

<b>Project Title</b>
<b>Management impacts on biodiversity dynamics at the landscape scale</b>
<b>Project Summary</b>
<p><b>Aims</b></p> <p>To understand the impacts of human activities on the dynamics of biodiversity at the landscape scale.</p> <p><b>Rationale</b></p> <p>Protected areas (PA) represent the most important approach for addressing the major global problem of biodiversity loss. Given the strong dependence of conservation strategies on PAs, it is important to understand the factors influencing their effectiveness and resilience, and their response to human disturbance. Identification of an appropriate disturbance regime represents a central objective of PA management. Ideally, identification of such a regime would be based on ecological theory, which would enable the impacts of human activities on biodiversity to be predicted. However, progress towards developing such a theory has been limited. Our recent research has focused on developing such theory through consideration of PAs as coupled social-ecological systems, supported by use of modelling approaches.</p> <p><b>Methods</b></p> <p>The research will be conducted in the New Forest National Park (NF), as a collaborative initiative between BU and the National Park Authority (NPA). The NF provides an outstanding opportunity to conduct this research. First, it is of exceptional importance for biodiversity, being the most species rich area of lowland England. Second, it is the largest area of semi-natural vegetation in lowland Britain, providing a unique opportunity to examine biodiversity dynamics at the landscape scale. Third, it has been subjected to intensive human disturbance over centuries, providing unique insights into the long-term dynamics of a coupled social-ecological system.</p> <p>The research will examine the impacts of specific management interventions on biodiversity. These will include: (i) the impact of burning gorse and heather; (ii) mechanical cutting of vegetation; (iii) wetland restoration actions; (iv) tree felling. In addition, the NF is also of exceptional importance for recreation, receiving 13.5 million visitors per year. The impacts of this recreational pressure will also be examined.</p> <p>Cutting and burning are performed on rotation, enabling replicated sampling of chronosequences to be performed. Field surveys of chronosequences will be conducted to determine the dynamics of vegetation composition and structure in response to different disturbance regimes. These analyses will enable the impacts of disturbance on the habitat suitability of selected organisms to be identified, focusing on species of conservation concern. The results of field surveys will also be used to parameterise and test a spatially explicit model of vegetation dynamics (LANDIS II). This modelling approach will enable biodiversity dynamics to be predicted in response to different disturbance regimes. Outputs will include spatial analysis of habitat suitability and the potential distribution of selected species over time, and the quantity and quality of grazeable material available to livestock.</p> <p><b>Outcomes</b></p> <p>The research will provide novel insights into the effects of human disturbance on biodiversity dynamics at the landscape scale, and will contribute to improved management of PAs. Although the research focuses on a single PA, the aim will be to use the case of the NF to demonstrate an approach that will be widely applicable, involving the development and testing of general theory. The research will deliver at least four publications in high impact, international, refereed journals.</p>
<b>Academic Impact</b>
<p>This project will contribute both to the development of ecological theory, and to the application of this scientific understanding to practical conservation management. From an applied perspective, tools are required that would enable the impacts of human disturbance on ecological communities to be forecast. Such tools would enable appropriate management interventions to be identified, and inform the</p>

<p>development of effective conservation plans. Ideally, such tools would be generally applicable, rather than specific to a given location. The identification of generalizations is a common element of ecological theory. However, at present there is a lack of either theory or generalizations that would enable the impact of anthropogenic disturbance on biodiversity to be predicted. In our research, we have recently begun to develop such theory (Newton and Echeverria 2011). This will be further developed and tested in the current project, by considering management interventions as a form of experimental manipulation of ecological communities. The use of spatially explicit modelling approaches together with collection of field data, as proposed here, is highly novel in this context. The identification of generally applicable findings, together with development of original theoretical and analytical approaches, will ensure that the research has significant academic impact.</p>	
<p><b>Societal Impact</b></p>	
<p>Biodiversity loss represents a global environmental issue, with potentially major implications for human society. This research is designed to help identify how biodiversity can be effectively conserved in practice, specifically in relation to the management of protected areas. Such areas are typically of high social, as well as scientific value. For example, the New Forest National Park, which will be the focus of the current research, currently receives more than 13 million day visits per year. The research will contribute to the effective management of this and other protected areas, securing their value both for wildlife and people, and the provision of ecosystem services on which human life depends. Specifically the research will examine how human uses of an ecosystem can be successfully combined with maintaining such values, and will provide insights into the dynamics of coupled social-ecological systems. Understanding such systems is of fundamental importance to achieving sustainable development.</p>	
<p><b>Training Opportunities</b></p>	
<p>The student will receive training in: (i) planning and executing a programme of research, (ii) ecological field survey techniques, (iii) GIS techniques, (iv) the principles of sampling and experimental design, (v) data analysis and presentation, including methods of statistical analysis, (vi) communication of scientific results, including scientific writing and the preparation of manuscripts for publication, as well as the PhD dissertation, (vii) interpersonal skills, including verbal presentation of research results. The student will also gain experience of working as a member of a research team. Training will be provided from the supervisory team and through the postgraduate training opportunities provided by BU.</p>	
<p><b>Supervisory Team &amp; Research Environment</b></p>	
<p><b>First supervisor</b></p>	<p>1. Adrian Newton, BU</p>
<p><b>Additional supervisors</b></p>	<p>2. Alison Barnes, NFNP 3. Elena Cantarello, BU</p>
<p><b>Recent publications by supervisors relevant to this project</b></p>	<p>1. Birch, J., Newton, A.C. et al. (2010). Cost-effectiveness of dryland forest restoration evaluated by spatial analysis of ecosystem services. <i>Proceedings of the National Academy of Sciences USA</i>, 107(50), 21925-21930.</p> <p>2. Newton, AC (2010) <i>Biodiversity in the New Forest</i>. Pisces Publications, Newbury, UK.</p> <p>3. Newton, AC (2011) Social-ecological resilience and biodiversity conservation in a 900-year-old protected area. <i>Ecology and Society</i>. In press.</p> <p>4. Newton, AC &amp; Echeverría, C (2011) Towards an empirical theory of anthropogenic impacts on forest biodiversity. In Coomes, D &amp; Burslem, D. <i>Forests and global change</i>. Cambridge University Press, Cambridge.</p> <p>5. Newton, AC et al. (2011a) Cost-benefit analysis of developing ecological networks as a conservation response to climate change. <i>Journal of Applied Ecology</i>. In press.</p> <p>6. Newton, AC et al. (2011b) Projected impacts of human disturbances on the biodiversity of a dryland forest landscape. <i>Biological Conservation</i>. In press.</p>
<p><b>Informal Enquiries</b></p>	
<p>To discuss this opportunity further please contact: <i>Prof Adrian Newton - anewton@bournemouth.ac.uk</i></p>	

## How to Apply

Information on how to apply can be found on [www.bournemouth.ac.uk/studentships](http://www.bournemouth.ac.uk/studentships)

Please note: the closing date for applications for this project is **31 August 2011**. The project will start in January 2011.