

Institution: Liverpool Hope University
Unit of Assessment: 14 – Geography and Environmental Studies

1. Unit context and structure, research and impact strategy

Overview

The Department of Geography and Environmental Science (DGES) at Liverpool Hope University (LHU) comprises a small (FTE 5.2), well-appointed transdisciplinary research team spanning the natural and human environments. Social responsibility and conscience are rooted in the nature and foundation of LHU mission and values. Our research culture draws strength from an inclusive approach to research within the department and throughout the wider institution. The UoA research breadth across the disciplines of Geography, Tourism, Ecology and Environmental Science naturally fosters research themes at the interfaces of: Geography and Tourism (e.g., geoconservation, destination management and urban development); Environmental Science and Tourism (e.g., hazard perception and preparedness); Environmental Science and Ecology (e.g., grassland entomology, forest disturbance dynamics and coastal dune conservation); and Geography and Ecology (e.g., grassland dynamics and coastal dune dynamics). For an overview of the UoA research themes see Figure 1: Transdisciplinary research themes within DGES.

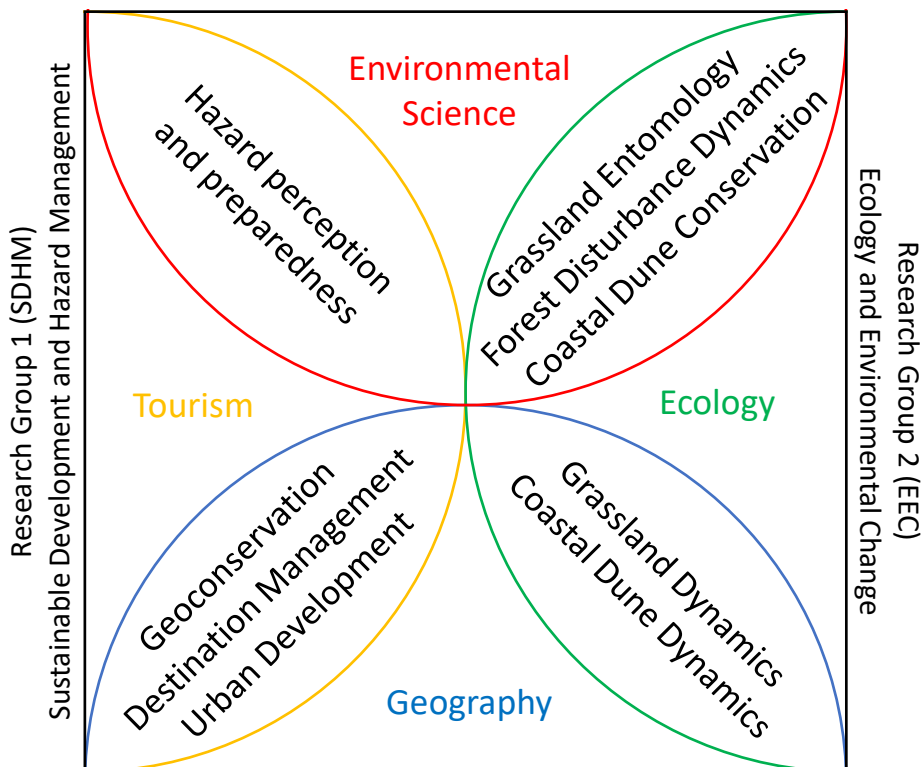


Figure 1: Transdisciplinary research themes within DGES

Our UoA structure and development of transdisciplinary research themes since REF 2014 have naturally formed two research groups:

- **Sustainable Development and Hazard Management (SDHM)** with research including hazard perception and preparedness (**Chester**), destination management (**Kennedy**), geoheritage and geoconservation (**Crawford**), resource management in the Archdiocese of Liverpool (**Rooney**), and contemporary urban development (Speake).
- **Ecology and Environmental Change (EEC)** with research including coastal dune ecology (**Rooney**), grassland entomology (**Lyons**), forest disturbance dynamics (**Clear**), and coastal dune dynamics (Smyth).

Our REF 2021 research vision is for an enhanced research environment with research impact achieved through staff support and facility development. Existing and planned investment and growth in staffing, infrastructure and facilities are outlined in sections 2 and 3 respectively.

Unit's achievement of strategic aims for research and impact during the assessment period

A submission to UoA 17 in REF 2014 prompted strategic planning of research and development to enhance research culture with the aim of creating a vibrant research environment. This is synchronous with LHM status as a young research institute, having gained research degree awarding powers in 2009. The general strategic aims outlined by the Faculty of Science in REF 2014 were as follows: (1) 50% of all staff in each department producing research recognised internationally in terms of originality, significance and rigour; (2) 90% of all staff to be REF eligible (3) all staff members to make at least one bid for research funding each year; and (4) areas of international research focus to be identified. Our REF 2014 objectives have been met with DGES submitting 100% of research-contracted staff to REF 2021 with a portfolio of research hopefully exceeding our 2014 strategic aim. Ambition and success with research funding in DGES are outlined in Section 3 and REF4b. Focus on achieving international quality research has become a priority with DGES adding scope and depth to existing research strengths. Our growth and development in research impact from REF 2014 and new staff appointments of Smyth, **Clear** and **Lyons** led to the strategic re-focus of research from 'Environment and Economic Sustainability' outlined in REF 2014, into the development of our two transdisciplinary research groups: Sustainable Development and Hazard Management (**SDHM**) and Ecology and Environmental Change (**EEC**).

Research impact highlights in research group 1 (**SDHM**) include:

- Influencing national cultural preparedness for environmental extremes in Malta (ICS1). Developed from long-standing departmental research strengths in hazard perception and preparedness in Italy and Portugal (Azores) (e.g., output DC13C). DGES (**Kennedy**,

Crawford, Chester and Speake) promote natural hazard education and training at the local and national stakeholder level in Malta. This involves identifying indigenous knowledge of island vulnerability, local and tourist natural hazard exposure, and stakeholder engagement with the tourism industry. This includes the development and management of geotourism (**Crawford**) and the development of niche tourism markets in Malta including waterfront luxury property development and stakeholder engagement (**Kennedy** and Speake e.g., outputs VK12C and VK22C).

- Theodicy, the role of religion (Christianity and Islam) in shaping responses to (earthquake and volcanic) hazards (**Chester** and Speake, e.g., outputs DC23C and DC33C). This research asserts how people perceive and respond to disasters and identifies the importance of faith communities in disaster risk reduction, and the development of NGOs for disaster relief. The research further explores vulnerability and recovery of socio-economic and environmental recovery particularly linked to agricultural-based communities.
- A new (2019-2022) transdisciplinary ministry project with the subject area of Theology, Philosophy and Religious Studies at LHU on strategic planning and evidence-based decision making for the deployment of resources and mission of the Archdiocese of Liverpool (**Rooney**).

Research impact highlights in research group 2 (**EEC**) include:

- Improving understandings and changing practices in dynamic coastal dunes (ICS2). Another long-standing research strength in DGES is coastal dune dynamics and habitat conservation (**Rooney** and Smyth, e.g., output PR11C). This research promotes stakeholder engagement between land managers, scientists and the public in coastal management practice and the implementation of policies.
- The impact of grazing management on biodiversity in plant communities and invertebrate habitats in upland calcareous grasslands (**Lyons**, e.g., output AL11B) and the training of future generations in evidence-based conservation management.
- The application of palaeoecology to inform forest conservation and management in Europe (**Clear**) with a focus on forest recovery after the impact of fire and pathogen disturbance (**Clear**, e.g., JC15D and JC25C).

Details of future strategic aims and goals for research and impact and how these relate to the structure of the unit; and how they will be taken forward.

Our strategic aim for REF 2021 is for growth in research culture, environment and impact in DGES. In order to achieve this, research culture, environment and impact need to be considered

as an integral part of the future departmental management plan and development with incremental investment into staff, facilities and infrastructure. Our progress in this respect since REF 2014 can be seen in: (1) The investment and appointment of ECR staff (Smyth, **Clear** and **Lyons**) with active research profiles demonstrated with co-authorship of approximately 50% of REF 2021 outputs; (2) The development and enhancement of PGR research environment with students (Lotteri and Main), and delivery of the *concordat* to support ECR career development (see Section 2); (3) An increase in research income (REF 4b); (4) Enhanced collaborations and contributions to the research base with an increase in international research and DGES management of three research networks: Sand Dune and Shingle Network (**Rooney**), PAGES Forest Dynamics 2016-2019 (**Clear**) and Royal Entomological Society Insect Ecology Special Interest Group (**Lyons**) (see Section 4); and (5) Investment in facilities and infrastructure (see Section 3).

Our strategic objectives for this period are as follows:

(a) Staff retention and recruitment

DGES aims to maintain a transdisciplinary approach to research, a strength of our small department, while increasing our research quality and societal impact through staff retention and new staff recruitment. Our aim is to further develop research scope and impact with new staff appointments within our existing research framework and concurrent research themes, and to future proof research investment by mitigating the impact of staff turnover. Staff recruitment will be based on research merit or excellence, in addition to DGES teaching requirements. Staff progression will continue to be supported through training and professional development opportunities and achievable promotional pathways. The continued implementation of the *concordat* to support the career development of ECR staff with Postdoc Teaching Fellows (PDTF) often becoming permanent lecturers will continue. In addition, staff support for development and progression of ECR staff to independent researchers and future departmental research leaders will be maintained.

(b) Enhance PGR culture

Increase research capacity through the further development of a PGR research culture. Continued investment into PGR students, PDRA staff and the planned development of an active MRes program will assist in creating a vibrant postgraduate research community. This development will ensure staff engagement into daily routine research activities alongside intensive teaching and administrative duties. Re-investment of REF 2014 research funds into the Vice-Chancellor Research Scholarship Program successfully prompted an active PGR research environment in DGES. Our aim is to capitalise on this success with additional training and progression of ECR staff to be PGR supervisors. External doctoral funding opportunities will be

identified and bid for with the support of LHU Research Facilitator (Cooper) and further supported through research administration management.

(c) Identify opportunity for research income and impact

In addition to sourcing external funding for doctoral studentships, our aim is to increase external research funding by increasing our bidding and success with research grants. Since REF 2014 our research income has increased by 1245% (REF 4b). A new (2021) structure to apply for internal research grant opportunities for new research, travel and publication costs are available through (i) DGES for grants less than £1,000, and (ii) from the Pro VC for Research (Nagar) for grants over £1,000. These internal grant opportunities are available biannually to all staff, including PGR students, to promote independent and collaborative research. These seed-funding opportunities provide research income to develop research ideas to increase competitiveness for external research funding.

Social responsibility and conscience are embedded in the foundation of LHU. The UoA has established strong links with local (e.g., Archdiocese of Liverpool) and international stakeholders (e.g., Government of Malta) to enable research impact (see section 4). Our aim is to further develop our research impact at the local, national and international levels across both environmental and social sciences. This will be achieved by expanding stakeholder engagement to additional communities, and through the development of transferable environmental management strategies (e.g., sand dunes, grasslands and forests) and tool kits for social engagement and response (e.g., Archdioceses resources and hazard preparedness and response).

(d) Promote networking, outreach and knowledge exchange

A structured research strategy will continue the UoA's supportive research environment to create research opportunities and impact by providing opportunities for networking, outreach and knowledge exchange. Continued support will be provided for internal DGES transdisciplinary collaboration and external local, national and international research networks; and to promote enhanced engagement with professional bodies e.g., Royal Geographic Society with IBG (**Chester** and **Crawford**), British Ecological Society (**Clear**), Royal Entomology Society (**Lyons**), Chartered Institute for Ecology and Environmental Management (**Rooney**) and Tourism Management Institute (**Kennedy**). Guidelines and support for staff to achieve a balance between basic and applied research will be used to increase research impact and knowledge exchange (e.g., Scottish Natural Heritage (**Rooney**), Malta Tourism Authority and Maltese Civil Protection Department (**Kennedy**, **Crawford** and **Chester**), Tatra National Park, Slovakia (**Clear**). Support for internal and external collaborative research (see Section 4) will be continued, as it is

essential to support the research environment and promote research impact in a small department like DGES.

(e) Incremental investment in research facilities and infrastructure

The UoA new staff appointments and shift towards ecological and environmental research has led to the incremental and planned investment into research facilities and infrastructure. Access to the new £8.5m Science Building (2016) includes designated wet and dry research laboratories and ICT facilities including a GIS suite. Planned investment and renovation of a designated DGES building (the Green Lane Building) including staff offices, lecture theatres, wet and dry research laboratories and ICT facilities is approved in principle but is delayed due to COVID-19. The DGES has gained approval in principle for the development of a field research laboratory facility at Plas Caerdeon Field Centre located in Snowdonia National Park. Again, this is delayed due to COVID-19.

Our DGES vision for 2025 is an active research environment with a varied staffing structure including new ECR recruitment, research-led development and thriving PGR community. The development of the Department of Geography and Environmental Science into the School of Environment and Earth Sciences is planned by Liverpool Hope University to take place by 2025. This will be fully supported by the allocated incremental investment into research infrastructure and facilities promoting research culture, enhancing research environment and creating opportunity for research impact. This development will strengthen existing research groups while facilitating space for growth.

2. People

Overview

The Department of Geography and Environmental Science comprises 5.2 FTE research staff; Head of Department (**Rooney**), Professor (**Chester**), Senior Lecturer (**Crawford**), and Lecturers (**Clear**, **Kennedy**, and **Lyons**). This is a 23% increase in research-active staff since REF 2014 (4.2 FTE). Staff members have a diverse first-degree background including Tourism Management, Geography, Environmental Science, Geology and Biology facilitating the transdisciplinary research themes evident in the UoA.

Since REF 2014, new staff recruitment (Smyth, **Clear** and **Lyons**) following the departure or retirement of senior academic staff (Professor Siska and Associate Professor Speake), and transitional ECR staff (lecturers Smyth to University of Huddersfield, Andreoni to Manchester Metropolitan University, and Filimonau to Bournemouth University) have led to a change in staffing structure. Staff support, development and retention is highlighted as a key strategic aim for research growth in the UoA. This will be achieved through continued staff support, career

development and opportunities for promotion. In addition to staff support and retention, staff recruitment is essential to further develop a thriving research environment. Staff development and recruitment across the transdisciplinary research themes (see figure 1) will support DGES research development and impact, while maintaining DGES excellence in learning and teaching.

Staffing strategy and staff development

DGES staffing strategy (2014-2021) was to employ research-active staff that enhance and diversify existing research strengths that have been nurtured over recent decades. The new approach of staff appointments, to consider research excellence in addition to teaching requirements, has ensured all new staff members hold a PhD in a concurrent yet diverse range of subjects in DGES. All new and existing research-contracted staff can demonstrate active research profiles with plans for short- (1-year), medium- (3-year) and long-term (5-year +) research development. All new staff appointments demonstrate evidence of quality of research and are on career trajectories to develop as independent researchers.

The new staff appointments in 2015 (Smyth), 2016 (**Clear**) and 2019 (**Lyons**), and respective promotions of staff from fixed-term PETF to Lecturer in 2014 (**Kennedy**), 2015 (Smyth), 2016 (**Clear**) and 2020 (**Lyons**) have ensured the development of a core research culture, fundamental to the emerging research identity of DGES. The appointment in coastal destination management (**Kennedy**) with a focus on stakeholder power and engagement and networks in the tourism industry develops existing research strengths in hazard perception and preparedness (**Chester**), geoheritage and geoconservation (**Crawford**), and gentrification and urban development (Speake) within research group 1; Sustainable Development and Hazard Management (**SDHM**). The appointment of grassland ecologist (**Lyons**) with expertise in European botany and entomology fits within the framework of research group 2; Ecology and Environmental Change (**EEC**) and supports existing research strengths in nature conservation (**Rooney**). **Lyons'** aim to further develop her research interests in Mediterranean island habitats strengthens DGES transdisciplinary research between **SDHM** and **EEC**. The appointment of a palaeoecologist (**Clear**) adds a temporal perspective of environmental change to conservation and management research strengths in **EEC**.

Staff development, performance and appraisal are monitored and evaluated using the annual Performance Development Review system where the Head of Department conducts a constructive, critical performance review of staff development with clearly defined and achievable research targets set for the next academic year. ECR staff are set specific, measurable, achievable, realistic, and timely (SMART) targets that are relevant to their development stage(s) as independent researchers and research leaders. Additional standard targets set for all DGES staff are that they are required to produce three research outputs over a five-year period, and one grant application per year. This is in addition to external academic

duties including peer review and grant review boards, editorial roles and official positions and personal engagement with relevant professional bodies (see Section 4). All research targets are set within the framework of the academic role profiles outlined by LHM.

Staff are supported and encouraged to apply for promotion in the annual (Senior Lecturer) and biennial (Associate Professor / Professorial) calls with clearly defined promotional guidelines encompassing (a) research, (b) teaching and (c) wider university contribution. These criteria ensure the holistic development of a well-rounded and balanced academic.

The DGES mentor system encourages senior colleagues to advise and collaborate with ECR staff e.g., **Chester, Crawford** and Speake publications with Kennedy (e.g., output KC11C); and **Rooney** with Smyth (e.g., output PR11C). Due to the nature of Liverpool Hope University's modern pathway to achieve research excellence, often ECR staff are research intensive and competent in identifying research opportunities for collaboration with senior colleagues. Grant writing, applications and research administration are supported by LHM Research Facilitator (Cooper).

The university workload model adopted by DGES allocates one third of research-contracted staff time to research activities. These activities include planning, preparation and delivery of research proposals and publications. Independent and collaborative research are supported by internal funding opportunities, travel and publication grants, and research administrative support.

Opportunities for additional research allocation is limited in a small department where teaching and administrative duties are distributed between a few members of staff. DGES growth and development will enable the department to make better use of institutional time and workload management to increase research intensity (e.g., consolidated research time and sabbatical leave).

Weekly informal research lunches facilitate creative transdisciplinary discussion, development and feedback of independent and collaborative research. Senior academics support and foster ECR research ideas and identify opportunities for research grants and impact. Departmental research seminars take place monthly with a program including both internal and external speakers. Internal research seminars provide opportunities to showcase DGES research results, promote formative feedback on research proposals and support PGR research development. External speakers, from both academia and industry, provide opportunities for research collaboration, outreach and impact.

Staff away days at Liverpool Hope University Creative Campus and Plas Caerdeon Field Centre are an integral part of staff training and development. Internal and external staff training and development workshops including: Research for ECR staff, grant writing workshops, PGR

supervision training, as well as more holistic training such as mental health awareness and personal resilience training is provided for all staff.

Staff mobility funding and ERASMUS has been utilised to increase international research capacity and to visit Liverpool Hope University partners in Hope College Michigan, USA (**Crawford, Rooney**, Smyth), De La Salle University Manila, Philippines (**Clear, Rooney**) and University of Malta (**Chester, Crawford**, Smyth).

DGES representation (**Clear**) at the University Research Committee provides two-way research updates and opportunities including Liverpool Hope University funding calls for start-up research projects, travel costs for conferences and fieldwork, and open-access publication costs. All staff including PGR students are encouraged to apply for annual conference funds to present and disseminate their research findings at national and international conferences and workshops. This has been extended to online conferences and workshops due to the imposed travel restrictions during COVID-19.

COVID-19 has added unprecedented challenges to staff support and development. DGES has provided equipment and research facilities to work from home and onsite COSH and additional health and safety protocols for laboratory access when needed. Flexible working hours enable staff to adapt to the challenges of working from home while managing home schooling and caring responsibilities. E-Learning modules including regular webinar and staff training via Zoom as well as enhanced mental health resources with opportunities to refresh these courses anytime.

Training and supervision of PGR students

The investment of REF 2014 funds into Vice-Chancellor Research Scholarships secured two funded PhD research scholarships in Island Hazard Perception, Preparedness and Management in DGES. These PhD studentships were completed in 2019 (Main) and 2020 (Lotteri).

A strategic strength of DGES is the integration of PhD students into daily departmental activities. Individual PhD offices with dedicated ICT facilities are located amongst staff offices along the DGES staff corridor. In addition to personal PGR offices, access to shared facilities including ICT suites with dedicated software (e.g., ArcGIS), as well as dry and wet research laboratories and facilities are available to PhD students when required.

Internal DGES support and mentorship is provided by a team of academics including a senior Director of Studies (Speake) and at least one additional Research Supervisor (**Crawford, Chester**). ECR staff are involved in PGR research supervision as research advisors (**Kennedy**). Academic external advisors (e.g., Duncan, University of Liverpool) were appointed for both PGR

students in DGES. The supervisor team is identified through research expertise and a track record of successful collaboration and supervision.

One benefit of the small Liverpool Hope University community is the support and engagement of the wider PhD research community. PhD students attend a series of annual informative meetings with Associate Dean for PGR Students (Speake). A clear outline of activities, dates and research development programme are disseminated for the duration of the studentships. This includes core elements of PGR skills and structured training provided to all PGR students. Additional, optional bespoke research training opportunities such as specialist software e.g., ArcGIS training is also available. External training opportunities are encouraged with DGES PGR students completing external courses in RStudio, PGR public engagement (University of Liverpool) and teaching in Geography (RGS [with IBG]).

Communal access to shared office facilities and dedicated research space is available. A shared PGR and staff common room is available for coffee breaks, lunch, discussions and research meetings. The onsite, affordable sports facilities and social spaces offer an escape from intensive PGR research, and an opportunity to focus on exercise, meditation and mental health. A tutor and student-led active social programme, with an additional programme for international students, provide opportunities to develop support, friendship and collaboration amongst the PhD community.

PGR student progression is monitored through: (1) a minimum of eight supervisory team meetings per year; (2) Annual Monitoring Reviews (AMR) including the delivery of a research presentation to peers and a meeting with the Director or Studies (Speake) on research progression and forward planning; (3) A second-year Confirmation of Registration Event (CRE) includes a mock viva and (4) Liverpool Hope University Research Skills Scheme (LHURSS). This ensures that all PGR students acquire the essential skills required by Vitae's Research Development Framework (RDF). All PGR students are required to keep an updated Personal Development Record (PDR) to monitor and evidence their progress towards the acquisition of necessary research skills. PGR students are expected to complete the LHURSS before submitting their thesis.

PGR student opportunities span research, administration and teaching. Competitive PGR funding is available for PhD student research development with an open call for up to £400 per annum. In addition, PGR students are invited to compete with academics for up to £1,000 for travel to conferences and workshops, and publication fees. There are abundant opportunities to present research internally through: DGES seminar series, Faculty of Science Annual Research Day, and annual PhD student progression prepares students for national and international conferences. Staff support with identifying conference opportunities (e.g., European Geoscience Union (EGU)) and support in applying for competitive student conference funding means all

students have attended national and international conferences, e.g., Cities on Volcanoes in Chile, 2016 and Naples, 2018 (Lotteri). PGR students have assisted with international conferences organised at Liverpool Hope University including Littoral (2017; Main) and PAGES Forest Dynamics (2016; Lotteri). Lotteri also organised a student-led PGR research conference during Science Week 2018. Engagement with external professional bodies such as RGS PGR fellow and ambassador (Main) is encouraged along with internal PGR student representation on academic boards including ethics, research, and student voice.

External research collaborations with UAc Universidade dos Açores (Lotteri) and L-Università ta' Malta (Main) were facilitated with extended overseas research visits to the Azores and Malta, respectively. While studying abroad, both PhD students hosted or took part in international conferences; Lotteri co-organised the Fourth VERTIGO workshop São Miguel, Azores (2017), and Main was invited keynote speaker at The Hazard Exposure of the Maltese Islands, Malta (2018).

Career support and development of PGR students involve wider academic experiences including the opportunity to contribute to undergraduate student teaching as well as laboratory, field, and international fieldwork demonstrations.

On successful completion of their PhD programme, PGR students produce a modern thesis consisting of peer review publications in high quality journals including joint publications with senior staff (e.g., KC11C). DGES has a strong track record of PGR career development demonstrated by recent career destinations including lecturer position in Geography at the University of Exeter (Main) and PDRF at Liverpool Hope University (Lotteri). Promotional pathways of PGR students are a strength of Liverpool Hope University, demonstrated in DGES with Lotteri progressing from PhD student (2015-2019) to PDRA (2019-2020) and presently, PDRF (2020-). This is one example of Liverpool Hope Universities *concordant* commitment to PGR student and staff career development.

Equality, Diversity and Inclusivity

A small yet diverse department with European, national and local colleagues with a range of shared experiences from traditional and non-traditional academic backgrounds. DGES fosters a research environment that recognises and respects differences, promoting Liverpool Hope Universities equality, diversity and inclusion framework. A departmental culture of openness amongst staff and PGR students fosters an inclusive and supportive environment.

Recruitment and career progression follow LHM good practice guidelines in the recruitment process which includes competency and merit in teaching, research and an understanding and contribution to LHM mission and values.

The appointment of three fixed-term Postdoc Research Assistants (PDRA) in Coastal dunes (Wood; 2021-) and the Liverpool Archdiocese Project (Ayokunle; 2019- and Lotteri; 2020) enhance and diversify the structure of the emerging DGES research culture. The new appointments of ECR staff members (**Clear** and **Lyons**) contribute to a balance in research career demographics and gender. In all, 50% of REF returned staff are female and represent more than 50% of the FTE. Short-term PDTF contracts have all been converted to long-term lecturer contracts (**Kennedy**, Smyth, **Clear** and **Lyons**) meeting Liverpool Hope University's *concordat* objectives. Opportunities for ECR staff are similar to senior staff members with ECR staff on committee roles including the Research Committee (**Clear**) and Ethics Committee (**Lyons**). This promotes ECR staff visibility to the wider university. PGR students are also represented on both the research and ethics committees.

Equality, diversity and inclusivity is a regular feature in weekly departmental meetings and biweekly senior management team (SMT) meetings. Senior management team comprises 50:50 male to female ratio and 50:50 established and ECR staff. Gender balance is also a priority for appointment to research committees and recruitment panels. Both DGES research groups (SDHM and EEC) have female research leaders (**Clear** and **Kennedy**) and there are clear departmental role models for PGR students.

DGES staff are encouraged to actively participate in Liverpool Hope Women's Network. External speakers are a regular feature through the Women's Network and during Science Week. The Aurora Management Programme is available to all female staff considering promotion to management roles in the university. The department (**Clear**) contributed to a Liverpool Hope University Foundation Hour promoting the International Day of Women and Girls in Science.

Liverpool Hope University has generous parental leave including extended period of full pay, and an award of £1,000 on the production of a birth certificate. Periods of both maternity and paternity leave have been available for staff members during this REF period with keep in touch days, phased return, and temporarily reduced workloads. Extended periods of staff leave are considered for research career expectations in the annual Performance Development Reviews. The challenges of online teaching through COVID-19 led to an additional three days annual leave in 2020-2021, with an optional additional four days paid annual leave for parents impacted by COVID-19 restrictions between January and March 2021.

3. Income, infrastructure and facilities

Overview

Since REF 2014 the UoA research income has increased by 1245% (REF4). The DGES aim is to further increase research funding with the support and development outlined in our key

strategic aims for REF 2021 (see Section 1). Existing investment into facilities and infrastructure including the new shared-access £8.5m Science Building completed in 2016, and the agreed in principal investment into both a designated DGES building, and the field laboratory facilities highlight the direction of investment into the UoA facilities and infrastructure.

Income

The UoA has had an increase in both internal and external research funding success during the REF period. External research grants include British Academy funding (2013) of approx. £8,000 to understand human responses to historic volcanic eruptions in the Azores. This research on past perception and response guides preparedness to natural hazards in the Azores and other European islands.

The EU-funded LIFE project held at CEH (2018) in partnership with LHU (**Rooney**) improved the understanding of dynamic coastal dune habitats through the production of management guidelines. Key elements of the management guide include land management education programmes, policy and practice to develop innovative and creative natural management solutions to increasing coastline resilience and response to climate change. The NERC grant (NE/T00410X/1) on 'Landscape-scale environmental drivers of coastal dune mobility' held at the University of Huddersfield (2019) with Smyth and co-investigator **Rooney** improves the understanding of dune surface movement in dynamic dune systems. This new understanding of dune adaptability and resilience to environmental change impacts the decision making of land managers in terms of dynamic dune restoration and nature conservation practice. Smyth was successful in receiving £11,500 from the Royal Geographical Society (2018) for a Differential GPS (DGPS) Trimble R8s Model 60 to assess movement of sand dune surface deflation in blowouts. This work develops the understanding of coastal dune formation and change in coastal dune systems where vegetated dune stability threatens biodiversity.

The Ministry Project (approx. £21,000) funded by a Dutch Family Foundation via the Porticus Trust in 2019 directly informs and influences the Archdiocese of Liverpool decision-making synod process. The Synod agrees annually on common goals and actions, which includes the ongoing development and implementation of an environment strategy.

Through PAGES Forest Dynamics, **Clear** was awarded approximately £8,000 to bring together international scientists, land managers and stakeholders to improve the reconstruction of forest disturbance dynamics and to identify opportunities and key methods for data integration across historical documents and multi-proxy (e.g., tree ring and sediment) palaeoecological records.

DGES have been successful with grants from LHU internal research funding initiatives during the REF period including: REFocus Higher Education Innovation Fund (2017) with £3,000 awarded to **Kennedy, Crawford, Speake and Chester**; and REFresh and REFine Higher

Education Innovation Fund (2018) with £2,500 awarded to **Kennedy, Crawford, Speake and Chester**. The grants enabled DGES to further develop and strengthen the research on natural hazard DGES research has previously been focused on human geography and pedagogical research. In recent preparedness in Malta by running two conferences with national government and NGO stakeholders. The conferences resulted in greater recognition of hazard vulnerability in the tourism sector in the Maltese Islands and have resulted in the development of a national Tsunami Advisory Board.

Infrastructure and facilities

The nature and tradition of years, new staff appointments have created a shift towards physical and environmental research, which has led to the incremental development of our infrastructure and facilities. In addition to human geography and pedagogical research, we specialise in traditional field-based ecological research utilising the local environment, particularly the sand dunes of the Sefton Coast, northwest England (ICS2). DGES has a range of basic surveying equipment, for instance handheld GPSs, Differential GPS, erosion pins and an EDM. Additional equipment orientated to field-based investigations with an emphasis on ecological research, particularly species identification and habitat monitoring include specialist field identification guides, invertebrate trapping and collection, and items required for botanical and habitat surveys. Research group **EEC** also specialises in environmental change research which is supported with field sampling equipment including basic corers, augers, and digital environmental sensors. For our research group **SDHM**, human geography and social science research on hazard perception and response, destination management and geoconservation (ICS1), DGES has adequate equipment for social science investigations including items such as Dictaphones and transcription equipment.

The new £8.5m Sciences Building was completed in January 2016 and includes shared laboratory facilities, technicians, and research space with other UoAs. Specialist research facilities include state-of-the-art wet research laboratories with a cold room for sample storage and equipment for palaeoecological investigations such as fume cupboard, centrifuge, water bath, oven, furnace etc. DGES dry research laboratory facilities including reference collections of museum-curated invertebrates, pollen and rock collections. A dedicated ICT facility supported by IT services includes a GIS suite with LHU licences for SPSS, ArcGIS, Digimap via JISC, Tilia and NVivo data analysis software. DGES library facilities include a designated librarian and an annual budget for software licences, e-books, hard-copy books, journal subscriptions and shared institutional packages. Research rooms including a PGR base are available for research including historical documents, newspapers and historical maps.

Human resources, including LHU Research Facilitator (Cooper), support the UoA research environments by identifying grant opportunities, internal grant review processes, paperwork

administration and budget planning. For successful grant applications there are resources for research administration and management. The DGES designated librarian supports and manages the UoAs research outputs in Hope's Institutional Research Archive (HIRA).

LHU Field Centre Plas Caerdeon is located in Snowdonia National Park with access to a range of outstanding geographical habitats including 18 acres of semi-natural temperate woodland, the majority of which is recovering Atlantic wet oak woodland adjacent to the Meirionnydd Bat and Oak woodland special area of conservation (SAC). DGES has proposed the development and ownership of a research field laboratory facility that has been accepted in principle, with development currently delayed due to COVID-19. The proposed development of the research field laboratory facilities at Plas Caerdeon would enhance research impact and PGR recruitment with the potential for on-site residential PhD students.

The UoA was scheduled to move into a purposely renovated, dedicated (Green Lane) building housing staff offices, lecture theatres, wet and dry research laboratories, and ICT facilities in 2020. This has been postponed due to the current remote / offsite working conditions imposed due COVID-19.

Key strategic aim (e) is the incremental investment in research facilities and infrastructure. The new staff appointments and shift in research direction towards ecological and environmental research has prompted incremental investment into research facilities and infrastructure. This includes the planned move to a designated DGES building and proposed development of the Plas Caerdeon Field Centre Laboratory, all with the aim of enhancing research environment and future research impact.

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

Overview

Due to the size (5.2 FTE) and research discipline diversity of the UoA, staff collaborations and engagement with their respective research communities at the local, national and international level foster individual research development and impact. A key aim is to maintain and enhance research collaborations internally in the department, across the university and with researchers external to the institution in order to ensure an outward looking, supportive and active research environment. During the REF period (2014-2021), DGES published 93 publications, including publications from REF-returnable, retired and transitional staff. Of the 75 REF returnable documents, DGES staff have published with approximately 197 colleagues from 160 departments in 107 universities from 32 countries see Figure 2: International co-author of REF-returnable staff.

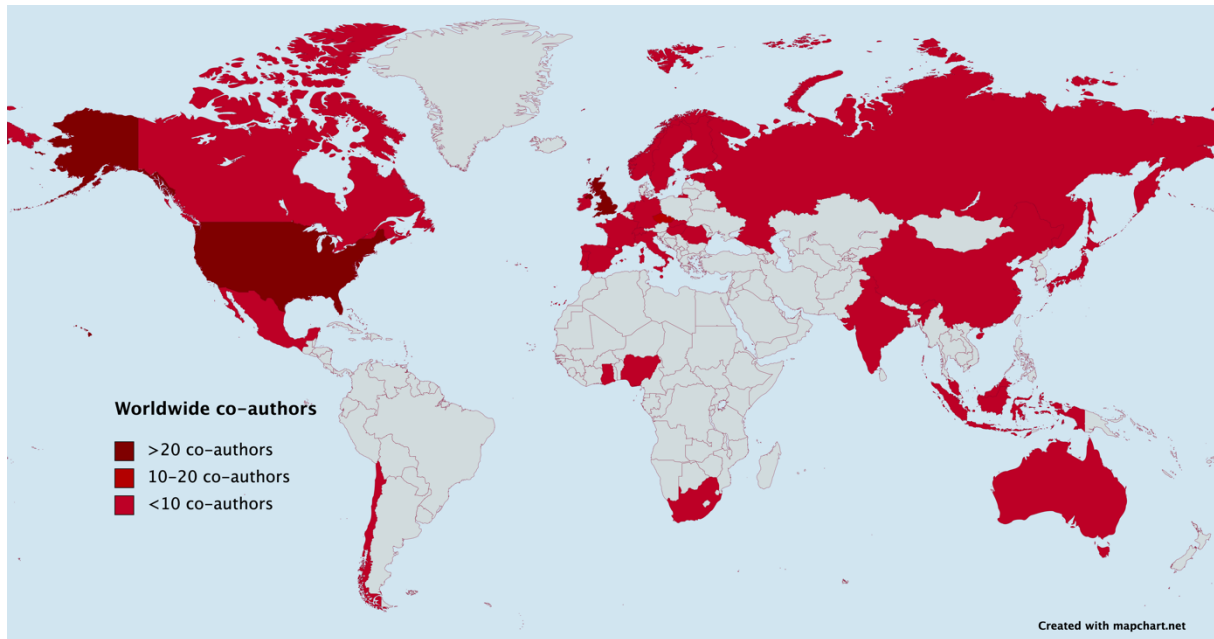


Figure 2: International co-authors of REF-returnable staff (2014-2021)

A strategic priority of the UoA is to create and sustain opportunities for networking, outreach and knowledge exchange in a supportive and collaborative research environment with the aim of promoting transdisciplinary and interdisciplinary research and impact.

Research collaborations, networks and partnerships

Effective collaborations between researchers in the department, with those across the university and with external partners are important to facilitate an active research environment and to achieve international research impact. Some key strategic local, national and international research collaborations are as follows: UK (University of Liverpool, Centre for Ecology and Hydrology, Edge Hill University, University of Huddersfield); Malta (L-Università ta' Malta); Czechia (Charles University, Česká zemědělská univerzita v Praze), Finland (University of Helsinki), USA (University of Utah, University of Colorado, Hope College Michigan), Sweden (Lund University), Portugal (Azores; UAc Universidade dos Açores), Germany (University of Bremen) and Italy (Università degli Studi di Catania).

DGES research collaborations and partnership with the University of Malta began in 2001 and has developed over the last two decades into a successful transdisciplinary research network that supports an annual (pre-COVID-19) research-informed final-year and postgraduate student field trip. Partnerships with the University of Malta, key government departments and NGO stakeholders (e.g., Malta Tourism Authority and Maltese Civil Protection Department) facilitates transdisciplinary research impact concerned with hazard perception and preparedness, vulnerability and resilience of island destinations, tourism place making and wider urban

development, particularly with a focus around aesthetics and neoliberal capitalism. The UoA research collaboration with multiple stakeholders on the Maltese Islands is an important research partnership with over 50% of UoA staff involved in developing research partnerships relating to Malta.

The size, values and mission of LHU encourages and facilitates interdisciplinary research within a wider university context. DGES is engaged in research with the Archdiocese of Liverpool focusing on improving strategic planning and evidence-based decision-making relating to the deployment of permanent Deacons and to evaluate the Archdiocesan Pastoral Associates Project. The research is funded by a Dutch Family Foundation via the Porticus Trust. The findings of the project relate to the depth of understanding of the permanent diaconate, and how the deacons can better serve the Church's mission in a dynamic social context. UoA local research collaborations, developed from approximately 75% of DGES staff having previously studied or worked at other local institutes, fosters strong research connections across the northwest England geographical area. This includes research in the following areas: coastal dune dynamics (Delgado-Fernandez, Edge Hill University); grassland conservation and management (Oxbrough, Edge Hill University); forest conservation and management (Chiverrell, University of Liverpool); and pedagogical research (Pownall, Chester University). UK-based coastal dune dynamics research partnerships extend to government and NGO stakeholders including Centre for Ecology and Hydrology (CEH), Natural England, Scottish Natural Heritage, Natural Resources Wales, The National Trust and Wildlife Trusts.

UoA international collaborations span six continents (Fig. 2), with key research networks and partnerships in Europe and the USA. Research group 1 (**SDHM**) focuses on hazards in European coastal and island regions including Portugal (including the Azores), Italy (including Sicily) and the Maltese Islands with engagement with stakeholders in Italy (Istituto Nazionale di Geofisica e Vulcanologia) and Malta (Malta Tourism Authority and Maltese Civil Protection Department). Research group 2 (**EEC**) focuses on conservation and management in Europe and the USA including the European Sand Dune Network (**Rooney**) with key EU collaborators including the Danish State Forestry Service, the French National Forestry Service (Office Nationale Forêt), the Dutch State Forestry Service (Staatbosbeheer) and the Amsterdam Waterworks. Research in palaeoecology and forest dynamics (**Clear**) has informed forest management practice in Slovakia (Fleisher, Tatra National Park), Czechia (Knizek, Department of Forest Protection and Game Management Research), and USA (Fettig, USDA Colorado; Seybold, USDA California; DeRose, USDA Utah).

Relationships with key research users, beneficiaries and audiences

In addition to key strategic national and research collaborations, the UoA research-informed impact extends to stakeholders including government and non-government organisations, land

managers, scientists, policy makers and practitioners in the following countries: UK (Centre for Ecology and Hydrology, Natural England, The National Trust, Wildlife Trusts, Natural Resources Wales, Plantlife and Scottish Natural Heritage); USA (USDA in California, Colorado and Utah); Slovakia (Tatra National Park); Czechia (Department of Forest Protection and Game Management Research); Malta (Malta Tourism Authority and Maltese Civil Protection Department) and Italy (Istituto Nazionale di Geofisica e Vulcanologia).

The UoA is involved in local stakeholder partnership and knowledge exchange in conservation and management in coastal dunes through the northwest 'Gems of the Dunes' project, part of the 'Back from the Brink' initiative by Natural England.

By involving postgraduate students in the formulation of draft site management plans, staff in the UoA proposed the development of broadleaved woodland and mesotrophic grassland located in Nutgrove, St Helens (UK) into a designated Local Nature Reserve (LNR). The proposal is accepted by the local authority and is currently under development. It is located on the site of what was once the largest mental health hospital in Europe. This new nature reserve promotes health and wellbeing for the local community by increasing their contact with nature. The UoA is working with local councillors, council officers and the Community Labour Party (CLP) as well as two local resident groups to further develop the LNR status, site management and community engagement.

The UoA was instrumental in the designation of Childwall Woods and Fields LNR in Childwall, Liverpool. Initially this was through the production of outline site management plans by undergraduate students. Recently the UoA hosted an Annual General Meeting (AGM) to re-launch the 'Friends of' Childwall Woods and Fields with local residents, the Lancashire Wildlife Trust and Liverpool City Council. The UoA continues to use the site for PGT research and undergraduate teaching, all of which engage with the 'Friends' group.

Wider activity and contributions to the research base economy and society

Engagement, education and training initiations with government departments and stakeholders (land managers, practitioners and the public) are key activities in the department's research strategy as they align with the mission, ethos and values of LHM. During REF 2014-2021, the UoA supported and managed three research networks:

(1) The Sand Dune and Shingle Network established in 2006 (**Rooney**). The network aims to promote the exchange of information and experience in the management of coastal habitats by identifying actions to support conservation to statutory agencies, coordinating regional and national events, supporting sustainable management of links golf courses, publishing newsletters and providing website resources. Littoral (2017) conference focused on the theme of 'Change, Naturalness and People' with participants from 11 countries in addition to scientists

from UK universities and agencies. Sessions focused on invasive alien species in coastal dunes, threats and solutions in dunes and dune slacks, and mobile dunes and dune dynamics. Since 2010 the Sand Dune and Shingle Network took a lead in developing and promoting the European Dune Network, an initiative to help raise awareness of the threats to coastal dunes and to encourage networking, exchanges of experience and cooperation within and between sectors. The network platform is supported by the Coastal & Marine Union (EUCC) Council in association with the UK Sand Dune and Shingle Network.

(2) PAGES Forest Dynamics working group 2016-2019 (**Clear**). Funded by Swiss Science Foundation and NOAA. As part of PAGES Forest Dynamics, the FutureEarth working group brought together academics, scientists and practitioners from a range of fields in forest conservation and management from boreal and temperate regions. The Forest Dynamics workshop (2017) was hosted by Liverpool Hope University with 29 participants, including 14 ECR from 13 nations. The event explored new approaches to reconstructing forest disturbances across four broad themes: (1) Improving reconstructions of non-fire disturbances; (2) Reconstructing the severity of forest disturbances; (3) Opportunities for database integration; and (4) Key methods for data integration.

(3) Royal Entomological Society Insect Special Interest Group (**Lyons**). As an adaptation to COVID-19 **Lyons** held a virtual e-Ecology meeting (2020) hosted by Liverpool Hope University. This Royal Entomology Society meeting brought together national and international academics and scientists focusing on technological advances and biodiversity in entomology.

In addition to organising and hosting international conferences and workshops at LHU, UoA staff members have developed, organised and hosted conferences at partner institutions including the University of Malta (The Hazard Exposure of the Maltese Islands, Malta (2018; **Kennedy, Chester, Speake, Crawford**) and the University of the Azores (Fourth VERTIGO workshop São Miguel, Azores (2017; Lotteri). Staff members have chaired sessions at international conferences (e.g., PAGES 5th OSM, Zaragoza, Spain 2017; **Clear**) and have been invited keynote speakers (e.g., *Littoral Facing present and future coast challenges*, Klaipeda, Lithuania, 2014; **Rooney**).

Staff are on local and national advisory and boards and committees including: The Chartered Institute of Ecology and Environmental Management (CIEEM), where **Rooney** has served on the membership admissions committee, advisory board and governing body. He is the Convener for the northwest England section of CIEEM and is the Vice-convenor of their Academic Special Interest Group. **Rooney** is an expert advisor on the coast for the Liverpool city region authority. He is on the steering group for Merseyside Biobank (the local environmental records centre) and was the chair of the Education and Outreach Board. He is on the advisory board of the Wildlife

Trust for Lancashire, Greater Manchester and North Merseyside. **Rooney** is on the Steering Committee of the International Geographical Union Commission on Coastal Systems.

Rooney is on the Archdiocese diaconate management board. He also serves on the Archdiocese of Liverpool Ecumenical Commission (Commission for Unity and Dialogue) and the Archdiocese environment group. He is a trustee of Nugent Care, a registered charity, caring, educating, and protecting vulnerable people through schools, care homes, and community and social work services.

Staff members serve on editorial boards including the Journal of Coastal Conservation (**Rooney**) and the Journal of Palearctic Grasslands (**Lyons**). **Clear** is a member of the grant review college for British Ecological Society.

Key strategic aim (d) is to promote networking, outreach and knowledge exchange (see Section 1). This will be achieved by identifying social, cultural and environmental research impact through enhanced internal and external research collaborations and increasing research income. Dissemination of research to stakeholders including government bodies, NGO's, land managers, policy makers, scientists and the public will remain a priority of DGES while growing and maintaining the UoA transdisciplinary research identity.