Institution:
Writtle College

Unit of Assessment:
UoA 6: Agriculture, Veterinary and Food Science

Title of case study:
Centre for Econics and Ecosystem Management

1. Summary of the impact

The Centre for Econics and Ecosystem Management is the product of six years of international collaborative research and sector-based consultancy between Writtle College and Eberswalde University for Sustainable Development (Germany). Activities at the Centre include developing a core body of internationally recognised research in the fields of non-equilibrium thermodynamics, complex systems science and adaptive management, and using the research to work with conservation organisations around the World to resolve significant environmental problems. Our sponsors include GIZ, Germany and WWF Germany, and our operations extend from Central America to the Ukraine, Russia, South Eastern Europe, China and Korea.

2. Underpinning research

The science of "econics" that is now the focus of research efforts in the Centre for Econics and Ecosystem Management is a coalescence of two main strands of study carried out over the last six years under the supervision of Dr P R Hobson at Writtle College and Professor P L Ibisch at Eberswalde, University for Sustainable Development in Germany. At Writtle Dr Hobson has been working with principles of non-equilibrium thermodynamics to advance techniques in assessing the ecological status of forests.

The first two years of a PhD project (2006-2007) were carried out in collaboration with Oulanka Biological Station, Finland with funding assistance from the Lapland Atmosphere-Biosphere Facility (LAPBIAT). Initial findings of this PhD research by P Mickleburgh confirmed a link between vegetation function and the thermodynamic attributes of a system, and also a degrading in both factors brought on by direct and indirect human disturbance (Hobson and Mickleburgh, 2008).

In Eberswalde, Professor Ibisch, together with a PhD student was developing techniques for applying theories of complex systems and ecosystems to adaptive conservation management. A first meeting between the two scientists at a British Ecological Society conference in 2006 set out a plan to establish a collaborative single body of scientific research drawing on the complementary studies on non-equilibrium thermodynamics and the theories of complex systems and ecosystems.

The opportunity to present the two complementary areas of research arose in 2009 at a special topics seminar chaired by both Hobson and Ibisch during the 2nd European Congress for Conservation Biology in Prague. In that same year two more PhD students, Catherine Norris (Writtle) and Lisa Freudenberger (Eberswlade), joined the team this time under the joint supervision of Hobson and Ibisch. Both students were working with principles of non-equilibrium thermodynamics and complex systems theory to derive effective measures of assessing ecosystem function at different scales of observation. In the case of Norris, empirical evidence was gathered from study sites at landscape scale across a variety of ecosystems in the UK, Germany and Ukraine. Whilst Freudenberger analysed global metadata to assess the function of

ecosystems and to use this data to prioritise areas for conservation.

Alberto Vega, the German Secretary to the United Nations Congress for Biological Diversity (CBD) attended the conference and later invited the research team to publish their findings in the CBD technical Series and also to present papers during a special seminar at the 2010 COP10 World Congress in Nagoya, Japan explaining the relevance of their research to global strategies of biodiversity sustainability. Subsequently, the theory underpinning the emergent concept of "econics" was laid out in a comprehensive series of papers in the CBD technical series 54 Interdependence of Biodiversity and Development Under Global Change (eds. Ibisch, Vega and Herrmann, 2010). Shortly afterwards, in 2011 the Centre for Econics and Ecosystem Management was launched by Dr Peter Hobson and Professor Pierre Ibisch, www.centreforeconics.org.

In the inaugural year of the Centre a substantial piece of research on thermodynamic measures in forest landscapes was published in Applied Ecology (see Norris et al. 2011), followed in the next year by two related papers on using measures of thermodynamics to assess global ecosystem function (see Freudenberger et al. 2012; 2012). The joint efforts of both research branches provided an appropriate framework on which to build the theoretical platform underpinning a recently developed adaptive management method for conservation called Adaptive Management of Risk and vulnerability at Conservation sites (MARISCO). With support and funding from the German agency, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), in 2013 the manual entitled, "Adaptive management of Vulnerability and Risk at Conservation sites: A guidebook for risk-robust, adaptive and ecosystem-based conservation of biodiversity" (Editors, Pierre Ibisch & Peter Hobson), was published together with a short website video on "MARISCO method" displayed on Vimeo and available here: http://www.centreforeconics.org/publications-and-products/adaptive-conservation-and-vulnerability-marisco/.

3. References to the research

1. Hobson,P and Mickleburgh, P. (2008) Ancient woodlands and climate change: old growth structures matter. *Quarterly Journal of Forestry* 102(3) 95.

2. Ibisch, P.L., A. Vega E., T.M. Herrmann (eds.) (2010) Interdependence of biodiversity and development under global change. Technical Series No. 54. Secretariat of the Convention on Biological Diversity, Montreal (second corrected edition) available at: http://www.cbd.int/doc/publications/cbd-ts-54-en.pdf

3. Norris, C., Hobson,P. and Ibisch,P.L (2011) Microclimate and vegetation function as indicators of forest thermodynamic efficiency. *Journal of Applied Ecology* 49(3):562-570. DOI: http://dx.doi.org/10.1111/j.1365-2664.2011.02084.x. This work was part funded (£45000) by a Writtle College Graduate Teaching Assistant Award (2009-2012) to C. Norris

4. Freudenberger, L., Hobson, P., Schluck, M. and Ibisch, P. (2012) A global map of the functionality of terrestrial ecosystems. *Ecological Complexity* 12:13-22 DOI: http://dx.doi.org/10.1016/j.ecocom.2012.08.002

5. Freudenberger, L., Hobson,P., Schluck, M., Kreft, S., Vohland, K., Sommer, H., Reichler,S., Nowicki,C., Barthlott,W. and Ibisch, P. (2012) Nature conservation: priority-setting needs a global change. *Biodiversity & Conservation* 22:1255-1281. http://dx.doi.org/10.1007/s10531-012-0428-6

6. P L Ibisch and P R Hobson (Eds) (2013) "*Adaptive management of Vulnerability and Risk at Conservation sites: A guidebook for risk-robust, adaptive and ecosystem-based conservation of biodiversity*" GIZ (GmbH) (ISBN 978-3-00-043244-6).

4. Details of the impact

The Centre for Econics and Ecosystem Management (www.centreforeconics.org) was formally established in 2011 under a memorandum of understanding between Writtle College and Eberswalde University. It operates from its main office in Eberswalde University under the management of two Co-Directors: Dr P Hobson and Professor P Ibisch, and is currently supported by Foundations of Success for Europe (Mrs I Tilders), Nature Conservation for Europe (Mr S Mueller-Kraenner), and the European Conservation Coaches Network (ECNet). Recently, it has established a memorandum of understanding with the Centre for International Development and Training at Wolverhampton University and also with the Wilderness Foundation.

The objectives of the Centre are to grow the specific brand of research underpinning "econics" and to develop mechanisms for applying the theory to meet the requirements of the sector. At the moment most of the international activities of the Centre are sponsored by four key collaborative partners all of which are based in Germany. They are the German Government agencies: GIZ; The German Federal Agency for Nature Conservation (Bundesamt für Naturschutz, BfN); the German Academic Exchange Service (DAAD); and German branch of World Wild Fund for Nature WWF.

After the success of the tenth Conference of the Parties of the Bern Convention (COP10) and the publication by Ibisch et al. edited by the Secretariat of the Convention on Biological Diversity (see 2 on section **3** above) a number of high profile contracts were agreed with the German Agency, GIZ to implement "MARISCO" (a method in vulnerability assessment and adaptive management recently developed by the Centre) in the planning process for protected area management. The first of the contracts was a two year project (BIOMARC) working with national park staff from two of the main marine reserves in Costa Rica. The task was to develop a MARISCO model for managers to use in the planning process for both parks. The successful outcome of the project prompted further discussions with GIZ on ways to widen access to the MARISCO process for all the international conservation partners working with GIZ. As a result a second contract was signed for the production of a manual detailing the science and method of MARISCO for the purpose of circulating to all the GIZ partner organisations in conservation. The manual and accompanying video was produced in 2013 (see 6 on section **3** above)

Raising the Centre's profile both through scientific publications and activities with GIZ was a contributing factor to the development of a working partnership with the Government agency, BfN. Two main projects were launched in 2012. The first relates to the Centre's research expertise in forest ecosystem function (see 3 on section **3** above), and is a contract to co-ordinate a UNESCO World Heritage European Beech Project. The goal is to establish by 2014 "World Heritage" status for a network of prime sites for European beech across its entire range of the continent. Identifying appropriate indicators of forest ecosystem function that could then be used by scientific staff in the project team to select priority sites for natural old growth beech was a key factor in the process. The second contract is to apply MARISCO to the process of planning for a UNESCO transboundary biosphere reserve in the Altai Mountains across the Russian and Kazakhstan border.

The scientific robustness of MARISCO enables practitioners to use the method to test and evaluate in detail existing practices in land use management. MARISCO is being applied this way in a project funded by the German branch of WWF to assess the effectiveness of FSC forestry schemes operating in Russia. The successful completion of the first phase of the project have simulated negotiations for a new four year contract to employ the method in an assessment of certification schemes in oil palm plantations in South East Asia and Argentina.

Providing training in specific skills directly related to the needs of the sector is one of the key objectives of the Centre and at the moment MARISCO is the main vehicle for delivering outcomes in this area. Many organisations within the environmental sector recognize a gap in the understanding and applied knowledge of complex cultural ecosystems amongst both existing and prospective employees. Often, highly qualified students and staff with academic knowledge in specific disciplines lack the necessary skills to transfer and apply their understanding to problems encountered within a multi-disciplinary environment. Using its knowledge and research expertise in ecosystem science and complex systems theory the Centre has, for the last two years, worked with the German Government agency, DAAD, to deliver training in Ecosystem Diagnostics Analysis and MARISCO to both postgraduate students and employees in the environmental sector within Albania. After the successes of the first consultancy project the Centre was encouraged to submit proposals for a larger, regional programme of training for postgraduates and professional staff across Montenegro, Albania and Kosovo. This latest contract will run for two years.

5. Sources to corroborate the impact (indicative maximum of 10 references)

1. Costa Rica MARISCO, BIOMARC Project Director, Gesellschaft für Internationale Zusammenarbeit (GIZ), Germany
2. UNESCO World Heritage European Beech Project Director; Bundesamt für Naturschutz (BfN), Germany
3. Federal Officer, ; Bundesamt für Naturschutz (BfN), Germany 53113
4. NABU/Forestry project :Conservation Officer
5. Project Manager for Sustainable Development, Ebwersbalde University, Germany
6. WWF Germany, Russian FSC Project Director
7. Federal Officer, BfN, Germany
8. Natural Resources Officer (Forest) GIZ, Germany