Institution: University of Cumbria

Unit of Assessment: 17 - Geography, Environmental Studies and Archaeology

a. Overview

This unit consists of research primarily within Environmental Studies, primarily environmental geography, as well as the conservation, ecology and resource management elements of environmental science. Researchers within these disciplines are predominantly based in the Forestry, Conservation and Applied Science group of the Faculty of Arts, Business and Science (previously part of the Faculty of Science and Natural Resources), with complementary work being undertaken within the Outdoor Studies area. The main body of the unit (Forestry, Conservation and Applied Science) existed as a single unit prior to the formation of the University of Cumbria in 2007, as part of the Cumbrian Higher Education campuses of the University of Central Lancashire. The Outdoor Studies grouping came into the University as one of the disciplines from St Martin's College.

Staff from these two areas have been located together since the formation of the University, predominantly at the Newton Rigg campus in Penrith. Within academic year 2012/13, this has begun to change, with some staff members transferring to the Ambleside campus, which will be the single site for this unit by the end of academic year 13/14 (for further details, see section d).

Within the unit, there are two main Research Centres: the National School of Forestry (NSF) and the Centre for Wildlife Conservation (CWC), with the majority of staff in the unit being members of one or both of these groups. Within the period, there has been a shift in the emphasis of the work, with an increased focus on applied and social science based research. This has led to the submission of the research into this unit of assessment, which represents a shift from the RAE 2008, where environmental work was submitted to the Agriculture, Veterinary and Food Science unit of assessment. Much of the research within the unit is multidisciplinary, and is largely focused on the effects of biodiversity and land management (particularly uplands and forestry) on local communities in the UK and overseas. Specialisms within the group include invasive species, renewable energy, forestry and marine conservation.

b. Research strategy

The strategy in RAE 2008 (relating to the same disciplinary areas, but submitted within the Agriculture, Veterinary and Food Science unit of assessment) was based on utilising the momentum created by the formation of the University to support and further develop the strong research orientation towards forestry and natural resources research which had begun in 2002. In particular, this included building on strong professional links to create active research collaborations with a broad range of forestry sector partners.

More specifically, the RAE 2008 strategy was to undertake high quality, end user focussed research within these areas, with specific objectives to:

- Strengthen support for collaborations and partnerships (via targeted allocation of resources and through an NSF Steering Group comprised of industrial liaisons);
- Development of staff research capabilities, supported by the prioritisation of this area for research development by the University, and with planned additional appointments;
- Development of the student base, including increasing numbers of externally funded research degree studentships;
- Enhancing research resources, including further development of the Newton Rigg estates;
- A focus on three core research themes:
    - Bioenergy and carbon management;
    - Species viability, conservation and management;
    - Adaptation of the natural environment and human communities to climate change.

In many respects, the RAE strategy has been successful. Structural change has altered a number of the parameters, most particularly through the change in the emphasis of the research from

forestry as the primary focus to a broader remit, and also through significant changes in the estates planning, driven by wider University priorities (whilst the facilities at Newton Rigg were substantially enhanced in the beginning of the period, the location of the unit will be undergoing change, see section d for further estates details). However, despite these changes, the unit has been successful in a number of these objectives, as detailed below.

The unit successfully recruited to a number of new academic posts, and has had some successful in terms of attracting and retaining staff with research profiles or individuals at early stages in their career who have been supported in developing research experience and capabilities (see section c for further details). The unit has also been highly successful in terms of maintaining and extending the range of collaborations with relevant stakeholder organisations. This has included maintaining key forestry links (for example with the Forestry Commission and their research division, Forest Research). However, in addition, engagement has also been developed to include associations and collaborations with a wide range of stakeholders outside of forestry, for example the Lake District National Park, the Scottish Association of Marine Science and a range of international organisations, including Western Australian Fisheries, Fisheries and Oceans Canada, Parks Canada and Almaty State Nature Reserve, Kazakhstan (for more details on the range of collaborations throughout the assessment period, see section e).

The unit aims to produce research that contributes to solving the problems faced by society globally. The themes of the research have not substantially changed since 2008, and encompass the conservation of biodiversity, sustainable forest management, and development of sustainable biomass energy, and these have been broadened to include a wider remit for the social aspects and community impacts of these themes. This is represented through a body of work that is interdisciplinary and directly brings in human geography and sociology methodologies or perspectives into the research, and applied science in which such implications of the work are explored through direct engagement with stakeholder organisations, such as local authorities and policy making bodies.

The strategy is reflected in the research of individuals within the unit. The main specialisms are NSF forestry research, including short rotation forestry, stand profile and woody biomass (WEATHERALL, CONVERY); conservation research, including brown bears and killer whales (DEECKE); marine conservation (SINCLAIR); population modelling for conservation (STEVENSON); environmental disaster management (CONVERY), cultural landscapes and environmental change (CONVERY); and community implications of renewable energies (CONVERY, WEATHERALL, STEVENSON, KOULOUMPIS).

Whilst the forestry elements and some strands of the conservation research are generating outputs from well-established research areas, a number of the specific conservation elements have been developing within the assessment period. One notable example is the work on community woodfuels and renewable energy, which has been extended by a number of studentships funded by the UK Energy Research Centre (UKERC) (for further details see section c ii).

Strategically, the unit aims to continue these current areas of research, but also anticipates that other work, currently at early stages of development, will begin to produce tangible outcomes within the next assessment period. These include bioengineering and the wider effects of renewable energy on biodiversity: current projects on-going within this theme include a Knowledge Transfer Partnership (KTP) looking at freshwater mussels for control of eutrophication in nuclear storage ponds at the Sellafield nuclear reprocessing plant.

The strategic aims and objectives of the unit within the next five years include:

- Growth of research activity within the existing research themes, which particularly aims to draw disparate pieces of work into cogent, interdisciplinary and highly applied research programmes to address national and international concerns around sustainability, conservation and environmental change. The interdisciplinary themes of the unit are:
    - Interdisciplinary studies of the development of renewable biofuels.

- Biology and conservation of biodiversity.
- Forest and woodland management and development.
- Rural communities and community development globally, especially in relation to the other thematic areas.

- To embed stakeholder relationships and research collaborations within the new location at the Ambleside campus, and leverage the benefits of the location to drive forward stakeholder engagement, particularly with the Lake District National Park (LDNP), Freshwater Biological Association and National Trust. Maintaining and extending stakeholder engagement is a key target, including developing stronger links with additional partners, including Natural England and Scottish Natural Heritage.
- To strategically target West Cumbria as an area for future research development, focussing particularly on the benefits from sustainable energies. In part, this work may be funded by the *Britain's Energy Coast* project, and will build on existing partnerships, such as with Sellafield.
- To continue to increase numbers of PhDs, including those funded by external partners.
- To deepen internal research connections with the newly established sustainable engineering area of the University (particularly through the Life Cycle Assessment Research Hub), in order to extend and further validate research activities through the testing and implementation of solutions, particularly in terms of renewable energies. (Examples of work initiated in this area include a short KTP on environmental impacts of the holiday cottage industry, in collaboration with Nurture Lakeland, and research validation work for industry on the impacts of stream based renewable energy turbines on fish, funded through an Innovation Voucher).
- To develop connections with the recently established Institute for Leadership and Sustainability (IFLAS) of the University's Business School, also located at Ambleside, as a means to developing engagements with a wider range of stakeholders, particularly those in industry.
- To increase the amount of external research funding won by the unit to support research activities. This will include sustaining and extending the increased level of bidding activity, and specifically targeting relevant funding organisations, including the European Commission, the Engineering and Physical Sciences Research Council (EPSRC; to develop collaborative work with Sustainable Engineering), Natural Environment Research Council (NERC), the British Ecological Society, the Scottish Forestry Trust and also the Leverhulme Trust funding for novel and highly interdisciplinary research schemes.

c. People, including:

i. **Staffing strategy and staff development**

The staffing strategy is principally determined centrally by Human Resources. However, as one of the areas of the University with a more traditional academic remit, rather than areas in practice-based disciplines where staffing being largely based on ex-professionals who require considerable development to gain research skills, this unit has a greater input into staffing policies. During the period, the unit's approach has been twofold; to both attract and retain early stage established researchers with a reasonable publication record, or to attract individuals immediately following doctoral completion and develop them as researchers. No short term staff appointments have been made from core university funding, with only a small number of individuals having been employed on short term contracts only where this has been required due to the constraints of external funders.

Three new appointments have been made to the area over the assessment period, delivering on a strategic staffing objective from the RAE. A senior researcher joined from Central Queensland University (SINCLAIR) to lead on conservation genetics whilst a senior lecturer joined from St. Andrews after as series of postdoctoral appointments (DEECKE). A third individual joined from University of Leeds after completing their PhD studies (van der Velden). The development of researchers is critical to the success of the institution and two staff members were promoted to

Reader during the assessment period in recognition of their research endeavours (CONVERY, SINCLAIR). A small number of individuals submitted in RAE2008 have left the University within the latter part of the assessment period. However, primarily these individuals had switched focus from research to administration, and so the impact on the submission was limited.

The University is committed to supporting the research development of its entire staff and fully endorses the Concordat to Support the Career Development of Researchers. Whilst the University does not currently have a large number of dedicated research staff (i.e. research only posts), it is committed to providing development and training opportunities in order to strengthen research capabilities. The University has evolved from a Higher Education teaching context, which means that a proportion of our staff have greater experience in teaching than in research; therefore providing opportunities for staff to gain skills in research is fundamental to maintaining and developing our research capabilities, capacities and culture. We are currently undertaking a benchmarking exercise against the principles of the Concordat, and are planning to submit an application for the HR Excellence in Research award in 2014.

The University commitment to researcher development is fixed in the University's goal to achieve Research Degree Awarding Powers, as stated in our strategic aims on the creation of the University. It is reflected through our engagement with the pilot for the Researcher Development Framework (RDF), which the University subsequently intends to schedule for roll-out to all academic staff. This will be an additional element to help tailor our support mechanisms to the needs of individuals. It will be integrated into the research and scholarly planning, which takes place as part of the annual review process. Staff also benefit from a fixed annual allocation of 25 days Scholarly and Research Activity (SARA) time and access to the Epigeum research skills package, Sabbatical Leave funding and Research and Scholarly Development Fund (RSDF). As part of our commitment to developing Early Career Researchers, we also provide fee waivers and additional support mechanisms for staff members developing their research capabilities following a professional career to undertake a PhD.

The University has a comprehensive Equality, Diversity and Inclusion strategy and a set of related policies and procedures that help to ensure equity of opportunity for all students and staff. This includes positive engagement with stakeholder groups external to the University, particularly with creating access for local community and under-represented groups. Specifically in relation to research activity, the procedures allow monitoring of equality, diversity and inclusion across research student recruitment, progression and completion. The policy is also applied to research staff appointment, promotion and support and where appropriate equality impact assessments are completed to evaluate the potential impact of new policy or procedures. The quality of research is maintained on a day to day basis by a Faculty Research Coordinator, who deals with bidding and quality across the unit. Authorship of papers is managed on an individual basis, however, staff are encouraged to follow the guidelines for good practice set out by the *Society for Conservation Biology*.

Research quality and integrity are of fundamental importance to the unit, especially the position of research ethics given the social science emphasis of the work. The Chair of the University's Ethics Committee is a member of this unit (CONVERY), and individuals sit on the University Research and Enterprise Committee.

The unit has had recent success in gaining funding from the Forestry Commission to fund a post-doctoral position, following on from a PhD funded jointly between the Forestry Commission and NSF. This position is full time and is funded by the Commission at £44,000 (for salary, research costs and some administrative costs, and with matched costs from the University through overheads) for the purpose of carrying out research on the topic of 'invasion characteristics of taxa: defining the scope of least-cost modelling and other techniques'. (The position was initially funded for one year, but discussions are in progress to extend the position for at least a further year). The funding of this position has increased research capacity, and added to the research environment through a full time research fellow. This is reflected in the submission with the addition of an Early Career Researcher with a growing publication record (STEVENSON). This is a valuable strategic

model for extending collaborative research with stakeholders, and will be taken forward into the next assessment period.

ii. Research students

The University of Cumbria is currently working towards acquiring Research Degree Awarding Powers (RDAP) and there are strategies and policies in place to achieve this, coordinated by a cross-institutional RDAP Steering Group. Research degrees are currently validated by Lancaster University, however, the management, administration and delivery of the postgraduate research programme is entirely managed by Cumbria. The University registers post graduate research students, provides supervision and research training, and manages quality and progression through the Cumbria Research Office and Graduate School

At Newton Rigg there are two dedicated rooms for PhD students (situated within an area of staff offices), in order to enhance the integration of post graduate research students into the research environment, and expedited formal and informal interactions. PhD students are integrated into the research programmes of staff, both via direct supervisor relationships and through wider opportunities which are provided for skills development and mentoring. The level of integration is reflected in the continuation of a research programme through the post-doctoral position detailed in the first part of this section. The unit has seen a healthy increase in the number of PhD students over the assessment period, including significant proportions that receive funding. This includes a number of studentships from the Natural Environment Research Council (NERC) via UKERC, which were from a highly competitive interdisciplinary fund open to Research Council UK (RCUK) qualified institutions. The unit managed to gain four of these studentships (two of these within the assessment period, and two of these won prior to 2008, but with research on-going during the assessment period), making it one of the most successful bidders in the country, second only in terms of UKERC studentships won to Imperial College and tied with Cambridge.

The UKERC studentships are interdisciplinary, and focus around the development of biofuel (in its widest context); each also contains an element of biodiversity linking to economic and / or social issues. The UKERC funding has also provided an excellent link for members of staff across the environmental sciences to work together in a truly integrated way. Supervisory teams normally include a forester, a biodiversity expert and a social scientist. The facilities provided through these studentships have provided spill-over benefits, enabling the development of a richer, highly academic and motivating environment to support other PhD students. These studentships form part of a wider research programme exploring environmental change in relation to renewable energies and carbon management, led by staff within the unit (CONVERY, WEATHERALL, Leslie, Ramsey).

Funding for PhD students has also included University studentships (one student through a University studentship, and one through a Faculty studentship); a studentship partly funded by the Forestry Commission and supplemented by the faculty (as indicated in part i); and the unit's first fully funded international PhD student in 2013, through the Brazilian Government's 'Science without Borders' program. Other students have enrolled as a result of industrial contacts including staff members based at the LDNP and the Freshwater Biological Association. Supervision is primarily delivered by staff from the unit, particularly those submitted (CONVERY, DEECKE, SINCLAIR, WEATHERALL). However, supervision is sometimes also supplemented, where appropriate, by experts from overseas, including by colleagues based in Malaysia, Norway, Greece and Australia, and also from relevant organisations, such as the Freshwater Biological Association, to enrich the skills development and research environment provided to the student.

d. Income, infrastructure and facilities

Income

During the assessment period, the unit received a range of research funding, including from the UK Energy Research Committee; the People's Trust for Endangered Species; The Darwin Initiative; the Lake District National Park (LDNP); Natural Environment Research Council (NERC); the Forestry Commission; Forest Research; and the Department for Environment Food and Rural Affairs (DEFRA). Specific project examples include commissioned research such as £7k for a

review paper on upland communities from the Commission for Rural Communities and £60k funding from the Joule Centre (Manchester University) on biomass energy in rural Cumbria.

The Faculty has been actively increasing the level of bidding for external funding over the past two years. Bids which are still awaiting decisions from funders, include to the European Commission (EC) Framework Programme 7 (FP7) and LIFE+ funding streams (woody biomass and renewable energy), a bid to the Leverhulme Trust (marine conservation) and the Snow Leopard Network (mammal and habitat conservation). Strategically, the unit will continue to bid to suitable funders, such as the Horizon 2020 programme, RCUK (particularly NERC and the Engineering and Physical Sciences Research Council, EPSRC), the Leverhulme Trust, various charitable organisations and also through continuing to undertake commissioned and competitively tendered research for relevant stakeholder organisations, such as Forest Research and the Lake District National Park. The unit also intends to continue to fund small research programmes to enhance stakeholder relationships and underpin larger research programmes through schemes such as Knowledge Transfer Partnerships (KTPs), building on the earlier success of previous KTPs, such as those with LNDP and with the Institute of Chartered Foresters.

Infrastructure and facilities

As indicated in section a, the remainder of the unit's staff will be moving location in August 2014 (joining the Outdoor Studies staff, who are moving during academic year 13/14). During the assessment period (at the Newton Rigg campus) the unit had a range of specialist resources, which include short rotation coppice, provenance plots, other woodland, upland farm habitat, laboratory space and experimental glasshouse. Plans for the development of the Ambleside campus include the creation of new laboratory facilities (dirty, clean, research and flexi laboratories), to replace the provision at the current Penrith site. Whilst the unit will continue to have access to the outdoor research facilities within academic year 2013/14, partnerships are being finalised to allow the unit to access equivalent or better resources at the new location. The move will also help to strengthen the partnership with LDNP. The new facilities will include a suite of new equipment for environment, forestry and conservation fieldwork, and will be supported by technical staff. Estimated spend includes £428,000 on new science facilities, £224,000 on equipment and £119,000 on additional learning facilities to be provided to the unit. A further £1 million is being spent on a new library, which will include a dedicated post graduate study area, which will support interdisciplinary integration at the site.

The unit also plans to take strategic advantage of other available support to further research programmes, by leveraging national infrastructure and facilities. This approach has been exemplified by the success of in achieving research income in kind from NERC. The funding was won within the assessment period, but the work will predominantly be undertaken outside of the period, and reported as such. The total value of the income in kind applied for on behalf of a PhD student, including training, supervision, support and equipment at the NERC Biomolecular Analysis Facility in Sheffield (NBAF-S) is estimated at £23,992.

e. Collaboration or contribution to the discipline or research base

The NSF and CWC specifically, and the unit more generally, collaborate with a range of partners in the UK and abroad. Links to the forestry sector are particularly strong, including a well-established association with the Forestry Commission / Forest Research, which has led to PhD funding and the unit's first externally funded post-doctoral appointment (as detailed in section b). Linkages with the LDNP continue to grow, and have included the successful completion of a KTP involving the development of a toolkit for farmers to reduce their carbon footprint, and which is being followed up with bids to fund wider initiatives to explore the sustainability of the park. The relationship with LDNP will be strengthened by the strategic move to the Ambleside campus.

In 2012 the CWC organised and hosted the Society for Conservation Biology (SCB) Third European Congress of Conservation Biology (ECCB) in Glasgow. ECCB is the largest conservation conference in Europe and the 2012 event attracted over 1000 delegates. Hosting of the conference was won through a competitive process, and succeeded over bids from Seville and Copenhagen.

Members of the unit have undertaken a range of roles for professional associations, learned

societies and other bodies during the period, including membership of the extended Board and lead of the *Illegal Logging and Forest Law Enforcement, Governance and Trade (FLEGT)-Processes* Task Force of the International Union of Forest Research Organizations (IUFRO); Chairman of the Regional Committee of the Institute of Chartered Foresters; member and Secretary of the European Board, member of the Global Board and member of the European and Global Education Committees of the Society for Conservation Biology; Fellowship of the Zoological Society of London; membership of the Scientific Committee for the second European Congress of Conservation Biology; member of the organising and scientific committees for the Institute of Forest Research Organisations international conference; membership of the Agroecology working group of the British Ecological Society; member of the Polycultures research team of the Permaculture Association; board member of the Confederation of Forest Industries, North of England Committee; and member of the Implementation Group of the North West Regional Forestry Framework.

Staff in the unit have also engaged in a range of roles within other stakeholder groups, including: Chairman of the Clyde Inshore Fisheries Group; Member of the Board of Trustees for the Solway Firth Partnership; Member of the Board of Directors for the Sustainable Inshore Fisheries Trust; undertaking a report on snow gum research for the Scottish Forestry Trust; commissioned briefing paper *Inquiry into the Future of England's Upland Communities - Rural People & Communities* from the Commission for Rural Communities; Conservation advisory panel (Training Estate North) for the Ministry of Defence; advisor to the Cumbria Woodlands carbon project; reviewer for an Economic and Social Research Council (ESRC) research grant; reviewer of grants on the behavioural ecology of cetaceans within the Strategic Environmental Research and Development Program for the US Department of Defence; expert review of post-doctoral fellowship applications for the David H. Smith Conservation Research Fellowship Program; Secretary of the UK Sycamore group; and Chair of the International Union for Conservation of Nature (IUCN) illegal logging group.

There are also a number of roles that have been undertaken in relation to peer review journals, including: a strategic role and management of the peer review process for the Elsevier journal Forest Policy and Economics; peer reviewing for the journals *Animal Behaviour, Biological Conservation, Conservation Biology, European Journal of Wildlife Research, Journal of Ecotourism, Mammal Biology, The Environmentalist, Ursus* (journal of the *International Association of Bear Research and Management*) and *Zoology*; and editorial roles for *Ursus, Scientific Reports*, and the *International Journal of Biology*.

The group has also undertaken collaborative research with a wide range of national and international Universities during the assessment period, including: Central Queensland University, Australia (including both Adjunct Senior Lecturer and Adjunct Associate Professor roles, and contribution or leading marine conservation research projects); School of Marine Biology and Aquaculture, James Cook University, Australia; Biodiversity Assessment Advisory Panel to the Centre for Alpine Ecology, University of Trento, Italy; Kazakh National University (Almaty), Kyrgyzstan (brown bear survey work in Almaty State Nature Reserve); American University (Bishkek), Canada; Uppsalla University; University of British Columbia (bears); University of Leeds (alpine ecosystems: eco-hydrology); University of St. Andrews; Lancaster, Durham and Newcastle (demonstration of mitigation of pollution from agriculture), Graduate Institute Connecticut (development of graduate programme in ecopsychology); and Telemark University College (olfactory communication in brown bears). There have also been research projects and on-going collaboration with a range non-academic organisations, including with Solway Shellfish Management Authority (benthic sampling techniques); Solway Haaf Netters (Salmon Management); Spirit Bear Foundation, Canada; Fisheries, Oceans Canada, Eye-to-eye Marine Encounters and Mike Ball Dive Expeditions Australia (*Nautilus* conservation); commissioned research for the National Trust (Atlantic Oakwood Genetics); Marine Scotland – Science; County Councils and Local Housing Allowance (monitoring and evaluation for a European Regional Development Fund project on carbon savings and knowledge exchange); the NERC Centre For Ecology & Hydrology; the Western Australian Fisheries and Marine Research Laboratories, Department of Fisheries, Government of Western Australia; Fisheries and Oceans Canada; and Parks Canada.