commitments. Development and/or support needs are taken forward through an action plan agreed with the line manager during the PDR.

DGP actively supports staff to re-connect interrupted careers, enabling additional research leave and release from administrative duties. In order to provide a clear idea of the requirements for career progression, a document outlining 'Department expectations' was drawn up in 2011 with the support of staff. This provides an overview of what can reasonably be expected from staff in

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different academic positions (e.g. Lecturer, Senior Lecturer, Reader, Professor), in terms of income, outputs, administrative and teaching loads, thus providing the basis for career progress planning. The Department is also actively engaging with the 'Female Career Research Network' and *Athena Swan* initiatives (supported with £4,000 per annum by the School) to support gender equity. Eight of our permanent staff are women (five of whom have been appointed since 2008) and overall 30% of all DGP staff are women. Achieving equal opportunity is an important aim for us, which is also reflected in the fact that 16 of our staff are of non-British origin.

The School Research Strategy Group ensures standards of research quality for both publications and research grant/fellowship applications, thus further contributing to staff development. Whilst being respectful of personal research interests, a programme of peer review, group discussion and interactive feedback provide encouragement and practical advice about how to improve manuscripts to enhance their impact, and to improve the likelihood of a research application being funded. All research involving human participants or databases of personal information is reviewed by the Faculty Ethics Committee (headed by **Burrell**), and the University Committee for enhanced review.

Departmental staff have been invited to serve as visiting fellows and professors as a consequence of their respective international research profiles. These include: **Bradshaw** (Linnaeus visiting Professor Lund University 2011-2012, Adjunct Professor University of Lund 2012-2022); **Cooper** (Visiting Professor at University of Padova Italy 2011); **Marret-Davies** (Visiting Professor at University of Bordeaux France 2009, Invited Professor at University of Quebec at Montreal Canada 2009 and Associate Professor, University of Quebec at Rimouski Canada since 2006); **Davies** (British Association of South Asian Studies/ European Consortium for Asian Field Study Visiting Fellowship École Française d'Extrême-Orient Pondicherry 2013); **Fischer** (Visiting Professor at University of Sao Paulo Brazil 2011 and Nankai University, China since 2007, Fellow at the Viessmann Research Centre on modern Europe, Wilfrid Laurier University Waterloo Canada since 2002); **Hooke** (Visiting Professor, Rhodes University South Africa and UNESP Brazil 2012); **Kulu** (Visiting Researcher The Centre for Population Studies at Umeå University Sweden 2013); **Lang** (Visiting Professor UCLA 2012); and **Singleton** (Honorary Visiting Researcher Ritsumeikan University Japan 2013-2014). These invitations have led to a strengthening of our research with regard to research projects (e.g. EU-funded EVOLTREE network of excellence with 30 European partners led by **Bradshaw**), academic and research student visitors (e.g. from Sao Paulo University and East China Normal University) and publications (e.g. with Padova and Lund).

Over the REF period, staff held prestigious externally funded research fellowships, including **Catney** (Leverhulme Trust Early Career Research Fellowship 2012-14), **Cooper** (ARCO Research Fellow in Environmental Fluid Dynamics at Hull University) and **Smith** (Marie Curie Fellow 2011-13). **Fischer** was made a Fellow of the Institute for Environmental Management and Assessment (2012), acknowledging his contributions to Environmental Assessment (EA).

**ii. Research students**

We have a vibrant and rapidly growing PGR student community, which enhances our research culture. DGP has been successful in attracting PGR students, and the number of PhD completions in the REF period has more than doubled compared with the RAE2008 period (section b). Collaborations with businesses, research labs (including the National Oceanography Centre – NOC), Government, Third Sector, professional organisations and NGOs have been a key feature of many of our PhDs since 2008 (see section e). Being part of the ESRC North West Doctoral Training Centre (NWDTC) (formed in 2011 in collaboration with the Universities of Lancaster and Manchester) has played an important role. Since 2008, the Department has won 13 ESRC (11 since the establishment of NWDTC; five include the Advanced Quantitative Methods (AQM) premium) and four NERC PhD studentships. Furthermore, the Centre for Global Eco-innovation (collaboration between Lancaster, Liverpool and 50 SMEs funded by the European Regional Development Fund) has generated five PhD students for the Department. International students see Liverpool's DGP as an attractive place to undertake a PhD and more than half of our research students are international, funded by their home countries. Recently, the Department has been

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engaged in a successful NERC Doctoral Training Partnership bid 'Training the Next Generation of Environmental Scientists' (with Manchester University & NOC).

Each PhD student has a two to three strong supervisory team with the ESRC NWDTC and Centre for Global Ecoinnovation facilitating interdisciplinary and cross-institution supervision - particularly with the Universities of Lancaster and Manchester. The Department is home to three MRes courses that are recognised by the ESRC for 1+3 studentships and the NWDTC has facilitated students' involvement in training across all three institutions. Procedures are in place to monitor PhD students progress, including an annual presentation at the School's PGR conference, submission of a detailed annual report and a satisfactory interview performance at the progress assessment panel meeting. The progress of ESRC students with AQM stipend is also monitored by the NWDTC AQM committee; AQM students prepare and submit an annual report and present their research at the annual Social Statistics and AQM symposium. These efforts have led to a high completion rate, with 91% of PhD students and 100% of ESRC and NERC supported students completing within four years. PhD students are expected to attend and to present their work at one or more international conferences per year and to publish in refereed journals during the course of their research. Papers submitted to REF have been co-authored with 11 PhD students, including (see REF2) **Fischer** #3; **Lang** #1, 2, 3; **Plater** #2, 3, 4; **Mauz** #3; **Morse** #3, 4; **Potter** #1. Recently, the number of PhD projects consisting of various research articles has also increased (e.g. Shen, Welsh, Thrasher, Bradley, Mellett).

Self-funded international students mainly come to DGP because of our sustained international research profile. This is also confirmed by the growing number of other institutions' PhD students who come here to advance their research over limited periods of time (up to a year), paying a bench fee for supervision during their stays. Over the REF period this has included students from Brazil, Japan, Italy, France, Germany and Hungary.

#### d. Income, infrastructure and facilities

##### Income:

Our two main research funders are UK research councils and EU government bodies. Other funders have included UK government bodies, charities and industry. Average research income per submitted FTE over the REF period has been circa £27k, up from £12.7k over the RAE2008 period. Grants have been obtained to advance all areas of our research. Some of the largest include; in the area of *health*, **Morse's** £2.9M FP7 QWeCI project, which brought £750k to DGP. There also have been EC and ESRC funded research project successes in the area of *influencing environmentally sustainable decisions*, including by **Fischer** the EC ESPON EATIA and Erasmus Mundus TwoEA-M projects along with the ESRC/JSPS 'EA and disaster events' project, and by **Kidd** and **Fischer** the ESRC 'developing the learning potential of appraisal' project (all projects about £520k departmental spend). In the *environmental, climate and societal change* theme, **Bradshaw** has been co-ordinator of the FIREMAN project, (NERC, £777k), **Plater** has secured funding in coastal change research in collaboration with colleagues at NOC-Liverpool, including the £946k EPSRC-funded project on the 'Adaptation and Resilience of Coastal Energy Supply, ARCoES' and **North** successfully secured two ESRC KE awards, totalling about £200k. In the same area, since 2011, **Kidd** and **Jay** have attracted funding (mostly EU) of £800k. In *Geocomputation and Geodemographics*, **Singleton** won four ESRC grants as PI in 2012/2013, totalling c. £670k. Smaller amounts of grant income (up to £250k) have been generated in other research areas. Finally, a number of recent grant successes include e.g. the AHRC 'Spaces of experience & horizons of expectation' (£300k; total budget £1.2M; **Macdonald**) and the EC Interreg 'Pure Hubs' project (£890k; total budget about £4M; **Fischer & Lord**) and two NERC Consortia namely **Chiverrell's** 'BRITICE-CHRONO Constraining rates and styles of Marine influenced ice sheet decay' (2012-2018) £330k; total budget £3.5M) and **Boyle's** 'LTLS Analysis and simulation of the Long-Term / Large-Scale interactions of C, N and P in UK land, freshwater and atmosphere' (£320k; total budget £2.5M).

There is a close link between our externally funded research and outputs (see REF 2) in all 4 groups; including those by **Evans** (#4), **North** (#1, 2, 4), **Jha Thakur** (#1), **Kidd** (#2) and

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**Singleton** (#1, 2, 3) based on ESRC funding; **Boyle** (#1, 2, 3, 4), **Lang** (#1, 2), **Morse** (#1, 2) and **Plater** (# 1, 2) based on NERC funding; **Bradshaw** (# 3, 4), **Morse** (#3, 4) based on EC funding; **Chiverrell** (# 2, 3) and **Plater** (#1) based on English Heritage ASLF funding; **Riley** (#3) based on an AHRC 'Innovation' grant; **Fischer** (#4) based on WHO funding; **Mauz** (#3) based on NSF funding; **Lang** (#3) & **Mauz** (#4) based on German Research Council (DFG) funding; **Lang** (# 4) based on Belgian Science Foundation funding.

We encourage all staff to apply for grants. Each month a newsletter detailing new calls for research proposals is distributed and a central support team helps applicants with costing of proposals and other administrative tasks. Our School's research strategy team has produced internal guidance to support high quality grant applications within a programmed timetable, including internal peer review. This process has been extremely useful in ensuring well developed applications. Attendance at professional development courses that include how to develop successful proposals is encouraged (e.g. as an outcome of PDRs), as is taking part in networking projects and developing seminar series and networking grants, such as **Macdonald** and **Fischer's** EC COST actions or **North's** ESRC seminar series grants (section e).

**Infrastructure and Facilities:**

In addition to the University's excellent library resources and state-of-the-art Central Teaching Laboratories (which are also open to research), staff benefit from a range of specialist facilities. These include our *Modelling, Population and Geocomputation* laboratory, our dedicated *Spatial Planning and Impact Assessment* group research laboratory and the *Geographic Information Centre*. There are dedicated rooms for Visiting Professors and Fellows.

During the REF period, significant pieces of equipment have been purchased for our ESPEC research group, including: Geotek Multi-sensor core-scanner; Riegl ground-based LiDAR scanner, RTK GPS, field-rugged hand-held XRFs, laser particle size-analyser, differential scanning calorimeter-thermogravimetric balance; diffuse reflectance UV-VIS spectrometry, Fourier Transform Infrared Spectrometer, OSL stimulation units; multi-parameter water quality sondes and rainfall simulator. These supplement a wide range of state of the art equipment for sampling and coring, open water research (coring, profiling, echo-sounding, CCTV system, access to the School's research vessel Marisa), surveying, hydrology (Particle Image Velocimetry, 3D imaging, water quality, flow meters, flumes), soil and sediment analytics (UV-Vis Spectrometry, AAS, XRF, Flow Injection Analyzer), environmental magnetism, meteorology (including permanent and field automated weather stations), palaeoecology, luminescence dating, radionuclide (long-term membership of the University of Liverpool Environmental Radioactivity Research Centre, **Plater**) and stable isotope analyses (Liverpool Isotope Facility for Environmental Research, LIFER, **Marshall**).

**e. Collaboration and contribution to the discipline or research base**

Whilst disciplinary research in the Department is essential, inter- and trans-disciplinary working is of increasing importance. There are, for example, no disciplinary boundaries between members of the MPaG group, drawing on staff from both former departments. Many of our research projects have members from two or more research groups, including the Centre for Global Eco-Innovation (all four groups), EC Interreg Pure Hubs (all four groups) and the EC ESPON EATIA (SPIA and MPaG). Several pump-priming projects have cross-disciplinary boundaries. Most of our research projects have considerable international involvement with partner institutions from numerous European countries, including the ESRC funded 'Exploring the Learning Potential of Appraisal' project by **Kidd** with Italy and Germany; **North's** British Academy UK-Latin American/Caribbean Link Programme funding on 'The Solidarity Economy North and South: Energy, Livelihood and the Transition to a Low-Carbon Society'; and the EC ESPON funded EATIA (Portugal, Slovenia) and ESaTDOR (Norway, Spain, Germany, the Netherlands, Romania, Greece) projects by **Kidd** and **Fischer**.

Furthermore, there have been jointly funded projects with academic partners from Malaysia, South

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Korea, China, Japan (EC Erasmus Mundus Project Two EA-M; Japan also in the ESRC project 'Environmental Assessment and post disaster management', both by **Fischer**); a range of central African countries (EC funded projects by **Morse**); Sweden (**Bradshaw's** Swedish Science Foundation Institutional Grant to the GeoBiosphere Science Centre within the project 'DYNAMIC Models in Terrestrial Ecosystems and Landscapes (DYNAMITE)'; FP7-IRSES-funded project with academic partners from Spain, UK, Russia and USA (**Marret-Davies and Morse** are project partners in CLIMSEAS (Climate Change and Inland Seas: Phenomena, Feedbacks, and Uncertainties. The Physical Science Basis); and China (**Plater's** 'Sustainability of Water Resources in Estuarine and Coastal Environment' (SWARCE) project sponsored by the Chinese Ministry of Education and the State Administration of Foreign Experts Affairs at the State Key Laboratory for Estuarine and Coastal Research).

Staff connect with other Faculties and Departments, through research collaborations and shared PhD supervision, including Sociology (in particular PSCC and SPIA), Architecture (SPIA and MPaG), Management School (PSCC and SPIA), the Liverpool School of Tropical Medicine and Veterinary Science (ESPEC), Engineering (ESPEC), Archaeology (ESPEC) Earth, Ocean and Ecological Sciences (ESPEC) and NOC-Liverpool (ESPEC). We are actively involved in the University's wider inter-disciplinary 'Research Themes' initiative, including 'Global Health' (**Morse** is its 'science champion'; **Fischer** was its 'social science champion' 2010-2012), 'Changing Cultures' (**Sturzaker** is its 'Faculty champion'), 'Sustainable Energy' (associated with the Stephenson Institute for Renewable Energy, of which **Fischer**, **North** and **Plater** are members), the Heseltine Institute (**Morrissey** and **North** are members), and in interdisciplinary research centres and networks such as the Institute for Risk and Uncertainty (**Macdonald**, **Cooper**, **Hooke** and **Morrissey** are members), and the Centre for Health, Arts and Science (**Evans** is steering group member) and through this the Northern Network of Medical Humanities Research. Finally, there are joint PhD supervisions with staff from Xi'an Jiaotong Liverpool University (XJTLU).

### *Indicators of wider influence*

The Department has initiated external collaborations and networks with other institutions, industry, professional associations and disciplinary bodies. Some of the associated initiatives cover more than one sector, for example those brought forward by EC funded COST (European Cooperation in Science and Technology) actions. Staff have chaired work packages in two COST actions; 'Historical Flood Records at a European Scale' (**Macdonald** was chair of a WP2 sub-group); 30 partners from 26 countries and support of £500K (four journal papers where Macdonald is co-author), and 'Towards the definition of a measurable environmentally sustainable transport', (**Fischer** was Chair of work package 3.1 'Requirements from a planning point of view'); 19 signatory countries and a support of £250K (one co-edited book).

Other collaboration initiatives include 'Future Forests', the largest research project ever in Sweden. **Bradshaw** was chair of the review panel, and, as project advisor, was also elected chair of the European Pollen Database (25 international research centres involved) in 2009. Furthermore, **Mauz** is on the advisory board of the INQUA Coastal and Marine Processes Sub-commission (covering 35 member states). During the REF period **Plater** has been a member of the UNESCO-BRESCE Estuarine Ecohydrology Working Group (members drawn from 12 nations) and recently joined the EA Advisory Board on Cliff Erosion by Rising Seas (12 academic and professionals from the Environment Agency, Natural Resources Wales, Natural England, National Trust and local authorities with coastal resource responsibilities), and **Hooke** has been appointed to the Natural England Science Advisory Committee.

Many of our staff are members of the Royal Geographical Society (with the IBG). **Davies** and **North** are committee members of the RGS-IBG Geographies of Justice Research Group; **North** is chair of RGS's Participatory Geographies Research Group; **Brunsdon** is current chair of the Quantitative Methods Research Group, and **Singleton** former chair; **Lang** was chair of the British Society for Geomorphology (Gm) and is chair of the European Geoscience Union Gm Division. He initiated the round table 'Gm in Europe,' an annual coordination platform for chairpeople of all learned societies across Europe, is on the steering committee of the Geosphere-Biosphere

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Programme PAGES (Past Global Changes) Land Use and Climate Impact on Fluvial Systems; **Chiverrell** was Honorary Secretary of the British Society for Gm; **Marret-Davies** has been board member and webmaster of the Association des Palynologistes de Langue Française (2005-2013), is currently Chair of Palynology of The Micropalaeotological Society and Director-at-Large of the American Association of Stratigraphist Palynologists; **Singleton** is Chair of the Output Area Classification User Group, Royal Statistical Society.

Some staff are members of professional associations and networks. These include the Royal Town Planning Institute, with **Potter** being the Deputy Chair of the Wales Policy and Research Forum, **Kidd** being on its Partnership Panel and **Sturzaker** being the leader of the Education, Careers and Mentoring Task Group for the North West; **Kidd** is government appointed Chair of the DEFRA funded Irish Sea Conservation Zones Project; **Fischer** is member of the IEMA EIA Quality Mark Team, which accredits EIA consultancies in the UK. Several staff are members of the International Association for Impact Assessment; **Fischer** chairs its Ireland-UK branch and **Riley** is committee member of the Society for Landscape Studies. Regarding other international academic collaborations (in addition to the visiting professor and fellowships listed in section c), **Lang** is one of five members of the Scientific Advisory Board for the largest German Science Foundation funded Doctoral Training centre at Kiel University.

Besides regular proposal evaluations for AHRC, NERC, EPSRC, ESRC and other UK research funders, staff have acted as referees for numerous European and other international research councils: **Bradshaw**, **Chiverrell**, **Hooke**, **Marret-Davies** and **Lang** have served as members of the NERC Peer Review College; **Marret-Davies** is on the NSERC (Canada) Discovery Grant evaluation panel; **Riley** was on the ESRC seminar series selection panel in 2009 and 2010; **Evans** is appointed to the ESRC Peer Review College; and **Morse** was a member of the ANR (France) Evaluation Panel for the CEP&S programme. Staff have also served as advisors to international and national bodies and agencies: **Fischer** was a Professional Member of the NHS National Public Health Programme Development Group for the NICE guidance on Spatial Planning; and **Morse** was a member of advisory committees and working groups for public health and climate change issues (e.g. Public Health Agency of Canada, which consists of 20 experts from four countries; Global Environmental Change and Human Health; the World Climate Research Programme).

Finally, over the REF period, DGP organised international conferences and workshops. These included the 23<sup>rd</sup> Congress of the Association of European Schools of Planning (AESOP) 2009 with more than 500 participants, the 2009 conference of the Regional Studies Association in Liverpool, also 500 participants (RSA, 2009), and the 9<sup>th</sup> International Conference on Modern and Fossil Dinoflagellates (2011). They also include conferences of the British Hydrological Society (2009, 2010, 2011), the Quaternary Research Association (2011), the British Society for Geomorphology (2011) and the GIS Research UK Conference 2013. A range of smaller workshops were also organised (up to 50 participants), e.g. of the IAIA Ireland-UK branch (2013) and staff have organised sessions at numerous conferences such as the Association for American Geographers and RGS/IBG international conferences.

**Participation in journal editing processes:** All staff have done peer review work for journals and publishers. Many have held formal editorial roles, amongst which the most prestigious are: **Bradshaw** - *Journal of Ecology* (editor until 2011); **Hooke** - *Geomorphology*, *Catena* (editorial boards); **Marret-Davies** - *The Holocene* (Associate editor); **Fischer** - *Journal of Environmental Assessment Policy and Management* (editor-in-chief), *EIA Review* (editorial board); **Kulu** - *European Journal of Population* (editor 2008-2012), *Fennia*, *Demographic Research* (editorial boards); **Singleton** - *Regional Studies*, *Regional Science* (editorial boards), *Environment and Planning B* (book review editor); **Lang** - *Geoarchaeology* (associate editor); **North** - *Antipode* (international advisory board); **Plater** - *Geomorphology* (editor-in-chief); **Riley** - *Landscape History* (editorial board); **Sykes** - *Town Planning Review* (book review editor).