

**Institution: Edinburgh Napier University**

**Unit of Assessment: 7 – Earth Systems and Environmental Sciences**

**a. Overview**

Research related to this Unit of Assessment (UoA) is conducted within the Faculty of Health, Life & Social Sciences (FHLSS), one of three Faculties at Edinburgh Napier University (ENU). FHLSS comprises two large Schools: the School of Nursing, Midwifery & Social Care and the School of Life, Sport & Social Sciences; all of UoA7 research activity is embedded within the latter. It has nine research-active Professors (Brown, Darlison, Elliott, Huxham, Karatzias, Kennedy, Kilbride, Smith and Tangney) and six Readers (Barlow, Chouliara, Cruickshank, Diele, Florida-James and Rae). Three of these posts (Chouliara, Diele and Smith) are new and ten have been promoted internally. There are also a number of Early Career Researchers and postdoctoral workers, who are supported by the Professors and Readers, reflecting our commitment to developing research careers at a senior level from within the organisation, while recognising the value of introducing research leaders from outside the institution.

All of the Faculty's research is being submitted to two Units of Assessment (UoA) in Research Excellence Framework 2014: UoA7 and UoA3 (Allied Health Professions, Dentistry, Nursing and Pharmacy). The Faculty's activities are overseen by an Executive that comprises a Dean, two Assistant Deans (one for Professional, Commercial and International Development, and one for Teaching, Quality and Student Experience), a Director of Research, two Heads of School, a Head of Business and Administration and a Human Resources Client Partner. The Faculty Director of Research (Darlison) is responsible for all aspects of research, including strategic decisions taken in consultation with the Faculty Executive, the allocation of the Scottish Funding Council's Research Excellence Grant, protected time for research within the academic staff workload and approval (with the appropriate Head of School) of research student registrations; he is also a member of the Faculty's Research Degrees Management Group, which is responsible for student progression.

Research within the Faculty is organised into four overlapping themes: *Biomedical Science, Health and Wellbeing, Human Performance and Environment, Sustainability and Society* (see: <http://www.napier.ac.uk/faculties/health-life-social-sciences/research/Pages/home.aspx>). Staff are strongly encouraged to collaborate across disciplines and, where appropriate, to align themselves with more than one theme. Each theme has a Theme Leader, who is responsible with the Director of Research for allocation of the Research Excellence Grant, encouraging collaborative, cross-disciplinary, international research and ensuring the long-term sustainability of the theme. Commercial activity is also encouraged and this is coordinated by an Assistant Dean, the Head of Business and Administration and the Director of Research. Opportunities are sourced and communicated to researchers by an Innovation Manager and a Business Development Executive, who are supported by the University's Finance, Planning & Commercial Services.

Whilst research in FHLSS is organised into four broad themes, the two Schools have their own specific areas of national and international expertise which map on to these. The range of activities in the School of Life, Sport & Social Sciences includes immunology, toxicology, medical microbiology, social psychology and the sociology of environmental issues, as well as a spread of work within the environmental sciences. Key strengths here include work on marine and coastal biodiversity and ecosystem functioning in the tropics and in Scotland. We are a member of the Scottish Funding Council's pooling initiative, the Marine Alliance for Science and Technology for Scotland (MASTS), which brings together all the main marine research institutions in Scotland (see: <http://www.masts.ac.uk/>). The conservation and management of ecosystems (both terrestrial and aquatic) and animal behaviour are other important areas of expertise. The exploitation of microorganisms for bioremediation and the production of biofuels is a major area of commercial success for the School.

The School of Life, Sport & Social Sciences also has three research groupings (which operate under the broader banners of the themes) of relevance to UoA7: i) the Centre for Environmental and Marine Sciences and Services (CEMaSS); ii) the Biofuel Research Centre (BfRC); iii) the

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Centre for Ecotourism & Wildlife Management (CEWM). Work in CEMaSS has been supported by charities (Earthwatch Institute, the Rufford Trust), Government (DfID), private industry (Aviva Ltd, Zurich International) and the Funding Councils; it hosts world-leading expertise in marine carbon. The BfRC was the UK's first research centre dedicated to the development of renewable and sustainable biofuels. It is pioneering the use of waste products from the whisky industry as a source of fuel. CEWM focuses on consultancy, developing ecotourism particularly in eastern Europe.

For Research Assessment Exercise (RAE) 2008, the two Schools were scattered across four different campuses (Comely Bank, Canaan Lane, Craighouse, and Merchiston), which clearly had an impact on cross-School research and working. In December 2010, the whole Faculty moved to a new, purpose-built, £60 million campus at Sighthill in the west of Edinburgh. This investment also included some £1.3 million in new, state-of-the-art equipment. The most obvious impact of this move is that the two Schools are located together on four floors, with ready access to excellent research laboratories, which is already aiding more interdisciplinary collaboration. The restructuring of research into four overlapping themes has also provided better incentives for working together. Some of this is evidenced in Section c below.

**b. Research strategy**

The research strategy for the FHLSS states that: *"The Faculty is committed to supporting programmatic research that is collaborative, international, and multi-disciplinary, and which fits within the four themes of: 'Biomedical Science', 'Human Performance', 'Environment, Sustainability and Society', and 'Health and Wellbeing'. Our research will inform teaching, where it will not only inform the curricula but also drive programme development, enhance the employability of our undergraduates and postgraduates, and generate Intellectual Property that can be harnessed for commercialisation purposes. Through our research, which aligns with Scottish Government priority areas, we also aim to make a major impact on health, medicine, the environment and society. The overarching purpose of the strategy is to ensure that research in the Faculty is sustainable in the long term, and that we achieve the best possible outcome in the next Research Excellence Framework exercise, which is due in 2020"*. This strategy has been developed to be inclusive and in particular is aimed at supporting and developing Early Career Researchers.

The strategy of both Schools in the Faculty is, wherever possible, to recruit active researchers and to support and encourage them to remain active whilst still developing their teaching and meeting other academic commitments. Recent examples include Rueckert and White, who are being submitted here and Aston and Murray, who are being submitted under UoA 3. There is also strong encouragement for Early Career Researchers to align themselves with current areas of strength. This does not mean that new staff are always expected to work with more senior staff, but they are counselled to work closely with established researchers and to take advantage of the knowledge and practical expertise as well as specialist equipment available in established groups. Support for both Early Career Researchers and more experienced academics is provided by the Research Support Office. They circulate notifications of upcoming calls for research funding and offer a complete 'pre-award' service to applicants, which includes all aspects of the costings of proposals. Advice and support is also offered by the Faculty Director of Research. In addition, advice and support on European Union funding (including Horizon 2020 funding) is provided by a dedicated Project Development Manager.

The four research themes in the FHLSS align closely with the Scottish Government's priority areas and much of our activity is applied. This is evident, for example, in research on impacts of pollution in coastal waters, where modelling and experimental work within the School helped the UK Government to apply European legislation, the restoration and creation of ecosystems used by local people and for the treatment of road run-off. Research within the biomedical science area is also frequently applied, with programmes on reproductive health, cancer, and infection control.

A Faculty Research 'Away Day' is held each year to which all academic staff are invited. The last meeting (held on 22 July 2013) considered Intellectual Property, Knowledge Transfer Partnerships, Horizon 2020 funding, and Open Access Publishing as well as strategic thinking about planning for

impact in the next REF exercise, scheduled for 2020. The previous year, the 'Away Day' was used to facilitate collaboration between researchers within the two Schools. Theme Leaders are also encouraged to hold regular meetings with their staff. In addition, regular (weekly in term time) research seminars, research clinics and journal clubs (organised by Rae) are held, to which academic staff, postdoctoral workers and research students are invited; the latter are expected to attend as part of their Professional Development Portfolio. Finally, the two Schools support conference attendance via their Staff Development budgets; money for this purpose can also be requested from the Faculty's Research Excellence Grant. Note that support for postgraduate research student attendance at conferences, workshops and related seminars is provided by the Research Postgraduate Grant that the University receives from the Scottish Funding Council. This budget is under the control of the Faculty Director of Research, who allocates funding to students on a case-by-case basis.

**c. People, including:**

**i. Staffing strategy and staff development**

*Staff development strategy:* In 2010, ENU received the European Commission's HR Excellence in Research Award. It was gained through a detailed gap analysis of our existing policies, followed by the development and implementation of a plan, which at all stages took into account the views of researchers. In 2012, we successfully retained our award for a further two years due to our continued progress against our Concordat Action Plan. We have created a Concordat Working Group, which comprises researchers at a variety of career stages. This reports directly to the University's Research and Knowledge Exchange Committee (RKEC) and provides a further route for communication between researchers and the University. The Strategic Approach to Effective Researcher Development, endorsed by the University's RKEC, Research Degrees Assessment Board, and Academic Strategy and Enhancement Committee (2011) implemented an integrated approach to researcher development across the University. It takes an inclusive approach to the development of Early Career Researchers which embraces research students and their supervisors as well as early career and established researchers. To support and implement the University-wide staff development strategy and to tailor its delivery towards researchers, a dedicated full-time Researcher Developer role was established in 2011.

The University launched a new Researcher Development Programme in 2011 which comprises events that map on to the Researcher Development Framework created by Vitae ([www.vitae.ac.uk](http://www.vitae.ac.uk)) and which supports researcher career development and planning. Approximately 20 events are held each Trimester that are tailored to our researchers and contain relevant sessions for all stages of a research career. The programme has helped to foster the research culture across the University by bringing researchers together to share best practice. We have also increased our online provision of resources. These include topics such as induction, research ethics, and integrity. We hold Researcher Development Conferences with themes such as *Supporting Researchers at ENU* and *Fostering Interdisciplinarity in Learning, Teaching and Research at Edinburgh Napier*, which are aimed at building the research culture of the University. Our achievements in this area have been recognised nationally through a Times Higher Education award in 2010 for Outstanding Support for Early Career Researchers; this was awarded to the Universities Scotland Research and Knowledge Exchange Committee Research Training Subcommittee, of which ENU is a member.

*Supervisor training and development:* We run several dedicated events each year for research supervisors. Our three-day *Supervising Research Degrees* course has been formally recognised by the Staff and Educational Development Association (SEDA), allowing our participants to gain an externally-accredited award upon completion of the course. New research supervisors also receive informal mentoring through participation in research student supervisory teams, allowing them to gain supervisory experience and growing supervisory capacity.

*Research integrity and ethics:* We have University-level and Faculty-level Research Integrity Committees, which meet four times a year and which are charged with all aspects of research integrity and ethics, including the ethical review of research project proposals. The University has recently revised its Code of Practice on Research Integrity and Ethics to provide a relevant

document on the day-to-day ethical issues that our researchers may encounter, including authorship, guidelines, informed consent. This document is available online and is currently being rolled out to all staff via workshops. These events allow the provision of generic and subject-specific skills across the University in a tailored manner.

*Providing time for research:* The Faculty has a scheme to protect individual staff time for research. Each year, individuals are encouraged to apply for an allocation that corresponds to up to 25% of their time. These bids must specify exactly what the time will be used for (for example, the writing of manuscripts, grant proposals, etc.), and also what was achieved with the previous year's allocation. These are considered by a small committee of seven or eight academics, which is chaired by the Director of Research. To reward exceptional performance in any one year, the committee can grant an additional amount of protected time (up to a maximum of 40%).

*Annual staff review and public engagement:* All staff engage in an annual Professional Development Review, which includes a staff developmental plan. These are carried out with an appropriate line manager – often the individual that allocates the teaching load – so that discussions can be had as to how best to utilise the member of staff's research time allocation. Academics who do not have an advanced degree can also study part-time for a postgraduate qualification (for example, MSc by Research or PhD degree) and time in their workload is provided to encourage this. The tuition fees for such part-time study are covered by School budgets. Finally, staff are encouraged to get involved in public engagement via the Beltane Public Engagement Network (see: <http://www.beltanenetwork.org/>). The Beltane is supported by the four Edinburgh universities: ENU, the University of Edinburgh, Heriot-Watt University and Queen Margaret University and builds on the work of the Edinburgh Beltane Beacon for Public Engagement project, which was one of six United Kingdom (UK) Beacons for Public Engagement funded by Research Councils UK, the Funding Councils and the Wellcome Trust. The Beacons were established in 2008 to bridge the gap between researchers working at the cutting edge and the people that their research will affect. Staff often contribute to high profile public events such as the Edinburgh Science Festival (see, e.g.: <http://www.sciencefestival.co.uk/whats-on/categories/talk/british-ecological-society-centenary-symposium>).

*The role of MASTS:* A key development since the RAE 2008 has been our membership of the Marine Alliance for Science and Technology for Scotland (MASTS). ENU was amongst the original founder members of this organisation, which aims to change the way that marine science can be delivered in Scotland by the sharing of resources across the MASTS community. By joining MASTS, ENU demonstrated its ongoing commitment to excellence in marine research and guaranteed institutional resources to foster marine research for the lifetime of MASTS. Not all institutes can support all aspects of marine research and many areas of provision (remotely operated vehicles, diving services, and vessel capacity) are complex to deliver and are only supported by specialised centres. MASTS has developed a resource map that allows members to identify such resources and provides access to the relevant contact to pursue cooperation. MASTS, therefore, facilitates the building of research capability and networks across Scotland. This is particularly useful for PhD students and Early Career Researchers as well as those working in highly specialised fields. Two of the posts at ENU (Diele and Rueckert) are half-funded by MASTS, and two new MASTS-funded PhD students will be registered in January 2014. Huxham serves on the MASTS Graduate School Steering Group, helping to provide opportunities to MASTS PhD students and students registered at MASTS institutions to meet and learn together. ENU also contributes through membership of the Governing Council (Darlison) and the Executive Committee (Huxham) and through formal and informal participation in the themes and forums.

*REF strategy and supporting researchers:* We are submitting six academics under UoA7. This is considerably smaller than the number that was submitted to RAE 2008. This reflects a strategy to focus research on key areas and to encourage development in specialist niches, including knowledge partnerships and commercialisation. For example, Tangney and Velander both work within the UoA7 area but are not being submitted here since they have focused on high profile and successful commercialisation projects rather than on peer-reviewed outputs. All staff are encouraged and facilitated to conduct research, commercialisation and scholarship activities and

this is not affected by their status as 'submitted' or 'non-submitted' staff.

## ii. Research students

UoA7 currently has seven associated research students, with two more due to start in January 2014. Our research student numbers have grown since RAE 2008, with seven doctoral degrees awarded in 2012 compared with one in 2008. All students initially register for a generic research degree and then, depending either on progress or the students' wishes, subsequently transfer to either an MSc by Research, MPhil or PhD degree. Each student has a Director of Studies and s/he is usually supported by one or two other members of staff, who complete the supervisory team. Through this mechanism, we are building a significant research supervisory capacity. Research students must complete a project proposal within either six months (full-time) or nine months (part-time) of starting and they then have regular formal progress reviews. The content and structure of these are informed by the Vitae Researcher Development Framework and thus include emphasis on professional development beyond the completion of research goals. Students are encouraged to take advantage of the Research Postgraduate Grant, which supports their attendance at conferences, workshops, and other learning events. All PhD students usually attend and present at, one or two conferences outside of ENU during their period of study and many go on to carry out postdoctoral work at other institutions.

Each year, the Faculty Director of Research provides a sum of £5,000 to £6,000 for the Postgraduate Research Student Conference, to which all research students and academic staff are invited. This full-day conference is organised by students who have full responsibility for the location, catering, programme, invitations, etc., providing an excellent learning experience for them. All students must present three times during the course of their PhD studies (one poster presentation and two oral) and the environment in which this occurs resembles that of large international symposia. In this way, students learn to present their work in a friendly, non-confrontational setting. The Conference is overseen by the Faculty Research Degrees Coordinator (Horsburgh), who is also the first point of contact for all research students. Horsburgh is also the Chair of the Research Degrees Management Group. She is responsible for overseeing student office space as well as organising a series of relevant seminars on topics such as literature reviews, research ethics, statistics, the use of EndNote, thesis writing, etc. She thus provides a single first point of contact for research students and supervisors alike. All research students have full access to library and research facilities and their own desk space and computer (desktop or laptop).

We were recently a full partner in the MASTS bid for a Doctoral Training Partnership, which aimed to bring an additional 30 environmental PhD students per year between the consortium partners. Whilst this was not funded by the Natural Environment Research Council (NERC), it did secure promises of match funding from senior management, MASTS plans to build on these to allow significant new recruitment even without research council input, by matching across institutions. We have already experienced a rapid expansion in research student numbers over the past two years as a result of investment by the University in fourteen fee waiver studentships and successful external bids. We support students studying part time and also at a distance, developing collaborative arrangements with institutions overseas to provide dual support for students studying in their home countries. Two recent case studies illustrate this approach:

Dr Marappullige Priyantha Kumara was sponsored by the charitable arm of Zurich International Bank, investing in coastal protection in Sri Lanka following the devastating tsunami of 2004. He discovered that increasing the density at which mangrove trees are planted not only increases the trees' abilities to trap sediment and protect the coastline but also produces a facilitative effect on growth, giving a 'win win' scenario of better growth and better coastal protection. He published three peer-reviewed papers from his thesis and is now a senior lecturer at the Ocean University in Sri Lanka.

Dr Joseph Langat's PhD was funded by insurance multinational Aviva Ltd. Registered at Edinburgh Napier, Joseph lived and worked in Kenya, benefiting from a model of co-supervision designed to enhance local marine science capacity with access to international networks and training. Joseph

ran eight teams of international volunteers, trained PhD students new to the site, and published three peer-reviewed papers. He is now the senior environmental advisor to the regional Government in Mau province.

*Integration of PhD students into wider research culture and career support for teaching:* The University Researcher Development Programme is open to all researchers regardless of career stage. Through a coordinated, cross-university approach to education, training, and professional development, we ensure that our research students feel integrated into our research community. We also provide specific induction sessions for research students allowing them to plan out their own professional development and to network within their own cohort of students. ENU has a dedicated module (*Teaching at University*), which was the first of its kind to be accredited by the Higher Education Academy, designed to give training for PhD students in teaching and learning. This ensures research students involved in teaching receive proper training and have the chance to develop skills to help them in academic careers.

#### **d. Income, infrastructure and facilities**

*Income:* UoA7 research income shows healthy growth. In the reporting period for REF 2014, it was £256,583 per research active member of staff compared with £139,604 over the period for RAE 2008. The period since 1 January 2008 has seen large grants captured by the Faculty from a number of sources, such as NERC/DfID (Huxham), Medical Research Council (Rae), the European Union (Hutchison), and the Scottish Government (Karatzias). We have also used £0.5 million of external funding to support eight new PhD studentships across the Faculty, with two in UoA7. Faculty income generation is improving year-on-year and, in addition, during the REF 2014 assessment period, the FHLSS generated some £2 million of commercial revenue, some of which has been used to support research by providing specialist equipment. All of this points to a strong increase in research activity and the necessary financial income to underpin it.

*Infrastructure and facilities:* ENU opened its new £60 million Sighthill campus in December 2010 as the home of the Faculty of Health, Life & Social Sciences. This building complex provides modern, purpose-built teaching and research facilities for environmental and conservation science. These include a constant temperature aquarium room equipped with seawater and freshwater tanks, dedicated microscopy suites and growth chambers, and well equipped wet and dry laboratories for sediment and faunal analysis. None of this was available in the period leading up to RAE 2008. The Sighthill campus also has IT and library facilities that use the latest digital technology and allow access to staff and students from anywhere in the world.

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

*Esteem:* Staff in UoA7 make significant contributions to the environmental science disciplines through publications, outreach, and support of learned societies:

**Briers** is a member of a range of biodiversity and ecological societies, including the Board of Directors of The Wildlife Information Centre (biological records centre for the Lothians and Borders), the Data Sharing and Data Flow subgroup of the Scottish Biodiversity Information Forum, and the Scottish Policy Group of the British Ecological Society (BES). He is also the BES representative on Scottish Environmental LINK, which is the forum for Scotland's voluntary environment organisations. He was co-convenor of Constructed Wetlands Research Group (2010-2012) (a combination of academics, practitioners, consultants, and representatives from Government and statutory agencies with a focus on the utility of constructed wetlands to reduce diffuse pollution).

**Diele** serves on the following Committees: Advisory Committee of the Pan-American Journal of Aquatic Science, and Editorial Committee of Revista Cepsul: Biodiversity and Marine Conservation. She was also a member of the Scientific Committee of the VII Brazilian Crustacean Congress, and is a member of the Steering Group of the MASTS Fisheries Forum. She has been an invited speaker at numerous Conferences, including the bilateral BioDiversity Management Conference, Tam Dao, Vietnam (2011), and the VII Brazilian Crustacean Congress, Belem, Brazil

(2012); she also organised the session Biology, Ecology and Management of Mangrove Crabs at the latter Congress. She achieved media outreach, for example on TV Brasil (16 February 2013 and 15 June 2013), broadcasting with her Brazilian colleague, Anders Schmidt, in the TV Programme Expedições, about mangrove ecosystem functions and services, and mangrove crab fisheries (see, for example, <http://tvbrasil.abc.com.br/expedicoes/episodio/manguezais-do-sul-da-bahia> and <http://www.youtube.com/watch?v=pQ3FkNyTJQ0>).

**Gilchrist** has contributed to prestigious encyclopaedias (invited submissions): Gilchrist, J.S., Jennings, A.P., Veron, G., Cavallini, P. (2009) The Herpestidae. In: The Handbook of the Mammals of the World, Vol. 1 Carnivores. Eds: Wilson, D.E. and Mittermeier R.A., Lynx Edicions, Barcelona, and Cant, M.A. and Gilchrist, J.S. (2013) *Mungos mungo*. In: The Mammals of Africa. Vol. 5. Carnivores, Pangolins, Rhinos and Equids. Eds: Kingdon J.S. and Hoffmann, M., Bloomsbury Publishing, London. He also regularly publishes in the popular science media, for example, Gilchrist, J.S. A Family Affair [Mouse lemur feature article], BBC Knowledge Magazine, July 2010; Gilchrist, J.S. When the Sun Goes Down [Camera trap feature article], Africa Geographic Magazine, October 2008; and Gilchrist, J.S. Small is Beautiful [Mouse lemur feature article], BBC Wildlife Magazine, July 2008. He also referees for a wide range of journals including Animal Behaviour, Behavioural Ecology, Behavioral Ecology and Sociobiology, BMC Ecology, Ethology, Ecology and Evolution, Ethology, International Journal of Primatology, Journal of Animal Ecology, Journal of Mammalogy, Journal of Zoology, Mammalia, Mammalian Biology, and the Proceedings of the Royal Society of London.

**Huxham** sits on the International Union for the Conservation of Nature's specialist group for mangrove ecosystems. He represents ENU on the Executive Committee of MASTS and on the MASTS Coastal Zone Forum as well as serving on the MASTS Graduate School Steering Group. He is the founding Director of the Association for Coastal Ecosystem Services, a registered charity dedicated to channelling money to the protection of coastal ecosystems in East Africa and a founding member of the East African Forum for Payments for Ecosystem Services. He serves on the steering committee of the Mikoko Pamoja project and on the Earthwatch/Gazi community committee. He is lead author for the Friends of the Earth expert group on bioproductivity and until recently served on the British Ecological Society Overseas Grants (Africa) committee. He is a frequently invited speaker to scientific (e.g. Aquatic Resources of Kenya Conference 2010) and public (e.g. Royal Geographic Society) events, is an editor of two educational journals and was a member of the scientific committee of the mangrove management meeting 2013 in Sri Lanka. He serves as a referee for numerous journals and for grant giving bodies including NERC.

**Rueckert** is a European Councillor of the International Society for Evolutionary Protistology (ISEP) and serves on the Editorial Board of the European Journal of Protistology.

**White** is a Member of the Chartered Institute of Ecology and Environmental Management (MCIEEM) and was on the steering committee for the Speyside Black Grouse Study Group for three years (2010-2013). He has been an invited speaker at the annual meetings of the Central Scotland Black Grouse and Capercaillie Study Group, the Earn Tay Almond Grouse Study Group, the Perthshire Black Grouse Study Group and the Deeside Black Grouse Study Group.

#### *Beltane Public Engagement Network*

ENU is a founding member of the Beltane Public Engagement Network, which started as a Public Engagement beacon. We have continued our support of this organisation as its beacon funding came to an end in 2012. Three of our research staff have obtained Beltane Public Engagement Fellowships, allowing them time and support to develop their public engagement and impact from their research. We have also benefited from researchers gaining access to Beltane training on public engagement, including evaluation of public engagement events. Our support of Beltane has also included the establishment of an Edinburgh-based 'Bright club', in which several of our researchers have used stand-up comedy as a route to engaging alternative public audiences with their research.