RURAL ECONOMY AND LAND USE PROGRAMME

DIRECTOR'S END OF AWARD REPORT

1 December 2003 to 30 March 2013

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Executive Summary

Introduction

1. The Rural Economy and Land Use Programme (Relu) aimed to advance a holistic understanding of the major social, economic, environmental and technological challenges facing rural areas. It was a collaboration between ESRC, BBSRC, NERC, Scottish Government and Defra with a budget of £27 million, and a further £4 million of co-funding. Relu involved *circa* 500 researcher and related posts in 78 projects and 16 PhD studentships. This included 4 waves of funding on the themes of: Sustainable Food Chains; Integration of Land and Water Use; The Management of Animal and Plant Diseases; and Adaptation of Rural Living and Land Use to Environmental Change.
2. Relu was built on two core premises. The first was that the salient challenges cut across disciplinary boundaries and that interdisciplinary research is required as a basis for sustainable rural development. The second was that to enhance the impact of research on policy and practice, the programme should engage potential stakeholders throughout all stages, including the identification of research questions, the conduct of the research and the dissemination of results. Relu was therefore a strategically important initiative from the point of view of public policy development, Research Council cooperation, and strengthening links between the Research Councils and governments. The programme departed radically from the 'end-of-pipe' role conventionally accorded to social scientists in technical programmes, of helping to overcome social constraints to advances in science and technology. It therefore brought critical social perspectives to bear on technical research agendas and promoted understanding of technological opportunities and environmental constraints in their appropriate social and economic contexts. The programme also provided a test case for the effective ways through which a strategic programme can enable governments to navigate and access expertise within the research base, and build its own internal capacity as a proficient commissioner and customer of interdisciplinary research.
3. Interdisciplinary research depends upon a supportive institutional context. This was recognised in the establishment of Relu. The three participating Research Councils agreed to pursue a strategic collaboration, pooling the funding and the management of the programme under a joint Programme Management Group (PMG) and Strategic Advisory Committee (SAC). This unified management structure facilitated the introduction of joint and streamlined arrangements to support interdisciplinary research. To operationalise this arrangement, further innovations at programme management level followed, such as the establishment of a Director's Office and development of bespoke cross-Council approaches and procedures for grant applications and assessment and the establishment of the first cross-Council data support service.

Achievements of the programme

4. Each of Relu's research projects involved a creative combination of social and natural sciences. Relu therefore succeeded in setting up a large-scale experiment in radical interdisciplinarity across the social and natural sciences, across the programme's overarching themes. All projects funded had to be interdisciplinary, but Relu did not predetermine particular disciplinary collaborations. It therefore tested out various forms, methods and processes of interdisciplinary working. This opened up the field to any conceivable coupling of social and natural sciences.
5. Relu brought together research communities with little if any experience of collaboration. A key task was to catalyse novel linkages and foster new research communities. This required an entrepreneurial approach to spotting and creating

opportunities for collaboration and various bespoke mechanisms, including seed-corn funding, workshops and conferences carefully orchestrated to promote shared perspectives, and interdisciplinary training. The contribution of Relu has been to broaden and strengthen collaboration between the environmental and social sciences, and to forge new strategic links between the social and biological disciplines to address such issues as carbon labelling, biopesticides, food chain risk, and management of animal and plant diseases. The programme has therefore enhanced capacity for interdisciplinary research at a range of levels. This included the cohort of individual researchers who took part in the programme and who represented over 40 disciplines. Many have gone on to lead other interdisciplinary research projects and major programmes.

6. Relu also showed that the needs and priorities of interdisciplinary research have to be considered at various levels from that of the individual researcher to the institutions sponsoring and overseeing the research. The programme had to test out, and pioneer, new methods at each and every level. Relu has therefore been instrumental in furnishing research funders in the UK with an understanding of the institutional processes and mechanisms needed to enable effective interdisciplinary research and knowledge exchange. Research funders increasingly acknowledged during the course of the programme the gains to be made from interdisciplinary research involving collaboration between social and natural scientists, not only in finessing the potential applicability of research but also in focusing its strategic direction. Major science funders have embedded the Relu experience and learning into new funding programmes and science strategies. However, Relu did not break the mould and the challenge looking ahead is how to further translate its programme innovations into changes in research policies and procedures.
7. ESRC's independent evaluation of the programme's impact on policy and practice found that the impacts of Relu have been extensive and transformative in a wide range of areas, such as sustainable food and farming; reform of the Common Agricultural Policy; strategic land use; policy for the uplands; targeting of the Water Framework Directive; policy making for the management of animal and plant diseases; reform of the veterinary profession; and barriers to growth in the rural economy.
8. The impacts of the programme were built on a foundation of very active and responsive knowledge exchange, and a programme of strategic influencing of stakeholder communities through a succession of targeted events, briefings and synthesised outputs. This succeeded in breaking with tradition to adopt an inclusive and pluralistic view of stakeholders to include the public, private and third sectors, including micro, small and large businesses, local and national interests, as well as the wider public. The programme involved 4000 stakeholders directly in its research projects (38% public sector, 36% private sector, 15% societal, 12% third sector). In many ways Relu was responsible for establishing the rise to prominence and understanding of knowledge exchange within the UK science base. Many of Relu's knowledge exchange mechanisms have been taken up by other programmes or mainstreamed into Research Council systems.
9. Specific outputs of Relu included 20 high profile conferences and workshops, production of 6 prestigious cross-programme journal special issues, orchestration of 21 cross-programme policy submissions and consultation responses, sponsorship of 5 cross-programme edited books, supporting 24 cross-programme workshops and special sessions, 16 Briefing Papers linking evidence from different waves of projects, 41 Policy and Practice Notes drawing out implications of the research for targeted audiences, 159 datasets and 1308 project outputs (journal articles etc.) available through the Relu Knowledge Portal (http://relu.data-archive.ac.uk/) and over 700 items of media coverage.

Contribution of the Director's Office

10. The Director's office actively facilitated networking and added value across the programme by means of cross-programme events, training workshops, stakeholder forums, visiting fellowship and work shadowing schemes, programme-level publications and journal special issues, joint-project planning meetings, support for cross-project synergies, enabling of international links, establishment of a high profile and trusted brand, and through orchestrating major strategic initiatives bringing together multiple projects – this all involved a major programme of engagement and knowledge exchange with several thousand stakeholders. The Office undertook strategic influencing in important areas of public policy, including food security, land use and animal and plant disease and coordinated programme responses to major consultations.
11. The Director's Office provided intellectual leadership on interdisciplinary perspectives of the rural economy and land use and in methodological innovations concerning interdisciplinary research and processes of collaborative research. This included over 120 presentations and keynote addresses, 33 journal articles, and editing of themed issues of highly respected mono disciplinary journals, setting out an ambitious intellectual agenda for interdisciplinary socio-technical research. The Office provided considerable input to individual research projects, the design of research call specifications and assessment of research proposals (contributing to 13 assessment panels and reviews of over 400 applications).
12. Lesson learning was a major focus throughout the programme, which meant Relu had significant and widespread impact on the profile of interdisciplinary research and knowledge exchange within science policies and strategies, and helped catalyse a cultural change in outlook among key research funders and technical agencies in the UK. The Director's Office carried out multiple briefings of staff from the Research Councils and other high level science funders, programme directors and policy makers and contributed dozens of presentations and keynote addresses. They conducted large scale national surveys of stakeholder engagement methods in research and of interdisciplinary research practices, and pioneered the development and use of the SIAM (Stakeholder Impact Analysis Matrix) method of stakeholder analysis. They also carried out their own investigation into the role of knowledge exchange mechanisms and intermediaries between research and practice. Overall key findings from this work have included:
    a. Demonstrating the institutional obstacles and requirements for effective interdisciplinary research programmes and policies.
    b. Identifying the range of analytical methods and approaches for collaboration between social and natural scientists.
    c. Highlighting the benefits of interdisciplinary research spanning the social and natural sciences in enabling socio-technical innovation.
    d. Providing systematic understanding of mechanisms for effective knowledge exchange and ways in which research findings impact on policy and practice.
13. The Director's Office, together with the PMG and SAC, adopted an opportunistic approach, responding to windows of opportunity through which to engage with policy and practice and build the scientific agenda of the programme. This flexible approach to planning and design of programme activities and mechanisms, much of which could not have been foreseen at the outset of the programme, was a key to Relu's success.

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Part 1: Introduction

1.1 Overview of aims

The Rural Economy and Land Use Programme (Relu) aimed to advance a holistic understanding of the major social, economic, environmental and technological challenges facing rural areas. Its specific objectives were:

- to deliver integrative, interdisciplinary research of high quality that will advance understanding of the social, economic, environmental and technological challenges faced by rural areas and the relationship between them;
- to enhance capabilities for interdisciplinary research on rural issues, between social, environmental and biological sciences;
- to enhance the impact of research on rural policy and practice by involving stakeholders in all stages, including programme development, research and communication of outcomes.

The programme was a collaboration between the ESRC, BBSRC and NERC. It had a budget of £26,644,000, including initial co-funding of £750,000 from the Scottish Government and £1 million from the Department for Environment, Food and Rural Affairs (Defra). Additional funding for Relu Phase IV on 'Adapting Rural Living and Land Use to Environmental Change' was also provided by NERC and the Scottish Government. There was a further £4,243,272 of co-funding attracted by projects and the Director's Office from multiple sources.

1.2 General background

Relu was built on two core premises. The first was that the salient challenges cut across disciplinary boundaries and that interdisciplinary research is required as a basis for sustainable rural development. The second was that to enhance the impact of research on policy and practice, the programme should engage potential stakeholders throughout all stages, including the identification of research questions, the conduct of the research and the dissemination of results.

The programme thus appeared in 2003 following the 2002 Spending Review as part of a wider demand for interdisciplinary research from within two broad areas of policy discourse, concerning sustainable development and the knowledge economy, and associated demands for greater accountability of science. It was established in a context of major policy and institutional developments that together represented a qualitative change in the way that government thought about and dealt with rural issues and which in turn demanded an accompanying step change in research. The UK Government had taken a strategic lead in the reform of the Common Agricultural Policy (CAP) towards the liberalisation of agricultural trade and a shift from subsidising farm production to support for environmental management and rural development. On the one hand, this raised questions concerning the competitiveness of rural areas in a globalised economy and the responsiveness of farming to consumer demands. On the other hand, public policy for the countryside faced growing pressures, including how to stem the decline in farmland biodiversity, how to combat diffuse pollution from agriculture, how to adapt the management of rural land to climate change and how to accommodate the growing demand for non-agricultural uses of rural land. Crucially, a series of policy crises, including Bovine Spongiform Encephalopathy, the Foot and Mouth Disease epidemic and the opposition to genetically modified crops, had both redirected attention towards public-interest science and reinforced arguments for more joined-up approaches to rural policy and research.

Relu was a strategically important initiative from the point of view of public policy development, Research Council cooperation, and strengthening links between the Research Councils and governments. In terms of inter- Council cooperation, it brought together ESRC, BBSRC and NERC. In the past, cooperation, particularly between the first two Councils, had been limited. The programme departed radically from the 'end-of-pipe' role conventionally accorded to social scientists in technical programmes, helping to overcome social constraints to advances in science and technology. It therefore held out the promise of bringing critical social perspectives to bear on technical research agendas and of promoting understanding of technological opportunities and environmental constraints in their appropriate social and economic contexts. The programme also provided a test case for the effective ways through which a strategic research programme can enable government to navigate and access high quality expertise within the research base, and build its own internal capacity as a proficient commissioner and customer of interdisciplinary research.

Lying behind the scientific objectives of the programme was the decision to pool the resources from the three participating Councils and other funders within a single budget and the related decision to require all projects funded to be interdisciplinary. These broad structural parameters were decided in the context of the drive for more joined-up science. Although very challenging and laid down by the Research Councils, their effects in terms of subject matter or approach to interdisciplinarity remained wholly unprescribed. The decisions did not predetermine particular disciplinary collaborations, but radically opened up the field to any conceivable coupling of social and natural sciences.

This pooling of resources represented an important procedural innovation within the Research Councils. To operationalise this arrangement, and to provide a supportive framework for interdisciplinary research, further innovations at programme management level followed, such as the development of bespoke cross-Council approaches and procedures for grant applications and assessment and the establishment of the first cross-Council data support service. The concerns of the Research Councils to ensure that 'their' research community received a fair share of the pooled resources reinforced the operational rule that every project should be required to comprise a substantive social and natural science dimension.

The third objective of Relu, relating to knowledge transfer, was an equally prominent dimension of the programme. The inclusion of this objective can be attributed to general criticism of past research initiatives for their lack of impact or late engagement of user communities in the research process. It was also a reflection of the origins of Relu as a strategic research investment within a prevailing climate of science policy in which knowledge transfer was considered central to enabling the contribution of science to economic growth, innovation and social well-being. It led to ambitious engagement and communication plans with several thousand stakeholders that has been central to the programme's impact (see ESRC's evaluation of the impact of the programme[1]).

1.3 Summary of management arrangements

The programme was managed by the joint Programme Management Group consisting of the research funders: officials from ESRC, BBSRC, NERC, Scottish Government and Defra. The PMG was an essential mechanism for managing the programme and its commissioning processes and in enabling Relu to make

[1] *Meagher, L (2012) Report - Rural Economy and Land Use Programme (Relu). Societal and Economic Impact Evaluation (REFERENCE PS110020).*

significant innovations in cross-Council collaboration. A Strategic Advisory Committee (SAC) was also appointed under the chairmanship of Sir Howard Newby, the former Chief Executive of the Higher Education Funding Council for England and a former Chief Executive of the ESRC, and comprising senior scientists from each of the three constituent research communities plus representatives of major public sector stakeholders (Annex D). Its role was to oversee the direction of the programme, and the Research Councils delegated to it the authority to appoint a Programme Director, to decide the content and timing of the calls for research bids, and to guide the balance and emphasis of resources across the programme.

The Programme Director's Office was established in December 2003 and directed the programme, providing scientific and knowledge exchange leadership until its conclusion in March 2013. The office comprised the *Director*: Professor Philip Lowe; *Assistant Director*: Jeremy Phillipson; *Communications Manager*: Anne Liddon (Jo Daymond 2004-2006); and *Administrator:* Eileen Curry.

1.4 Overall size and distribution of the Programme

The Relu Programme was a major initiative running over 10 years, 2003-2013. There were *circa* 500 researcher and related posts in the programme in 78 projects (Tables 1 and 2) and 16 interdisciplinary PhD studentships. This included 4 waves of funding for large research projects on the themes of: Sustainable Food Chains; Integration of Land and Water Use; The Management of Animal and Plant Diseases; and Adaptation of Rural Living and Land Use to Environmental Change. The programme specifications, which were devised following extensive consultation with research and stakeholder communities, included lists of indicative research topics, but remained open in terms of methods, epistemologies, approaches to interdisciplinarity, disciplinary collaborations and the research problems to be addressed (within the identified themes).

The first call also experimented with various modes of support for preparatory and developmental initiatives (across all of its research themes). These provided more modest funding specifically to build up linkages between researchers from different disciplinary backgrounds and with stakeholders, while scoping novel research topics and methods. These experimental modes of seed-corn funding included: Capacity Building Awards to facilitate the development of interdisciplinary research capacity through, for example, support for interdisciplinary events involving social and natural scientists; Scoping Studies, which aimed to scope interdisciplinary research agendas; Development Activity Awards for activities designed to facilitate the overall development of the Relu programme and/or demonstrate its value and potential; and small Networking Awards to facilitate the development of proposals under the second call for funding. The seed-corn funding aimed to build interdisciplinary research capacity and knowledge exchange networks and proved to be a highly effective means for developing capacity on which the programme could build (see ESRC evaluation of the seed-corn funding[2]).

[2] *Meagher, L. and Lyall, C. (2007) Review of the Relu Programme's Seed-Corn Funding Mechanisms. Ref/UNT 357.*

Table 1: Number of projects

Type of project	Total awarded
First Call Research Projects	8
Second Call Research Projects	11
Third Call Research Projects	11
Fourth Call Research Projects	9
First Call Seed-corn Projects	34
Interdisciplinary Fellowships	5

Table 2: Projects funded and Principal Investigators

ESRC Ref No.	PI	Title	Start Date	End Date
FIRST CALL RESEARCH PROJECTS				
RES-224-25-0041	Professor H Buller	Realising the Links between Quality Food Production and Biodiversity Protection	01/01/2005	31/12/2007
RES-224-25-0044	Professor G Edwards-Jones	Comparative Merits of Consuming Vegetables Produced Locally and Overseas	01/12/2004	31/03/2008
RES-224-25-0048	Professor W Grant	The Role of Regulation in Developing Biological Alternatives to Pesticides	01/11/2004	31/10/2007
RES-224-25-0066	Dr D Little	Warmwater Fish Production as a Diversification Strategy for Arable Farmers	01/01/2005	31/01/2008
RES-224-25-0073	Professor B Traill	Implications for a Nutrition Driven Food Policy for the Countryside	01/04/2005	30/04/2008
RES-224-25-0086	Dr D Chadwick	Sustainable and Safe Recycling of Livestock Waste	01/02/2005	30/06/2008
RES-224-25-0090	Professor R Shepherd	Managing Food Chain Risks	01/02/2005	31/07/2008
RES-224-25-0093	Dr A Bailey	Overcoming Market and Technical Obstacles to Alternative Pest Management in Arable Systems	01/02/2005	31/01/2009
SECOND CALL RESEARCH PROJECTS				
RES-227-25-0001	Dr K Hubacek	Managing Uncertainty in Dynamic Socio-Environmental Systems: An Application to UK Uplands	01/03/2006	31/10/2009
RES-227-25-0002	Dr E Oughton	Angling in the Rural Environment: Social, Economic, Ecological and Geomorphological Interactions	01/03/2006	31/05/2009
RES-227-25-0006	Professor S Stagl	An Integrated Analysis of Scale Effects in Alternative Agricultural Systems	01/01/2006	31/05/2010
RES-227-25-0010	Professor JM Bullock	Improving the Success of Agri-Environment Initiatives: the Role of Farmer Learning and Landscape Context	01/10/2006	31/03/2012
RES-227-25-0014	Dr RJ Irvine	Collaborative Frameworks in Land Management: A Case Study on Integrated Deer Management	01/02/2006	31/12/2009
RES-227-25-0017	Professor J Morris	Integrated Land & Water Management in Floodplains: Experience of Agricultural Flood Defence Schemes in England and Wales	01/05/2006	01/03/2009

RES-227-25-0018	Professor SJ Whatmore	Understanding Environmental Knowledge Controversies: The Case of Flood Risk Management	01/03/2007	30/06/2010
RES-227-25-0020	Dr A Karp	Social, Economic and Environmental Implications of Increasing Rural Land Use under Energy Crops	01/01/2006	30/09/2009
RES-227-25-0024	Professor IJ Bateman	Catchment Hydrology, Resources, Economics and Management: Integrated Modelling of the Water Frameworks Directive's Impacts upon Rural Land Use & Farm Incomes	01/01/2006	30/04/2010
RES-227-25-0025-A	Professor WJ Sutherland	Evaluating the Options for Combining Economically, Socially and Ecologically Sustainable Agriculture	01/02/2006	21/12/2009
RES-227-25-0028	Dr P Armsworth	A Landscape-Scale Analysis of the Sustainability of the Hill Farming Economy and Impact of Farm Production Decisions on Upland Landscapes and Biodiversity	01/01/2006	31/08/2009
THIRD CALL RESEARCH PROJECTS				
RES-229-25-0004	Dr M Huby	Social and Environmental Inequalities in Rural Areas	01/08/2007	31/07/2009
RES-229-25-0005	Dr CA Potter	Memory and Prediction in Plant Disease Management	01/09/2007	31/08/2010
RES-229-25-0007	Dr CP Quine	Assessing the Potential Risk of, and Possible Responses to, Zoonotic Diseases on the Development of Recreational Use of British Forests and Wild-lands	01/09/2007	30/11/2010
RES-229-25-0008	Ms C Waterton	Understanding and Acting within Loweswater: A Community Approach to Catchment Management	01/06/2007	31/12/2010
RES-229-25-0009	Mr LED Smith	Developing a Catchment Management Template for the Protection of Water Resources: Exploiting Experience from the UK, Eastern USA and Nearby Europe	01/06/2007	31/12/2010
RES-229-25-0012	Dr N Strachan/ Prof K Kilham	Reducing Escherichia Coli O157 Risk in Rural Communities	01/10/2007	28/02/2011
RES-229-25-0013	Professor P Mills	Growing Risk? The Potential Impact of Plant Disease on Land Use and the UK Rural Economy	01/07/2008	28/02/2011
RES-229-25-0015	Professor B Wynne/ Prof L Heathwaite	Lost in Translation: A Cross-disciplinary Analysis of Knowledge Exchange and Effectiveness in Animal Disease Management	01/07/2008	31/11/2011
RES-229-25-0016	Professor GF Medley	Decision-making Frameworks in Management of Livestock Disease: Interaction of Epidemiology, Economics and Politics	01/11/2007	31/10/2010

RES-229-25-0022	Professor C Banks	Integrated Systems for Farm Diversification into Energy Production by Anaerobic Digestion: Implications for Rural Development, Land Use & Environment	01/10/2007	30/09/2010
RES-229-25-0025	Mr J Phillipson	Science in the Field: Understanding the Changing Role of Expertise in the Rural Economy	01/06/2008	18/08/2011
FOURTH CALL RESEARCH PROJECTS				
RES-240-25-0004	Professor R Pain	Building Adaptive Strategies for Environmental Change in River Catchments	01/06/2010	01/04/2012
RES-240-25-0006	Professor W Sutherland	Linking Evidence and Policy for Managing Biodiversity in the Agricultural Landscape	01/11/2010	01/01/2012
RES-240-25-0009	Professor D Harvey	Sustainable Cultivation of Upland Environments	01/10/2010	01/03/2012
RES-240-25-0012	Dr M Reed	Sustainable Uplands: Transforming Knowledge for Upland Change	01/10/2010	01/03/2012
RES-240-25-0016	Dr A Scott	Managing Environmental Change at the Rural-Urban Fringe	01/07/2010	01/02/2012
RES-240-25-0018	Dr L Smith	Market-Based Mechanisms for Protection of Water Resources	01/10/2010	30/09/2012
RES-240-25-0019	Dr J Franks	Collaborative Conservation in Agri-Environment Schemes	01/10/2010	01/09/2011
RES-240-25-0020	Dr E Oughton	Flood Management in Borderlands	01/08/2010	01/01/2012
RES-240-25-0025	Dr M Phillips	Rural Communities Adapting and Living with Climate Change	01/12/2010	01/06/2012
INTERDISCIPLINARY FELLOWSHIPS				
RES-229-27-0001	Dr AL Woods	Re-inventing the Wheel? Farm Health Planning, 1942-2006	30/09/2007	31/01/2011
RES-229-27-0002	Dr EDG Fraser	Integrating Economic and Land Use Models to Anticipate Rural Vulnerability to Climate Change.	30/09/2007	31/08/2010
RES-229-27-0003	Dr A Davies	Foundations for the Future: Learning from the Past	31/03/2007	28/05/2010
RES-229-27-0006	Dr KJ Appleton	The Development of Sustainable, Multi-functional Landscapes in Rural Areas: A Case Study of a Norfolk Broads River Valley	31/10/2008	30/09/2011
RES-229-27-0007	Dr AM Cassidy	The Badger-TB Controversy: Expertise and Experience in Animal Disease Research	31/10/2008	30/09/2011
SEED-CORN PROJECTS				
RES-224-25-0002	Professor N Hanley	Climate Change, Non-Point Pollution and Land Use: Modelling Interactions	01/10/2004	30/09/2005
RES-224-25-0003	Prof L Heathwaite	A Cross-Disciplinary Methodology to Promote an Holistic Understanding of Diffuse Pollution Issues in Rural Environments	13/08/2004	12/06/2005
RES-224-25-0009	Dr JR Franks	Co-operative Management of the Agricultural Environment	08/11/2004	07/11/2005
RES-224-25-0018	Dr M Thomas	Designing and Implementing Large Scale Experiments in Land Use	27/09/2004	26/09/2005

RES-224-25-0031	Dr HF Cook	Building Networks - RELU Capacity Building Programme: Exploiting Options for the Eastern US & Nearby European Continent	12/07/2004	31/08/2005
RES-224-25-0036	Dr R Baines	Private Sector Environment Standards: Impact on Ecological Performance & International Competitiveness of UK Agriculture	01/10/2004	30/09/2005
RES-224-25-0037	Dr ND Boatman	Data Resources for Rural Sustainability Research: Realising Their Combined Potential	01/09/2004	31/05/2005
RES-224-25-0039	Dr S Maberly	A Study to Generate New Understandings of Ecological, Economic and Social Interactions in a Lake District Environment	01/07/2004	31/12/2004
RES-224-25-0042	Professor E Tipping	Developing an Interdisciplinary Approach to Address Environmental and Social Issues Resulting from Changes in Land Use	01/09/2004	31/08/2005
RES-224-25-0058	Dr EA Oughton	Developing Tools for Interdisciplinary Research: Physical and Social Science Perspectives on the Use of Rural Catchments	01/10/2004	31/03/2005
RES-224-25-0062	Dr M Huby	Developing Spatial Data for the Classification of Rural Areas	01/10/2004	30/09/2005
RES-224-25-0068	Professor DW Macdonald	Development of a Landscape Intervention Decision Support System to Maximise Net Social Benefit	01/07/2004	30/04/2005
RES-224-25-0076	Dr MP Phillips	Gentrifying Nature: An Investigation of the Social Use and Modification of Nature in a Leicestershire Village	13/12/2004	12/12/2005
RES-224-25-0081	Professor CL Spash	Achieving Sustainable Catchment Management: Developing Integrated Approaches and Tools to Inform Future Policies	01/07/2004	30/09/2005
RES-224-25-0084	Dr F Lyon	Learning and Research for Sustainable Agro-Ecosystems by both Farmers and Scientists	01/09/2004	31/08/2005
RES-224-25-0087	Dr K Matthews	Integrated Modelling and Assessment of Agricultural Sustainability - Scoping How to Support Policy Relevant Assessments	01/08/2004	31/10/2005
RES-224-25-0088	Dr K Hubacek	Sustainable Upland Management for Multiple Benefits	01/08/2004	31/07/2005
RES-224-25-0091	Professor D Miller	Analysing Visual Quality in Relation to Landscape Change Scenarios: An Assessment of the Requirements	01/07/2004	31/01/2005
RES-224-25-0095	Dr N Russell	Building Capacity to Investigate the Potential Role of Sustainable Agricultural Intensification in AgroEcological Systems	01/10/2004	31/07/2005
RES-224-25-0099	Dr P White	Integrating Spatial Data on the Rural Economy, Land Use and Biodiversity	15/11/2004	14/04/2005

RES-224-25-0100	Professor D Raffaelli	RELU: The International Context	15/11/2004	14/04/2005
RES-224-25-0102	Dr RB Matthews	Development of a Rural Economy and Land Use Simulation Modelling Strategy	01/09/2004	31/03/2005
RES-224-25-0105	Professor H Buller	A Review of Recent and Current French Initiatives in Rural Economy and Land Use Research	01/01/2005	31/12/2005
RES-224-25-0107	Dr CA Watson	Soils - The Foundation of the Rural Economy?	01/09/2004	31/12/2005
RES-224-25-0110	Dr S Bell	Calming Troubled Waters: Making Interdisciplinarity Work	01/09/2004	28/02/2005
RES-224-25-0113	Dr KC Twyman	Learning from the South: Mixed Farming in Stressed Environments	25/10/2004	24/04/2005
RES-224-25-0119	Professor PH Selman	Landscape as an Integrating Framework for Rural Policy and Planning	01/02/2005	30/06/2005
RES-224-25-108	Prof K Beven	Coping with Uncertainty in River Basin Planning and Management for Sustainable Land and Water Use	2004	2004
RES-224-25-111	Dr S Hillyard	The Environmental, Economic and Social Impact of Game Shooting in the UK	2004	2004
RES-224-25-114	Professor R Ison	Modelling and Social Learning in Rural Landscape Analysis and Management	2004	2004
RES-224-25-117	Dr C Potter	Alternative Scripts for Ecological Restoration and Management in a Period of Agricultural Restructuring	2004	2004
RES-224-25-121	Dr J Irvine	The Role of Collaborative Land Management in Developing a Sustainable Rural Economy: A Case Study of Factors Underlying Integrated Deer Management	2004	2004
RES-224-25-123	Dr A Lawrence	Sustaining Environmental Governance: A Critical Assessment of Participatory Planning Tools, Processes and Impacts in Rural Landscapes	2004	2004
RES-224-25-124	Dr D Pink	The Feasibility and Public Acceptance of Substituting Bio-Composites for Fossil Fuel Derived Plastics.	2004	2004

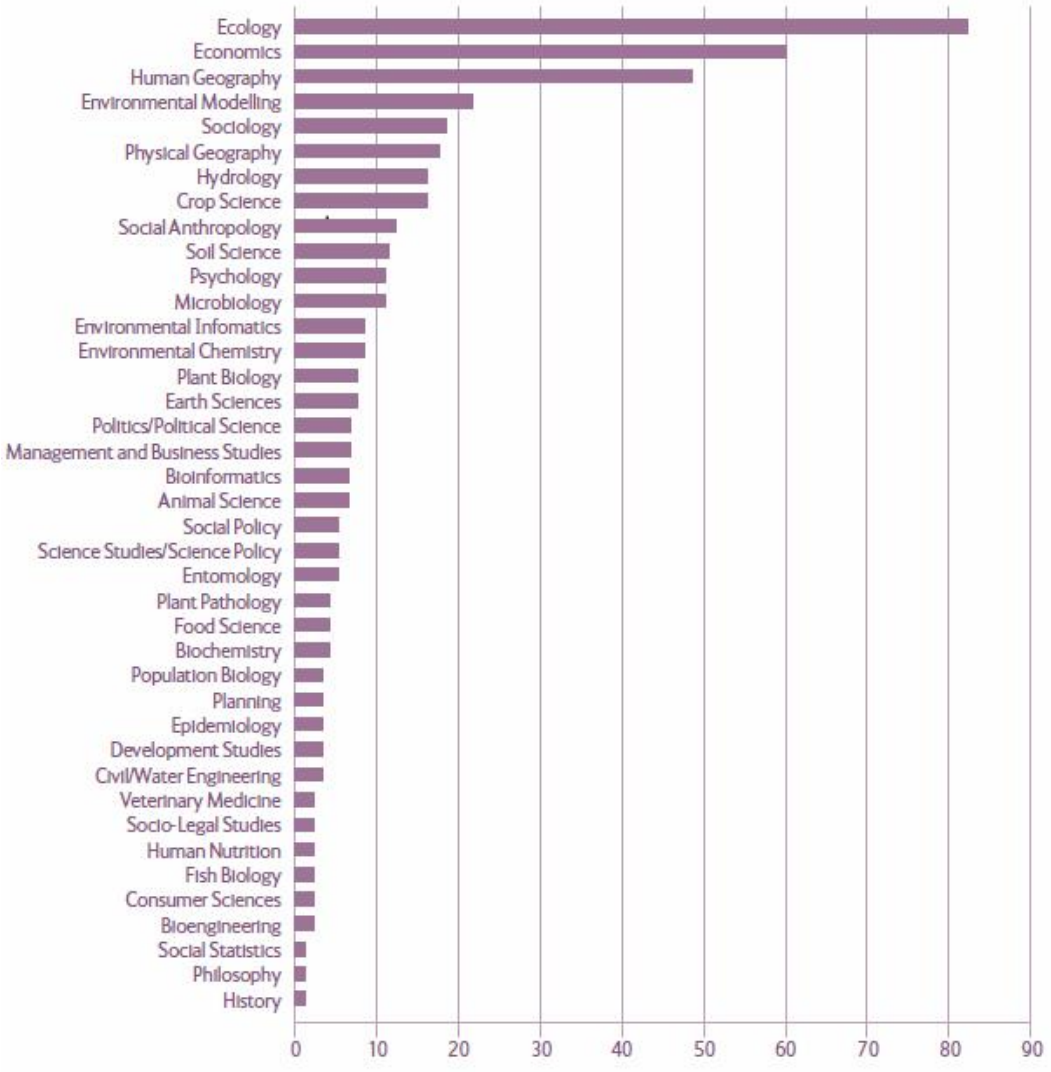
Part 2: Programme objectives

2.1 Achievement of the 3 programme objectives

- *to deliver integrative, interdisciplinary research of high quality that will advance understanding of the social, economic, environmental and technological challenges faced by rural areas and the relationship between them;*

A central premise of Relu was that many of the salient challenges facing rural areas cut across disciplinary boundaries. Research in the programme was therefore based on joint agenda setting at programme and project level. Every one of its research projects involved a combination of social and natural sciences, including in all over 40 disciplines (see Fig. 1). Relu therefore succeeded in setting up a large-scale experiment in radical interdisciplinarity across the social and natural sciences, across the programme's overarching themes of: Sustainable food chains; Integrated land and water use; Animal and plant disease management; and Adaptation of rural living and land use to environmental change. The academic contribution of this research is discussed in section 4.1. As of October 2013, 37 research projects and fellowships have received end of award evaluation grades (11% Outstanding; 70% Good; 19% Problematic).

Figure 1: Disciplines of Relu researchers



- *to enhance capabilities for interdisciplinary research on rural issues, between social, environmental and biological sciences;*

The capacity building challenge was different across Relu's three research communities. With respect to the linkages between the environmental and social sciences, research teams could often build on existing connections and previous exchanges, such as those between the two largest groupings in the programme – the ecologists and the economists. The contribution of the Relu programme here has been to broaden and strengthen collaboration, for example bringing together qualitative as well as quantitative disciplines and methods, and supporting novel disciplinary collaborations e.g. hydrology and sociology; ecology and political science.

With respect to the biological and social sciences there was not such a legacy of collaboration on which to build. Indeed, the stand-off between social and biological sciences in the past seriously limited their ability to respond to cross-cutting issues of critical importance. The programme therefore had to forge new strategic links between the social and biological disciplines to address such issues as carbon labelling, biopesticides, food chain risk, and farm waste management. Particularly in the management of animal and plant diseases, this has opened up new research frontiers. Traditions of social science research in this field were much weaker than natural science traditions. With the exception of economic analyses of disease control and political science accounts of policy-making, social scientific research into the management and impact of infectious plant and animal diseases was insignificant. For the first time - through Relu - social scientists were able to make major contributions to the fields of animal and plant biology and in assisting biologists to reposition their research.

The programme undoubtedly enhanced capacity for interdisciplinary research at a range of levels. This included the cohort of *circa* 500 individual researchers who took part in the programme. Many have gone on to lead other interdisciplinary research projects and programmes building on the expertise garnered through Relu, and will be a useful resource for the future where interdisciplinary research opportunities arise. The researchers emerged from the programme with enhanced interdisciplinary capabilities – the improved skills to operate in interdisciplinary contexts, to combine techniques and data sets from different disciplines and to cross-fertilise ideas and concepts.

There has been capacity building too in research methods that will have broader applicability for researchers in other fields and beyond the UK. The programme provided an opportunity to test out various forms, methods and processes of interdisciplinary working and took a reflexive approach throughout in learning from the experiences across the programme. The programme did not prescribe the specific form of interdisciplinary collaboration, only that each project had to have good, well integrated natural and social science components. This meant experimentation with a diversity of approaches. These approaches have been published in a series of Relu Briefing Papers and journal special issues which have taken interdisciplinary insights into a number of mono-disciplinary research communities (see 4.5). Examples of approaches adopted include providing integrated assessments of novel technologies; designing diagnostic measures of the performance of socio-ecological systems; offering synoptic perspectives on complex problems; and developing tools and methodologies to support decision-making. Collaboration also took place across the spectrum of research activities spanning research design, empirical and experimental work, analysis, modelling, evaluation and dissemination. It included both quantitative and qualitative approaches to

integration. The methodological innovations of the programme were independently documented and catalogued[3].

At a broader level there has been institutional capacity building - the programme has been instrumental in furnishing research funders in the UK with an understanding of the institutional processes and mechanisms needed to enable effective interdisciplinary research and knowledge exchange. Research funders increasingly acknowledged during the course of the programme the gains to be made from interdisciplinary research involving collaboration between social and natural scientists, not only in finessing the potential applicability of research but also in focusing its strategic direction. Science funders have embedded the Relu experience and learning into new funding programmes and science strategies. This has included the Research Councils (see section 5.1) and key government science funders. For example, the Relu Director, through his membership of Defra's Science Advisory Council, helped instigate a review of Defra social research, drawing extensively on Relu evidence. The review recommended a significant expansion of Defra's social science capacity to support greater interdisciplinarity. These recommendations were embodied in the Defra Evidence Investment Strategy and went on to influence many areas of Defra's science policy. Relu process learning continues to feed into science programme development, for example through the Relu Assistant Director's appointment to the Scottish Government's Rural and Environment Science Analytical Services Board.

- *to enhance the impact of research on rural policy and practice by involving stakeholders in all stages, including programme development, research and communication of outcomes*

ESRC commissioned a separate independent evaluation of the programme's approach to knowledge exchange and its impacts on policy and practice (see Meagher, 2012[4]). This found that the impacts of Relu had been extensive and transformative in a wide range of key areas such as sustainable food and farming; reform of the Common Agricultural Policy; strategic land use; policy for the uplands; targeting of the Water Framework Directive; policy making for the management of animal and plant diseases; reform of the veterinary profession; and barriers to growth in the rural economy (see section 4.3).

The impacts of the programme were built on a foundation of very active and responsive knowledge exchange and an ambitious communication plan which was refreshed annually with advice from Relu stakeholders. The Relu programme set out in 2003 to actively engage stakeholders in the upstream design and execution of its programme of work and individual research projects. It also succeeded in breaking with tradition to adopt an inclusive and pluralistic view of stakeholders to include the public, private and third sectors, including micro, small and large businesses, local and national interests, as well as the wider public. The programme went on to involve 4000 stakeholders directly in its research projects (38% public sector, 36% private sector, 15% societal, 12% third sector).

In many ways Relu was responsible for establishing the rise to prominence and understanding of knowledge exchange within the UK science base. This reflected its success in promoting and embedding a philosophy of knowledge exchange within the

[3] *Relu Data Support Service 2011: Innovations in Interdisciplinary Methods: The Relu Experience.*
[4] *Meagher, L (2012) Report - Rural Economy and Land Use Programme (Relu). Societal and Economic Impact Evaluation (REFERENCE PS110020).*

programme rather than just knowledge transfer, seeing effective research uptake as being built on a foundation of active stakeholder engagement and the sharing of expertise during the research itself. Knowledge exchange with stakeholders was an integral feature of Relu and the basis of its impact. Too often research programmes segregate scientific research and knowledge transfer, operationally and temporally. Relu systematically integrated the two through a philosophy of knowledge exchange emphasising close and active involvement of stakeholders throughout the research. This radical approach dissolves sharp distinctions between the producers and users of knowledge; and between the scientific process and application of research results. Knowledge exchange occurs during the research, in the form of new connections and perspectives, and involves diverse sources of expertise.

The Relu approach to knowledge exchange was based on four principles that:

- Stakeholders must be engaged throughout the research, helping establish its focus, priorities and conduct.
- Non-academics have knowledge and expertise to contribute actively to a reciprocal process of knowledge exchange.
- An inclusive notion of stakeholders should be pursued encompassing policy-makers, practitioners, businesses and the public.
- Transfer of ideas and results happens through multiple channels, including informal networks and movement of people between research and practice.

These principles informed the design of an interwoven package of communication and innovative knowledge exchange mechanisms that were tested out during the programme, many of which have been taken up by other research programmes or mainstreamed into Research Council systems. The programme for example pioneered the use of project communication and data management plans which have subsequently been adopted across the Research Councils.

Relu undertook extensive stakeholder consultation to inform the design of calls for research proposals. As well as quarterly newsletters, media contacts, academic publications, conferences, website etc., the programme experimented with novel mechanisms and approaches that helped it build extensive networks for knowledge exchange. Workshops bringing together academics and stakeholders from across the programme to discuss common themes helped to create a sense of community and cross-fertilisation. Rather than holding traditional academic conferences where researchers presented papers, Relu events aimed to be interactive and to concentrate on agenda setting or results and their potential application. Stakeholders were provided with every opportunity to sample the research and to contribute feedback via small group discussions, full scale debates and interactive science fair type activities. Web technology was also employed to reach out more widely via the website and the highly successful Great Land Use Debate. Conferences that featured stakeholders as speakers and panel members ensured that non academic knowledge and the users of research were visibly involved throughout the programme.

Relu adopted a sustained approach to strategic influencing through building stakeholder communities around themed clusters of projects, with an orchestrated succession of targeted events, briefings and synthesised outputs. Important features of this strategy were three national stakeholder forums on Food, People and the Rural Environment, and Animal and Plant Disease that met biannually (Annex D). The forums acted as sounding boards on research programme and project development and dissemination strategies. They included a broad constituency of stakeholders from the public, private and voluntary sectors. Projects presented their research to the members of the relevant forum at an informal seminar-style meeting

and there was extensive discussion and feedback from members to the project team. Members of the forum played an active role throughout the programme, facilitating work shadowing and visiting fellowship placements, taking part in interactive Relu events and disseminating research findings through their respective networks.

Schemes for people exchange in the form of work shadowing and visiting fellowships played a key role. The placements (involving 58 fellows and work shadowers) built links between stakeholders and strategic research projects and the programme overall, through which insights from the research could flow and stakeholders could in turn contribute to the wider strategic research.

- *Work shadowing*: A scheme for researchers to spend up to a month in commercial, voluntary or public organisations where their research might be used. Organisations taking part included Clinton Devon Estates, Commission for Rural Communities, Defra, East Anglia Food Link, Environment Agency, Environment Agency Wales, Farm Advisory Services Ltd, Food Standards Agency, Food Standards Agency (Scotland), Forestry Commission, Freshwater Fishfarms Ltd, Health Protection Agency, Institute of Grocery Distribution, National Farmers Union, National Federation of Anglers, Pesticides Safety Directorate, Pinguin Foods UK Ltd, Royal Society for Protection of Birds, Stag Inn, Tiverton.
- *Visiting fellowships*: A scheme enabling key stakeholders to spend time with research teams, with a view to designing bespoke dissemination activity. Organisations taking part included the Association of River Trusts, Assynt Foundation, Biodiversity International Limited, East Riding of Yorkshire Council, Environment Agency Wales, Institute for European Environmental Policy, North East Rural Affairs Forum, Northumberland County Council, One North East Regional Development Agency, Otley College, Pesticides Safety Directorate, Natural England, Smiths Gore, International Union for the Conservation of Nature, Scottish Government, Sustainable Development Commission, Health Protection Scotland, Defra, Royal Agricultural Society of England, Syngenta, Welsh Assembly Government.

Relu's approach to stakeholder involvement was encouraged and replicated at project level. Each project produced its own stakeholder engagement plan. In many Relu projects the involvement of stakeholders was key to the whole project design. The projects were therefore experiments in collaborative knowledge production, recognising the contribution of multiple forms of expertise.

We advised a range of other research progammes on stakeholder engagement and science communication planning such as, *inter alia*, LWEC, UK Environmental Observation Framework, Ecosystem Services for Poverty Alleviation (ESPA), NERC's Natural Hazards Programme, QUEST Programme, Water Knowledge Exchange programme, Global Food Security Programme, Insect Pollinator Initiative, Macronutrient Cycles Programme, Biodiversity & Ecosystem Service Sustainability (BESS) programme, Environmental Exposures and Health (EEHI) and Environmental and Social Ecology of Human Infectious Disease Initiatives and Scottish Government's Rural and Environment Science Programme. Relu's Communications Manager and Assistant Director have since gone on to launch a new policy and practice note series for LWEC that capitalises on the brand reputation and well established format of the Relu series (see 4.5).

2.2 Contribution of projects

The success of Relu built on the work of its research teams (see Annex A). The vast majority of Relu projects played a very active role in contributing to programme-level

activities and objectives. This included taking part in programme events and workshops, journal special issues, stakeholder forums, visiting fellowship and work shadowing schemes, training events and activities, and publication series such as the Policy and Practice Notes and Briefing Papers. Projects played an active part in programme-wide initiatives, for example Relu's Land Use Initiative (see 4.4). Many actively explored cross-project synergies that were available within a strategic research programme leading to linkages in terms of publications, events and data exchange. Project leaders were also willing to contribute to planning meetings that were frequently held throughout the programme to shape Relu's rolling communication plan.

2.3 ESRC Strategic Objectives

Relu addressed the research priorities of all three of its participating Research Councils across its four waves of funding. In particular it provided a foundation for the development of emerging cross-Council priorities around global food security and living with environmental change. Its research contributed to all three of ESRC's priority themes. In relation to *Economic performance and sustainable growth*, the programme considered the basis for sustainable food chains and land use and an ecosystem services approach. It explored alternative land uses and the values and economic and environmental trade-offs associated with different management approaches. It also built networks for creative knowledge exchange between researchers and stakeholder groups for adaptive learning for living with environmental change. Most Relu research projects considered processes for *Influencing behaviour and informing interventions,* for instance in terms of the collective behaviours of land managers and countryside users, the operation of rural and agri-environmental policies, payment for ecosystem service schemes, and the governance of land use change, flood risk, and animal and plant disease outbreaks in circumstances of uncertainty. Finally the programme enhanced understanding of the processes and methods of engagement of stakeholders and other publics in science and policy and therefore made an important contribution to ESRC's third priority relating to a *Vibrant and fair society*.

Part 3: Programme activities

3.1 Programme-wide activities

Events and networking
We organised an ambitious calendar of programme-wide events as well as joint-group planning meetings with clusters of research projects. Relu conferences and workshops were not modelled on traditional academic lines. Stakeholders played a key role throughout (representing at least 50% of the delegates but usually far greater) and rather than being talked at, delegates played an active part, with debate, "speed dating" sessions, and other interactive formats designed to engineer linkages and collaborations between stakeholders and research teams.

Major events included: *Rural Futures* (Oct 2004); *Rural Economy and Land Use: The Challenge for Research* (January 2005); *People and the Environment: Scoping the Research Agenda* (May 2005); *The UK Rural Economy and Land Use Debates* (March 2006); *Enabling Knowledge Exchange* (January 2006); *Sustainable Food Chains and Rural and Regional Development* (May 2006); *Research on Rural Resource Management and the Rural Economy: Addressing the Local and Regional Dimension* (May 2007); *Unlocking Change in the Food Chain* (November 2007); *The Future of Rural Land Use* (June 2009); *Adapting Rural Living and Land Use to Environmental Change* (July 2010); *New Horizons for Animal and Plant Disease from the Relu Programme* (May 2011) and *Who Should Run the Countryside?* (November 2011). The Relu events provided important forums for recruiting stakeholder visiting fellows to the programme and linking up researchers with organisations offering work shadowing opportunities.

The 'end-of programme' event in Nov 2011 illustrates the innovative approach of the programme to event design. It was planned around a series of debates on topical issues facing the countryside featuring high profile and provocative speakers. Topics were: whether food production or biodiversity should take precedence; whether 21st century land ownership is a responsibility or a privilege; and whether individual actions can help to save the Earth. Two smaller panel-led discussions focused on the pros and cons of environmental modelling, and whether farmer or state should take responsibility for animal disease. Throughout the day delegates also got involved in activities such as scoring their kitchen for food-health hazards in the clickin' chicken interactive quiz and learning about the rural-urban fringe by playing "Rufopoly". A dozen Relu projects put on interactive displays about their research and there were even singers and a storyteller. The Relu Awards (for *Interdisciplinary Methodology and Scientific Innovation*; and *Impact*) featured prominently, with films about the finalists showing all day, and delegates casting their votes to decide the winners. A highlight was the presentation of the specially-commissioned Relu awards by Sir Howard Newby. Over 200 delegates from academia, business, policy making and the public sector and third sector organisations attended the conference.

Public debates involving researchers and stakeholders were also organised during Science Weeks 2006 and 2007. In Science Week 2008 Relu's Great Land Use Debate broke new ground by involving stakeholders across the country in an on-line debate on a topic that was high on the policy agenda. Headline pieces on key questions were provided by leading thinkers in land management and the debate was kicked off by Secretary of State Hilary Benn. Around 100 comments were posted, reflecting a range of opinion and there were over 4,500 hits on the site from readers. The debate received extensive media coverage being featured in the Guardian, The Times, Guardian on-line, Farmers' Weekly Interactive, Royal Institution of Chartered Surveyors' Land Journal, Royal Agricultural Society's

magazine Rural Matters, NFU News on-line and BBC Radio 4 Farming Today, as well as numerous website and electronic newsletters. The debate heralded and helped to set the agenda for the UK Government's Land Use Futures Project.

Cross-programme outputs
Facilitation of inter-project linkages led to added value, including the production of 6 prestigious cross-programme journal special issues (Annex C.3), the establishment two high profile and impactful series targeted at policy makers and practitioners (Relu's Policy and Practice Note series and Briefing Paper series – see Annex C.1 and 2), orchestration of 21 cross-programme policy submissions and consultation responses (Annex C.7), and sponsorship of 5 cross-programme edited books (Annex C.4).

Cross-project collaboration
There was very active and sustained encouragement of inter-project synergies throughout the programme. There were numerous joint articles and cross-project activities, including several Relu sessions at national and international conferences. Cross-project synergies were actively identified and encouraged throughout the programme at individual project visits and during cross-project induction and planning meetings that were held for clusters of projects. They were also sponsored by the programme through an inter-project collaboration fund managed by the Director's Office.

Countless informal and bilateral project synergies emerged involving joint meetings; joint-project launches; joint publishing of articles and books; joint method and model development; cross-membership of project advisory groups; exchange of research protocols and questionnaires. These collaborations were all discussed in detail in the programme annual reports under Added Value. Series of internal policy briefing seminars were also organised, involving many Relu projects, for Defra and the Food Standards Agency. Finally the programme facilitated and sponsored 24 workshops and special sessions spanning research projects on the following themes: Data integration: working together across the disciplines; Interdisciplinarity within and beyond geography; Can interdisciplinary research produce 'good' knowledge?; Farm modelling; Stakeholder analysis; Rural geography and public policy engagement; Future farming in the UK: global implications for society and biodiversity; Land use management: the new debate; Farm production modelling; Healthy diet, healthy countryside?; Expert systems for natural resources management; Land valuation and decision making; Regulating infectious disease in the 21st Century; Human-wildlife conflict resolution; Delivering ecosystem services through agricultural payments; Benefits of social interaction around models; Cost and responsibility sharing in disease management; Risk and uncertainty in the context of animal and zoonotic disease management; Catchment management and public engagement; The uplands; Managing environmental change at the rural-urban fringe; Participatory approaches to river catchment management; and Conservation conflicts for a changing world.

3.2 Strategy for promoting interdisciplinary collaboration

The needs and priorities of interdisciplinary research have to be considered at various levels from that of the individual researcher to the institutions sponsoring and overseeing the research. Relu brought together research funders and communities with little or limited experience of collaboration. The programme therefore had to test out, and pioneer, new methods at each and every level.

Funded projects were required to meet the interdisciplinary training needs of their researchers and postgraduates. This provision was supplemented by programme-level workshops on interdisciplinary research methods and approaches to data integration. The programme also included small-scale trials with interdisciplinary postgraduate studentships and early career interdisciplinary fellowships. However, while these initiatives embodied an implicit model of preparing a future generation of 'hybrid' interdisciplinarians, the predominant model pursued in the programme was one of giving an interdisciplinary orientation to discipline-grounded scientists. A survey of the largest disciplinary grouping in the programme – the 90 ecologists – found them to have become discerning partners for social scientists and their methods, with the implication that they would be intelligent customers for social science in the future[5].

It was important therefore to raise the profile and significance of interdisciplinary work and experience in the basic disciplinary communities. This informed the programme-level scientific publishing strategy. While there are more and more interdisciplinary journals, these tend to be lower impact and are not attractive outlets for researchers. The programme therefore arranged special interdisciplinary issues of prominent mono-disciplinary journals. These landmark volumes – including the first ever issue of the Journal of Applied Ecology on ecology and the social sciences and the first ever interdisciplinary issue of the Philosophical Transactions of the Royal Society on the management of animal and plant diseases – not only established the standing of Relu's interdisciplinary research but also mapped out emerging research frontiers at the interfaces between the social, biological and environmental sciences.

Relu required that each and every project creatively combine social and natural scientists, but not specifying how this should be done. Project proposals had to show how they would effectively combine research staff and perspectives to maximise their synergy. This called for strategic leadership and innovation in project design. Project management had to combine inputs from different departments and institutions, each with their own logistics. It also had to make space for interdisciplinary exchange and synthesis. Projects developed their own approaches to interdisciplinary working and methods.

A thorough approach to the assessment and selection of research proposals was essential and the programme learned from experience and improved its assessment processes through successive funding phases. It was found to be vital to have two separate elements. First, a rigorous peer review by relevant experts of the strengths of the scientific components of a project proposal, and second an overall assessment of its quality of integration and the strategic importance of its interdisciplinary collaboration, done by assessors with a breadth of understanding and experience of interdisciplinary research. It is important to differentiate these elements so that each is done thoroughly. Thus Relu applicants had to prove themselves against two separate assessment hurdles, and the programme funded 1 in 8 research applications.

Good research depends upon a supportive institutional context. Unfortunately, in the main, scientific institutions are poorly set-up for enabling interdisciplinary research. This was recognised in the establishment of the Relu programme. The three participating research councils agreed to pursue a strategic collaboration, pooling the funding and the management of the programme under a joint Programme Management Group and Strategic Advisory Committee. This unified management

[5] *Phillipson, J et al., 2009, 'Navigating the social sciences: interdisciplinarity and ecology' Journal of Applied Ecology Vol. 46(2) pp. 261-264*

structure facilitated the introduction of joint and streamlined arrangements to support interdisciplinary research. These included combined arrangements for assessment of research applications, data management, output archiving and research evaluation. These arrangements while intended to meet the needs of Relu established precedents and protocols for subsequent inter-Council working. For example, for the first time, for Relu the Councils set up a cross-Council Data Support Service (hosted at the UK Data Archive and the Environmental Information Data Centre) led by Louise Corti and Veerle Van den Eynden, which established a linked archiving system for interdisciplinary data sets and an integrated knowledge portal, bringing together published scientific outputs and data records. In retrospect it can be seen that the pooling of resources was a pivotal decision underwriting the joint facilitation of the programme and an entrepreneurial Director's Office. This gave an emphasis to programme management of overcoming obstacles and promoting opportunities to interdisciplinary collaboration. Without this prior commitment, the risk is that subsequent inter-Council initiatives are either little more than rebranding exercises or rely on top-heavy strategic planning to achieve coordinated outcomes.

We had least impact on interdisciplinary research assessment procedures for end of project and programme evaluation. This was a failure and remains an unreformed element of inter-Research Council cooperation.

3.3 Strategy for developing interdisciplinary research capacity

Relu brought together research communities with little if any experience of collaboration. A key task at the programme level therefore was to catalyse novel linkages and foster new research communities. This required an entrepreneurial approach to spotting and creating opportunities for collaboration and helping to make connections. The following mechanisms were used to build interdisciplinary capacity:

- seed-corn funding to forge initial links across disciplines and with stakeholders. A variety of "linking" activities were facilitated by awards, including setting up informal networks between researchers, and between researchers and other stakeholders.
- workshops and conferences carefully orchestrated to promote shared perspectives on cross-cutting strategic themes, and to draw researchers out of their disciplinary enclaves.
- interdisciplinary training and career guidance to researchers.
- establishment of a dedicated Data Support Service, to support the joined-up archiving of data sets from interdisciplinary research projects.

3.4 International links

The Relu partners gave the programme a strong steer to focus on UK rural economy and land use agendas and this has informed the main complexion of Relu's communication plans. Relu therefore funded research of relevance to UK rural economy and land use. It was crucial though that the research done was of international standard, addressed global challenges and learned from experience from outside the UK. The Director's Office therefore sought to help projects make appropriate international connections and aimed through its events to place Relu research in its international context. A number of projects had a strong international research agenda, for example on such topics as water catchment management, food chain lifecycle analysis and the regulation of bio-pesticides. The programme made targeted efforts to stimulate its international profile, responding to opportunities from abroad to learn from Relu's experience in interdisciplinary research and knowledge exchange. Some of the international highlights included:

- A series of successful applications to the ESRC-SSRC Visiting Fellowship Scheme that strengthened comparative research possibilities and collaborations between the US and UK and helped to internationalise Relu research exchange. This included Professor Clare Hinrichs from Pennsylvania State University on the theme of "Relocalization of agri-food systems in USA and UK"; Professor Jim Shortle from Pennsylvania State University on "Modelling land use-environment interactions under policy change"; and Dr Mark Reed, Leeds University, on "Coupled Human Natural Systems".
- Major addresses were given by the Director or Assistant Director, for example: on public R&D in the agri-food system to national agricultural science directors from across the EU; on critical research gaps in research on the environmental relations of agri-food systems to the European Commission Seventh Framework Programme; on CAP reform and rural development to the European Commission; and on new directions in agri-food research to the OECD. Invited addresses were given at conferences and institutions in Finland, United States, China, Belgium, France, Sweden, Denmark, Spain, France, Italy, the Netherlands and Japan on the experience of the programme.
- The Relu programme made a major contribution to the XXIII Congress of the European Society for Rural Sociology, held in Vaasa, Finland in August 2009, helping to extend Relu's interdisciplinary insights onto the world stage. The theme of the Congress was 'Re-inventing the Rural: Between the Social and the Natural'. Five hundred rural scientists attended from across the world. Relu Director, Philip Lowe, was the Scientific Chair of the Congress. His opening keynote address was entitled 'Enacting rural sociology: or what are the creativity claims of the engaged sciences?'. Relu researchers led several international workshops at the Congress.
- Relu played an ongoing role in contributing to UK–Chinese collaboration through Defra's China-UK Sustainable Agriculture Innovation Network, which was established to provide a platform for the development and implementation of China-UK collaboration on sustainable agriculture.
- Relu played an active role in the launches of RCUK offices in Washington and China. The US links led to engagement with the National Science Foundation on potential links between the Relu Programme and parallel US research programmes, on the 'Dynamics of Coupled Natural and Human Systems' and the 'Ecology of Infectious Diseases'.
- Finally, Relu insights helped shape the approach and agenda of the Belmont Forum and FACCE-JPI call on Food Security and Land Use Change in 2013, following contributions to the scoping workshop in Sao Paulo, Brazil, in December 2012.

Part 4: Programme outputs and impacts

4.1 Academic contributions

In casting technical research within a social and economic framework the research programme provided a step-change in our understanding of coupled socio-technical innovation i.e. technological innovation that facilitates and works with the grain of social change and social and environmental adaptation which creatively exploits technological opportunities. The complex requirements of sustainable development mean that technological solutions on their own do not suffice – they must be responsive to consumer demands and sensitive to the social and economic contexts in which they are to be applied. Effective technological change moreover may release human potential and may be dependent on behavioural and institutional adaptations within social, political and economic systems. Socio-technical innovation was explored under four main themes:

4.1.1 Sustainable food chains

The programme was successful in providing a strategic approach to research on sustainable food chains. Farming crises, chronic health risks, food safety scares, and resource and habitat depletion have all evoked considerable mistrust of the science and technology underpinning food chains and have been associated with an assertion of consumer/public interest not only in what food is produced but also how it is produced, stretching along the food chain. Biological advances may well be expanding potential to produce nutritious food in a sustainable manner, but it is social and economic factors that will determine the uptake and value of this research. Relu research has therefore contributed in three main areas: food chain risk, diet and health, and the environmental sustainability of food production.

- From field to farm to fork, risk is an inherent feature of the food chain. Risk issues range from contamination of water sources by farm run-off, to consumers' concerns over food safety and the means for improving tools for assessing and managing food chain risks. The programme provided insights to emphasise how dealing with food risk is more than a purely technical task. The *way* in which food chain risks are managed is considered critical, and Relu research highlighted new participatory methods for incorporating stakeholder and public preferences in the design and implementation of risk assessment, management and communication techniques.
- Concern with diet and health has moved the subject of nutrition much higher up the policy agenda. Relu research considered the implications for production systems and technologies of consumers demanding more nutritious and wholesome foods, explored the potential viability of new production systems as diversification options for farmers, and provided evidence that biodiverse pasture can enhance the nutritional qualities of meat, a finding that could enable farmers to translate environmental protection into increased market value.
- The programme enhanced our understanding of the growing public concern over the provenance and environmental sustainability of food production. Such shifts in attitude have major implications for rural economy and land use. The programme included a major review of the local food and food miles debate and its complex environmental and socio-economic trade-offs, and influential work on pest management systems, including socio-technical innovations in the development of biological alternatives to the use of chemical pesticides in the food chain.

4.1.2 Ecosystem services and integrated land and water use

The Relu programme made a significant contribution to understanding of the relations between human action and the environment and the social and ecological

dimensions of environmental management. The research adopted numerous methods and approaches in researching the socio-ecological systems under study, ranging from individual fields and farms, through to geographical clusters of organic enterprises and whole landscapes (flood plains, uplands, river catchments etc.).

- Important advances were made in the participatory modelling of coupled human-natural systems and deliberative approaches to stakeholder participation in science. This has led to improved understanding of how policy decisions relate to human actions and the effects on ecological processes and environmental and societal outcomes. The programme has highlighted that although humans are major drivers of change in many environmental systems, this is also an interactive and reciprocal process with human actions shaped and prompted by perceived changes in system state. Research across the programme has demonstrated the challenges and opportunities that stakeholder expertise presents in dealing with questions of uncertainty and scale, in contexts ranging from flood control and wildlife management to management of upland and arable land uses.
- The programme of work has made a major contribution to our understanding of ecosystem services and their business opportunities, landscape and catchment-wide approaches to environmental management, and the trade-offs between alternative land uses. This has included the translation of ecological data into economic or cultural values, bringing perspectives on societal values from both within and beyond economics. Major projects in the programme have provided for the first time a holistic understanding of novel systems and technologies, ranging from an analysis of new farming approaches such as energy crops, the scale effects in organic farming, to the viability of anaerobic digestion.

4.1.3 Management of animal and plant diseases

Animal and plant diseases pose a serious and continuing threat to food security and safety, human and animal health and welfare, national economies, biodiversity and the rural environment. New challenges, including climate change, regulatory developments, changes in the geographical concentration and size of livestock holdings and increasing trade made this an appropriate time to assess the state of knowledge about the impact that diseases have and the ways in which they are managed and controlled. However, incidents of animal or plant disease are not solely natural occurrences. Human actions are extensively implicated in the spread and outbreak of disease. In turn, disease affects human interests widely, and much effort is spent in the control of disease. Consequently, it is difficult to prise apart the natural phenomena of disease and the social phenomena of the drivers, impacts and regulation of disease. Yet our understanding of animal and plant diseases has been riven by a great divide between the natural and social sciences – a divide that is entrenched in differences of research methods, approaches and language. Against this backdrop Relu made a major contribution to our understanding and framing of the social dimension of animal and plant disease.

- It highlighted how our understanding of the biology of animal and plant diseases must also inform and be informed by social science research, showing how disease management involves important political and economic choices that are more contestable the more the science is uncertain. Many persistent, food-borne, public health diseases such as E. coli O157 are a function of complex, multi-causal relationships operating across food chains. The programme has therefore made an incisive contribution in challenging the artificial barriers that are often created by governmental institutions and research cultures, including the divisions between plant and animal diseases, between diseases that affect agricultural production and those that do not, and between endemic and exotic diseases.

- Relu has brought novel disciplinary insights to disease management, including the use of historical perspectives in improving our understanding of contemporary disease control policy, its determinants and its deficiencies, and perspectives from political science to explore the governance of endemic diseases and showing how policy responses are not always appropriate or proportional to disease risk. The research has contributed significantly to our understanding of the interrelationships between government regulation, industry and trade, and their effects on disease.
- Important insights have been generated concerning the understanding, assessment and communication of risk in such areas as E. coli O157, Lyme disease, Foot and Mouth Disease, Avian Influenza and cryptosporidiosis, and the programme has offered frameworks to explain how scientific uncertainty across the sciences about disease spread can be incorporated into decisions about control measures.

4.1.4 Adapting rural living and land use to environmental change

Environmental change is ubiquitous and puts new pressures on human and natural systems. With the science and politics of climate change largely focused on mitigation, this wave of research within the programme shifted the focus to the processes of adaptation needed for unavoidable environmental changes. The projects, which were funded as part of a joint initiative with the Living With Environmental Change (LWEC) Programme, focused on the building of networks and capacity for creative knowledge exchange and learning between researchers and policy makers, businesses, practitioners, local communities and the wider public, with a view to strengthening adaptive capacities. They also developed and promoted novel approaches and partnerships for interdisciplinary research and analysis on living with environmental change in rural contexts. They were successful in pinpointing important concerns when considering the implications of environmental change for rural communities:

- The programme explored the role of power in participatory processes and the development of trust through locally driven approaches to dealing with environmental change, for example, in defining flooding problems and producing options for flood management. Advances have been made in our understanding of the means for encouraging co-operative and adaptive approaches to environmental and wildlife management.
- The programme has highlighted persistent gaps in knowledge for adaptation, both within rural communities and between research and rural practitioners. There is a continuing dependence of rural lifestyles on carbon fuels, while communities still seem uncertain over the causes of climate change and the value of mitigation activities. This uncertainty is an important contributor to the discrepancy in expressed concern and behaviour that is apparent. Another significant gap in knowledge is between land-based practitioners and researchers on the effectiveness of interventions designed to conserve wildlife.
- A particularly novel area of the programme has been the exploration of ‘contested spaces’, such as the area between town and country, which are increasingly under pressure, but are often forgotten in policy and decision-making. The research has shown how using ideas within the ecosystem approach and spatial planning may provide an improved lens through which planners and policymakers can view these places.

4.2 Examples of outstanding science

4.2.1 Devastating events like flooding can move those affected by them to subject the scientific and policy practices meshed together in the ‘expertise’ of flood risk

management to the demands of public scrutiny. Typically, such environmental knowledge controversies have been seen in science and policy communities as troublesome problems to be avoided. Following work in science studies, the **Understanding Environmental Knowledge Controversies project** investigated how knowledge controversies might play a generative role in developing the capacity of democratic societies to handle environmental uncertainty more effectively. The project team consisted of natural and social scientists, working collaboratively with people affected by flooding in two localities (Ryedale and Uckfield) and trialled Competency Groups as an experimental way of translating the 'generative' potential of knowledge controversies into a transferable research methodology. This was key to the development of an alternative knowledge-theoretic approach to modelling, incorporating the richness of local knowledge into the process. Although the models were coded by one of the 'university' members, the content of the models and their use in practice was grounded in the wider, collective work of the Groups. The approach was distinctive in terms of the point in the practice of flood risk science that this was achieved. In Pickering, the project's collaborative modelling work and proposals for 'bunds' (or mini-dams) to mitigate flooding (the *Ryedale Flood Research Group's 'bund-model' and report 'Making Space for People'*) have been tested subsequently as part of a Defra funded 'demonstration project' (£500,000) 'Slowing the Flow at Pickering' and is now due to be built with funding from Ryedale District Council (£800,000). In Uckfield, the Group presented its modelling work to the local Flood Forum, suggesting that bunds alone would not protect the town from flooding. A new model, *Overflow*, has subsequently been developed further by the project team's modellers in collaboration with the regional Environment Agency, calibrating it for Uckfield and using it to test new flood management measures. The project has been selected as a case study in public engagement by the HEFCE/RCUK Beacons for Public Engagement initiative and in the *Academy of Social Sciences* publication 'Making the case for the social sciences'. The project's PI has been identified as one of the case-study academics by RCUK in their publication (2010) 'Demonstrating the benefits of public engagement for researchers'.

4.2.2 The ecosystem services approach to decision making seeks to clarify the contribution of the natural environment to human wellbeing, and establishes the value of such services so that they can be assessed on a level playing field alongside market priced goods. The **Modelling the Impacts of the Water Framework Directive project** provides probably the most thorough UK (and arguably worldwide) application of the ecosystem services approach to date. In particular the project delivers the fundamental integration between natural science and socio-economic analyses which is a necessary prerequisite for operationalising ecosystem service assessments. An empirical analysis of a complex and policy relevant real world issue, the implementation of the Water Framework Directive, was undertaken, providing the raw data for a rigorous stress-test of the approach. The project examined how the full range of policy, market and environmental change drivers affect rural land use. Econometric behavioural models provided insight into the impact of major drivers such as market fluctuations, CAP reform and climate change upon inter-farm behaviour. Linear programming mathematical models yielded insights into intra-farm impacts of micro policies such as changes to stock fencing regulations and face-to-face interviews gave direct assessments of farmer attitudes and contingent behaviour in a variety of possible future scenarios. A multi-input, multi-output model was developed and successfully tested. The model was found to be a highly robust predictor of land use and land use change under a wide variety of conditions. Its outputs include estimates of farm income and land use under present or feasible future conditions. The econometric model was used to examine the changes in agricultural land use arising from a variety of different policy options and decision tools, including taxes on fertilisers, quantity restrictions on activities and the

most efficient reallocation of land. In all cases the analysis provided both measures of the financial impact upon farmers and the effect on water quality. The linear programming mathematical model produced a number of interesting results, including showing that simple measures regarding the fencing-off of streams from livestock were highly cost-effective in delivering reductions in in-stream levels of faecal indicator organisms (FIO). Two different hydrological modelling approaches were used to determine how agricultural inputs translate into concentrations of agrichemical compounds in water bodies, and to assess the likely impacts of a range of measures proposed to Defra for tackling diffuse pollution from agriculture. These models have, in a spatially-explicit manner, combined the simulation of river nitrate levels with techniques for estimating the economic costs to agriculture of modifying those levels, thus enabling the policy-maker to target pollution-reduction measures in the most cost-effective way. The ecological quality outputs of the project form the inputs to an advanced, spatially sensitive model of the benefits of river water improvements, developed through a custom designed survey of a large sample of households. Using a novel fusion of both revealed preference (observed behaviour) and stated preference valuation techniques, this analysis captured the highly significant impacts which issues such as population distribution, household circumstances and the characteristics of the natural environment have upon the value of improvements to river water quality. The work found that significant improvements in river water quality can be generated by policies aimed at altering agricultural land use, but that these will lower farm incomes; and the major potential beneficiaries of such river improvements are in urban areas. Within any given locality, the value of additional river quality enhancements diminishes significantly once an initial river is improved and the most efficient policy would be to focus upon improving sufficient urban rivers rather than pursuing the WFD objective of improving all rivers in all areas to pristine ecological standards.

4.2.3 Specialised knowledge providers for farming proliferate, but the knowledge practices of those experts who now mediate between institutional science, rural policy and land management practitioners are little understood. The ***Science in the Field*** **project** sought to fill this gap by investigating 'field-level advisors' within three case study professions - rural vets, applied ecologists and land agents/surveyors. Advisors undoubtedly act as intermediaries bringing science to farms but research agendas have become disconnected from technical dissemination capacities, and vice versa. So, whilst advisors look to their professional bodies to filter and synthesise the latest research findings, this is unevenly done across the professions. Moreover, the relevant rural professional associations are marginal to public research decision making. The findings showed the complexity of field advisors' knowledge sources and how formal continuing professional development provision does not fully reflect the range of ways advisors keep their expertise up to date. Advisors were found to be actively brokering a range of different types of knowledge, besides formal science, crucially including generating knowledge themselves through learning on-the-job. Both experiential and experimental knowledge are pivotal to their work. Yet they are given limited recognition and generally undervalued by both professional and training organisations. The findings also revealed an advisory landscape now characterised by a pluralistic system of field advisors, operating a mixed economy of expertise. Advisors were found to develop their knowledge through interactions with other professionals, from within the same profession and between professions, as well as farmers and other land managers. The results highlight the significance of inter-professional working. Operating as part of complex, multi-professional networks, advisors have to develop skills of negotiation and networking in order to navigate inter-professional competition and co-operation. In an arena where professionals are obliged to work together and learn from each other, advisors need to be better prepared to understand the inter and intra-professional contexts in which they will

have to operate. A feature of the exchanges between farmers, scientists and professionals is the way in which the polarity between expert and inexpert may be reversed. In fact, both advisors and land managers develop expertise in knowing when and how to play the 'expert inexpert' as part of their interactions. Close links were maintained with the professions throughout the research, and the project actively utilised the dissemination channels of the Relu Programme and of the professions themselves. The research, for example, made a marked contribution to the future of the veterinary profession, through informing the work of co-investigator Philip Lowe in preparing his report for Government and the profession on '*Unlocking potential, a report on veterinary expertise in food animal production*', which led to the establishment of the Veterinary Development Council in 2010. The project also led to the setting up of the ESRC/LWEC funded Landbridge initiative, a knowledge exchange network for research programmes and the land-based professions. Finally, the project's analysis of concepts of knowledge exchange and experimentation with methods for accounting for its processes and impacts, have helped embed notions of 'knowledge exchange' within the Research Councils. Particular interest has been shown by major funders and programmes in the SIAM (Stakeholder Impact Analysis Matrix) methodology pioneered by the project and the potential it offers for research impact analysis.

4.3 Impacts on policy and practice

ESRC have comprehensively evaluated Relu's considerable impacts on policy and practice and how this was built on its foundation of stakeholder engagement and knowledge exchange. The Executive Summary is presented below:

"*1. Impacts:* Relu was successful in generating a portfolio of a significant number and a diversified range of types of impacts and impacts-in-progress, in a variety of Contexts. Through qualitative findings and surveys, this evaluation's "snapshot in time" found significant development of various types of impact, including as highlights:

- Instrumental Impacts**:** there was sound evidence of instrumental impacts, for example, contributions to food sourcing decision-making by a major supermarket company and to Defra and EA's Catchment Management Approach with related pilots
- Conceptual Impacts: Conceptual Impacts were the most commonly cited form of impact, for example helping a water company to see the business value of stakeholder engagement and sound science, generating an appreciation of the more complex "big picture" around food sourcing, and spreading awareness that rural and land use policies must be holistic and integrated.

2. Knowledge Exchange: Relu has built a solid base for future Knowledge Exchange, within and beyond the specific researcher/stakeholder relationships forged. Relu researchers and stakeholders perceive that effective Knowledge Exchange has been achieved by Relu, a perception in line with the array of impacts or impacts-in-progress achieved. Development of commitment to knowledge exchange among researchers and stakeholders bodes well for follow-on interaction that may enhance the likelihood of additional impacts. The Relu Directorate utilised a set of Knowledge Exchange mechanisms (including but not limited to: a requirement that projects pursue Knowledge Exchange; researcher/ stakeholder events; Work-shadowing; Visiting Fellowships; Stakeholder Advisory Forums, publication of accessible policy and practice briefing notes). In a distinctive example of pro-active influencing, the Director worked to improve the viability of "both sides" of the Knowledge Exchange equation, seeking to catalyse communities of willing policy partners for new areas of research. Knowledge Exchange was defined, encouraged and exemplified by the Relu Directorate, which "grew" this emphasis so that it became a central theme of the Relu culture and also helped promulgate the concept of two-way Knowledge Exchange beyond the programme. Relu's other emphasis, on interdisciplinarity, appears to have bolstered capacity for both working with individuals having different perspectives and generating usefully integrated findings. Beyond Relu, the programme has been used as a learning opportunity by

other research and science policy/funding bodies hoping to encourage Knowledge Exchange and impacts. The Relu leadership (Director and Assistant Director) have demonstrated cordial willingness to share lessons learned with others, including acting as advisors or reviewers.

3. Contribution of Individual Projects and other Investments: Relu projects have clearly generated numerous impacts and impacts-in-progress. Relu projects reached a variety of non-academic domains, in particular Environment and Land Use, and a range of sectors, in particular the Private Sector and National/UK Policymaking. Projects' impacts ranged from local community action around flooding to training of regulators about new bio-pesticides to incorporation of research in UK-wide policies on integrated land and water management in the light of climate change. … Our analysis of the projects from Calls 1, 2 and 3 that were cited in survey respondents' free text comments, together with Relu's own Changing Landscapes publication, show thirty-two impacts, with many of these encompassing multiple impacts.

4. Contribution of the Programme Organization and its Management: Relu's Directorate and Programme-wide efforts added value, directly as non-academic impacts/influence and also through "interactive value-added" enhancing the capacity of constituent projects to generate impacts. Relu itself was effectively a "Knowledge Intermediary", adding value through: its leadership; Strategic Advisory Committee and funded directorate carrying out activities such as events, communications and a variety of Knowledge Exchange activities. Through its own actions and its requirement that projects show stakeholder engagement as well as interdisciplinarity, the Relu Programme created a distinctive culture oriented toward addressing stakeholder issues. Learning from Relu should help future complex initiatives aiming for multiple impacts. Interviewees and survey respondents affirmed the importance of an array of multiple factors contributing toward impacts, including: Relu's culture; enhancement of Knowledge Exchange by interdisciplinarity; roles played by Knowledge Intermediaries; emphasis on Knowledge Exchange; activities promoting and celebrating Knowledge Exchange (e.g. Work-shadowing, Visiting Fellowships, final conference's Impact Awards). A Programme-level Case Study on Land Use illustrates ways in which the Programme itself led to various impacts and enhanced projects' ability to do so; just a few of these included: its broadly publicised Great Land Use Debate; the input of numerous Relu projects, the Director and other individuals' input into the Foresight Land Use Futures project; and placement of Relu-related individuals on key advisory groups, e.g. for Defra. Programme-level Communications effort was also analysed, suggesting useful learning for the future. Without doubt, this is a programme that is more than the sum of its parts. Although there is no counter-factual available, it is improbable that the projects acting individually would have interacted so much with stakeholders, joined up results or penetrated in as many ways into diverse stakeholders' realms, leading to so many impacts. Through formal and informal communication and behaviour, the programme has achieved a significant level of recognition and credibility as "genuinely" seeking two-way interaction between researchers and stakeholders in order to contribute to important issues - thus helping to pave the way for impact-generation.
Much of the "value-added" of the Programme can be traced to its entrepreneurial leadership (Director and complementary Assistant Director) constantly and pro-actively encouraging stakeholders as well as researchers to participate fully in Relu. This pro-active stance combined with a budget for a centralised directorate allowed experiments to be conducted in ways to foster Knowledge Exchange and related impact-generation. Naturally, not all experimental mechanisms or indeed all projects led to effective Knowledge Exchange or impact-generation. However, the portfolio of impacts is robust. Relu's legacy also includes influences on the science policy arena; a cadre of individuals oriented to and capable in Knowledge Exchange; and numerous stakeholders aware of the potential usefulness of research.

6. Legacy: Significant legacies created by Relu include:
- Enhanced conceptual and practical understanding of 'land use'
- Influence in the research and science policy arenas, particularly in growth of acceptance of interdisciplinarity in policy-relevant research and in a shift from a model of "Knowledge Transfer" to two-way "Knowledge Exchange"
- Evidence of a set of approaches that can deliver research impacts.

7. Conclusions:
1) Relu has significantly helped to change policies and practices concerning rural economy and land use
2) Relu has generated an exemplary volume and distribution of impacts and impacts-in-progress across types of impacts: Conceptual, Instrumental, Capacity-building, Enduring Connectivity and Attitude/Culture Change. Conceptual Impacts are the most common, but Relu also led to some significant Instrumental Impacts and other types of Impacts.
3) At the programme level, Relu's pro-active leadership, Strategic Advisory Committee, effective and resourced central directorate, culture and innovative Knowledge Exchange mechanisms combined to add significant value to impact generation, both directly and through enhancing the impacts that individual projects were able to generate.
4) This evaluation has elicited unusually extensive and informative input from stakeholders. This has validated and enriched the findings, while also underscoring the effectiveness of Relu's engagement.
5) This evaluation offers lessons for future complex large-scale initiatives as well as illuminating impact-generating and impact-evaluation processes. We have examined in detail: a) Relu's collection of approaches toward Knowledge Exchange and impact generation, including but not limited to leadership, culture, and specific activity and communication mechanisms and b) Relu's portfolio of impacts and impacts-in-progress achieved at the Programme and the project level, as well as c) researcher and stakeholder perceptions of both. Taking all this into account, we conclude that *Relu's impact generation is substantial and significant*. At least two-thirds of the first three waves of projects have generated some sort of impact; this represents a strong return on investment, even if all do not lead to tangible impacts. (Conventionally, venture capitalists hope that ten per cent of investments will become successful companies, for example.) *The Relu programme constitutes a benchmark*, a new 'standard' in impact-generation from which others in the future can learn and toward which they can strive. Despite issues inherent in a pioneering and risk-taking experiment, Relu has had everything going for it – multiple funders, an entrepreneurial leader and an able assistant director with complementary strengths, a discretionary budget for centralised activity, topical subject matter, and reach and longevity across a significant number of projects over close to a decade. This does not imply that Relu was perfect, or that future initiatives should aim to copy it slavishly or be limited by its achievements. However, it does offer what may be a usefully realistic picture as to what sorts of non-academic impacts and impacts-in-progress can reasonably be expected (or not) from a research initiative at the moment, if it is provided with the advantages enjoyed by Relu".

Source: Meagher, L (2012) Report - Rural Economy and Land Use Programme (Relu). Societal and Economic Impact Evaluation (REFERENCE PS110020).

4.4 Examples of high impact activities

4.4.1 UK uplands are facing an unprecedented combination of pressures, as they experience the effects of climate change and a rising demand for home-grown food and energy security. Cultural, demographic and policy changes are also affecting upland communities. People who live and work in the uplands or use them in other ways, need to know more about the range of possible futures they may face, if they are to prepare effectively. The **Sustainable Uplands: Learning to Manage Future Change** project set out to combine local knowledge and modelling techniques from natural science to express future scenarios for the uplands, and to work with stakeholders on identifying ways they could adapt. There have been considerable impacts on policy and findings featured prominently in the Mountains, Moorlands and Heath chapter of the National Ecosystem Assessment. The researchers contributed to numerous policy reviews, including being commissioned to carry out work for the International Union for the Conservation of Nature on policy options for sustainable peatland management, and by Foresight Land Use Futures to review the future of the uplands for their report to the UK Government. They were asked to contribute to the Commission for Rural Communities Uplands Inquiry, and were part of a team commissioned by Defra to look at barriers and opportunities for payments for

ecosystem services, which helped shape the White Paper on the Natural Environment. The research also had impacts in economic and business contexts. The team advised Yorkshire Water, Premier Waste PLC and United Utilities on how to reduce discolouration of water by changing land management strategies, with beneficial effects on water treatment costs and on the development of a corporate social responsibility scheme to finance peatland restoration. Funding from NERC's Valuing Nature Network enabled the work to proceed with the development of the draft Peatland Code for Defra, building on the original research. This was hailed as an example of "open policymaking", facilitated by government but involving a group of external experts.

4.4.2 The project **Comparative Assessment of Environmental, Community and Nutritional Impacts of Consuming Fruit and Vegetables Produced Locally and Overseas** assessed the pros and cons of 'local food', comparing case studies of cabbage and broccoli, peas and beans and lettuce and leafy salad for the UK market grown in different parts of the UK, Spain, Uganda and Kenya. It generated new evidence on greenhouse gas emissions, taking into account soil emissions that are usually left out of life cycle assessments. The research came about because people were unsure how to compare the environmental impacts of food produced in different countries. The media were talking about 'food miles' and how eating food imported from abroad was bad for the environment. There was almost no scientific evidence to support or refute these claims. The project gathered evidence about the social and environmental impacts of food grown locally in the UK and overseas and worked out whether the environmental impact of UK food was different from that of imports. They also investigated the health status of farm workers in the UK and overseas, and the nutritional quality of the food produced in the different countries. They found that there was no clear relationship between distance from the UK and the environmental impact of food, or its nutritional status, and the impact varied between seasons. Sometimes buying imported food was the best option and sometimes it was best to buy UK grown food. They found no evidence to support the proposition that 'food miles' were a good indicator of environmental impact but they did find that the health of farmers in developing countries was enhanced by growing and exporting vegetables to the UK, which raises ethical questions about whether we should only buy produce grown in this country. The research had a lot of influence, leading to scientific acceptance that food miles are a poor indicator of environmental impact. After seeing the research results, the World Bank commissioned a paper with recommendations on how to make emerging carbon labelling schemes fair for developing countries, and the project also carried out work for two trade organisations on carbon footprinting of products.

4.4.3 **The Developing a Catchment Management Template for the Protection of Water Resources** project defined a template of principles and approaches for integrated catchment management. Diffuse water pollution is difficult to assess and control. Pollution control must be integrated with management of land, flood risk, water abstraction, and the economic and social goals of communities. Researchers looked at catchment management and governance regimes in the UK, Europe, USA and Australia. They tested the lessons learnt through catchment assessment and planning in two case studies in England. They then developed an Ecosystem Health Report Card (which has been adopted by the Environment Agency for communicating information), and a participatory, interdisciplinary approach which yielded a new and innovative modelling tool. These have become established parts of the evidence informing national water and environmental policy, and in particular the adoption and piloting of a new catchment management approach by Defra and the Environment Agency. The project has maintained close links with both, and also with Natural England, water companies and River Trusts, and researchers have been

consulted by senior staff in these organisations. At a regional level the project's template and recommendations have informed the Somerset Water Management Partnership's review of its objectives. A member of the team was awarded a NERC Knowledge Exchange Fellowship and developed further applications of the catchment modelling approach, in partnerships with the Broads Authority, the Westcountry Rivers Trust and Defra. Further research by members of the team, including the Wensum Demonstration Test Catchment project and work on pollution mitigation in China was funded, building on the project's results.

4.4.4 At programme level Relu influenced thinking on fundamental issues affecting rural areas. Government and public debate over the **future of land use** in the UK gained considerable momentum during the life of Relu, with Relu research making a major contribution. With over 20 research projects on various aspects of land use, Relu positioned itself to provide evidence and analysis to a series of major inquiries through a suite of knowledge exchange activities (debates, policy briefings, consultations, workshops, major regional and national conferences, visiting fellowships, advisory roles and a sustained flow of articles in the technical and professional press). The programme successfully drew in public and expert contributions by means of the high profile, on-line "Great Land Use Debate" held during 2009. The pervasive influence of Relu can be seen in the broad analytical perspective taken on board by the inquiries in relation to the strategic significance of rural land and their integrated approach to the land system, transcending scales, and rural-urban divides: the Government's Foresight Land Use Futures project and Natural Environment White Paper; the Scottish Government Rural Land Use Study; Natural England 'Vital Uplands' Uplands Vision, and 'Mapping Values'; Commission for Rural Communities Inquiry into the Future for England's Upland Communities; and Defra and LWEC National Ecosystem Assessment. They have, increasingly, encouraged a multifunctional approach to land use and brought ecosystems thinking into their analysis on the value of land and decision making. They have moved towards the promotion of cooperation between landowners, managers and stakeholders to deliver an optimal mix of public and private benefits and an appreciation of the regional and landscape context of land use. Relu's Great land Use Debate and the questions that the programme raised about what rural land is for and what our priorities should be heralded and helped to set this agenda. Overall the contribution of the programme was not just about the pertinence, timeliness and weight of its evidence, and the range and depth of its accumulated expertise, but was also about broader consciousness raising, agenda setting and informing public debate about the issues.

4.5 Main publications and outputs

The Relu programme Director's Office published a series of **16 Briefing Papers** (see Annex C.1). These documents linked evidence from different waves of projects to address particular challenges, feeding into public debates on societal issues such as the sustainability of the food chain, land use policy, animal and plant disease, the Common Agricultural Policy and the Water Framework Directive. Relu's philosophy of stakeholder engagement fed into and enriched their production and they were used to convey syntheses of the research into national and European policy making forums. The Briefing Paper series also provided a vehicle for lesson learning about the scope and process innovations of Relu, with dedicated consideration given to its approach to knowledge exchange (*Common Knowledge*), accounting for research impact (*Telling Stories*) and the programme and institutional considerations for interdisciplinary programme management (*Adventures in Science*).

Relu's series of **Policy and Practice Notes** (see Annex C.2) has been hailed as a successful communications medium by stakeholders from policy, practice and academic circles and has influenced the setting up of similar series for subsequent major research initiatives within government and the Research Councils. Forty one notes were published over the lifetime of the programme. Each major project published a note, drawing out implications of the research for a targeted audience, with concrete recommendations for policy and/or practice. The series also included a specialist subseries for local government (advised by a sounding board of local authority officers), which drew on specific waves of projects on the topics of the changing role of local government in managing water resources, management of animal disease risk, and how "Big Society" could support communities in taking action. Cross cutting notes on animal and plant disease policy, Bovine TB, the role of protected landscapes in promoting landscape scale land management and the potential of the rural economy as an engine for economic growth were also published. Some of the notes were prepared by stakeholder and visiting fellows to the programme which proved to be especially effective. Overall, the notes were a useful medium in their own right. They were also instrumental in building the profile of the programme and provided a useful archive of key findings that ensured timely, cross-programme responses to government consultations.

Six Relu **interdisciplinary special issues of monodisciplinary journals** (see Annex C.3) were also published with four edited by the Director's Office (members of the Director's Office published a further 33 journal articles and other publications throughout the programme – Annex C.6). The aim was to bring interdisciplinary research insights into leading and impactful monodisciplinary journals. The programme targeted well-respected journals such as the Journal of Agricultural Economics, Trends in Food and Science Technology, Journal of Applied Ecology and the Philosophical Transactions of the Royal Society B.

Through Relu's Data Support Service the programme created for the first time within the Research Councils a linked **knowledge portal bringing together archived data sets and scientific publications** and other outputs. This fully searchable system is available at http://relu.data-archive.ac.uk/. The portal currently provides access to 159 datasets and 1308 outputs (journal articles etc.) from Relu. Relu research data are digitally archived at the UK Data Archive and the Environmental Information Data Centre and made available for future research and education through the portal. The portal also provides a comprehensive look at the data sharing and management approaches and methodological innovations that were adopted within the programme. Relu piloted the use of data management plans for the Research Councils. Guidance and examples are available to award holders through the portal together with extensive practical data management and sharing guidance, to support research excellence and facilitate data sharing.

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Part 5: Programme management and the Director's role

5.1 Brief account of achievements against Director's terms of reference

Adding value
The Director's office has actively facilitated networking and added value across the programme by means of cross-programme events, training workshops, a regular newsletter, establishment of programme-level publication series (Briefing Papers, Policy and Practice Notes, journal special issues – see 4.5), joint-project planning meetings, support for cross-project synergies (see 3.1), enabling of international links (see 3.4) and through orchestrating major strategic initiatives bringing together multiple projects (for example on land use – see 4.4.4). As well as convening 20 high profile conferences and workshops (see Annex C.8) the Office supported a further 24 cross-programme events (see 3.1). These enabled researchers to benefit from each other's thinking, bring new ideas into their projects and form new interdisciplinary collaborations for future research applications. The Relu Awards for Methodological Innovation and Impact, presented at the final Relu conference in 2011, and initiated by the Director's Office, provided an innovative means of recognising and celebrating the collective achievements of the researchers.

A programme-level communications plan also provided an effective framework for communications across the programme. The Director's Office established very recognisable branding that achieved a high recognition factor and was trusted by stakeholders. A dedicated Communications Manager enabled the research to reach a much wider audience by achieving wide coverage in the media (over 700 items – see Annex C.9) and by producing 41 Policy and Practice Notes on the research findings and 16 Briefing Papers, all written in accessible language and targeting stakeholder audiences. Our approach to adding value is discussed further under 5.2 below.

Providing intellectual leadership
The Director's Office has provided considerable intellectual leadership on interdisciplinary perspectives of rural economy and land use and in methodological innovations concerning interdisciplinary research and processes of collaborative research. They have given over 120 presentations and keynote addresses (Annex C.5) and published 33 journal articles and other publications (Annex C. 6). The Director's Office also facilitated six (and edited four) themed issues of highly respected mono disciplinary journals, drawing in articles from the different waves of research within Relu and setting out an ambitious intellectual agenda for interdisciplinary socio-technical research (Annex C.3). The Director's Office also provided considerable input to individual research projects in their set-up stages and ensured that they met the conditions set out by the Research Councils. Visits to each project during its first year provided an opportunity for monitoring and feeding into the design of the interdisciplinary methodology and intellectual process of the research. Finally we played a prominent role in the design of research call specifications (covering both scientific scope and the application procedures necessary to enable interdisciplinary research) and assessment of research proposals. In all we took part in 13 assessment panels, providing overviews of the scientific scope of the suite of research projects, and offering individual reviews of 421 applications. We engaged in detailed discussions with projects over meeting conditional requirements on awards.

Providing a lead on engaging with potential users of the research, especially users outside the research community

The Director's Office orchestrated a major programme of engagement and knowledge exchange with several thousand stakeholders. The overall approach is discussed in sections 2.1, 3.1 and 5.2**.** To ensure relevance of the research we consulted widely among stakeholder organisations in the formulation of the research specifications and engaged in countless high-level bilateral discussions with stakeholders (these are itemised in Annex B). Stakeholder forums were formed to bring together key stakeholders from the public, private and voluntary sectors to act as sounding boards on research programme and project development (Annex D). Relu's food chain projects were informed by the Food Chain Forum 2005-2008, rural land use projects by the People and the Rural Environment Forum from 2006-2009, and disease projects by the Animal Plant Disease Forum from 2009-2011. Stakeholder Engagement Plans were also put in place with key stakeholders and the Director's Office organised and funded a Work Shadowing scheme, to introduce staff to the action-contexts in which their research could be used. Visiting Fellowships were funded to enable policy makers and practitioners from the commercial, voluntary or public sector to visit a Relu research team or cluster of teams with a view to exploring the implications of the research for their work and to raising awareness of their interests among the researchers. Conferences and workshops organised by the Director's Office also aimed to engage research users in a very active fashion, rather than just providing an opportunity for researchers to report on their research. By means of techniques such as video box facilities, debates and science fair formats, stakeholders were enabled to play a full part in the knowledge exchange process and helping to shape future activities. Finally, publications produced by the Director's Office (including the Briefing Paper and Policy and Practice Note series) synthesised results and implications of the research across the different themes and targeted the policymaking and practitioner communities. Many targeted specific audiences, including land based practitioners, and national and local government. Stakeholder comments and contributions were also fed back into the evolution of the series.

Providing input to public policy debates

The Director's Office undertook strategic influencing in important areas of public policy, including food security, land use and animal and plant disease. A good example of this was Relu's input into various inquiries on the future of land use (see 4.4.4) For this we appointed two land use policy analysts, backed by an expert advisory group, to draw strategic lessons from research projects and to enhance the impact of the programme's research. We also held an on-line "Great Land Use Debate", involving a wide range of contributors, produced the briefing paper "*Landmarks for Policy*", and influenced the setting up of a Foresight Programme on land use. More broadly, by drawing on its regular publication series, the Director's Office was able to respond to government consultations in a timely and focused way. In some instances highly skilled consultants were commissioned to assist in this process and the Director's Office team prioritised this time-sensitive activity in order to feed into the policy cycle wherever appropriate. We coordinated and developed 21 programme level responses to major governmental consultations (see Annex C.7).

Providing a channel of communication for the research councils with the research community to explain council policies

The Office was in regular formal and informal communication with researchers and formed a real research community during the lifetime of the programme. The quarterly newsletter and more frequent news alerts enabled the Director's Office to feed information from the Research Councils to projects, while more informal

contacts were fostered by the regular workshops and activities that took place across the programme. This meant that the researchers were open to communication and valued the information provided. Communications of Research Council policies to researchers are listed in annual reports from the programme available on the Relu website.

Providing an input to research council policy debates to help council policy making take account of views of those responsible for investments
Lesson learning from Relu was a major focus throughout the programme, which meant Relu had significant and widespread impact on the profile of interdisciplinary research and knowledge exchange within science policies and strategies, and helped catalyse a cultural change in outlook among key research funders and technical agencies in the UK. Lesson learning focused on implications of the programme for interdisciplinary research practices, interdisciplinary programme management, collaborative knowledge exchange processes and mechanisms, and methods for accounting for research impact. We carried out multiple briefings of research council staff from ESRC, NERC and BBSRC, and other high level science funders and policy makers (including the Government Chief Scientist) on the process lessons from Relu and contributed dozens of presentations and keynote addresses to Research Council events. There have been multiple briefings of follow-on Research programmes, notably LWEC and Global Food Security and lesson learning from Relu has been a key focus of a follow-on LWEC fellowship held by Jeremy Phillipson. These are all itemised in Annex B and Annex C.5. In May 2012 the Relu PMG and SAC brought Chief Executives from ESRC, BBSRC and NERC to the table to hear feedback from the programme and from the researchers, particularly on the experience of managing an interdisciplinary programme of the size and scope of Relu. Briefing papers from Relu give a good account of the philosophy and novel techniques developed for communications and knowledge exchange and these have fed back into the Research Councils.

Providing advice to research teams and the research councils over securing maximum value for money
The Director's Office was especially active in extracting and disseminating process learning to enhance the value for money of research investments. This work focused on Relu's approaches to interdisciplinary programme management, knowledge exchange and impact. This is summed up in Relu's Briefing Paper 16 *Adventures in Science* published in 2011. It identifies the major lessons on interdisciplinarity to be drawn from the programme and can be viewed as a handbook for future research council initiatives. The briefing paper explains the novelty and innovation of the programme and how this enabled it to succeed in engaging stakeholders and promoting research findings. The briefing paper was the last in a series of briefing papers reflecting on the process lessons of Relu which were disseminated actively within the Research Councils.

The process of developing and investigating the Relu experiment fell to the Director's Office**.** We utilised our position as participants in, and observers of, the programme process to develop insights into interdisciplinary working and knowledge exchange between stakeholders, and to experiment further with different approaches to enhancing the impact of research. We conducted large scale national surveys of stakeholder engagement methods in research and of interdisciplinary research practices, and pioneered the development and use of the SIAM (Stakeholder Impact Analysis Matrix) method of stakeholder analysis. The Office also carried out our own investigation into the role of knowledge exchange mechanisms and intermediaries between research and practice through the *Science in the Field* project (2008-2011) (see 4.2.3). The findings from all these research approaches were distilled into an

understanding of interdisciplinary research and knowledge exchange activities and policies which were published in a series of articles. Overall key findings from this research have included:

- Demonstrating the institutional obstacles and requirements for effective interdisciplinary research programmes and policies within the UK Research Council system and beyond.
- Identifying the range of analytical methods and approaches for collaboration between social and natural scientists, including the various roles of social scientists within interdisciplinary research projects and their input into socio-technical research agenda setting.
- Highlighting the benefits of interdisciplinary research spanning the social and natural sciences in enabling socio-technical innovation, in such areas as the management of animal and plant diseases, sustainable food chains and rural land use.
- Providing a systematic understanding of the mechanisms for effective knowledge exchange between research, policy and practice, and the ways in which research findings impact on policy and practice, and the importance of stakeholder engagement during the process of knowledge production itself.

Many keynote presentations and bilateral briefings were given by the Relu Director's Office on Relu's approach to interdisciplinary programme management and knowledge exchange to Relu's funding councils (BBSRC, NERC, ESRC) as well as other Councils (notably EPSRC and AHRC). This included briefings and sessions for ESRC Research Committee and BBSRC Sustainable Agriculture Panel and knowledge exchange committees and personnel. We regularly briefed and made presentations to many other research programmes, such as Quantifying and Understanding the Earth System, NERC Natural Hazards, Ecosystem Services for Poverty Alleviation, UK Environmental Observation Framework, National Centre for Research Methods, LWEC, Global Food Security etc.. In one of many examples, the Relu Director gave the opening address at a two-day Masterclass for managers and managers-to-be of interdisciplinary research programmes. The event was organised by Catherine Lyall, Laura Meagher and Ann Bruce, of the University of Edinburgh. The focus of the event was on the challenges of interdisciplinary leadership at the project, programme and institutional levels. It was attended by about 40 research leaders, including major research programmes in the UK.

Several meetings were held with LWEC staff and presentations given to LWEC events on Relu's approach to knowledge exchange and impact analysis. There were multiple requests for advice and information about Relu's methodology for accounting for knowledge exchange and impact (SIAM) developed by the Director's Office. Relu fed into the design of the LWEC guidelines for knowledge exchange. The Guidelines, disseminated across the LWEC national portfolio of programmes, contain multiple references to innovations, mechanisms and learning developed by the Director's Office. We continue to advise the councils beyond the programme through, for example, the Relu Assistant Director's LWEC fellowship, with a brief to further embed experience on interdisciplinary and knowledge exchange procedures and policies. Both the Living with Environmental Change Partnership and Global Food Security Programmes are incorporating the recommendations and learning from Relu. One output of this has been launch of an LWEC Policy and Practice Note series modelled on the Relu approach.

ESRC's revised research data policy has also drawn on Relu experience by introducing the need for data management planning for all grant applications. Relu Data Support Service Manager, Veerle Van den Eynden, worked closely with ESRC staff to ensure that valuable experiences of data management planning and data

archiving from interdisciplinary projects were incorporated. Research applications now have to include data management plans when they are submitted to ESRC, and researchers are expected to make data as openly available as possible for subsequent use. In many respects Relu led the way for the Research Councils in demonstrating the benefits of proactive data management.

The impact of the programme in encouraging added value more broadly within the Research Councils is demonstrated by comments from senior officials concerning how they are incorporating insights into the design of major new programmes, including interdisciplinary commissioning, assessment, programme design and decision making. For example:

- BBSRC's review of biological research relevant to climate change recommended: *"research should build on experience from Relu… to study the interactions of social and economic factors with management for biodiversity in agricultural systems*" and commented that Relu "*broke new ground in forging collaborations of biological and environmental science with social and economic research*".
- The NERC Head of Science Pamela Kempton described how *"Experiences with Relu have been very informative in terms of developing approaches to all aspects of commissioning interdisciplinary research. We have used many of the lessons learned in the early days of Relu to commission subsequent interdisciplinary programmes ... Relu really led the way for us".*
- Paul Rouse, Senior ESRC officer said that *"Relu is widely held in high regard as a model for future and evolving partnerships in, for example LWEC but also more widely as an exemplar for cross-council and other programmes such as Global Food Security. Essential to creating a strong environment to allow interdisciplinary research to flourish under the programme has been the way in which peer review has been conducted"*.
- According to Brian Harris, Head of Agriculture and Food, BBSRC: *"One of the most significant impacts of Relu has been its facilitation of the engagement of biologists with social scientists. BBSRC values the new cross-cutting approaches, encouraged by Relu, to the framing of scientific questions in ways that enhance the relevance of research to policy and practice. Lessons learned from Relu now need to be applied to "grand challenges" such as global food security and living with environmental change, and I would like to see the extension of its integrated approach to other areas of BBSRC-funded research"*.

Approaches and tools developed by the Director's Office as part of the Relu experiment have been used within ESRC and NERC knowledge exchange and impact best practice guides and within many national research programmes. These include mainstreaming of work shadowing and visiting fellowship schemes, stakeholder forums, a national Policy and Practice note series, and highlighting SIAM as a new tool for measuring research impact. Evidence of impact on knowledge exchange strategy include the following testimonials:

- According to Faith Culshaw of the NERC Knowledge Transfer team: *"NERC uses Relu as an example of good practice in user engagement and knowledge exchange, in its own KE policy* [and advice] *it supplies to all new research programmes. NERC highlights Relu good practice in publishing briefings particularly targeted at policymakers. … [and] building on the success of Relu's workshadow scheme, NERC also now offers a workshadow option - a more bottom-up approach, through which we have supported some very successful placements"*.
- Fiona Armstrong, ESRC Head of Knowledge Transfer, said that *"ESRC does in fact consider Relu to be a source of good practice* [and] *it will be used to highlight the innovative ways in which Knowledge Exchange and Communications tools*

can be used to develop and deliver a pathway to impact. [Relu's] *practical experience, both in terms of thinking about potential pathways and then implementing them, will I am sure inspire other researchers who might be otherwise daunted. ..In particular, we found* [Relu] *evidence that coproduction has a positive impact on academic researcher as well as users, particularly enlightening"*.

- According to the LWEC Head of Directorate: *"LWEC has learned from Relu that focussing on the aims of research with stakeholders from the outset shifts emphasis away from discrete scientific disciplines and onto the problems that the research aims to solve. Relu's publications help show how to embrace interdisciplinarity in both the scientific and the policy layers, through production of special scientific journal issues that create an interdisciplinary culture and through policy practice notes that create messages for policymakers from across a range of projects. … Relu's innovative workshops have influenced the approaches taken in meetings for the development of other LWEC programmes and have helped the LWEC Directorate to be more creative in setting up opportunities for knowledge flow between academics and funders. Relu has helped to develop the LWEC Directorate's understanding of the value of fellowships"*.

5.2 Added value of the Director's Office

The Director's Office comprised a director, assistant director and science communications manager. The Office had a devolved budget that provided for an integrated approach to scientific leadership and knowledge exchange and ensured the critical flexibility and operational responsiveness needed for entrepreneurial programme management. Much of our energy was put into active relationship management, both internal to the programme and with external audiences and interests. The interdisciplinary nature of Relu demanded a flexible and opportunistic approach of spotting emerging opportunities and facilitating connections. Because interdisciplinary research opens up new perspectives on contested problems, there is a need to create novel constituencies of both scientists and stakeholders to take forward the work. The Director's Office integrated knowledge exchange and scientific leadership functions so we were able to shape these research and stakeholder constituencies so that they were coterminous and mutually supportive.

A critical requirement was for the programme to create a supportive framework that would induce projects to work together in support of programme-level objectives for knowledge exchange. This entailed providing various types of opportunities, including access to training and networking, access to 'hard-to-reach' or elite stakeholders, access to resources for collaboration, access to major dissemination networks and access to prominent publishing and publicity outlets. Above all, it meant giving projects access to a respected brand identity that stakeholders recognised.
We placed significant emphasis in establishing brand identity and recognition. A brand defines who you are and what you offer: it's a promise about the quality and nature of your product. That brand is expressed via a corporate identity and livery that makes you instantly recognisable to your customers. Setting up this supportive framework of opportunities called for adequate promotional funding for a programme-wide communication strategy oriented towards impact generation.

We enabled a culture of knowledge exchange that was supported by a sustained approach to strategic influencing and relationship management. By engaging stakeholders early, we aimed to respond to stakeholder interests but also prepare stakeholders for the reporting and application of results. The cross-cutting nature of interdisciplinary programmes means that often there are not ready made stakeholder

communities out there to influence. We therefore set out to build Relu's own novel constituencies.

As well as establishing a major national network of several thousand stakeholders and researchers that received quarterly newsletters and newsflashes, by developing its stakeholder databases Relu created the means for getting research findings to the people who actually want particular information, both via written communications and at its events. We designed these to work together: with the publications providing useful materials for workshops, project events and face-to-face briefings for stakeholders; and Relu's interactive events generating comment and discussion that fed into publications.

We also built communities of 200 to 300 key stakeholders around major clusters of projects with an orchestrated succession of targeted events, internal policy briefings and synthesised outputs. At the core of each we set up a national stakeholder forum involving a couple of dozen experts from commercial, public and voluntary sector organisations. The forums acted as critical sounding boards for the programme's knowledge exchange strategy. They were important devices for influencing key movers and shakers. The programme also actively recommended researchers as experts to key advisory and research positions. In this way, we were able to shape the terms of debate for reporting scientific results from the programme.

We placed much emphasis on building networks between research and practice for knowledge exchange. A central part of this was experimentation in the design of interactive workshops and events. We avoided holding conventional scientific conferences – there were plenty of these already for our academics to attend. Events therefore focused on building understanding and networks through interactive formats. A further key element in network building was also people exchange. We devised highly successful schemes that we managed which funded researchers to spend time work shadowing in settings in which their research may be relevant, whether in the public, private or third sector, and also for stakeholders in turn to visit projects to develop dissemination activities. We funded 70 such exchanges. Stakeholders and researchers found them useful. They brought an outside perspective that helped identify emerging issues and research needs. People exchange also enhanced analytical capabilities and strategy development of stakeholders. Evidence from the programme was accepted as particularly relevant having been developed in collaboration with policy and industry stakeholders.

We devised a distinctive approach to science communication through the skills of our science communication manager. A central mechanism was Relu's publications – Briefing Papers and Policy and Practice Notes - that translated research findings into everyday language, and addressed the specific interests of groups of stakeholders. This back catalogue of analytical and practical source material meant we were able to provide pertinent evidence to multiple policy consultations, for which a timely response was essential. We actively targeted links with knowledge brokers as dissemination partners, such as agricultural journalists, field advisors, and interest groups. Communications were directed at the specialist and technical press that is key to the knowledge renewal of tens of thousands of land managers and other rural professionals.

As well as finding the best means of promoting knowledge exchange, how could we tell if we were being effective? There were 4000 stakeholders involved in Relu research projects. We therefore developed a diagnostic tool, the Stakeholder Impact Analysis Matrix (SIAM), to track their involvement annually, what they brought to it and what they took away from it. We think a system of this nature should be

systematised within research programmes. There are many advantages in recording these formative effects. This may seem to run counter to the orthodoxy that impact analysis should be left until many years after research has been completed. However exposing the live connections made in knowledge exchange establishes links of causality and an 'audit trail' of early encounters between researchers and stakeholders that give a steer about where eventually to look for longer term research impacts. The SIAM Methodology has attracted huge interest among science funders and is written up in the Relu Briefing Paper *Telling Stories: Accounting for Knowledge Exchange*, and an article in *J. of Environmental Management*[6].

The research and management of the Relu programme was acclaimed by a range of influential people from policymaking, land use practice and academia. Professor Philip Lowe was appointed OBE for services to the rural economy in 2003 and in 2013 was awarded the Bertebos Prize for his significant contribution to sustainable rural development, land use management, and interdisciplinarity and specifically recognising the achievements of the Relu programme.

Relu researchers, the Relu Director and Assistant Director have also been invited to contribute to many national bodies at a high level. For example Jeremy Phillipson has been appointed to the DECC/Defra Social Science Expert Panel and as a member of the Scottish Government RESAS Strategic Research Board. In 2007 Professor Philip Lowe was asked to chair the group set up to consider and report on the changing public priorities in Great Britain for farm animal health and welfare, food safety and public health and the ability of farm animal veterinarians to respond to these demands. Chief Veterinary Officer Nigel Gibbens commented that "*He earned the respect and active support of veterinary professionals and others through a working group which met to build an evidence base on which Professor Lowe prepared a personal report. 'Unlocking potential' was subsequently published and provided an insightful and fresh analysis to issues which directly affect the future of the veterinary profession. The BVA has subsequently implemented Professor Lowe's primary recommendation by establishing a Veterinary Development Council. The Royal College likewise responded to another recommendation by establishing a working party to review the workings of veterinary specialisation*." Professor Lowe was also thanked by Rural Affairs and Environment Minister Dan Norris MP in 2010 who said his "*outstanding involvement in the SAC-ED contributed to the significant impact the recommendations have had on Defra's approach to animal disease*."

Other endorsements for the programme have come from all quarters, for example:

- Professor Nigel Brown Senior Vice Principal, Planning, Resources and Research Policy at the University of Edinburgh said Relu "*set a standard to which …other interdisciplinary projects much aspire*."
- Sir John Beddington, Government Chief Scientific Adviser praised Relu as "*an extremely progressive programme of which you and your colleagues should be proud*."
- Helen Browning, organic farmer, Chief Executive of the Soil Association and member of Relu's Food Chain Forum said "*The Relu programme has been ground-breaking in the way that it combines both natural and social science disciplines. Project discussions have been fascinating, and opened up new avenues of thought and enquiry; one day, perhaps all research will be conducted this way.*"

[6] Phillipson, J., Lowe, P., Proctor, A. and Ruto, E. (2012) Stakeholder engagement and knowledge exchange in environmental research' in *J. of Environmental Management* 95(1), 56-65.

- David Gregory Technical Director Marks and Spencer said "*In a world faced with new and conflicting challenges, the Relu approach uniquely cuts through the complexities to provide ideas and practical science which can guide decisions by businesses and other stakeholders. On a personal level, I have found the research and the subsequent onward communication of the RELU programme to be highly effective*."

5.3 Unexpected issues

The Director's Office adopted an opportunistic approach, responding to windows of opportunity through which to engage with policy and practice and build the scientific agenda of the programme. This flexible approach to planning and design of programme activities and mechanisms, much of which could not have been foreseen at the outset of the programme (for example the launching of Relu's policy and practice note series, journal special issues, or decision to run major research calls on the management of animal and plant diseases, or adaptation to environmental change), was a key to Relu's success. This flexibility was supported by an evolving, responsive and rolling communication plan and advice and feedback from Relu's Strategic Advisory Committee and advisory forums.

5.4 Co-funding

Of the co-funding brought to the programme £466,500 was secured or negotiated by the Director's Office, including:

Conference sponsorship: £6000 (One North East, Natural England)
ESRC-SSRC fellowship funding: £16,800
ESRC and LARCI knowledge transfer funding: £14,700
ESRC Science Week: £4000
Defra/ESRC/Scottish Government/Commission for Rural Communities for Relu Land Use initiative: £61,000
Defra for Animal Disease phase £239,000
Defra for water catchment phase £125,000

Part 6: Reflections on the Programme and the Director's role

Our experience is that dedicated resources and integrated structures and processes are needed to promote true cooperation between disciplines and active engagement of stakeholders within the research. This is a clear message of Relu and the institutional innovations it tested. The Director's Office was supported in this role by highly committed and skilled staff within the Research Councils who were critical to the ambitious steps that Relu took and overcoming the challenges it faced. However, Relu did not break the mould and the challenge looking ahead is how to further translate its programme innovations into changes in policy and procedure within the Research Councils.

Part 7: Forward Look

It was an ambition of the programme to enhance capabilities for interdisciplinary research between the social and natural sciences beyond the life of the Programme. That has been dependent as much on how Relu could influence institutional cultures and procedures as changes in outlook and behaviour of the scientists involved. As well as publishing and promoting the substantive and methodological insights far beyond the programme, Relu therefore placed significant importance on inputting into science policy development and new research programme design within the Research Councils and other key research funders.

Perhaps the most tangible lasting legacy of the programme is the Relu researchers who have now moved to prominent positions in successor programmes. They are more confident in their ability to work with researchers from other disciplines. It is now more widely accepted that the complex problems facing society have strong socio-economic as well as technical dimensions. It follows that strategic research to tackle them must be engaged with stakeholders and be interdisciplinary, combining social and natural sciences.

The challenge ahead will be for future research initiatives to truly embed an interdisciplinary approach involving social and natural sciences within their research activities and governance structures. It will be critical that social sciences are recognised as playing a strategic role in helping shape innovation.

Together with new areas of research (for example around the bio-economy and new environmental technologies), continuing attention is needed to revisiting well-established research priorities, but through a socio-technical and socio-ecological lens (for example the sustainability of marine ecosystems, environmental change mitigation and adaptation, food security and land use governance, and the management of animal and plant diseases) and in establishing research and policy and practice approaches that can address long run challenges in more joined up ways (for example across water, energy, food and environmental sectors).

Annex A: Large Research Projects and Fellowships

5.1 First Call Projects on Sustainable Food Chains

RES-224-25-0041, Prof H Buller, University of Exeter
01 Jan 05 - 30 Dec 07
Eating Biodiversity: An Investigation of the Links between Quality Food Production and Biodiversity Protection

This project investigated the links between quality food production and biodiversity protection by looking at the benefits of grazing farm animals on natural grasslands to farm businesses, product quality, ecological management and human health.

Researchers undertook detailed fieldwork on over 40 beef, lamb and cheese producing farms where farmers have specifically sought to graze their animals on natural grasslands and where this is or might be considered as an actual or potential source of added value. The results might be divided into three sets: the contribution of on-farm grassland management to environmental value; the effects of natural grassland pasture feeding on the quality of the final animal products; and the impact of such production on farm businesses and rural development.

In terms of environmental impacts, the results show that, on certain farms, conversion from formerly improved pastures to natural grassland is leading to a net increase in the area under permanent grass, with an associated growth in grassland diversity. Furthermore, the extensive grazing practices on the farms are having an identifiable and beneficial impact upon the floristic composition. As many of the farms concerned are located within what are recognised as priority habitats (notably heath and moorland and calcareous grassland), these high value, extensive systems are helping to reverse biodiversity loss.

Detailed laboratory analysis indicates that differences in pasture biodiversity can positively affect meat quality, chiefly as a result of the impact of plant species upon the rumen process. These findings confirm research that has been undertaken elsewhere. There are a number of elements to this. First, the research reveals that, when controlling for breed, lamb meat produced on biodiverse rich grassland (particularly heather pasture systems) displays higher levels of Vitamin E (a natural anti-oxidant affecting shelf life) than control meat. Second, lamb meat from biodiverse rich grasslands recorded generally lower skatole levels (a product of rumen fermentation which adversely affects meat taste, particularly when grilled) than control meat. Third, lamb meat from biodiverse rich grassland recorded higher levels of a number of nutritionally healthy fatty acids (notably n-3 polyunsaturated fatty acids and conjugated linoleic acid) than control meat. Fourth, beef breeds (such as Longhorn) were shown to be more suited to biodiverse pastures and generally yield higher meat quality.

For producers, this has potentially significant implications for farm businesses and, ultimately for rural development. By integrating natural value into production chains, producers are able to increase the value of their products and, through marketing and sales strategies, retain a greater proportion of that value within the farm business. The analysis of returns shows that, despite possible lower production volumes (in body weight per animal and in the number of animals produced), the higher prices obtained, in some cases combined with payments under agri-environmental schemes for natural grassland management along with other ‘Pillar 2’ measures, make this form of farm enterprise profitable in what are often otherwise considered as marginally productive regions.

RES-224-25-0044, Prof G Edwards-Jones, University of Wales, Bangor
01 Dec 04 – Mar 08
Comparative Merits of Consuming Vegetables Produced Locally and Overseas

The project posed the question 'Which is best; to produce fruit and vegetables in the UK, or to import produce from overseas?' Researchers investigated different aspects of growing local food, including the environmental impact, the emission of greenhouse gases (GHGs) and compared these with importing produce from Spain, Kenya and Uganda. They also sought to understand how important the localness of vegetables was to consumers.

In order to explore these issues researchers undertook field work on farms and questioned farmers about their businesses. They held focus groups and one to one interviews with local people in rural areas and carried out a large scale survey of urban consumers. They then used a series of models and analytical techniques to help understand these data.

The research focused on the cabbage family (cabbage and broccoli), peas and beans, and lettuce and leafy salad in three study regions in the UK (Lincolnshire, Hereford & Worcester and Anglesey) and three overseas countries, Spain, Kenya and Uganda.

They measured the GHGs emitted from fields in each study region, and showed that vegetables such as lettuce emitted more greenhouse gases than did other types of crops such as wheat. They used data on GHG emissions and other environmental information in a Life Cycle Assessment (LCA) of the different vegetables. The LCA looked at the environmental impacts of the entire production chain, including growing, processing, retail and consumption.

The results showed that for some crops like beans, more GHGs are emitted from the production and consumption of African crops than UK grown crops. This is because the aircraft used to transport the crops to the UK release a large amount of GHGs. The same is not true for lettuce from Spain. During our winter Spanish lettuces are grown outside in the field. In the UK, lettuces are grown in the field in summer and in greenhouses in winter. Greenhouses use a lot of energy for heating and lighting. They found that the GHGs from UK greenhouses during the winter were greater than were the emissions from transporting the lettuces by truck from Spain to the UK. The situation for broccoli is different again, as it is grown outside in both Spain and the UK. Here UK broccoli released fewer GHGs than Spanish broccoli. The LCA also showed that a large proportion of the GHGs emitted during the life cycle of a vegetable were from its storage, use and disposal in the home.

RES-224-25-0048, Prof WP Grant, University of Warwick
01 Nov 04 – 31 Oct 07
The Role of Regulation in Developing Biological Alternatives to Pesticides

Fungi that kill insects are naturally widespread in the environment and can be used to control insect pests of crop plants. Fungal bio-pesticides have been produced in the past, but little work has been done on their environmental sustainability. The project looked at the potential for these and examined the rules governing the introduction of bio-pesticides in the UK, Europe and the USA to assess whether changes in regulations might encourage a move towards bio-pesticide use.

There has been a poor uptake of microbial pesticides in the UK. The regulatory system in the UK was developed in accordance with a chemical pesticides model which did not facilitate the registration of biopesticides.

The regulatory agency, the Pesticides Safety Directorate (PSD), introduced a Pilot Project to facilitate the registration of biopesticides in 2003 and converted this into a Biopesticides Scheme in 2006 offering features such as pre-submission meetings, reduced registration fees and a Biopesticides Champion within PSD. The project was able to study this process of regulatory innovation and work with PSD to provide training to facilitate the achievement of their objectives. It also enabled the development of a model specifying the conditions under which regulatory innovation was likely to occur.

Outputs from the project will explore the wider implications of the system of private retail governance which some supermarkets are operating. Some retailers cultivate a greener image than competitors as part of a marketing strategy. This leads them to prohibit or control the use of pesticides that have been approved by the regulatory system. A cross-national comparative element was introduced into the analysis by comparison with regulatory arrangements in Denmark, the Netherlands and the United States.

Relatively little is still understood about the underlying ecology of bio-insecticides. Research results indicate that habitat type is likely to influence the environmental fate and behaviour of entomopathogenic fungal strains released as biocontrol agents. It would make sense to develop control agents for a particular habitat type using fungal strains from a genetic group adapted to the same habitat. Ecological niche theory suggests that such strains are likely to persist for longer (thereby giving more effective pest control) and there should be less of risk of the strain establishing in a heterologous habitat and causing unintended effects on nontarget organisms.

The project team submitted a response to the draft National Pesticides Strategy and also took part in the informal and formal consultations run by Defra on the future of PSD. At a European level, the project was represented on the steering group of the European Commission policy action, REBECA (Regulation of Environmental Biological Control Agents). Project members took an active role in various workshops and played a key role in shaping the final report with Professor Grant serving as a member of the round table at the plenary session of the final conference in Brussels. The work undertaken in the project is consistent with Defra's Science and Innovation Strategy objective to develop alternative plant protection technologies to reduce reliance on conventional pesticides.

RES-224-25-0066, Dr DC Little, Stirling University
03 Jan 05 – 31 Jan 08
Warmwater Fish Production as a Diversification Strategy for Arable Farmers

This project aimed to develop technical guidelines for a sustainable system for tilapia culture as a potential diversification strategy for farmers in the UK. It involved a comprehensive analysis of the practicality, sustainability and viability of the system through laboratory and on-site investigations, as well as trials with commercial partners.

Many farmers have underutilised farm buildings that if insulated would be suitable for farming these fish, as well as relevant husbandry skills, and some have access to on-farm energy sources that have little alternative use. Moreover many farmers were attracted to the project concept through an appreciation of how fish might be a

valuable and novel product, complementary to their current activities and allowing them to diversify through food production. Initially it was perceived that a culture system that has been promoted elsewhere but was unproven under commercial UK conditions (Activated Suspension Technology, AST) might be appropriate rather than more conventional Recirculated Aquaculture Systems (RAS). A series of technical trials established that AST was highly uncompetitive with RAS and the researchers concluded that fish welfare and resource use efficiencies were particularly high for a simple, modular design of RAS.

This comparison of technical systems has provided conclusive information for stakeholders within an emerging and important area of aquaculture. It has provided an evidence base for future investors and promoters and contributed to the knowledge base on sustainable aquaculture strategies.

A simplified RAS approach was further developed with inputs of UK-based commercial collaborators with a view to identifying interested adopters in the UK farming industry. An integrated approach to identifying market opportunities for various scales of production was pursued throughout the project. Focus group-based research confirmed several potential niche markets for such 'ethical' fish produced locally, the results of which were fed back into the cost models for potential adopters.

An important component of the project was assessing the interest and capacity among both farmers and other stakeholders in using tilapia as a diversification strategy. The risks associated with such a novel production and marketing system have emerged as the major impediment to farmers seeking to develop a pilot system. The reluctance of Government agencies to support both production and marketing start-ups of small-scale aquaculture have also proved a problem since such scheme attributes often disallowed support for the type of pilot required to establish the approach in a commercial environment.

The integration of technical and marketing research has been critical in the project and led to new insights to developing novel diversification strategies and in generating data for use in assessing public health/environmental health impact.

RES-224-25-0073, Prof B Traill, University of Reading
01 Apr 05 - 30 Apr 08
Implications of a Nutrition Driven Food Policy for the Countryside

This project drew on economics, psychology, ecology, crop science, animal science and human nutrition to assess the potential for improvements in the nutritional quality of soft fruit, lettuce, and meat and milk, and the possible implications for both human health and the countryside.

Policy makers have become increasingly concerned about the obesity 'epidemic' and other aspects of an unbalanced diet, such as consumption of too little fruit and vegetables and too much saturated fat. The project aimed: to determine the potential for agricultural production systems to produce crops and livestock with enhanced nutritional profiles; to examine the determinants of overall diets, attitudes and constraints to healthy eating sensitivity of diets to prices, attitudes and demographics and hence policy options to promote healthier eating; and to model the impact of three scenarios on changes in diet on land use and production, wider rural employment implications of land use change, and impacts on landscape and biodiversity and public preferences for different types of land use change resulting from a nutrition-driven food policy

The researchers experimented with using plastic filters in polytunnels to study the effects on levels of beneficial compounds (phytochemicals). For soft fruit, the results were found to be limited in comparison with the effect of variety, but for lettuce results were more positive. In lamb, enhancing biodiversity had a positive impact on meat fatty acid profile as reflected in increased levels of n-3 and total polyunsaturated fatty acid profiles. In consumer studies, choice experiments show consumers willing to pay a premium for enhanced health attributes in both strawberries and lamb in excess of production cost increases. The researchers conclude there is potential for choosing varieties, breeds plant and animal and husbandry methods to select for healthy nutrient profiles and consumers would be willing to pay for significant improvements provided the products could meet health claim and labelling regulations.

In the investigation of policy options to encourage healthy eating, selected fiscal measure (1% tax per percent saturated fat used to subsidise fruit and vegetables) led to intake of saturated fatty acids and cholesterol falling by 4.5% and 5.4% respectively. Other nutrients such as sodium and all categories of fats, as well as total energy intake would decrease, while protein, fibre and fruit and vegetables intakes would increase (by 4.5% for the latter). Attitudes and constraints to healthy eating were modelled effectively and linked to demographics. This enables the targeting of specific healthy eating messages to specific population segments through leaflets and marketing campaigns; for example, young females care more about healthy food for reasons of appearance than health. The disappointing finding is that the low SES groups, who are known to eat least healthily, prove to be the most difficult group to target.

Healthy eating scenarios imply loss of demand for red meat. Regions dependent on beef and sheep production are hard hit. These more remote regions are not well suited to production of arable crops, so will not benefit from growth in demand for cereals and fruit and vegetables. Structural change in these areas would be extreme, with declines in the number of farms and average farm sizes increasing. The overall net margin of agriculture would rise due to increased production of higher market value crops. In the East and South East, intensive horticulture will expand, together with the use of poly-tunnels and irrigation. In those areas able to take advantage of the new arable and horticultural opportunities, farming income will increase, but significant increases in farm employment would not occur, due to dependency on casual labour and the scope for the use of machinery for these operations.

The predicted spatial distributions of farmland birds resulting from land-use projections of policy scenarios differs among species. Species associated primarily with arable land were affected negatively, whilst those associated with grassland landscapes expanded their range. In contrast, the predicted responses of birds typical of mixed farming varied considerably and were predominately determined by spatially explicit changes in the balance of different agricultural land uses. The impacts of the scenarios on the landscape character vary spatially across England according to differences in the extent of permanent pastures, stocking rates and crop diversity.

RES-224-25-0086, Dr D Chadwick, IGER, North Wyke
01 Feb 05 - 30 Jun 08
Sustainable and Safe Recycling of Livestock Waste

This project evaluated the changes needed in management practices to limit the risk of pathogen transfers from grazing livestock, manures and other farm wastes to

water courses. The effect of these changes on the economics and practicalities of farming were investigated as well as the 'knock-on' effects for local communities and industries reliant on clean water supplies.

The project has developed a farm scale risk tool to indicate the likelihood of faecal indicator organism (FIO) loss from farm enterprises and to highlight key attributes of the farm system contributing to FIO loss. The 4 key risk components are; accumulating microbial burden to land, landscape transfer potential, infrastructural characteristics of the enterprise, and social and economic obstacles to taking action. It enables the farmer or other land manager to analyse where the most serious and difficult risks lie, and to mitigate these more effectively and efficiently.

The farm-scale toolkit highlighted that changing farmer attitudes to manure and land management is part of the process by which we can make our food and water safer, but that this not always enough. Appreciation of the interplay of social and natural processes and understanding this interaction will allow the policy community not only to target high risk areas, but also develop mitigation strategies that are sensitive to the different ways in which risk is produced. The review of management practices which could reduce FIO transfers to water was accompanied by the development of an FIO cost assessment tool to allow farmers and advisers to explore the financial burden of employing mitigation measures.

Results from replicated plot-scale experiments on FIO survival and dispersion from a range of faecal matrices were used to inform the risk assessment tools. This research also demonstrated the need to assess environmental trade-offs from different land management practices. For instance, slurry injection, as is required in several European countries to reduce ammonia emissions, rather than surface spreading, favoured survival of FIOs in the injection slots.

A citizens' jury heard evidence from 18 expert witnesses with different responsibilities and expertise in the area of microbial watercourse pollution and were asked to judge the nature and acceptability of these risks as this relates to the role of livestock farming, and what might constitute socially acceptable and sustainable pathways to their management. The process highlighted emerging public priorities for action and provided an opportunity for stakeholders to discuss policy approaches.

RES-224-25-0090, Prof R Shepherd, University of Surrey
01 Feb 05 – 31 Jul 08
Managing Food Chain Risks

Too often in recent crises in food and agriculture (e.g. BSE, E. coli, Foot and Mouth Disease) a narrowly technical perspective has been taken: the social, political and economic issues have been addressed too late in the process with the result that many people lose confidence in the authorities' management of the situation. The project therefore developed and tested method to incorporate the thinking and values of stakeholders into the scientific modelling of food chain risks.

The aim of the project was to design and evaluate decision support tools and processes for participatory risk management and communication across the food chain that fully integrate the views and values of all stakeholders, particularly those in the rural community. The work centred on three case studies: (CS1) pesticide residues on apples and pears; (CS2) campylobacter in chickens; (CS3) a crisis scenario related to contaminated chicken feed.

Participation was investigated in 11 workshops (including one web-based) bringing together different combinations of experts and stakeholders. The workshops were successful in highlighting new areas of concern (such as mixtures of pesticides) and this did not differ greatly between a group of experts on the one hand and experts and members of the public on the other.

In a second stream of research, statistical risk modelling both fed into each of the case study workshops and also made significant progress on specific technical aspects of modelling. A probabilistic model was developed and applied to exposure of children to the pesticide carbendazim in apples, apple juice and processed apple foods. A key feature was the development of new approaches, using Bayesian techniques, to model various sources of uncertainty and variability, including measurement uncertainty and calibration errors affecting chemical concentrations, and variability of pesticide residues between and within batches of produce. It was shown that measurement uncertainty can have a significant impact on results, with unquantified uncertainties making the quantitative estimates conservative. Further developments have modelled between and within individual variability in consumption and extended the approach to model consumption of more than a single food type. A simplified model was implemented as a web-based calculation tool for the public to compute their probability of exceeding recommended limits according to their age and diet.

The project found that risk information had a greater impact on perceived risk if attributed to the Food Standards Agency (FSA) rather than to the food industry, showing the FSA to be a more trusted source. Attributing information to a group comprising FSA experts plus stakeholders, rather than an FSA group alone, led to information being rated as more factual but the FSA were seen as less expert and to have less responsibility.

The project also investigated how stakeholders thought about the food chains for chicken and apples and the implications this has for communicating the risks involved. Innovatory methodology was developed("fuzzy felt") that involved constructing a picture of the chain, indicating where the risks were and how they should be mitigated. There is also a web-based version.

RES-224-25-0093, Dr AS Bailey, Imperial College London
01 Feb 05 – 31 Jan 09
Overcoming Market and Technical Obstacles to Alternative Pest Management in Arable Systems

This project investigated both the efficacy of alternatives to chemical pesticides and issues for producers in switching to them. Two alternatives were explored: habitat manipulations to encourage predators and parasites and semiochemical odours (natural smells) to manipulate predator distribution.

Much research in the recent past has demonstrated the potential viability of biologically based measures farmers can use to help control insect pests which could reduce pesticide use in commercial agriculture. Likewise, work across a range of scientific disciplines has drawn attention to the potential harm that pesticides can do, while environmental economists have shown that the public are willing to pay to see threats reduced. This research investigated reasons why much of the UK field crop agricultural sector still relies heavily on conventional toxic pesticides for pest management. Two alternative approaches to the control of cereal aphids, a herbivorous pest of wheat crops, were used as a case study of how to conduct Integrated Pest Management Research at a complementary range of scales.

Numbers of cereal aphids have been low in recent years but they are still a target of much insecticide use. Previous research has suggested that both conservation biological control (CBC) to promote predation and parasitism of pest populations and the deployment of nontoxic signalling chemicals (semiochemicals) can be used by farmers to boost the effect of natural population control mechanisms and limit aphid pest infestations. The techniques work in differing ways, CBC is said to boost populations of beneficial control organisms in the farmed landscape, while semiochemicals have been shown to help farmers direct naturally occurring beneficial organisms toward infested cropped areas. The project showed that CBC can, and is, providing background control of cereal aphids but this function can be improved by manipulating the environment. Semiochemicals can attract natural enemies into crops and reduce pest populations but these effects were difficult to measure in this study because of the very low levels of aphids present. A valuable new finding is that certain wheat varieties respond better to plant activator treatments than others.

Work to address the economic barriers to commercial use of these, and other, pest management techniques has highlighted the importance of government policy in the adoption process. The research reacted to concurrent policy changes in the UK which saw farmers implement a wide range of landscape changes on their farms. While these Agri-environment Scheme (AES) programmes are not specifically aimed to promote biocontrol of pests, AES options can produce habitats conducive to the promotion of biocontrol, although the removal of explicit reference to crop management with the withdrawal of Crop Protection Management Plans (CPMPs) is a setback. Researchers discovered that farmers do appear to be implementing a high proportion of practices and land uses which can be beneficial for biocontrol. They also found that farmers appeared to be combining these practices in coherent ways which could be considered as functioning IPM portfolios, including one that does appear to be associated with lower rates of insecticide use. One important outcome of the joint work and improved understanding of biocontrol processes and functions, and farmer adoption incentives is that we are now better placed to help reshape AES so that it explicitly promotes IPM.

5.2 Second Call Projects on People and the Rural Environment

RES-227-25-0001 Dr K Hubacek, University of Leeds
01 Mar 06 – 31 Oct 09
Sustainable Uplands: Learning to Manage Future Change

The aim of this project was to combine knowledge from local stakeholders, policy-makers and social and natural scientists to develop approaches to anticipate, monitor and sustainably manage rural change in UK uplands. The project started by identifying the current needs and aspirations of policy-makers and those who work, live and play in three large and very different upland case study areas (Peak District National Park; Nidderdale AONB and several catchments in Galloway, Scotland).

Information about drivers of change and their potential effects on system dynamics was obtained from stakeholders and researchers, and used to develop qualitative scenarios, while subsequent modelling work provided depth, detail and feedbacks to enhance accuracy and utility of the scenarios. By using model outputs as heuristics to support stakeholder learning and decision-making, this work helps us devise and explore adaptation strategies for coping with rural change in UK uplands.

As well as large numbers of publications and reports to government, researchers are engaged in major knowledge exchange projects that follow on from and build on the

work. Contributions to the policymaking process included commissions from the Commission for Rural Communities to feed into their Inquiry into the Future of England's Uplands, a review on The Future of the Uplands for the Foresight Land Futures project, submissions to the Scottish Government's Pack Inquiry and to Natural England's Upland Futures Project, and a case study based on work in the Peak District National Park for the Scottish Government Rural Land Use Study. Responses were submitted to: the Consultation on a Soil Strategy for England; Review of the Heather & Grass Burning Code; and Scottish Government Inquiry into the Future of Agricultural Support in Scotland.

The methodological framework from the project has been used as the core of a nine million Euro EU-funded project working in degraded drylands, and this also led to two members of the team being invited to lead authorship of an IPCC-style synthesis of current research and to make recommendations to the last Conference of the Parties to the UN Convention to Combat Desertification. A team member is also a contributing author to the Mountains, Moors and Heath chapter of the National Ecosystem Assessment.

Their work with other stakeholders has involved inputs to numerous strategies and reviews carried out by the third sector, a commission from Yorkshire Water to carry out research in Nidderdale on land management impact on water treatment costs and working with them on carbon mapping, working with Premier Waste plc and United Utilities to devise more effective ways of reducing water colour from upland catchments and progress towards a corporate social responsibility scheme for restoring degraded upland habitats and carbon offsetting.

RES-227-25-0002 Dr E Oughton, Newcastle University
01 Mar 06 – 31 May 09
Angling in the Rural Environment

Angling is increasingly important as the rural economy moves from being dominated by production (agriculture, forestry), to being dominated by consumption (leisure, tourism). But rivers are under further pressure from other human activities, so their ability to sustain flora and fauna may be at risk. This project looked at the case studies of the Rivers Esk, Ure and Swale and analysed the complex relationships between river, fishing, biodiversity and institutions of governance and practice. Results of the research are relevant to policy on integrated development of the rural river environment.

The organisation of fishing involves clubs, societies and commercial still waters. The research has found that planning of club activities tends to be carried out by a limited number of people through personal relationships. Fiscal probity and legitimacy is maintained but 'things get done' and even within national organisations the most effective forms of communication are still found to be informal. There is government pressure for a single body to represent angling interests and after much negotiation the Angling Trust was launched in January 2009. Angling is, however, an intensely individual activity and in the absence of a perceived threat very few anglers have joined. The official position of the Environment Agency requires that local officers spend time and effort interpreting national plans in local circumstances. Although the Environment Agency consults with anglers there was no clear evidence that the results of public consultation are made widely available through the organisation, and greater consideration needs to be given to consultation.

The research found that it is difficult to count, or even identify anglers and looked at how different organisations do this. There is great diversity in understandings of the

river environment and little attention being paid to “lay knowledge” even though this has later confirmed new scientific findings in some instances. Anglers’ understandings are formed primarily through ‘watercraft’, that is, the practices of learning of how to fish. Their experience influences how they think about environmental change, especially climate change and prey-predator relationships and therefore their support for initiatives to react to these changes. This source of information should be more valued. Researchers considered how anglers put their environmental understandings to work. Management of rivers for angling is highly fragmented with uncertain consequences, often taking place outside official scrutiny and scientific debates. Such water management requires more extensive negotiation across a wide range of partnerships.

The project also considered whether angling is commercially important for rural areas. There have been developments of new, commercial still waters that provide out of season angling at lower costs in both money and organisational time and more potential profit for entrepreneurs. But overall, for many small businesses, angling makes up only one part of income and in the Swale and Ure catchments the average spend on fishing is small. So there are no large financial gains to be made comparable to the salmon fisheries, but income from angling business may be important when other household income falls. It is important also to note that there are additional social gains: many of these very small businesses offer social well being and environmental benefits. Because angling business incomes are relatively small, however, angling seems to be invisible in the planning and economic development in this area. In order to realise all of the benefits, angling businesses will have to co-operate and work together to gain support from local development agencies.

But care does need to be taken to avoid the more negative environmental impacts of any growth in angling. The increase in numbers of still waters brings risks to freshwater catchments from stocking (including non-native species), fish movements and disease. Eighty percent of still waters surveyed (n=404) contained non-native species. Researchers found lack of due care and some cases wilful neglect of regulations. The high frequency of sites with stocked fish close to watercourses suggests that escape during floods is a significant potential problem. Wider education and more effective implementation is needed with regard to non-native species and disease.

RES-227-25-0006 Dr S Stagl, University of Vienna
01 Jan 06 – 30 May 10
The Effects of Scale in Organic Agriculture

This project investigates what causes organic farms to be arranged in clusters at local, regional and national scales and assesses how the ecological, hydrological, socio-economic and cultural impacts of organic farming may vary due to neighbourhood effects at a variety of scales. It will map out some alternative scenarios for future growth of the organic sector in the UK, and evaluate the potential positive and negative effects that different patterns of organic cultivation might have, at a variety of scales, in the future.

No End of Award Report received

RES-227-25-0010 Dr J Bullock, CEH Dorset
01 Oct 06 - 31 Mar 12
Improving the Success of Agri-Environment Schemes

The study considered how well wildlife habitats are created under agri-environment schemes. So far these schemes have had limited effects, possibly because of a combination of less than optimal management by landowners and the inability of plants and animals to colonise new habitats, either because they are already so rare, or because of obstacles in the landscape. Researchers examined the effects of training on farmers as well as the availability of different species and habitat types in the wider landscape, to enhance the biodiversity benefits of agri-environment schemes.

Researchers suggested three possible constraints on agri-environment scheme success: 1) The management prescriptions given to farmers may be ineffective, perhaps because they were developed under controlled experimental conditions and will not work in the field; 2) Farmers may lack sufficient knowledge or understanding to apply the prescriptions effectively; 3) Landscapes may have such diminished biodiversity that the target species may not be present to make use of agri-environment habitats. They assessed these constraints in the establishment of two field margin options under the Entry Level Stewardship Scheme – the basic agri-environmental programme in the UK: 1) the provision winter food for farmland birds by sowing plants with high energy seed; and 2) planting pollen- and nectar rich flowering plants for bumblebees and butterflies. They studied 48 farms: 24 of the farmers undertook a one day bespoke training course with a follow-up half-day farm visit, while the remaining 24 received no training. Over five years they measured whether the wildlife habitats created by the trained and untrained farmers attracted target species of birds and insects and what local and landscape factors affected the quality of these habitats. The results showed that given the right conditions, these schemes have the potential to provide good resources for bumblebees, butterflies and birds on working farms (addressing constraint 1). Surveys at the start of the project showed that the most important factors determining quality of the wildlife habitats were: soil type; experience of the farmer in agri-environment schemes; and location of the habitat on the farm. The research team also worked with 48 farmers to determine their perceptions and issues concerning agri-environment schemes and their implementation. This demonstrated that implementing agri-environment schemes at the farm level poses problems that are not only technical, but also bound up with farmers' attitudes to the schemes themselves and the environment. Farmers may not feel a real engagement with the objectives of the scheme and they may have limited understanding of how the instructions they are given relate to the expected outcomes. This research was closely linked to agri-environment policy and throughout the project researchers had many meetings with Natural England and Defra. Indeed, this project was specifically mentioned in the 2008 Defra Review of Progress of Environmental Stewardship as major supporting evidence for the proposal that "there is a need to increase the current level of best practice guidance being provided". This has resulted in the Environmental Stewardship Training and Information Programme. Furthermore, we held end-of-project stakeholder meetings, which were attended by Natural England and Defra, among others, and it was repeated at these that the project had influenced agri-environment training policy. Other stakeholders also found the project informative; for example, researchers were asked to meet with Syngenta to discuss training approaches. The project suggests that policymakers should take a range of factors into consideration: 1) farmer training can affect the delivery of environmental outcomes from agri-environmental schemes; 2) farmers need to be more involved in developing agri-environmental policies; 3) past experience of agri-environment schemes is important to their successful

implementation by farmers; 4) training for farmers can instil a more positive and professional attitude towards agri-environment schemes, and allow farmers to become more skilled at putting interventions into effect; 5) it is important that training delivered by professionals with farming experience who can gain the respect of farmers; 6) there is a need to move away from "self-service" schemes where farmers are simply left to get on with implementation, but it is also important to retain the role of the farmer in deciding management options.

RES-227-25-0014 Dr J Irvine, Macaulay Institute
01 Feb 06 - 31 Dec 09
Collaborative Deer Management

The management of deer provides a useful case study for the use of ecological resources in the countryside, because there are so many associated costs and benefits. This project investigated how well people involved in deer management work together and how this can be improved so that the costs of managing deer are minimised and the benefits maximised.

Deer illustrate problems around ownership of environmental resources because they offer both societal benefits and drawbacks. Wild deer are not owned though the land they occupy is. As deer move around, they usually cross ownership boundaries and thus provoke potential conflicts between neighbouring owners who have differing management goals. The project offered three key advances. First, the team developed a choice experiment, where people are offered choices between sets of rival scenarios. Carrying out these experiments in sites across Britain allowed the team to make systematic comparisons of deer managers' views and to understand the extent of obstacles to collaboration. Collaboration was usually resisted on grounds that managers valued their independence and financial incentives towards collaboration were generally seen as too unreliable to compensate for the perceived loss of independence. Secondly, they developed new techniques for collaborative mapping. Managers' problems with collaboration are often worsened because of conflicting interpretations of evidence. The team developed techniques for using Geographical Information Systems to explore conflicts between landowners. These techniques tended to diminish the conflicting interactions among stakeholders and had the additional benefit of helping to improve the quality of ecological models by bringing local expertise to bear on the modelling assumptions. The team also developed new techniques for widening the pool of stakeholders. The project recognised that recent attempts to stimulate collaboration between stakeholders tended to impose quite tight limits on the kinds of people assumed to have a stake. Overall, the research showed that techniques from economics can be used to give a much more precise sense of the extent of obstacles to collaboration and thus allow appropriate incentives to be developed. Collaboration can often break down because people pursue interminable arguments. Novel geographical techniques can be used to help to cut short these arguments by helping participants to agree about what they know, rather than focusing on what they don't, hence helping to build trust and understanding. Finally, the way that collaboration is conventionally structured means that insiders are often given a voice to the exclusion of outsiders. Social research techniques can be used to identify apparent outsiders who may be able to improve the quality of the collaborative process. Though these proposals were applied to deer, they are likely to be relevant in other scenarios and should be considered in other cases of disputed or rapidly changing ecological resource management.

RES-227-25-0017 Professor J Morris, Cranfield University
01 May 06 – 31 Mar 09
Integrated Management of Floodplains

This project explored changes that have occurred over the past 40 years, in areas which were 'defended' under flood defence schemes. Case studies of selected schemes, first studied by the research team in the early 1980s, show how land use has changed in the meantime and the consequences for livelihoods and the management of flooding problems. The project is helping to inform decisions about the future management of floodplains.

A comparison of the results of the farm survey carried out in this project and those carried out in the 1980s showed that although the land use changed significantly following the land drainage improvement schemes, there has been little change in land cover since the 1980s. There has, however, been a tendency towards less intensive land management, for example a shift from dairy to beef or from root crops to cereals, that reflected national trends in response to changing policies and market conditions.

Detailed ecological data from 8 sites described existing habitats and identified potential for enhancement. Seven alternative methods to assess the value of nature-conservation interest were evaluated. Some of these methods use predefined targets for biodiversity, some use preferences expressed by stakeholders, and others use monetary values. As a result, recommendations were made on which methods suit particular purposes and conservation priorities.

The costs to agriculture of the severe summer 2007 floods in England, based on loss of output, extra costs and damage to property were estimated at £50 million on 42,000 ha of agricultural land flooded.

The development of a quantitative ecosystems framework to assess the relative performance of alternative land use scenarios was an important output of the research. Analysis of 6 alternative scenarios across all study sites confirmed potential synergies and conflicts amongst different types of (ecosystem) benefits.

There is typically conflict between agricultural production and environmental outcomes, such as water quality, greenhouse gas balance, habitat and species. Other relationships, however, are less obvious and may challenge commonly held beliefs. There is for example, potential synergy between short duration flood storage (to deliver benefits to urban areas downstream) and agricultural production. Contrary to popular belief, there is potential conflict between flood storage and biodiversity, which can be extremely sensitive to flooding and yet requires high ditch and water table levels that use up potential flood storage capacity. 'Making space for water' - by reconnecting rivers with floodplains - may not provide the degree of control required by flood managers in some circumstances. These results can provide a basis for quantifying such relationships, recognising the importance of local conditions. They can also help inform discussion amongst key stakeholder groups that have interest in, and influence over, the management of floodplains.

It is clear that the management of lowland floodplains is a product of policy interventions and stakeholder interests that have promoted particular objectives at different times. An ecosystems framework of the type developed here can support the integrated, joined-up approach to the management of floodplain land (and natural resource management in general) which is now a dominant policy theme. It can also help to design, promote, fund and reward new forms of land management that deliver

intended outcomes in the most cost effective and socially acceptable ways, making the link between the valuation of land and water services in floodplains and their governance.

RES-227-25-0018 Professor S Whatmore, Oxford University
01 Mar 07 – 30 Jun 10
Understanding Environmental Knowledge Controversies

This project studied flooding and water pollution as pressing rural land management problems that are controversial among scientists and the public, especially those directly affected. To explore these environmental 'knowledge controversies', the project developed cutting edge tools and approaches that pinpoint which practices result in which impacts, and account for how environmental science is produced, used and disputed. The project set out to develop a different way of "doing science" that involves social and natural scientists working closely together, and with local people, in 'Competency Groups'.

Typically, environmental knowledge controversies such as flooding have been seen in science and policy communities as troublesome problems to be avoided. This project investigated how knowledge controversies might play a generative role in developing the capacity of democratic societies to handle environmental uncertainty more effectively. Flood risk management relies on the scientific practice of predictive modelling. Even as modellers acknowledge the provisos and uncertainties that attach to their work, so such provisos become dulled with the automation and standardisation of modelling undertaken by the engineering consultancies on which government agencies rely for their flood risk estimations. The project explored how the process of expert knowledge production might be opened up to public interrogation, such that the uncertainties admitted in robust scientific practice become admissible also in the public realm. The analysis demonstrated that what 'modelling' involves varies significantly in different contexts, notably between commercial and academic arenas of practice. Equally, the contractual terms set by government agencies were shown to be a major influence on the standardisation of modelling practice and the erasure of the provisos and uncertainties attached to flood risk estimation. This work informed the design of an experimental method for doing flood risk science differently. The competency group work was key to the development of an alternative knowledge-theoretic approach to modelling, incorporating the richness of local knowledge into the process. The models developed were co-produced through collaborations with people affected by flooding which refigured the expertise of flood scientists and other group members, producing models specific to flood risk management in the two locations. These models are spatially-explicit and time-dependent, allowing active exploration of different possible interventions and their effects on flood risk reduction by all group members. Although the models were coded by one of the 'university' members, the content of the models and their use in practice was grounded in the wider, collective work of the groups. The Ryedale Group's 'bund-model' performed effectively enough to prompt the regional Environment Agency to adopt a new flood risk reduction strategy, while the Uckfield 'overflow' model is now performing in the development of a land management strategy to reduce flood risk in collaboration with the regional Environment Agency. The project has been selected as a case study in public engagement by the HEFCE/RCUK Beacons for Public Engagement initiative.

RES-227-25-0020 Dr A Karp, Rothamsted
01 Jan 06 - 31 Sept 09
Impacts of Increasing Land Use Under Energy Crops

If more land is to be converted to energy crops, then we need to know more about the implications of climate, soil and water availability, and the possible impacts of such crops on the environment, social acceptance and rural economy. Using the East Midlands and South-West regions as study areas, this project has reviewed current knowledge and conducted new state-of-the-art social, economic, hydrological and biodiversity research to develop an integrated scientific framework for Sustainability Appraisal (SA) of the medium and long term conversion of land to energy crops.

Biomass crops, such as short rotation coppice (SRC) willow (*Salix* spp) and *Miscanthus* grass (*Miscanthus x giganteus*), have strong potential for sustainable bioenergy production. They are fast growing, produce large yields from low inputs of fertilisers and pesticides, and show high energy gains and greenhouse gas reductions in life-cycle analyses. However, they are quite different from conventional arable crops. They are grown for up to 25 years, are harvested in winter/early spring, in the case of *Miscanthus* annually and for willow, in 2-3 year cycles. They are also very tall (3-4 m), dense and may attract different wildlife. Large expansion would, thus, constitute a major land-use change and this has raised concerns over possible social, environmental and economic impacts. Two contrasting farming systems were chosen for this study: the arable cropping dominated system, represented by the East Midlands; and a grassland-dominated system, typified by the South West of England.

The constraints mapping exercise identified circa 4.7 million hectares of land suitable for growing biomass crops without conflicting with nine environmental constraints. When further restricted to Grade 3 or 4 land, which is not the most productive for food, this reduced to just over 3 million hectares (23.9% of England). When combined with yield mapping, the results indicated that areas with the highest biomass yields co-located with important food producing areas. Nevertheless, investigation of a scenario involving energy crop planting on 350,000 ha (a UK Biomass Strategy aspiration for 2020) suggested that this could be achieved without requiring higher grade land, and so would not necessarily greatly impact on UK food security. A questionnaire survey found that most respondents (>75%) felt that both *Miscanthus* and SRC would fit into the landscape ‘very well’ or ‘reasonably well’ and over 60% said they would not mind seeing the crops within the view from their home, although this percentage halved, when a biomass power station was also shown. In the focus group meetings the most commonly expressed concerns related to increased lorry movements, loss of view and the ‘food versus fuel’ issue.

Overall, the water use of the biomass crops, when grown in the UK, is likely to be higher than permanent grass and winter wheat. The water use of *Miscanthus* is higher than that of willow SRC, approaching that of some deciduous woodlands, but less than evergreen woodlands. Counts of the biodiversity plant indicators were generally significantly higher in SRC willows compared with *Miscanthus*, and significantly greater in both biomass crops than in cereals. Biomass crop planting has taken place within a very wide range of farming systems and farmer decision-making has been driven by diverse factors. The low returns of biomass mean it is unlikely to be the dominant enterprise on most farms, except in special circumstances such as where the farmer is looking for a reduced commitment of time and effort. However, the predictability of returns may be very attractive as part of a risk management strategy in an era of greater market volatility.

Early indications from analysis of the SA framework based on environmental indicators suggest that sustainability implications are enhanced where small scale CHP is the biomass end use in both the East Midlands and South West regions. Preliminary results also suggest that small-scale planting is preferable in the East Midlands, whereas large-scale planting can be better accommodated in the South West. Results are being used by Natural England to revise the Energy Crops Scheme and by DECC/Defra to advise policy on energy crop plantings and were used by the NFU as evidence in the Campaign for the Farmed Environment.

RES-227-25-0024 Professor I Bateman, UEA
01 Jan 06 - 30 Apr 10
Modelling the Impacts of the Water Framework Directive

The project is developing a hydrological-economic model to assess the costs and benefits of changing farming practices in the Humber catchment area in order to produce a healthy river environment with good amenity value in line with the European Water Framework Directive.

The ecosystem services approach to decision making seeks to clarify the contribution of the natural environment to human wellbeing. This project provides probably the most thorough UK (and arguably worldwide) application of the approach to date. In particular it delivers the fundamental integration between natural science and socio-economic analyses. The project has developed a novel Integrated Modelling for Integrated Effects (IMIE) approach to fusing together natural science and socio-economic analyses. Here models of the physical environment were integrated with those of economic and social systems in ways which allowed changes in either dimension to impact upon the other. Within this approach, techniques were developed for incorporating the extreme spatial variation which characterises the natural environment. This permitted a new locationally sensitive approach to decision making which significantly enhances the efficiency of resource use. Advanced techniques for the valuation of non-market goods and services (such as those provided by ecosystems) were integrated within the locationally specific IMIE approach to yield robust values of the impacts of decisions. This provides a much firmer basis for predicting the consequences of change, whether inspired by policy, market forces or environmental. The methodology was developed through empirical analysis of a complex and policy relevant real world issue: ie the EU Water Framework Directive (WFD) within the context of ongoing Common Agricultural Policy (CAP) reforms. In order to maximise the policy relevance of this work, this empirical development process was informed throughout by frequent formal and informal interactions with relevant policy groups (e.g. Defra and the Environment Agency) and stakeholders (e.g. farmers and the NFU, CIWEM, regional groups, etc.) The IMIE approach within the context of WFD implementation provides a spatially and temporally sensitive econometric behavioural model of rural land use. The model was found to be a highly robust predictor of land use and land use change under a wide variety of conditions. Its outputs include estimates of farm income and land use under present or feasible future conditions. The land use predictions generated by the model were used as base inputs to a model of river water quality developed to permit transferability across different catchments. This applied advanced hydrological modelling techniques to relate land use (both arable mix and livestock type and stocking intensity) and the physical characteristics of river catchments (including urban land use and associated sewerage inputs) to river water quality in terms of both nutrient levels (e.g. nitrate pollution) and faecal indicator organisms (FIO). Costs associated with the WFD run into many billions of pounds, and Cost Benefit Analyses (CBA) assessments are an increasingly common element of decision making. The

ecological quality outputs from the IMIE process form the inputs to an advanced, spatially sensitive model of the benefits of river water improvements. The project developed this last phase of the analysis through a custom designed survey of households drawn to capture variation in both socioeconomic and demographic circumstances as well as changes in access to rivers of different qualities and characteristics balanced against access to the full range of alternative recreational resources. The methodology was then adopted as the basis of the pan-European *Aquamoney* programme which was funded by the EU. The IMIE framework provides policy makers with the first truly integrated decision analysis tool combining natural science, economics and social science. It yields a raft of results arising from any given change in policy, market or environmental drivers. Tests across a number of scenarios (including policy changes in taxation, quantity restrictions and regulations; as well as environmental drivers such as climate change) revealed important and policy relevant results. Changes in drivers were assessed in terms of: impacts on land use and agricultural production; changes in farm incomes; shifts in river water quality both in terms of nutrients and FIOs; changes in the ecological status of those rivers; alterations in the number of recreational visits undertaken and their value. Interesting features of the results obtained from these analyses include the following:

(i) Forecast climate change is likely to increase farm incomes in those (mainly upland) areas which are currently disadvantaged by lower temperatures and higher rainfalls.

(ii) FIO levels cannot be adequately controlled through purely rural land use measures such as reductions in livestock intensities, urban measures are the major issue here.

(iii) Significant improvements in river water quality can be generated by policies aimed at altering agricultural land use, but that these will lower farm incomes

(iv) The major potential beneficiaries of such river improvements are in urban areas.

(v) Within any given locality, the value of additional river quality enhancements diminishes significantly once an initial river is improved.

(vi) The most efficient policy would be to focus upon improving sufficient urban rivers rather than pursuing the WFD objective of improving all rivers in all areas to pristine ecological standards.

RES-227-25-0025 Professor W Sutherland, University of Cambridge
1 Feb 06 - 31 Dec 09
Management Options for Biodiverse Farming

The variation in management of farms is a key determinant of differences in biodiversity. This study is linking together models of the dynamics of weed and bird populations and farm management decision-making. These will then be applied to help us to understand how the variability in arable farming practices, and intensity affect biodiversity and farm livelihoods. The work will be used to determine the most effective ways of targeting agri-environment schemes.

This project investigated how the land management strategies of UK farmers affect the biodiversity of the countryside. It brought together social and natural scientists to understand the factors influencing farming practices and the implications of variations in practices for biodiversity. The aim was to develop models of farm land-use by integrating its economic, social and biological components. The project developed an

interactive software tool for classifying the type and strength of interest and influence, that different stakeholders, such as farmers, government, and commercial organisations have, in the management of arable farms. This has been useful in showing how stakeholders exert influence to achieve their particular interests, for example through land ownership or legislation. An innovative feature of this study is that a survey of farmers' objectives and preferences was designed to produce results for direct input into a predictive model of land-use. This model determines the optimal management of a farm, given constraints such as the time and equipment available, soil type, commodity prices, labour, and input costs, taking into account the farmer's land-use objectives. This was used to predict landscapes based on crop prices and agricultural subsidy structures, and compared our predictions with actual land-use recorded by the Farm Business Survey. The team found that a model that included non-profit objectives, such as risk management and preference for the number of crops managed, improved predictive capability compared with a model based on profit-maximisation alone. Weeds are very important in determining farmland biodiversity, but good data on populations and dynamics are extremely time consuming to collect. The project mapped whole fields, developing a new method for assessing weed population responses to management for integration with other models and vastly outstripping previous studies in scale. The resultant dataset consists of maps of weeds within ten fields per farm, over three years. This, in itself, is a unique resource. The results show that there are significant variations in density between ecologically and economically significant weeds. The latter, comprising species such as Blackgrass, tend to be dominant. Patterns of weed abundance and management are enormously variable even within the same crop. Birds suffered the most publicized losses of biodiversity due to farming practices and bird populations underlie the principal monitoring of ongoing changes. The project developed statistical models of variation in bird breeding abundance with respect to cropping, field boundary characteristics and landscape composition across 880 lowland farmland 1km squares. The models integrated predicted bird population consequences with the models of farmers' cropping choices. The results showed that crop types were less important than landscape composition and field boundary characteristics in determining absolute bird abundance, but are probably more important in driving changes in numbers. A separate analysis considered how land-use heterogeneity (i.e. the mixing of arable, grass, woodland, etc.) affected bird counts. More threatened species responded negatively to heterogeneity, unlike generalist species and contrary to previous research results. This work integrates research at several scales. For a single farm it can (i) predict optimal management, (ii) measure the degree to which actual behaviour deviates from this optimum, (iii) produce average weed densities for different crops, (iv) predict weed populations and bird populations for altered management. At a landscape scale, it can predict aggregate land-use and ecological populations under different assumptions about farmer behaviour. The main result from this work was that profit maximization does not provide a good description of actual farming practice. Instead the inclusion of farmer-specific stated preferences improved models and gave predicted power. This emphasises the need to include social data in models that attempt to recreate agricultural landscapes. The enormous variability in weed and bird populations also cautions that local farm and individual farmer differences need to be considered. The work on farmer decision making has, for the first time, linked social data with farm management and ecological outcomes. The models contribute to answering several policy questions, including:

- What would be the best policy measures to achieve the targets on bird populations set by the government?
- What determines which new farming methods will be adopted by farmers?

- What will be the social and economic consequences of biodiversity conservation?

This could enable best practice models for arable farm management and is particularly important given that the use of certain herbicides is set to be curtailed by the government, meaning that management practices could change considerably.

RES-227-25-0028 Professor P Armsworth, University of Sheffield
01 Jan 06 - 31 August 09
The Sustainability of Hill Farming

Taking the Peak District as a case study, the project examined how hill farmers are likely to respond to major changes in the Common Agricultural Policy and the consequences for upland landscapes and bird biodiversity.

A range of coupled farm-scale ecological and economic models have been constructed within the same parameters as socioeconomic and ecological survey data on a panel of Peak District hill farms. These models have been used to examine the effects of particular policy shifts on hill farms.

The project has used choice experiments and valuation workshop methodologies to assess what people wanted from the hills and whether they would be willing to pay to achieve that vision. Key findings show that visitors to the Peak District National Park would be willing to pay an additional parking fee to support conservation of key habitats, especially for moorlands, but residents of towns surrounding the National Park would not be willing for local taxes to increase in order to support further conservation efforts. Estimates of people's willingness to pay for environmental goods are affected when respondents are taken to visit exemplar sites, given time to reflect on their choices, or provided with expert witness testimony.

The ecological economic models enabled researchers to examine how agricultural subsidy schemes can be designed more effectively to provide environmental benefits. They have been able to derive an estimate of the "true" private costs of providing environmental benefits and from it of the most cost effective policy design for delivering particular conservation benefits. Ecological survey results for moorland fringe habitats demonstrate an important role for socioeconomic characteristics of farms in influencing species richness patterns for birds across properties. An analysis of historical data sources for the Peak District relates the history of intensification and specialisation of agriculture in the region to very dynamic patterns of habitat change and to stakeholder perceptions of historical changes.

The farm models, ecological and economic data all demonstrate strong subregional environmental signals. The research has shown that, as a consequence, policy impacts will be different in different areas and the team has been analysing how policies can be designed to reflect heterogeneous conditions experienced by farms.

5.3 Third Call Projects on the Management of Animal and Plant Diseases and on Sustainable Rural Planning

RES-229-25-0004 Dr M Huby, University of York
01 Aug 07 – 31 Jul 09
Social and Environmental Inequalities in Rural Areas

This project examined patterns of social and environmental inequalities in the distribution of social, economic and environmental goods and services. Having

identified inequalities, researchers considered whether they can be regarded as unfair or unjust including the judgements of local residents.

The project has investigated the nature and extent of social and environmental inequalities and injustice in rural England addressing the questions:

- How can we measure rural spatial inequalities in (a) socio-economic and (b) environmental-ecological characteristics of small-scale areas of England?
- How can inequality measures inform our understanding of the distributions of social and environmental deprivation in rural England?
- How do rural residents experience the kinds of inequality identified by the research, and what types of inequalities do they perceive as inequitable?
- Are there identifiable areas of rural England where the potential for environmental and social inequity suggests a need for policy intervention?

The project worked closely with the Environment Agency and the Commission for Rural Communities, with meetings and seminars to discuss datasets, and researchers spending time with the CRC on work shadowing. Inequality in social, economic and environmental conditions has important implications for individuals or groups of people experiencing its negative effects, but also for society as a whole. In urban areas, poor environments are associated frequently with deprivation and social exclusion. Where the unequal distribution of social and environmental goods is considered unfair, it constitutes social or environmental injustice. This project has quantified inequalities in social and environmental conditions and identified those areas where inequalities are greatest. It has also enhanced understanding of perceptions of inequality and injustice in rural areas. The work shows how rural policy can be refined and targeted to tackle these multi-faceted problems in the most appropriate way for the benefit of society. Researchers have developed a major dataset that encompasses 32 variables relating to economic activity, income and wealth, health and wellbeing and ecology, land and environment.

Interviews with rural residents revealed that people recognise that rural areas offer limited opportunities for recreation and local services, and a lack of affordable housing. These disadvantages can be offset by aesthetic benefits and a strong sense of community but the heavy burden on local communities to provide essential services on a voluntary basis is perceived as unfair. Inequalities become unfair when people have no choice or when political decisions are made without taking account of local concerns. Market forces are often seen to exacerbate local problems. Information on the absolute level of social and environmental factors, together with consideration of the inequalities in distribution, can inform the direction of policy, as well as the appropriate scale and type of intervention needed. For example, in addressing problems of disadvantage:

- High priority rural areas are those areas with high levels of disadvantage and high inequality in disadvantage, such as the north-east and the south-west
- In such areas, a focus on specific pockets of disadvantage would be the most efficient approach

Where there is a high level of disadvantage and high inequality in inaccessibility, policy must be designed to take account of varying levels of accessibility to services.

RES-229-25-0005 Dr C Potter, Imperial College London
01 Sep 07 – 27 Aug 10
Lessons from Dutch Elm Disease in Assessing the Threat from Sudden Oak Death

This work examined the threat to trees and woodlands in the rural landscape from Sudden Oak Death (SOD) in the light of experience of the Dutch Elm Disease (DED) outbreak of the 1970s. It brings together historical research methods to investigate memories of DED amongst experts and members of the public, with modelling tools to map the likely spread and impact of SOD.

The research analyzed the biology, policy and economics of the Dutch Elm Disease outbreak of the 1970s to see if lessons can be drawn in relation to the prevention, management and control of present day tree disease threats. The reconstruction of the epidemic drew on archival research, interviews with key informants and modelling work to conclude that biology trumped policy at an early point in the outbreak. The disease entered the UK earlier than previously thought, probably late in 1962, incubating slowly but then spreading very rapidly. This rapid spread was due both to its inherent virulence as a disease system but was also aided by human movements of diseased timber that were restricted only very late in the day. Scientific experts were initially slow to identify the new disease but, even when confirmed as a threat, policymakers were reluctant to put containment measures in place to begin to manage the outbreak. Debates within government about Dutch Elm Disease were dominated by concern about exposing the Treasury to escalating costs. This resulted in responsibility for disease control being devolved to poorly resourced local authorities. The main conclusion is that, in any event, prevention would have been better than any attempted cure. Earlier and more aggressive sanitation felling would not have slowed the disease spread to any significant extent but port inspections and quarantining of diseased timber might have prevented establishment of the disease in the first place. The 'sudden oak death' pathogen now affecting trees, woodland and heathland in the UK is thought to have entered the UK through the nursery trade. It affects susceptible trees like Japanese larch, Douglas Fir, beech, ash, birch, sweet chestnut and evergreen oaks, as well as many shrubs. In a manner strongly reminiscent of Dutch Elm Disease, the authorities seem currently to be dealing with an epidemic with unpredictable characteristics. New susceptible species are being discovered as the epidemic unfolds and attempts to contain the outbreak appear to have failed. The plant health authorities in the UK appear to have acted with reasonable speed to attempt to contain the outbreak but these measures, and the considerable efforts made to bring garden owners, landowners and other stakeholders on board, have had limited success. This is due both to the complexity of the disease and its unpredictable and shifting host range but also due to resistance from some large garden owners and others to the removal of diseased material. Despite important biological differences, there are growing parallels between this outbreak and the Dutch Elm Disease epidemic. Whereas Dutch Elm Disease rapidly became uncontrollable because of its ability to spread very rapidly across a given host range, the sudden oak death system is proving equally uncontainable due to its capacity to infect new types of plant host species. The cardinal lesson to be drawn from both outbreaks is the same – it is far better to prevent the entry of a disease than to attempt to contain it once established. But the recent Sudden Oak Death outbreak also illustrates how hard this principle is to implement in the contemporary setting of a European Single Market. In tracing the outbreak to a breach of biosecurity within the European horticultural trade which enabled a diseased plant to be brought into the UK, people interviewed for this research also recognize how difficult it is to ensure proper inspection and accurate diagnosis of the large (and growing) volume of plant imports involved. The

researchers conclude that more public debate is needed concerning the nature and extent of the threat from tree diseases. The surprisingly low level of awareness or understanding of the tree disease threat translates into a comparatively low willingness to pay for control measures, as expressed in valuation surveys. Public awareness needs to be raised, both in order to establish a stronger sense of personal responsibility for preventing tree disease spread (as gardeners, landowners and visitors to the countryside), but also to elicit more support and a greater willingness to pay for any more restrictive measures and policies that may in future be necessary. Equally, key stakeholders - notably environmental, farming, forestry and horticultural groups and organizations - need to learn from history and be more aware of other country experience in their assessment of the threat from invasive pathogens. Environmental agencies and environmental groups arguably need to give more attention in their campaigning and advocacy work to the threat to biodiversity, our horticultural heritage and other public goods from invasive diseases than they do currently. Finally, within expert circles, there is a need to develop a better and more critical understanding of the interlinked biology, economics and policy of biosecurity measures and of the difficult trade-offs that will need to be made between freer trade and effective biosecurity. Expert biosecurity discourse is heavily focused on the risk assessment tools and largely technical procedures that have been developed to anticipate and manage outbreaks. Beginning at European Union level, there is a need for a more critical and interdisciplinary analysis of the underlying causes of the growing threat to biosecurity and of conflicts between those advocating further market opening and those arguing for restrictions on trade in the interests of biosecurity.

RES-229-25-0007 Dr C Quine, Forest Research
01 Sep 07 – 30 Nov 10
Assessing and Communicating Animal Disease Risks for Countryside Users

Many people take pleasure from outdoor leisure activities but surprisingly little is known about how best to warn countryside users about the potential for problems such as Lyme Disease without scaring them away or spoiling their enjoyment. This research will help those involved in the countryside to better understand how to deal with diseases such as Lyme Disease, how to effectively communicate the degree of risk, and how to encourage preventative action such that the countryside continues to be a source of pleasure and well-being for its users.

Three study sites were selected to provide a range of environmental conditions and countryside use: peri-urban parkland, accessible lowland forest and heath and remote upland forest as represented by Richmond Park on the fringe of Greater London, the New Forest in Southern England, and Exmoor in South West England. The risk assessment study at the study sites showed that ticks were present in very many more habitats than are currently emphasised in risk communication. Modelling of the population dynamics indicates complex and in some instances surprising responses to management of host populations. The biological knowledge emphasises the wisdom of preventative actions, and in particular the merit of post-visit precautions because selective avoidance of tick habitats does not seem feasible, and tick eradication is impossible though local tick abundance may be reduced. The research into risk perception and communication considered patients diagnosed with Lyme disease, countryside visitors, and those who make a living in land-based activities. Neither those who had suffered disease, nor a broader sample of countryside users considered avoidance of the countryside or major modification of behaviour during a visit, as an appropriate response to risk. There was a distinct preference for post-visit precautions, an option that is consistent with the delayed transference of bacteria from tick to human, but which would be less appropriate with

some other zoonoses. Information on the disease and precautions was obtained from a wide variety of land-based organisations. Despite a view that the risk was small compared to other hazards, many organisations nevertheless provided information – particularly to staff - but also to visitors. Information varied in content, and there was interest in developing greater consistency of approach between different organisations. By developing scenarios of future land management and visitor use the research enabled stakeholders to identify fresh perspectives on future challenges in visitor and disease management. Profiles of potential users for the case study sites suggested considerable variation in countryside knowledge, and thus prior preparedness for hazards such as ticks. Interactions between local and national level initiatives in providing information, for example when there are outbreaks of new diseases, were seen to be particularly challenging. Two frameworks were developed. A conceptual framework identifies the potential organisational responses to disease incidence, one of which was influencing behaviour of countryside users. A second framework provides cues to customise risk communication to the specifics of time and place, making use of comprehensive biological understanding. There is scope for further refinement of these frameworks to identify those involved in choice of response option, and participating in risk communication. The main implication is that the proportionate and effective response to most zoonotic diseases is to influence behaviour, so that people using the countryside take appropriate precautions to protect themselves. Many organisations still need to understand that influencing behaviour is about more than risk communication which in turn requires more than just the provision of information; so, successful behaviour change will require a diverse range of actions from different people and organisations. A range of disciplines needs to be involved in considering how to encourage precautionary behaviours, so that strategies are based on sound biological knowledge, as well as an understanding of risk communication, how messages are received and which sources are trusted. Land managers are key to achieving success and they could work with health professionals to share and develop knowledge, formulate response strategies, and identify target audiences. Together, health authorities and land managers could establish an authoritative knowledge base on which individuals and organisations could draw. There should be new organisational links to enable this to happen.

RES-229-25-0008, Dr C Waterton, Lancaster University
01 Jun 07 – 31 Dec 10
Testing a Community Approach to Catchment Management

The aim of this research is to carry out an interdisciplinary study aimed at sustainable catchment management in Loweswater, Cumbria and to assess the transferability of the approach to other places and problems. The research is shaped by a new institutional mechanism or 'new knowledge collective' set up by the local community, stakeholders, and researchers.

The research addressed a specific environmental problem encountered at Loweswater - the occurrence of potentially-toxic blooms of blue-green algae on the local lake - through both 'interdisciplinary' and 'participatory' methodologies. The three research objectives were:

1. *To create a mechanism* that would enable decision making by the community- and institutional-stakeholders and form a possible basis for improving ecological, economic and social sustainability within the Loweswater catchment.
2. *To carry out high quality interdisciplinary research* in order to produce a catchment knowledge-base to inform decision-making. This included research into upland farm economies, land and water ecology, institutional 'governance' and responsibilities for land and water quality, local understandings and

knowledge of Loweswater, and socio-economic and cultural challenges faced by the residents.

3. *To assess the 'transferability' of the approach adopted,* and to question whether bringing residents, institutions and researchers to work together could a) be beneficial; and b) be done elsewhere, and if so how, at what scales, and for what kinds of problems.

A variety of ecological, agronomic, and sociological methods were employed, including surveys of soil, vegetation and land, monitoring of water quality and fish, interviewing of institutions/local residents/farmers/other local businesses, and examination of national and international policies pertaining to land and water quality. The project aimed to set up a participatory forum that opens up, rather than closes down, questions about what is at stake, ecologically, economically and socially for Loweswater, and possibly for other places like it. The forum, 'the Loweswater Care Project' (LCP), consistently drew local residents, institutional stakeholders and researchers together for challenging debates over a two and a half-year period and is now sustained by local residents. Loweswater was found to be a rich terrestrial environment (e.g. in habitats) relative to comparable upland areas. Farming is almost wholly low-intensity beef and sheep farming, although both stocking rates and fertiliser input have increased in the last 50 years. Loweswater's aquatic environments (the lake and its feeder becks) have been extensively managed over the last 100+ years and, linked to farming intensification, have suffered declining water quality. The latter highlights the acute sensitivity of this particular land-water 'system' to what are quite small-scale changes (e.g. relatively small increases in inputs of nutrients, and/or minor shifts in the biology of the food chain within water bodies). Very recent results of lake water monitoring show lower levels of available phosphorus, the main limiting nutrient for blue-green algae, along with lower levels of chlorophyll *a*. If these results are the beginning of a trend, this is 'good news' and shows that recent moves towards more sensitive management of the land and of nutrient inputs around the lake have had positive effects within a relatively short time. Evidence from other surveys suggests that measures such as the good maintenance of septic tanks and slurry tanks may also be beneficial. This is likely to be the case in spite of the fact that some aspects of the phosphorus-algae cycle cannot be directly controlled (the most important of these being the 'recycling' of phosphorus from lake sediments). Loweswater is not only sensitive to physical changes it is also fragile in economic and social terms. Loweswater is populated increasingly by an ageing cohort of people, largely retired, relatively wealthy, 'offcomers' and resident low-income farmers. Employment/business opportunities are almost nil, and there are fewer and fewer young people able to work and live in the valley. There is also a shortage of affordable housing. The economics of hill farming are precarious. Interviews revealed significant shifts and pressures on Loweswater farming over the last 30+ years. These include decreases in farm labour, a decrease in the number and a consequent increase in the size of farms and an increase in stress due to increasing outside control and paper work. To date only 3 of 8 farmers with land draining into Loweswater have known successors who will inherit the business, and land amalgamations have taken place even during the limited time of this project. Researchers, institutions and residents debated within the LCP about the future of Loweswater and the possible implications of working farms disappearing from the landscape. Findings from the work on governance and management revealed a distinctive shift underway, both nationally and regionally, towards a more integrated approach to the use and protection of land and water. Nevertheless, the desired move from fragmented to integrated catchment management is problematic for several reasons. Different agencies work at different spatial scales and have different priorities and so cannot easily co-ordinate policy or its implementation. Agencies and other institutions are unsure how to respond to and link with 'bottom-up', catchment-

level initiatives such as the Loweswater Care Project. In addition, small and relatively remote lakes and catchment areas, such as Loweswater, struggle to attract management attention particularly if their water quality problems are not widely known or publicised. Experience at Loweswater suggests that the transferability of a mechanism like the LCP to other places, scales and varieties of environmental problems should be possible. However, as knowledge transfer activities with other initiatives like the Coniston and Crake Partnership and the Shropshire Hills AONB confirmed: successful, active involvement of communities also depends on whether or not regulatory agencies and institutions can both recognise and support bottom up collaborative work. This may require some shifts in decision making power and re-negotiation of roles and responsibilities.

RES-229-25-0009 Mr L Smith, SOAS, University of London
01 Jun 07 – 31 Dec 10
Catchment Management for Protection of Water Resources

This project was investigating how to extend the scientific and social accomplishments of innovative catchment management programmes in the USA, and other European countries to the UK. The aim was to derive a catchment management 'template' which compiles and assimilates scientific understanding and governance procedures as tested in actual decision making and management practice in case study catchments. This will provide a framework to integrate interdisciplinary assessment of methods to protect water resources.

Water pollution poses difficult challenges for policy, control strategies and scientific assessment. This project aimed to investigate how best to integrate and extend the scientific and social accomplishments of innovative catchment management programmes in the USA, Australia and other European countries to catchments in the UK. This built on the work of Capacity Building Award RES-224-25-0031 which successfully formed a network of researchers and water professionals capable of investigating integrated solutions for water resources protection. The project conducted an international comparative analysis of catchment programmes with a focus on collaborative governance, local coordination and action, and tools for assessment, planning and knowledge exchange. Two catchments in England were investigated as case studies against which international lessons were tested: the River Tamar and the River Thurne. The project researched the current issues, water quality targets, pollution mitigation potential and governance systems in these two catchments. Results were integrated with the findings of the wider comparative study of governance arrangements, leading to the ‘template’. There was also a higher level international analysis of land and water governance regimes, and of the transferability of policies, approaches and measures. A survey was conducted of collaborative governance in England and Wales, including the emergence of community-based catchment groups. For the ‘template’ key components are an adaptive management approach, collaboration between agencies and levels of government and a ‘twin-track’ of deliberative partner and stakeholder engagement supported by scientific research. Programmes are best built from existing organisations and partnerships, centred on those with current management responsibilities, and working within the framework of prevailing law that facilitates partnership arrangements and appropriate delegation. Integrated land and water management involves local responsibilities and requires inclusive deliberation at local level under the framework of multi-level government. Thus locally acceptable responsibilities and rights must be translated from higher level regulation, with provision for inter-locality cooperation and coordination. Meaningful public participation can integrate environmental and public health criteria with economic and social goals, whilst catchment assessments, programme design and implementation

are enhanced by local knowledge, acceptance and ownership. Locally trusted technical providers are needed for capacity building and advisory work, not least with farming communities. Their essential functions include convening and mediating to foster trust, collaboration and co-production of knowledge. Capacity is needed for assessment of the condition of water resources and comprehensive planning. Monitoring of processes and outcomes is essential. Successful collaborative programmes require a shared knowledge base, skilled intermediaries, and high quality communication and decision-support tools. In meeting this need in the English case study catchments the project developed an Ecosystem Health Report Card and an innovative participatory and interdisciplinary modelling approach that enabled collective framing of the scale and severity of selected water quality problems. The higher level analysis showed that the EU, USA and Australia have seen a discernible shift from top-down, hierarchical modes of governance of natural resources towards more networked forms, based on collaborative linkages and interactions between multiple actors and levels. In each case the shift endorses arguments for more collaborative public management of land and water. However, arrangements also differ. Both the EU and the USA still exhibit strong elements of hierarchical, vertical control and increased consultation and sharing of tasks does not necessarily equate to greater sharing of responsibility and decision-making. One explanation for this divergence is how federal multi-level governance is manifested in each context. The three jurisdictions exhibit different approaches to federalism and the variation in institutional, legal and political structures shapes the degree of collaboration occurring in water governance. This variation limits the scope to transfer organisational and institutional lessons from one jurisdiction to another, although catchment level techniques and tools transfer more readily. Several lessons emerge from the project's survey of collaborative catchment governance in the UK. An expansion of both community-based and state-led initiatives has been evident and information was compiled concerning capacity, funding, institutional profile and activity.

RES-229-25-0012 Dr Norval Strachan, University of Aberdeen
01 Oct 07 – 28 Feb 11
Reducing Escherichia coli O157 risk in rural communities

E.coli is a very serious threat to human health. It can be devastating and sometimes fatal, and children and elderly people are at particular risk. But we still know little about how it is spread in rural environments. This project has been investigating how stakeholders perceive the risks of E.coli and how we can reduce the risks of people becoming infected.

Escherichia coli O157 is a micro-organism that causes illness in humans (1246 UK cases in 2010) and is commonly found in the guts and faeces of cattle and sheep where it causes no disease. There are a particularly high number of cases in young children and in rural areas. The pathways through which humans can become infected include: contact with farm animals and their faeces, contaminated food, consumption of water from an untreated supply and person to person transmission. The symptoms of human disease include stomach pain leading to bloody diarrhoea (dysentery) leading to kidney failure in 5-10% of cases and occasionally death. There have been a number of major outbreaks in the UK (e.g. Godstone petting farm and Central Scotland outbreak) which have further brought this pathogen to prominence. The overall aim of the project was to provide the evidence to ensure that rural policies minimise the risks to communities from *E. coli* O157. This was implemented through seven work packages focussing on two study areas (North Wales and the Grampian region of north-east Scotland). The study areas included important farming (i.e. cattle and sheep) areas, with countryside used widely by both visitors and

residents for leisure and also had different levels of disease (Grampian has 4 times as many cases per head of population compared with North Wales). The main findings of the research were obtained through a variety of social and natural science methods.
A questionnaire of farmers, rural visitors and residents found that:

- People think about protecting themselves indoors (e.g. cleanliness, food and home) rather than outdoors
- Awareness is highest in farmers particularly in the Grampian region and lowest in visitors to the two areas
- Most (83%) identified *E. coli* O157 as a severe disease however a relatively high proportion of farmers in Grampian (25%) described it as mild
- Knowledge of symptoms was similar between groups but vomiting was frequently described as a symptom and this is not usually the case for *E. coli* O157. Antibodies from blood and saliva were measured to give an estimate of exposure and potential immunity of individuals to this pathogen. Results showed that there were a relatively high percentage of people with antibodies (12%) but the levels were not found to be higher in Grampian.

RES-229-25-0013 Professor P Mills, Harper Adams University College
01 Sep 07 – 28 Feb 11
Assessing the Potential Rural Impact of Plant Disease

UK crop production is vulnerable to a plethora of pathogens some of which directly affect crop yields, disrupt the food chain and impact on land use and wider society. The aim of this project was to develop a critical, inter-disciplinary appraisal of the potential impacts of plant diseases (food and non-food) on land use and the UK rural economy.

Overall, the project has provided a framework for taking an inclusive approach to risk analysis, regulation and governance for plant diseases and scenario planning to help inform the national response to plant disease epidemics.
Specific aims were to;

i. Develop a conceptual framework for the analysis of risks to plant health, including a detailed review and historiography of plant disease epidemics in the UK and beyond as informed by comparative studies elsewhere.
ii. Forecast the risk and potential impacts of food and non-food plant diseases on land use and the UK rural economy.
iii. Examine the routes of infection and spread for plant diseases specific to food and non-food plants through trade activity and by natural transmission.
iv. Examine the environmental and socio-economic impacts of specific food and non-food plant diseases in selected agriculture/horticulture sectors and land based industries in the UK, including an assessment of alternative disease management strategies on individual stakeholders and community behaviour.
v. Provide an overall evaluation and a generic framework for taking a holistic approach to risk analysis, regulation and governance in relation to plant disease epidemics.
vi. Disseminate and transfer the findings in a novel manner through media channels (including film) in addition to conventional publications and appropriate events.

The project team has built and interacted with an extensive network of stakeholders taken from all levels of the production supply chain, processing, retailing, support industries, NGOs, Government Departments, research organisations, other RELU

projects and the general public. More than 100 academic and non-academic stakeholders have attended a series of workshops run by the team, including one workshop that brought together practitioners, academics and policy makers from both animal and plant disease constituencies. Initial work focused on creating a sound project framework based on a review of relevant literature and an analysis of historical data on UK plant epidemics. This created appropriate UK crop maps, examined structural change in each sector since 1950s, established disease typologies (food/non-food crop, based on modes of spread, whether largely through human activity in trade, or more natural dispersal mechanisms) and developed an overall conceptual framework for risks to plant health and governance. Using members of a project Advisory Board, scenarios were built that examined the impact of plant diseases (food and non-food) on land use and the UK rural economy. Following on from this, in depth interviews in each of three food sectors (potato, wheat and mushrooms) were conducted with sixty eight key 'actors' in these sectors to understand how risks are measured, perceived, interpreted and managed throughout the production chain for specific diseases. Of these, 60 semi-structured in-depth interviews were conducted with growers and other supply chain actors in the cereal and potato sectors. Outputs suggest that plant disease is a controllable production risk for growers. Wheat and potato growers favour high-yielding varieties demanded by millers and supermarkets respectively, even if risk is increased. This situation could change if Directive 91/414, with its focus on 'hazard' rather than 'risk', is activated in its current proposed form, emphasising the importance of 'risk as politics'. Disease is not considered a major risk to 'downstream' actors in the wheat and potato supply chains. For them, key risks revolve around volatile prices and supplies. Initiation of contracts between contractor and grower ensures that most risk is passed to growers, even though key downstream actors influence growers' choice of varieties. Choice experiments (CE) using a sample of 323 members of the public with respect to and willingness to pay (WTP) for reductions in pesticides for bread, potatoes and a rose bush as payment vehicles reveal the public are WTP a small premium to avert human illness and to stop the decline of bird species by reducing pesticide use on potatoes and roses respectively. A model was created investigating the effect of crop consultants wrongly estimating the fungicide dose response curve in cereal production in combination with attitude to risk. We were able to investigate which aspect of the consultants' decision-making process (disease prediction or attitude to risk) has the largest effect on yield and financial losses.

RES-229-25-0015 Professor B Wynne, Professor L Heathwaite, Lancaster University
01 Jul 08 – 01 Nov 11
Assessment of Knowledge Resources in Animal Disease Control

Containment is a controversial issue in animal disease outbreaks. Strategies often come under the spotlight, particularly when human health may be at risk or when animal and farm welfare issues are promoted in the media. This project is building more integrated strategies of containment by bringing together expertise in public health, sociology, microbiology, epidemiology and veterinary science, environmental science, human geography and medical statistics.

The management of human and animal health or the health of the environment does not, and cannot, rely on one discipline or a single group of experts. Where disease is concerned, it requires containment strategies in order to prevent further spread. Management has to require and interplay between scientific knowledge, social and environmental criteria rather than a single expert group. In managing these complex situations and making informed decisions, limitations in understanding of the research, policy and stakeholder communities are exposed. For those concerned

with animal disease events there is a pressing need to develop an effective cross-disciplinary understanding of strategies of containment. This is the issue at the heart of the project. The overall aim was to break down these disciplinary barriers by creating a truly cross-disciplinary understanding of the problem. There were two main objectives: To bring together natural and social science approaches to analyse the complexities and uncertainties embedded in animal disease management strategies and to use a cross-disciplinary approach to evaluate why particular research and technical developments have been adopted and others not, in the deployment of strategies of containment. The first objective is based on the assumption that the scientific knowledge upon which decisions are made contains inherent uncertainties and that when science is translated into policy, these uncertainties are often overlooked. Such uncertainties include a lack of understanding of the complexity of the problem particularly a poor understanding of the interaction between different disciplines and a lack of sufficient data. Central to this objective is advancing our understanding of different types of uncertainties, their complexity and significance and how this knowledge can be translated into improved management practices and policy. The second relates not only to techniques and equipment, but also to the related skills, resources and knowledge that are employed during animal disease management. The researchers designed their programme to examine a range of practices covering detection, identification, modelling and emergency response. The aim was to understand the goals and evaluate the tools used to integrate these practices and how they might be brought together to provide more effective measures to manage disease outbreaks. A core deliverable is an understanding of disease containment to indicate how knowledge of the uncertainties could be communicated better in the process of translating knowledge from research to policy, in order that more robust preventative and responsive strategies of containment can be implemented and are available in the future. They also explored issues of scale, when moving from a regional and national context, to an international context.
Three diseases were explored: Cryptosporidiosis (a disease that can affect drinking water quality), foot and mouth disease (an animal disease where the response for containment is well documented) and avian influenza (where failure of containment could cause pandemic disease in humans).
The results were formulated as key messages:

- An interdisciplinary perspective represents a strong strategic opportunity to improve animal disease management.
- Communication of uncertainties is challenging - especially between sectors (e.g. between the policy sector and the livestock industry).
- New technologies including devices, techniques and associated skills, can provide solutions but may add complexity and new forms of uncertainty if implemented.
- Issues of scale can occur when moving to broader/higher authorities/legislative bodies (e.g. from the UK to Europe). This can increase complexity and difficulties for maintaining trust.
- The processes that shape the prioritisation of disease management options and foci lack transparency; they also vary with reference to human and/or animal health and by different organisations. This can impair coordinated responses to managing disease risks.
- The perception and understanding of uncertainties can vary dramatically between different stakeholders; for example between scientists, policy makers and industry. This in turn leads to the emergence of divergent agendas and priorities in managing disease.
- Institutional memory is important in the translation of knowledge from science to policy.

- Actual disease events, such as the 2001 FMD outbreak or widespread contamination of public water supplies by Cryptosporidium, remain by far the strongest influences for change.
- Trust in authorities needs to be enhanced. Problematic decisions or policy implementation lives long in the memory of stakeholders, creating cynicism or lack of appetite for new legislation or uptake of novel guidelines.

RES-229-25-0016 Professor G Medley, University of Warwick
01 Nov 07 – 31 Oct 10
The Governance of Livestock Disease

We know that sick animals produce less meat and milk, and provide less profit, so it is not just their welfare that suffers. Animal disease can also seriously affect consumer demand at home and abroad. This project considered a range of issues around several different cattle diseases, how policy on one disease affects others and how different organisational levels interact in tackling disease outbreaks.

The research posed four questions relating to endemic diseases of livestock, which are present all the time in the UK. The first considered what the best frameworks for understanding endemic disease control would be. Results showed the importance of "problem framing" in the management of livestock disease. For example, the definitions of which diseases are endemic and which exotic are essentially driven by policy and political considerations. Diseases defined as exotic, attract central government resources for research, and considerable resources are diverted to remove the disease when it enters the UK. In contrast, endemic diseases generally receive far less government attention and are regarded as problems for farmers. Consequently, farmers learn to live with them, and adopt management practices that might mitigate their impact, but which might also enhance their persistence. A framework was developed that combines the epidemiological modelling (i.e. mathematical descriptions of the processes of disease transmission), economic process (e.g. whether disease freedom is a public good) and political considerations (e.g. whether the disease affects human health or international trade) to classify diseases. Bovine tuberculosis (bTB) is the exceptional endemic disease. It has a high political profile and considerable impact on government resources. A review of the National Archives showed that the involvement of badgers, has made the disease unusual, because the government has failed to reconcile opposing, polarised views, resulting in "intractable policy failure". There are multiple groups who have an interest in livestock disease, and they approach the problem from different directions: livestock health, animal welfare, ecological conservation, productivity and profitability, and as a potential political issue. These different perspectives mean that the interpretation of scientific evidence is contested, and it is difficult to find consensus based on general principles. For example, the precautionary principle suggests that, in the face of uncertainty, decisions are taken to avoid the worst case outcome. But for bTB, if conservation is the main concern, then the precautionary principle dictates not culling badgers, but from the viewpoint of animal health and productivity, culling badgers is the most pragmatic action.

During the period of the research, the government developed plans to change the way in which livestock disease is managed: the cost and responsibility sharing initiative, in which the costs of disease management to the livestock industry, along with more control of decision making. Researchers contributed two reports to the consultations for this change. They suggested a regulatory framework (i.e. where government proscribes the rules and conditions, but not the implementation). They also thought it prudent for animal keepers (i.e. farmers individually and collectively) to have a central say in what and how disease is regulated and advocated the

regulation including all diseases, not only those which are deemed important by the current framing. This would require that a new regulatory body with a budget for research to determine the impact of different diseases, and develop the necessary technologies (e.g. diagnostics and vaccines). The project also looked at what factors determine farmer decision making processes, and what their impacts are. They found that patterns of disease (e.g. presence of a disease in a herd) are largely determined by farmer decisions (especially buying and selling of animals). There are two important aspects of these decisions. First, movement of animals has different effects on different diseases. Unusually, the project considered multiple diseases simultaneously (most research and decision-making treats different diseases separately and independently). Selling cows from a herd might be good for one disease (e.g. if they are infected and infectious) and might be bad for another (e.g. if they are immune). Findings reinforce the conclusions that farmers acting individually cannot completely eliminate disease from the UK. Some form of collective action is required so the risks and benefits of disease control are shared in such a way that it is to the benefit of all. Overall, it is possible to see that disease (and therefore its control) is determined by the interactions between the natural science processes (e.g. biology and epidemiology), and social science processes (e.g. economics, politics and law). These interactions are mutually reflexive, i.e. if policy changes, then epidemiology will change, which will cause policy to change.

RES-229-25-0022 Professor C Banks, Southampton University
01 Oct 07 – 30 Sep 10
Energy Production on Farms through Anaerobic Digestion

This project examines the potential for development of anaerobic digestion on farms, and the contribution this could make to rural development and agricultural diversification.

Anaerobic digestion (AD) on farms can provide additional income through using the biogas to generate electricity and heat or upgrading it to a transport fuel. This contributes towards renewable energy targets, with the option of supplying the energy to local communities. It also offers environmental benefits by reducing greenhouse gas (GHG) emissions associated with farming, and promotes the recycling of nutrients in place of artificial fertilisers. The process can use energy crops, agricultural residues and wastes, and by careful planning and adaptive land use can maximise the use of whole crop biomass into both food and energy markets. The research aim was to develop and verify rigorous models for analysis of these claims and assessment of the commercial viability, energetics, land use and societal implications of diversification into on-farm energy production through AD. The UK Government is currently promoting AD as a key renewable energy technology and sees farm-based systems as playing a major role. To stimulate the development of AD, new policy measures and financial incentives have been introduced, including feed-in tariffs for renewable energy supplied to the electricity and gas grids; doubling of the entitlement to tradable renewable energy certificates; and a digestate protocol and publically available specification (PAS) to allow deregulation of digestate under the EU Waste Framework Directive. The research concluded that these have gone some way towards promoting the uptake of AD on farms, but some points regarding the regulatory structure for AD are still unclear (e.g. planning, taxation and the use of digestate). The results also showed there were no regulatory or fiscal measures to promote on-farm AD from a purely environmental perspective, and that regulation and rewards had focused more on European Union drivers aimed at energy production and the diversion of urban organic wastes from landfill. Economic modelling showed that AD is commercially viable using crops as the feedstock, and would allow a 300-hectare arable farm to double its profit. The best crops to digest

were found to be sugar beet and wheat which can be grown within crop rotations. Digestion would remain profitable even if market prices for crops increased by 50%, but this also depended on maintaining the current level of subsidy for energy production through the feed-in tariff scheme. The commercial case for AD on a dairy farm was less certain, with a 6% predicted increase in profit when animal slurry only was digested. Economic viability could, however, be significantly enhanced by importing pre-processed food waste which enhances biogas yields and can balance the farm's fertiliser needs, reducing both the costs of purchase and the GHG emissions associated with production. AD can process a wide range of crops and residues, and the impacts of this on ecosystem services provision were investigated using an environmental risk assessment framework. The results showed that crops could be selected to minimise risks and maximise benefits: favoured plants included legumes to reduce nitrogen requirements and flowering crops to attract insects and bird populations. Crops grown as feedstock did not need to be 'weed-free', thus reducing herbicide and pesticide requirements. Crops from headlands and marginal areas could also be used, helping to maintain these areas under stewardship. The process is beneficial in treating slurries and manures as this reduces uncontrolled GHG emissions from storage; it was less certain whether digestion would aggravate or alleviate further emissions during land application but there were ecological advantages from the better availability of nitrogen to the crop. One of the greatest advantages of AD was the energy and GHG emission savings potentially gained from artificial fertiliser displacement. In the case of arable farms, where part of the crop was used for energy production, nutrients captured by digestate recycling made a significant contribution to farm profits by reducing fertiliser buy-in costs. Digesting the slurry produced by one dairy cow can reduce methane emissions by 25 kg and generate 1000 kWh/year of electricity: a typical dairy farm could supply most of its electricity requirements by slurry digestion. Nutrient self-sufficiency could be achieved by closing the agricultural production and urban waste generation cycles through importing food waste back onto the farm for energy generation. Each tonne of food waste digested on farms could replace 9.5 kg of mineral nitrogen fertiliser, saving 105 kWh of energy and 77 kg CO_2 equivalent emissions. A survey of 2000 farmers in England found that ~40% were interested in AD. Potential users tended to have larger farms, were more likely to be owner-occupiers and were younger and better educated than average. Barriers to adoption were seen as high establishment costs and the perceived difficulty of obtaining planning permission. Focus groups and a consumer survey established that most consumers were happy for crops to be used for energy production, although they considered that one of the main benefits of AD was as an alternative to landfilling organic wastes. Many thought that cattle and pig manures were the most suitable feedstocks. There were concerns that introduction of AD on farms might increase traffic on rural roads although in general the public were supportive of AD and would be willing to pay higher taxes to provide grants encouraging uptake. The research provided guidance to Government and its agencies on issues associated with the planned expansion in this technology. It is hoped that the outcomes will further influence the choice of policy drivers to enable AD to realise its full potential in providing environmental benefits, particularly in reducing GHG emissions and promoting sustainable nutrient use through integration of on-farm digestion with the recycling of food wastes.

RES-229-25-0025 Jeremy Phillipson, Newcastle University
01 Jun 08 – 18 Aug 11
Science in the Field: Understanding the Changing Role of Expertise in the Rural Economy

This project explored the current and potential role of field-level advisers as knowledge brokers between scientific research and land management practice, with

a focus on how their knowledge and expertise are constructed and disseminated. The research looks specifically at knowledge transfer practices within three case study professions (rural vets, wildlife ecologists and land agents/surveyors) using a mixed-methods approach which includes interviews, work shadowing and observation of continuing professional development activities.

Changes in recent decades, including shifts in the objectives for agriculture, new priorities for rural development and environmental conservation, and new institutional and regulatory frameworks, have introduced greater complexity to the contemporary 'land system', influencing the ways in which environmental knowledge is produced and translated into professional expertise and practice. With the privatisation and restructuring of agricultural extension services there has been a proliferation of specialised knowledge providers for farming and other types of rural land management expertise. What is not understood are the knowledge practices of those experts who now mediate between institutional science, rural policy and land management practitioners.

The research sought to redress this gap by investigating 'field-level advisors' within three case study professions - rural vets, applied ecologists and land agents/surveyors. The project explored the current and potential role of field-level advisors as knowledge brokers or intermediaries between scientific research and land management practice, with a focus on how their knowledge and expertise are constructed and disseminated. The findings provide a number of new insights into the nature of field-level expertise and the workings of the contemporary advisory landscape. Advisors undoubtedly act as intermediaries bringing science to farms. However research agendas have become disconnected from technical dissemination capacities, and vice versa. So, whilst advisors look to their professional bodies to filter and synthesise the latest research findings, this is unevenly done across the professions. Moreover, the relevant rural professional associations are marginal to public research decision making. The findings highlight the need to improve knowledge exchange between the professions and research base. More generally, the research has helped to understand processes of knowledge exchange taking place between research and practice. This included the development and testing of a novel experimental tool, the Stakeholder Impact Analysis Matrix (SIAM), which provides a method for analysing how research projects are engaging stakeholders and has widely influenced the Research Councils' thinking on mapping and assessing the impact of research projects and programmes. There is a disjuncture between the conventional understandings of knowledge exchange and brokerage and the actual experience of encounters between research, field advisors and land managers. The findings revealed the complexity of field advisors' knowledge sources and how formal CPD provision and requirements do not fully reflect the range of ways advisors keep their expertise up to date. Advisors were found to be actively brokering a range of different types of knowledge, besides formal science, crucially including generating knowledge themselves through learning on-the-job. Both experiential and experimental knowledge are pivotal to their work. Yet they are given limited recognition and generally undervalued by both professional and training organisations. Advisors develop their knowledge through interactions with other professionals, from within the same profession and between professions, as well as land managers. The results highlight the significance of inter-professional working. In an arena where professionals are obliged to work together and learn from each other, advisors need to be better prepared to understand the inter and intra-professional contexts in which they will have to operate. Furthermore, through their client/professional encounters, advisors and land managers do not simply exchange knowledge but learn mutually from each others' knowledge practices. In this way, they also co-construct one another and produce new knowledge. A feature of the

exchanges between farmers, scientists and professionals is the way in which the polarity between expert and inexpert may be reversed. In fact, both advisors and land managers develop expertise in knowing when and how to play the 'expert inexpert' as part of their interactions.

Broader transformations of state-extension relations have been emulated by parallel changes within the professions in terms of their relations to the regulatory state. Land agents have increasingly found themselves at the meeting point where the regulatory state meets rural landed property, while ecologists and other environmental advisors have accrued increasing status in rural land management and regulation. In the case of the veterinary profession the research highlights an erosion of the traditionally close relationship with the state with the application of neoliberal management techniques to the governance of animal health.

5.4 Fourth Call Projects on Adaptation of Rural Living and Land Use to Environmental Change

RES-240-25-0004, Dr R Pain, Durham University
01 Jun 10 – 31 Apr 12
Building Adaptive Strategies for Environmental Change in River Catchments

Agricultural practices will need to change if we are to achieve more sustainable environmental futures. Research is already investigating the role played by rural land management in delivering the ecosystem services necessary to reduce climate change impacts but scientific prescriptions do not in themselves effect behavioural changes. This research took an alternative focus by seeking to understand the ways in which the working practices of rural land managers frame climate change.

The aim of this research project was to test and develop Participatory Action Research (PAR) as a radical 'deep' participatory approach that might allow communities to harness their local knowledge and feed this into environmental policy frameworks to effect change. This use of PAR in river catchment management – a ground-up, open ended collaboration in knowledge production with members of the Lune Rivers Trust working as equal partners throughout the research process - is the first in the UK. This focus arose from the growing imperative for participation and public engagement in environmental management - particularly, in this context, the Water Framework Directive – and the fact that many existing approaches are limited intheir levels of participation. The research objectives were: to undertake a detailed review of existing practice with respect to the generation and dissemination of the knowledge that is being used to inform policy, especially focusing on participatory approaches within science; to develop, apply and evaluate Participatory Action Research as an alternative knowledge practice; and to produce a toolkit for policy makers, policy-delivers, NGOs, land owners and land managers for exploring how engagement in sensitive environmental situations might be approached. The research demonstrated the value of PAR in this context and its role as a critical alternative framework for science. It produced a PAR Toolkit from the process which can be used elsewhere. An innovative Farm Vulnerability Tool for assessing the local risks of slurry pollution was also developed. The research makes a number of contributions to rethinking participation within this context: Participation in knowledge production and planning is not about 'including' relevant publics/stakeholders in what is being done, or about building trust in policy, it is about devolving the whole process of knowledge production to local groups, with external facilitators and people with specific expertise brought in from outside if the group decides that is needed. Such

collaborations have the potential to enrich the learning and knowledge of all parties, and leave behind new tools, skills, and ways of working. Participation cannot be reduced to data collection but specific methods are not central to participatory processes. Although the coding of the model remained with the natural scientist, other participants drove the scientific research process and contributed to many other aspects of it. Knowledge production was a shared and negotiated process. The ways that participation has been co-opted (and institutionalised) mean they are most likely to include only the already-empowered within particular communities but with the conditions in place for real collaboration, this can happen. However, national regulatory frameworks remain a barrier. A genuinely participatory model of working with local groups for the Environment Agency and DEFRA would be to restructure a greater proportion of funding so that local groups and organisations identify issues that need problem-focused research, and have access to funding to support this research and follow-up action.

RES-240-25-0006, Prof W Sutherland, University of Cambridge
01 Nov 10 – 31 Jan 12
Linking Evidence and Policy for Managing Biodiversity in the Agricultural Landscape

In environmental research there is a considerable gap between the generation of results by the research community and the needs of practitioners and policymakers. The challenge is, to ensure that the information from previous research - including that from existing and completed Relu projects - is available to practitioners in a form they can use, and in a location they can access when they have the need. Science and policy have to be linked together and we have to investigate interventions that are social, economic and physical (such as changes in farm management).

This project developed and tested a new method for integrating scientific evidence into policy and practice, using wildlife conservation on farmland as a demonstration. Researchers aimed to combine expert evaluation of synthesized evidence with consultation with practitioners and policymakers, to identify research priorities in important areas where evidence is weak or incomplete. The project had three main objectives: to identify the range of options for managing farmland to benefit wildlife; to synthesize scientific evidence for the effectiveness of these interventions; and, for each intervention, to quantify the importance to practitioners and the level of current scientific understanding, and use this information to set research priorities. Other objectives were to assess knowledge amongst farmland conservation practitioners of the available interventions and the evidence relating to them. Ecologists, rural social scientists and agricultural policy analysts worked together to compile a list of 118 interventions to benefit wildlife on agricultural land. Evidence for the effectiveness of each intervention was gathered using systematic review methods, and each piece of evidence (743 in total) summarised in plain English. Fifty-four people involved in the policy and practice of farmland conservation took part in the project as 'practitioner' consultees. They scored the importance of each intervention for farmland conservation from 1 (not important) to 5 (very important). They were asked how much they knew about a selected subset of interventions, including whether they had heard of it, how much scientific evidence they thought existed for it, and whether they thought it benefitted wildlife. Experts assessed how much we know about each intervention (% certainty) and whether the evidence showed a benefit to wildlife. There was a high level of awareness of farmland interventions among practitioners. On average, they had heard of 29 out of the 34 interventions for which levels of awareness were tested. They also had good knowledge of the amount of scientific evidence that exists about the interventions - their assessment correlated with our expert evaluation of how much evidence exists. However, the practitioners generally

had less good understanding of the results of research. The researchers identified ten interventions that should be research priorities for farmland conservation, having high importance to practitioners and low certainty of scientific knowledge about their effectiveness for wildlife conservation:

Research priorities for farmland conservation:
1. Provide specialist advice to farmers and land managers
2. Manage woodland edges to benefit wildlife
3. Provide training for land managers, farmers and farm advisers
4. Control invasive non-native plants on farmland (such as Himalayan balsam, Japanese knotweed)
5. Connect areas of natural or semi-natural habitat
6. Manage the agricultural landscape to enhance floral resources
7. Provide buffer strips alongside water courses (rivers and streams)
8. Provide bat boxes, bat grilles, improvements to roosts
9. Support or maintain low-intensity agricultural systems
10. Restore or create wood pasture

A similar process for wild bee conservation was based on a previously published synopsis of evidence. There are remarkable similarities between the two lists of research priorities, even though they were devised using different sets of evidence, and independent assessment processes with different groups of practitioners and experts. Both processes identified training land managers, connecting areas of semi-natural habitat and enhancing floral resources at a landscape scale as priorities for research. For wildlife conservation on farmland, advocacy priorities were also identified. These interventions had high importance to practitioners, high certainty of scientific knowledge about effectiveness for wildlife conservation and unanimous agreement among ten experts that the evidence demonstrates a benefit to wildlife. They are presented with the highest priority first. Advocacy priorities for farmland conservation - interventions that evidence-based policy should support:
1. Restore or create species-rich semi-natural grassland
2. Plant nectar flower mixture/wildflower strips
3. Plant wild bird seed or cover mixture
4. Create uncultivated margins around intensive arable or pasture fields
5. Create skylark plots
6. Use mowing techniques to reduce mortality
7. Reduce fertilizer, pesticide or herbicide use generally
8. Leave uncropped, cultivated margins or plots (includes 'lapwing plots')
9. Reduce management intensity on permanent grasslands
10. Use organic rather than mineral fertilizers

RES-240-25-0009, Prof D Harvey, Newcastle University
01 Oct 10 – 31 Mar 12
Sustainable Cultivation of Upland Environments

This project looked at three questions: how we articulate and communicate whole system assessments and inherently uncertain predictions of the causes and effects of environmental change; how we reconcile conflicting interests with common necessity and purpose and how we encourage interdisciplinary working, stakeholder engagement and knowledge exchange. Previous models are either too simple, or irrelevant. But the process of creating a model does tell us something about the environmental systems. It ought to be possible to communicate our separate and different understandings about the ways in which these systems work without getting bogged down in technical detail or buried in sophisticated computer models. The project set out to identify the key systematic relationships between, for instance, land

use, landscape appearance and environmental effects, and also identify the major differences of judgment and knowledge about the ways in which these key relationships work - what they mean for the management of the system.

The project intended to test the proposition that stakeholders' conceptions of the major socio-economic and environmental linkages in upland agricultural environments could be represented as a network of causal processes, captured and analysed in a Bayesian Belief Network. This network would focus on the principal causal relationships between observed variables (land uses, livestock numbers, ground cover etc.), and the resulting network could be used to investigate the general effects of changes in determining or conditioning variables on outcomes, such as biodiversity and economic sustainability. Researchers tested this proposition using the Northumberland National Park as a case study. An intensive workshop involving the principal park officials and other relevant stakeholders was held to identify the key relationships affecting the park's landscape and environment. Whilst identifying key features of interest (although not necessarily of influence) to the management of the NNP, this initial picture was far too complex for either calibration or manipulation. The NNPA had separately commissioned an intensive representative survey of the commercial farms in the Park, (50 of the 125 total) carried out by members of the research team in conjunction with the Park officials, which they allowed the project to use to develop possible models of land use. Much of the research resource has been devoted to fully exploring the relationships revealed by these data between land use and management, and commercial viability (sustainability) both in the past and expected in the future for these farms. However, extensive statistical exploration of possible relationships and associations in these data failed to identify any strong (and reliable) relationships, with one important exception. Part of the survey questionnaire asked farmers about their likely responses to three caricature representations of possible future policy scenarios, based on a précis of the European Commission's proposals for the future of the Common Agricultural Policy post 2013 at the time (October, 2010). It proved possible to characterize the farms in the survey according to the number of adult dependants on the farm, whether they were (mainly) tenants or owner occupiers, and how long the manager had been in charge of the farm. These characteristics were the principal determinants of "farmer type". This variable, in conjunction with four other variables: frequency of management changes in the past (previous 10 years); region of the park (North or South); diversification income; off-farm income; proved to be the major determinants of responses to the three policy options (which included the option of giving up farming. Land use and management change is most often associated with change in control or ownership of land. As a consequence, the factors which determine whether or not current farmers go on farming (such as policy change), and the conditioning factors such as farm type and farm family business conditions, are important for the future condition and prospects for the park. The project's simple belief network captures the principal elements of these relationships, on the basis of survey data, and is capable of validation, up-dating and extension through a short, two page, repeat survey. A further meeting with park officials to explain the work, present findings and seek permission and assistance with a follow up survey revealed two major and difficulties. First, the NNPA's relationship with the farmers is complex, potentially difficult and requires careful management and cultivation. Unless these farmers can be convinced of the benefits to them of repeated surveys (and implied intrusion in their personal and business affairs), then repeat surveys are not appreciated and can easily make NNPA farmer relationships more difficult to manage in the future. The researchers are therefore surveying a sample of Northern upland farmers to validate and extend their simple model. They conclude that reduction of the inherent complexity of socio-economic and environmental relationships to a simplified form (through a belief network) is likely to be a chimera, despite the superficial attraction of the approach;

and that the need for specific identification of apparent causal linkages depends critically on both the existing institutional knowledge and understanding of the critical relationships, and on the objectives to which this knowledge is relevant.

RES-240-25-0012, Dr Mark Reed, University of Aberdeen
01 Oct 10 – 31 Mar 12
Sustainable Uplands: Transforming knowledge for Upland Change

The British countryside is changing rapidly as a result of human activity, climate change and other pressures. Upland areas are particularly sensitive to these changes. If we are to adapt successfully to manage future challenges, we need to be able to understand what is currently happening and what our options for shaping the future might look like. This project aimed to improve our understanding of how knowledge generated through research can be most effectively transferred into useful policy and practice.

By understanding how knowledge is created and transformed as it flows between individuals, the research documented best practice and developed new approaches for stimulating knowledge exchange, learning and innovation between researchers, policy makers, businesses, local stakeholders and the wider public. In parallel with this, the team continued to do a range of knowledge exchange activities, applying what was being learned in the research, linked to the previous phases of the Sustainable Uplands project. Questionnaire responses from 17 experts helped to design a professionally facilitated workshop in which they identified the top research questions for knowledge exchange and further developed theoretical understanding of how knowledge exchange processes operate. These research questions were then sent to 114 members of the policy and practitioner communities for comment, and their feedback was used to help frame interview questions put to people involved in knowledge exchange. Fifteen in-depth interviews were completed with Principal Investigators, project managers and stakeholders of RELU, single council RCUK and non RCUK research projects that were doing knowledge exchange in an upland and/or catchment management context in the UK. Interviews were analysed to identify best practice principles for knowledge exchange in research projects and programmes. A multi-stakeholder group was formed to develop a UK Peatland Action Gateway to facilitate more effective knowledge exchange between peatland researchers, policy-makers and practitioners. Both the process and the resulting proposal for a Peatland Action Gateway followed emerging best practice from the project. A workshop was convened at the University of Stirling as part of an IUCN conference on peatlands, which led to the formation of a working group of agency funders from each of the devolved administrations. This process identified a clear demand for sharing of expertise on peatland management, through a focal point where peatland information can be accessed and knowledge exchange facilitated. This gateway will enable best practice to be shared, avoid duplication across the various country projects and allow easy access to information and expertise. Funding is now confirmed verbally for the first three years of operation for the gateway, awaiting formal approval via procurement processes, from Natural England, Countryside Council for Wales, Scottish Natural Heritage and Northern Ireland's Department for the Environment. This will give the project continuing influence and legacy. The research team also obtained funding from NERC's Valuing Nature Network for a project on "valuing peatlands" to convene a workshop with researchers, policy-makers and practitioners to help develop a UK Peatland Carbon Code, to facilitate private investment in peatland restoration. This builds on research conducted during previous phases of the Sustainable Uplands project (funded by RELU and ESRC). Mark Reed took part in the RELU work shadowing scheme, enabling him to work closely with DEFRA on Payments for Ecosystem Services. This

has led to a report commissioned by DEFRA and co-authored by Mark Reed on "barriers and opportunities to Payments for Ecosystem Services", which fed into the development of DEFRA's Natural Environment White Paper (NEWP), and the production of DEFRA's Payment for Ecosystem Services Best Practice Guide (again co-authored by Mark Reed). As a result of this work, the UK Peatland Carbon Code will feature prominently in DEFRA's Payment for Ecosystem Service Action Plan at the end of 2012. The UK Peatland Carbon Code has also now been ranked by DEFRA's Ecosystem Markets Taskforce (set up under the NEWP) as the UK's top business opportunity in the natural environment. Top ranked opportunities receive funding for further development and will be recommended to the Secretaries of State for BIS, DEFRA and DECC in March 2013.

RES-240-25-0016, Dr Alister Scott, Birmingham City University
01 Jul 10 – 29 Feb 12
Managing Environmental Change at the Rural-Urban Fringe

The spaces where countryside meets town are often amongst society's most valued places yet there seems to be little understanding and integrated management of these spaces within the UK. What is this "rural-urban fringe"? How is it changing and why? And how can environmental change be managed more effectively where uncertainty, diversity, neglect, conflict and transition commonly feature?

This research rediscovers the Rural Urban Fringe (RUF) set within more positive, inclusive and proactive agendas for management. The focus was on assessing the implications of policy and decision-making processes and outcomes for the sustainability of the RUF. The assessment tool was a framework uniquely fusing ideas within the Ecosystem Approach (EA) and Spatial Planning (SP) to provide an improved lens within which to view the RUF. A research team was established involving academics, policy advisors and practitioners working collectively across professional, disciplinary, scalar and sectoral boundaries. Three cross-cutting themes emerged from the fusion of SP and EA ideas; Connections, Time and Values. Key findings were that: the RUF needs to be re-positioned as an opportunity space based on assessments of the needs of the people, place and environment within the RUF itself; the rural aspects of the fringe need to be considered more explicitly in policy and decisions rather than imposing urban expansion models. Agendas, policy frameworks and goals tend to be pursued separately across the urban and rural institutions creating a marked policy and practice 'disintegration'. The cross-cutting themes that emerged from the project allow professional sectors and publics to engage, interact and participate more effectively within more inclusive and understandable concepts and language. The RUF is an 'edge' space crossing many boundaries with a complex pattern of explicit and hidden connections. This requires unpacking within and across RUF spaces. Working across multiple scales (national, landscape, local and neighbourhood), sectors (e.g. landscape, nature conservation, economic development) and actors (e.g. planners, developers, environmentalists, communities) is key, yet demands significant changes in work practices and tools to deliver more joined-up responses. The research revealed how policymakers often fail to learn from the past when planning for the future. The RUF is a transitory space, defined within short-term thinking but requiring more long term policy and investment opportunities. The project has helped to develop other Ecosystems Approach research and was used to influence the NPPF consultation process. Learning from new and experimental approaches is key when planning for uncertainty with partial evidence. It is valued differently by different people and those values need to be unpacked using monetary and non-monetary approaches. There is a danger that, in decision making we only value what can be easily measured as opposed to measuring what people really value. An interactive tool "Rufopoly" that

was developed by the project provided one means of exploring this in a novel learning environment. Within a game format players devise a vision of 'Rufshire' from answering questions as they randomly land on squares, set within one of the key themes of the project. Questions have been devised drawing from evidence encountered by the team within the research process itself. The project work led to the PI becoming a member of a think-tank of planners to advise the shadow secretary of state on planning matters.

RES-240-25-0018, Mr Laurence Smith University of London
01 Oct 10 – 30 Sep 12
Market-Based Mechanisms for Protection of Water Resources

Faced with climate change, many of our catchments are already under stress from high demands for water and from diffuse and some point source pollution. The risk and severity of flooding may also be increasing. We need improved ways to protect water resources at source and alleviate flood risk. This requires change in land use and farming practices and the cooperation of land users. Advice and capital grants backed up by regulation can take us so far, but this project investigates how we may go further by incentivising landowners to set aside targeted areas of land with most beneficial effect for water protection.

The project's focus was participation in, and evaluation of, the development of Payment for Ecosystems Services (PES) approaches by the Westcountry Rivers Trust (WRT), an environmental charity. The primary objectives concerned building and evaluating networks, knowledge exchange, and adaptation, through exploration of a novel approach and its partnerships. Research undertaken was relatively small scale and "gap filling" in support of this agenda. Narrow definitions of PES focus on periodic payments for income foregone matched to the opportunity cost of the ecosystem service provided and conditional on defined service delivery; but contemporary practice and policy guidance in the UK and internationally adopts a broader scope. To date many PES payments for water resource protection have grant funded investments in improved farm infrastructure that along with conditional changes in farm management are assumed to deliver desired ecosystem outputs. The credibility of a PES scheme is enhanced when scientifically valid approaches are used for spatial targeting of payments and assessment of environmental benefits. As supporting research the project team worked with WRT to assess alternatives for land use change which will bring about water quality improvements, and to model the likely impacts of such changes on greenhouse gas emissions. The outputs of this assessment have contributed to the suite of tools employed by WRT in their multi-criteria analyses of catchment management options. The project examined in particular the 'Upstream Thinking Project' (UTP) which aims to protect water quality through improved land management. The UTP was co-developed by WRT and South West Water (SWW), who as buyer of ecosystem services recognised the economic, ecological and regulatory benefits of improved raw water quality. Partnership was essential, as SWW had no working relationships with farmers whilst WRT could act as an ethical non-profit intermediary with the capacity for farm level assessments and advice. It was observed that the development and implementation of the UTP required networks of technical providers and authorities, partnership working and creative knowledge exchange. Social capital and trust between the parties involved are important facilitating factors, and assets for a scheme intermediary that can reduce transaction costs, help resolve conflicts and enhance sustainability. Coordinated engagement of landowners can also improve impact through interventions that are well targeted rather than scattered and ad hoc. Collective compliance by participating farmers with baseline regulation also helps achieve "additionality" in response to PES incentives, helping to avoid equity.

RES-240-25-0019, Dr Jeremy Franks Newcastle University
01 Oct 10 – 31 Sept 11
Collaborative Conservation in Agri-Environment Schemes

The aim of this research project was to explore whether collective contracts will increase the ecological effectiveness of agri-environment schemes (AES). Species' range and the scope of landscape are typically larger than individual farms, so why are AES options struck with individual farmers on a farm-by-farm piecemeal basis? Collective contracts would allow neighbouring and near-neighbouring land mangers to jointly enter agreements to conserve and protect the environment.

This study examined the different styles of landscape-scale collaboration that could be incorporate into AES to improve their effectiveness, and the species that could be expected to benefit from a landscape-scale perspective. Data on the spatial use for 54 of 92 key farmland species were identified through a combination of species protection status, conservation lists and general ecology. Of these 54, 22 had home and/or foraging ranges that operated at scales larger than the typical English farm. It is therefore concluded that landscape-scale management is likely to benefit these species. The project set out to identify the problems faced by farmers currently involved in collaborative options, and how these were overcome; attitudes of farmers towards collaborative AES (cAES); and the implications of responses for the design of cAES. The problems they identified in telephone interviews were similar to those anticipated by case study interviews with 33 farmers and responses from 122 contributors to an on-line consultation. Barriers include a lack of communication and mutual understanding between farmers; a cultural imperative for independence and timeliness; and alternative interpretations of risk amongst farmers. However, the study concluded that if designed appropriately, cAES have the potential to overcome farmers'concerns. cAES is likely to be more successful where it does not require the whole farm to be entered into a scheme. This will allow farmers greater flexibility and choice over which parts of the farm they would like to include in a scheme, and (Entry Level Stewardship) ELS participation should not be a pre-requisite for entering a cAES as this will encourage participation by current AES non-participants. Farmers also need to be involved in the design of the scheme and have established communication channels with opportunities to provide feedback. Schemes should be flexible in initial design and adaptable to changing circumstances. Farmer involvement in the scheme will facilitate this, although it will be essential to strike a balance between ecological needs and farmers' desires for flexible management. It is important for cAES to be locally specific and targeted at a known species or habitat of interest. A scheme needs to have a demonstrable problem and clear aims, which can be facilitated through education and mutual learning. As well as a clearly defined problem and aims the scheme should also work towards clearly demonstrable benefits. To this end, the scheme should include monitoring and reporting towards the achievement of the objectives, which will allow farmers to monitor their own success and feel a sense of satisfaction in their involvement in the scheme. The scheme should be seen to reduce rather than increase risk. This will be facilitated by providing an alternative income stream that is seen as complementing rather than competing with income generated by food production, contractually insulating farmers from financial penalties associated with the actions of others, and by providing long-term, but flexible support. The on-line consultation identified one additional requirement, a need for collaboration for environmental benefits to be discusses more widely among farmers, because few respondents had previously considered such an option. The project also identified that an intermediary, overseeing organisation played an important role facilitating these collective agreements. The studies identified two "styles" of collaboration; 'active' and 'passive'.

‘Active’ collaboration can be considered as requiring ‘positive integration and interaction’ between farmers in their farming operations, for example co-ordinated the cutting of grass and cereal crops with neighbours. If this form of co-operation were introduced into AES there would have to be legally enforceable safeguard of each collaborator’s liabilities – farmers would have to be confident that they remained responsible for the conservation activity undertaken on their own land, and would not be liable to penalties due to shortcomings of other members of collaborative agreements. ‘Passive’ collaboration more closely resemble ‘co-ordination’ rather than active integration and interaction, for example, in the placement of hedges to form and/or extend corridors), placement of buffer zones around high environmental valuable sites which may be on their neighbour’s property, and to locate ponds as stepping stones in strategic locations as dictated by environmental features in the to assist the movement of target species. ‘Passive’ co-ordination appears to be the form of collaboration farmers would be most willing to support. This could occur within the current farm-by-farm contractual framework, subject to overview of an organisation with responsibility for integrating each farm’s submissions into a landscape-scale environmental plan. Farmer support could be facilitated by developing an intermediary organisation, such as a conservation NGO or Natural England, to play the role of honest broker to facilitate negotiations between farmers. Such an organisation can help inform farmers of the opportunities of participation in collaborative options and schemes.

RES-240-25-0020, Dr Elizabeth Oughton Newcastle University
Aug 10 – Jan 12
Flood Management in Borderlands

The aim of this project was to help develop better resilience to flooding through natural flood management in a rural area. It aimed to do so by supporting the development of networks of knowledge exchange and cooperation between stakeholders including land managers, members of statutory agencies, and local government, businesses, and local residents.

This project was designed to contribute to knowledge exchange between organisations and individuals concerned with flood risk in rural areas on a borderland. The study focussed on the Tweed catchment which crosses the border between England and Scotland, is subject to multiple environmental agencies and expected to suffer more extreme weather in future. The objectives were: to incorporate local knowledge into land management strategies; to facilitate knowledge exchange between local groups, local and national agencies and across the border; to use an integrated set of qualitative and quantitative research methods to explore options for adaptive management; and to examine existing social and natural science data sets to see how they may be used more effectively to support management. Tweed Forum and the Northern Rural Network (NRN) were partners in the research project. Qualitative and quantitative methods were used in the study. Secondary data and expert interviews established the forms of information relevant to natural flood management. Primary data were collected through a Q sort methodology to obtain a deeper understanding of people’s views on flood risk management. Participatory mapping was used to determine where flooding was perceived to be a problem and how this could be reduced. The findings from the analyses were then discussed with institutional stakeholders to determine what outputs would best help them in knowledge exchange and flood risk management in the Borders. There are six key groups, representing 17 organisations, whose remit covers flooding. Some individuals are common to all groups, so the stakeholders feel well connected, with well-developed routes for knowledge exchange. Nevertheless there was still confusion about the practice of flood risk management, especially about who was

doing what where and how different organisations interpreted regulations and evidence. Project findings suggest that there is not much cross-over between academic and non-academic knowledge. Those responsible for regulation and implementation are caught between incompatible expectations rooted in changing approaches to flood risk management. They find that Natural Flood Management (NFM) is a potentially good but disputed idea which is still being tested. Respondents generally characterised NFM as a socio-political manifestation of the public's desire for a more natural system of flood management and associate NFM with 'popular' initiatives like river restoration, and await tangible scientific evidence that NFM will be able to control river behaviour. The importance of networks among those with trusted experiential expertise was repeated in many interviews. Separation between academics and environmental managers was reinforced by time pressures and standard ways of working in agencies, and by lack of access to academic resources. Both documents and experiential knowledge can become inaccessible. Organisations may buy in or develop individual and group expertise, but this is not always communicated well. These problems are compounded by the outsourcing of work to consultants. Much comment was focused on designing small scale interventions to prevent flooding rather than large-scale, generic flood prevention schemes. Small scale intervention was simpler in that it provides a focus for the many perspectives and expertises that exist in the decision making processes in the Borderlands. Because there is also a lack of clarity about the jurisdiction of organisations, especially in England, partnership working at one particular location is an efficient way of bringing the full range of knowledge and expertise together. The Q methods revealed two distinct positions for adaptive management practices, one stressing NFM and the other traditional flood management. After further discussion at three local meetings these positions were developed into three options which were tested amongst the wider community through participatory mapping. The findings were remarkably similar in Scotland and in England. The former had 66% in favour of NFM-type solutions with 17% in favour of traditional engineering solutions while 17% either chose both or a mixture. In England the figures were 70% in favour of NFM, only 4% choosing engineering solutions alone, and 26% choosing a mixed approach. These results showed how local community stakeholders could contribute to defining flooding problems and producing options for flood management. The results of the analysis were taken back to organisational stakeholders who identified significant outputs for development including a physical model of a river catchment to demonstrate the effects of NFM on rainwater flow and flooding is being developed by Tweed Forum to take to agricultural shows throughout the catchment to explain and discuss NFM and SFM with the general public. The model will facilitate education but engagement with the public on flood risk management and climate change. In addition to the Borderlands contribution, the Scottish government has contributed £6K for a purpose built trailer, to be completed by May 30th 2012. A short manual on conducting and analysing a Q sort is being provided so that interested agencies can conduct further comparative Q studies and a handbook of Participatory GIS practices has been made available on the Tweed Forum website, offering a straightforward introduction to the techniques. These can be used by government bodies, planning or regulatory agencies or local groups concerned with environmental management.

RES-240-25-0025, Dr Martin Phillips University of Leicester
Dec 10 – June 12
Rural Communities Adapting and Living with Climate Change

The research was exploring the impacts on rural communities of the social and environmental effects of climate change. In particular it set out to assess the degree to which three drivers of rural transition - governmental policies for climate change mitigation and adaptation, alternative/counter-cultural visions and practices, and

environmental changes associated with climate change - might present quite contrasting futures for rural communities.

The study has explored how rural communities may be impacted in the future by social and environmental changes associated with climate change. In particular it assesses how changes in energy, food and housing related to climate change mitigation and adaptation might impact on, and be embraced, promoted or resisted by, rural communities. A detailed investigation of four rural communities in England reveals how contemporary rural lifestyles are highly dependent on carbon fuels, which are viewed as a key contributor to humanly induced climate change, as well as being an unsustainable energy source into the future. The study demonstrated that rural residents are generally concerned about both climate change and energy provision, although suggests that for many climate change is viewed as a 'back-of-the mind' concern, whilst energy often appears as a 'front-of-the-mind' issue, principally in terms of price and security of supplies. The study also highlighted uncertainty over the causes of climate change and the value of mitigation activities, including the development of renewable energy sources. Such uncertainty is an important contributor to a gap between levels of expressed concern and behaviour that are also clearly revealed in the study. It is, however, argued that such disjunctures between expressed concern and specific action should not be interpreted as simply signifying some deficit in knowledge or motivation. Instead, it is argued, attention needs to be paid to the interpretations or narratives that surround people's participation or non-engagement with mitigation and adaptation activities. The research identifies five distinct narratives of non-transition that appear to be of significance in the four rural villages examined in this research, as well as three narratives of transition. The project then explores how such narratives might be impacted by 3-d visualisations of rural communities created to represent four quite distinct and different scenarios of the future. These scenarios are described as 'cornucopian neoliberalism', 'fortress neoliberalism', 'ecomodernism' and 'ecolocalism'. Each scenario represents distinctly different configurations of governmental policy, economics and cultural values, each with implications for levels of CO2 emissions and climate and environmental change. 3-d computer generated representations of these scenarios are being established to be shown to the residents of the four rural communities being studied. The study seeks to explore whether localised 3-d visualisations of climate and other changes foster any re-evaluation of the narratives of non-transition or whether these narratives come to condition people's reception of alternative scenarios of the future. The findings are of clear relevance to policy makers concerned with facilitating community mitigation and adaptation activities, although the study also seeks to foster engagement within and between rural communities themselves.

5.5 Interdisciplinary Fellows

RES-229-27-0003 Althea Davies, University of Stirling
01 Mar 07 – 31 May 10
Foundations for the Future: Learning from the Past (Lessons from the Past for the Future of the Uplands)

This interdisciplinary fellowship explored how knowledge about the way landscapes have been formed historically might influence how those who inhabit or visit those areas today appreciate them. It drew on a range of different kinds of evidence, including historical records, archaeology and environmental data, such as pollen preserved in bogs, to trace changes in the upland landscapes of the Peak District and Sutherland over the past 500 years. Using techniques developed by economists to assess people's values regarding landscape change or conservation,

the research looked at how information from the past affects their preferences for the future.

The project revealed that although the ecological community does value long-term evidence, there is infrastructural resistance to incorporating additional sources of knowledge into the evidence-base due to pressures to meet existing targets. This indicates the need for engagement both at policy-level and with local stakeholders to introduce and embed long-term concepts into the governance arena and decision-making frameworks, as well as developing and testing strategies that can be applied to specific situations to increase local resilience. On local scales, the case study results show that, despite spanning nearly c.100 years, ecological survey records for Peak District moors are not representative of the range of habitat variability, and may produce baselines that underestimate the extent of change and sensitivity of the UK's drier peatlands. In Sutherland, combined long-term and short-term insights indicate that current legislative and stakeholder emphasis on oak in habitat definitions for Atlantic woods are too narrow to ensure sustainability, and that managed livestock disturbance may also be a more feasible means of ensuring regeneration than relying on natural processes. Many of the changes recorded in both case studies lie beyond the scope of conventional ecological datasets. This indicates the value of reference points that are apt to the ecosystem rather than convenient to human timeframes. Policy and practice impacts are relatively limited as bringing unfamiliar sources into established decision-making frameworks requires continued interaction to introduce the concepts and also ensure that long-term ecologists are sufficiently familiar with the needs of potential users. These goals are being actively pursued through networks like Bridging the Gap, an informal group of ecologists, conservation managers and palaeoecologists interested in exploring the ways in which long term perspectives can help understanding of present ecosystems and ecosystem processes and predict future responses to environmental and management change. Through this network, experience gained during this fellowship and by other long-term ecologists who have also established good local partnerships is helping to forge common agendas and increase awareness to effect longer-term change.

RES-229-27-0002 Evan Fraser, University of Guelph
01 Sept 07 – 31 Aug 10
Integrating Economic and Land Use Models to Anticipate Rural Vulnerability to Climate Change
In this interdisciplinary fellowship, Dr Fraser used tools from a range of disciplines to consider how climate change may affect food production and distribution, and the rural economy. Dr Fraser assessed the importance of these factors in a range of different circumstances and applied this knowledge to predicted changes in our climate, to see what the effects might be.

The research has used historic cases to combined conceptual advances in a number of disciplines (comparative history, development studies, landscape ecology, ecological economics, political science) to identify food systems "vulnerable" to environmental change and published comparative work where relatively minor weather anomalies sparked major food-crises as a way of understanding how our own society may respond to similar shocks. Specifically, Dr Fraser has investigated the Irish Potato Famine, Ethiopia in the 1980s, and famines in India in the Victorian period and explored how economic marginalization and a lack of effective formal institutions led to highly productive yet homogenous landscapes that were vulnerable to environmental change. He conducted empirical studies that use a mixture of qualitative and quantitative methods to understand how land use patterns are influenced by socio-economic drivers and conducted research on how class, education and culture influence perceptions of the environment and sustainability and

how this has management implications for the uplands of the UK. He was also involved in coordinating a number of different research teams to develop system dynamics models that show how socio-economic and landscape factors interact to create vulnerability to climate change. Work on the implications of different types of landscapes for food security and other ecosystem services has been based on extensive collaboration with natural and social science colleagues and involved writing theoretical papers on how to formally combine natural and social sciences to understand these issues. The work on historic cases resulted in observations that in some, but not all situations, even small perturbations to the environment are enough to undermine food security. This has led to quantitative work on identifying characteristics of farming regions where harvests are more or less sensitive to climatic stresses. As well as numerous academic publications, Dr Fraser co-authored two books on food, sustainability and global environmental change: *Beef: the untold story of how milk, muscle and meat shaped the world*, and *Empires of Food: Feast, Famine and the Rise and Fall of Civilizations.*

RES-229-27-0001 Abigail Woods, Imperial College London
1 Sept 07 - 31 Jan 11
Reinventing the Wheel? Farm Health Planning 1942-2006

As part of this interdisciplinary fellowship, Dr Woods explored the history of animal disease prevention from 1942 onwards, in its economic, social, political and policy contexts, and related her research to current policy discussions and the present-day science and practice of farm health planning. She looked at the circumstances that gave rise to past initiatives, considering not just the science, but the social and political factors that have influenced the way we react to outbreaks of animal disease.

This project was inspired by Defra's commitment to promoting the wider use of Farm Health Planning (FHP), an activity that brings vets and farmers together in the active measurement, management and monitoring of livestock health. It aimed to situate FHP within a broader history of efforts to prevent livestock disease through an activity known as veterinary preventive medicine. Objectives were:
1. To produce an analytical, historical account of the developing concern for and expertise in livestock disease prevention, which illuminates how, with reference to the changing scientific, agricultural and policy contexts, vets, farmers, scientists and government officials problematised and addressed impediments to production, and with what effects.
2. To provide a critical, historically-informed analysis of current policy-making on FHP which situates its subjects, objects and processes within social, scientific, economic and political context.

The project has recommendations regarding the future framing, implementation and evaluation of FHP. Due to constraints of time, and limitations of the existing literature, the project focussed largely (though not exclusively) on the period 1942-75, and on pig production. Publications from the project: provide an overview of state involvement in veterinary preventive medicine. This is situated within a broader context of 20th century changes in the diseases suffered by British livestock, and the ways in which they were perceived and managed; provide a more detailed analysis of the post-WWII drive to extend the provision of preventive medicine to British farms, mainly from the perspective of the veterinary profession; focussing on pig production, examine the disease targets and goals of mid-20th century preventive initiatives. The project also explored how and why – in relation to agricultural practices, policies and the economy – disease demographics changed over time, together with the veterinary conceptualisation of health and disease. Outputs directed at Defra and

the veterinary profession, situate 21st century FHP within a longer context of preventive efforts, and draw lessons for its present and future applications. They put into historical perspective the recommendations for more FHP, made by Prof Philip Lowe in his 2010 report *Unlocking potential: A report on veterinary expertise in food animal production*. Other specific outputs used the historical analogy of the 1960s Newcastle Disease (ND) vaccination campaign to draw lessons for Defra's current attempts to encourage blue tongue virus (BTV) vaccination by farmers.

RES-229-27-0006 Dr Katy Appleton, University of East Anglia
1 Oct 08 - 30 Sept 11
The Development of Sustainable, Multi-Functional Landscapes in Rural Areas: A Case Study of a Norfolk Broads River Valley

This interdisciplinary fellowship examined the sustainability of different patterns of future recreational use of the Ant catchment of the Norfolk Broads. The research aimed to develop and assess ways to deliver sustainable, multifunctional landscapes in rural areas, particularly those with significant pressures from tourism and recreation.

Although there is considerable interest at present in defining and quantifying the benefits humans derive from the environment, this knowledge is more advanced for some types of benefits than others. Benefits of a personal and subjective nature, such as cultural and aesthetic enjoyment of the landscape, are generally less well understood and therefore less well accounted for. In the UK, enjoyment of the landscape often takes place in countryside areas, particularly on a casual basis such as a short walk, and while previous work has attempted to capture this type of benefit it has often been on the basis of simple factors such as types of land cover or the amount or density of footpaths. Better understanding of which aspects of the environment or landscape contribute most to recreational enjoyment will allow these aspects to be protected and enhanced in future policy decisions. This work examined recreation in an area of lowland rural landscape in Norfolk, UK. It used a questionnaire survey (both online and in-person) to gather information on the location preferences of those undertaking recreation in the area, including assessment of the importance of various landscape factors in location choice. Analysis shows that tranquillity, the presence of trees and water, variation in terrain and variety of land cover were highly preferred. Digital map data were then used to determine how these factors varied across the study area; the results for each factor were combined to derive an overall picture of recreational suitability. This picture is richer than that provided by land cover alone as in previous work. A further important factor identified by the survey was the accessibility of an area on foot, either for walking as an activity in itself, or as a means of reaching recreational destinations or carrying out other activities such as photography and nature watching. Previous work using footpath density fails to account for the unattractiveness of dead-end routes for recreation, and therefore a more network-based conceptualisation of accessibility was derived. Information on roads and paths in the area was used along with techniques from urban route analysis to generate an overview of accessibility on foot for recreation. It highlighted significant variability including the degree to which main roads can provide a barrier. These two datasets were then combined, allowing immediate comparison of recreational suitability with pedestrian accessibility. Such information has potential use for decision-makers at the local level, for example directing funding or approaches to landowners for permissive routes in areas that are potentially very suitable for recreation but have limited access. In addition, areas that are both highly accessible and recreationally suitable may be candidates for the provision of visitor facilities.

RES-229-27-0007 Dr Angela Cassidy, University of East Anglia
01 Oct 08 – 30 Sep 11
The Badger-TB Controversy: Expertise and Experience in Animal Disease Research

Dr Cassidy investigated public controversy in the UK over transmission of bovine TB (bTB) between domestic cattle and wild badgers; and whether badgers should be culled to manage the disease. The research used analyses of texts and qualitative interviewing to understand how contestation over the science and evidence of bTB in the public sphere of the mass media has shaped policy.

The fellowship aimed to analyse the course of the controversy over time, mapping the key actors, their understandings of the bTB situation and rhetorical strategies and to understand the role of expertise in the case and how it fits into the broader context of the governance of animal disease in the UK. The research employed a mixed-methodology design, involving a combination of quantitative and qualitative media analysis; analysis of cultural and visual sources; and field interviews with key actors in badger/bTB. The research found that framings of badgers as either dangerous, disruptive vermin, or as a charismatic British wildlife species and innocent 'scapegoat' have played a central role in public debates, acting as a rhetorical resource for actors to communicate their arguments for and against badger culling. Evidence from historical and cultural sources shows that these framings long predate the current controversy, suggesting that public debates about bTB are also about the 'proper' nature of the relationship between badgers and humans. Media coverage of badger/bTB has been written primarily by agricultural and environmental journalists, and correspondingly framed as such: bTB as an agricultural problem versus the potential environmental risks of badger culling. These oppositional ways of understanding the issue are deeply embedded in broader public debates over bTB. Further analysis of this coverage has underlined the deeply political nature of the controversy, and how the transfer of public 'responsibility' for the issue back and forth between policy, science, 'the public', and politics has contributed to further polarisation of the debate. The RBCT field trial was commissioned during 1997 in the wake of the incoming Labour government's philosophy of 'evidence based policy', which was invoked to establish public expectations of the promise of science for resolving the bTB issue. However, the contingencies of field science have meant that the RBCT was unlikely to provide the certain evidence expected to direct bTB policy. This explains how it has been possible for the same 'sound science' to be cited in support of directly opposing bTB policy options, as has happened over the past few years in England and Wales. The research has a range of potential impacts for policy and practice in the area. In particular, a wider recognition of the politics and history of badger-human relationships, and of the potential difficulties of living and working alongside these animals may help research and policy on bTB biosecurity move forward by addressing sources of resentment driving the controversy. The research findings as a whole point towards an urgent need to reframe public debates away from the reductive yes/no question of culling and towards broader discussion of the bTB problem and how to address it. Finally, in line with a growing body of research on the evidence-policy relationship, these findings point towards the need to establish a more nuanced relationship between policy and evidence, whereby research findings can be taken account of in context without being expected to provide certainty in complex problems, or the sole justification for controversial policy decisions. While it would be impossible to definitively determine real 'impact' on the debate, particularly at this early stage of the publication cycle, recent developments in badger/bTB should be noted. Over the past year (since Dr. Cassidy started discussing her research with stakeholders) pro-cull actors in particular appear to have adjusted their communication strategies to damp down their

rhetoric against badgers. While on most fronts the controversy has escalated recently, there are some less 'public' cases of co-operation: a particular example of this can be seen in the announcement during November 2011 of collaboration between the NFU and Badger Trust on a trial vaccination project.

Annex B: Director's Office Activities

Month	Programme Events
2003	
Dec 03	Relu Strategic Advisory Committee meeting
2004	
Jan 04	**Invited address:** Programme presentation to UK Biodiversity Research Advisory Group (BRAG) Socio-economic Sub-Group, London
	Stakeholder meeting: Programme meeting with Dr Andrew Moxey and Dr John Hooker, Scottish Executive Environment and Rural Affairs Department, Edinburgh
	Programme meeting with Professor Richard Shepherd, Director of LINK Eating, Food and Health Programme, University of Surrey
	Programme meeting with Professor Joyce Tait, University of Edinburgh, Director of 'Innogen', ESRC Centre for Social and Economic Research on Innovation in Genomics, Edinburgh
Feb 04	**Stakeholder meeting:** Programme meeting with Environment Agency (Professor Mike Depledge, Head of Science; Bob Harris, Head of Air, Land and Water Science; Toby Willison, Head of Land Quality), Bristol
	Invited address: Programme presentation to English Nature Socio-Economic Advisory Group, Peterborough
	Programme meeting with Dr David Lynn, Director, Science and Innovation, NERC, Swindon
	Stakeholder meeting: Programme meeting with Peter Costigan, Defra, London
	Programme meeting with ESRC, NERC and BBSRC Communication Teams, Swindon
	Stakeholder meeting: Programme meeting with Liz O'Brien, Steve Gregory, Marcus Sangster, Forestry Commission, London
	Programme meeting with Professor David White, Head, Science and Technology Group, BBSRC, Swindon
	Invited address: Programme presentation to ESRC RELU Scenario Workshop, London
	Programme meeting Ian Douglas, Co-ordinator, LOCAR Programme, NERC, London
Mar 04	**Stakeholder meeting:** Meeting with Dr Mike Farrimond, UK Water Industry Research Ltd, London
	Invited address: Programme presentation to ESRC Research Priorities Board meeting, London
	4th meeting of RELU Strategic Advisory Committee, London
	Stakeholder meeting: Programme meeting with Jacob Tompkins, Water UK, London
	Stakeholder meeting: Programme meeting with Ken Roy, Countryside Agency, Newcastle
	Invited address: Director gives an opening address at Age Concern Conference: "Ageing and the Countryside", London
	First Call Assessment Panel for Capacity Building Awards and Scoping Studies, London
	Invited address: 'Microbusinesses and the rural economy'. Invited guest lecture, Waseda University, Tokyo, Japan.
Apr 04	**Invited address:** RELU presentation to senior Defra civil servants, London
	RELU Data Management Sub-Group Meeting, London
	First Call Assessment Panel for Research Projects, London
May 04	ESRC RELU Scenario Results, London
	5th meeting of RELU Strategic Advisory Committee, London
	First Call Assessment Panel for Networking and Development Activities, Swindon
Jun 04	**Invited address:** Programme presentation Local Government Association

	and Local Authorities Research and Intelligence Association (LARIA) Conference, Crewe
	Stakeholder meeting: Programme meeting with Jacob Tompkins, Water UK, London
	Stakeholder meeting: Programme meeting with Dr Mike Farrimond, UKWIR, London
Jul 04	**Invited address:** Keynote programme presentation given at Royal Show, Birmingham
Aug 04	**Invited address:** Programme presentation to Land Use Policy Rural Affairs Group with representation of Joint Nature Conservation Committee, English Nature, Countryside Agency and Environment Agency
Sep 04	**Invited address:** Programme presentation to English Nature Socio-economic Advisory Group, Peterborough
	Invited address: Director gives opening address at Action for Market Towns Convention, Romsey, Hampshire
	Invited address: Keynote programme presentation given at Sustainable Development Research Network Annual Conference
	Director is key discussant at Defra's Agricultural Economics Academic Panel "The future of the CAP"
	First Call Assessment Panel for Studentships, Swindon
Oct 04	RELU Principal Investigators Coordination Meeting, Ramada Plaza Hotel, Regent's Park, London
	RELU Rural Futures Workshop, Royal Institution, London
	Programme meeting with RCUK – meeting with Helen Thorne and Annabel Smith, Swindon
Nov 04	Director gives evidence to Parliamentary Select Committee on Environment, Food and Rural Affairs Inquiry on Modernising Rural Delivery, London
	Invited address: Programme presentation to NERC Science into Policy: Best Practice, Keyworth
	Director is Chair of the Countryside Agency Sustainable Land Management Conference, Birmingham
	6th meeting of RELU Strategic Advisory Committee, London
	Second Call Assessment Panel for Outline Research Projects, Swindon
Dec 04	**Invited address:** Programme presentation to Food Ethics Council conference "Just Knowledge? Governing Research on Food and Farming", London
	Invited address: Programme presentation to Welcome Trust/NERC/Research Councils Conference on interdisciplinary research on environment and health, Hixton, Cambs
	Invited address: Programme presentation to LARCI Conference on "Research for Local Government", London
2005	
Jan 05	RELU Programme National Conference, "RELU: The Challenge for Research" Birmingham
	RELU Strategic Advisory Committee meeting, Birmingham.
	RELU Data Sub-Group, Newcastle.
	ESRC Directors' Meeting, Swindon.
Feb 05	RELU Project Workshop, "Learning from the South: mixed farming in stressed environments", University of Oxford.
	1st Meeting of RELU Food Chain Forum, London.
	Invited address: RELU sponsored conference, with Northern Rural Network "Understanding Rural Economies", York (Assistant Director's presentation on *"Research for Evidence-Based Policies for Rural Economies"*).
	Invited address: Director's Presentation on *"RELU's Approach to Knowledge Transfer"* to English Nature, Peterborough.
	Stakeholder meeting: Meeting with Defra/Age Concern staff to advise on research needs on demographic ageing and rural areas.

Mar 05	**Stakeholder meeting:** Programme meeting with ESRC/Defra, London (to promote stronger links on rural research).
	Programme meeting with EPSRC, Swindon (to explore possible scope for collaboration).
	RELU Management Advisory Group, Swindon.
	RELU Newsletter January – March (http://www.relu.ac.uk/news/news1.pdf)
Apr 05	RELU Project Workshop, "Large Scale Investigations in Ecology and Rural Land Use" Imperial College London. (Director gave summing-up address)
May 05	**Invited address:** Director's presentation on *"Agenda Setting and Accountability in Interdisciplinary Research Programmes"* to ESRC-sponsored "Interactive Agenda Setting in the Social Sciences" seminar, Abingdon.
	RELU Project Workshop, "Landscape as an Integrating Framework for Rural Policy and Planning" University of Sheffield.
	RELU Programme Workshop with the Land Use Policy Group of the UK conservation agencies "People and the Rural Environment: Scoping the Research Agenda", York
	RELU Project Workshop on "Data Integration", York.
	Stakeholder meeting: Programme meeting with Defra Rural Economics Unit to advise on rural productivity analysis (for Defra's report on *"Rural Productivity"*).
	Invited address: Director's presentation on *"Sustaining Agri-food Systems: the Need for Interdisciplinary Research"* to OECD/Italian Government Conference on "Opportunities and Challenges in Agri-Food Research", Rome.
	"Setting the Research Agenda" Rural Economy and Land Use Programme Briefing Series No 1.
	"Rural Economy and Land Use Futures" Rural Economy and Land Use Programme Briefing Series No 2.
Jun 05	**Invited address:** Director's presentation on *"Accountable Science: Improving the Social Responsiveness of Research Programmes: the Case of RELU"* to ESRC-sponsored Transdisciplinary Seminar Series on Sustainable Agriculture, School of Geography, University of Nottingham.
	Invited address: Director's presentation on *"The Changing Politics of the Countryside"* to ESRC-sponsored Governance of Sustainability Conference, Norwich.
	Second Call Assessment Panel, Swindon.
	Studentships Assessment Panel, Swindon.
	RELU News April – June (http://www.relu.ac.uk/news/news2.pdf)
	Stakeholder meeting: Programme meetings re Third Call with Fiona Stuart and Fred Landeg, Animal Health and Welfare Division, Defra, London.
Jul 05	**Stakeholder meeting:** Programme meeting re Third Call with Stephen Hunter and Alan Inman, Plant Health Division, Defra, York.
	Stakeholder meeting: Programme meeting with Jim Knight, Defra Minister of State with responsibility for the countryside.
	RELU Strategic Advisory Committee, London
Aug 05	**Lesson learning:** Programme meeting with NERC staff, Swindon (to discuss the relevance of RELU's experience to the new interdisciplinary programme on environment and health).
	Stakeholder meeting: Programme meeting with Martin Fitton, Chief Executive, Association of National Parks Authorities, to discuss joint stakeholder activities, Newcastle.
	Invited address: Assistant Director's presentation on *"The Social Sciences and Agri-food Research")* to European Society for Rural Sociology Congress, Keszthely, Hungary.
Sept 05	**Invited address:** Director's presentation on *"Sustaining Agri-food Systems: Rethinking Public Research"* to EURAGRI Members' Conference "Anticipating the future: knowledge based policy for European Agriculture",

	bringing together the Directors of Research and Chief Scientists from EU Agriculture Ministries, York.
	2nd meeting of RELU Food Chain Forum, London
	Teleconference with PMG to discuss Second Call Conditional Offers
	RELU Newsletter July – September 2005 (http://www.relu.ac.uk/news/news3.pdf)
Oct 05	Second Call Principal Investigators' Induction Workshop, Newcastle
	Invited address: Assistant Director's presentation on *"The Changing Research Agenda for Sustainable Agri-food Systems"* to Strategic Research Review of FPVII, Working Group on 'Environmental Issues Related to Food and Feed', European Commission, DG12, Brussels.
Nov 05	**Invited address:** Director's presentation on *"Promoting Diversification into Non-Farming Activities and Developing the Rural Economy" to* Rural Development in Europe**:** Funding European Rural Development in 2007-2013. Agra Europe Conference, London.
	Invited address: Director's presentation on *"Reflections on Nature and Society and Interdisciplinarity"* to the Mammal Society's Autumn Symposium on Wild Mammals and the Human Food Chain**,** London Zoo.
	Invited address: Director's presentation on "*Strategies For Rural Development: Past, Present and Future"* to China-UK Symposium on Appropriate Science and Technology for Rural Sustainable Development – The Challenges and Opportunities**,** sponsored by DFID. Yangling, Shaanxi Province, China.
	RELU Management Advisory Group meeting, London.
	RELU Data Sub-Group, London.
Dec 05	**Invited address:** Director's presentation on *"Towards Rural Development Policies for Europe for the 21st Century"* to IPPR seminar 'A New Rural Agenda' seminar, Brussels
2006	
Jan 06	RELU Conference *"Rural Economy and Land Use: Enabling Knowledge Exchange"*, Manchester. *(Presentation by Assistant Director on "Knowledge Exchange and RELU")*
	RELU Briefing Paper 3 *"The Unfolding Research Agenda"*
Feb 06	**Invited address:** English Nature's Socio-Economic Advisory Group meeting. *(Presentation by Director on "The Progress of RELU Research")*
	Twin RELU Project Launch, Losehill Hall, Peak District National Park Study Centre, Castleton, in collaboration with the Moors for the Future Partnership *(Presentation by Director on "The Rural Economy and Land Use Programme")*
	Third Call Concept Notes Assessment Panel, London
Mar 06	Agricultural Economics Society/Société Française d'Économie Rurale Conference, Paris (*Member of Round table on possible avenues of research and future challenges for agriculture and rural areas*)
	Invited address: Agricultural Economics Society 80th Annual Conference, Paris (*Presentation by Director on "Interdisciplinary Research: The Challenge for Agricultural Economics"*)
	The UK Rural Economy and Land Use Debates, National Science / Social Science Week, Royal Academy of Engineering, London -13 Maarch *"Energy crops running out of steam?"* -15 March *"Where any lessons learned from Foot and Mouth?"* -16 March *"Farming's no place for wildlife?"* -17 March *"Food miles: should we be buying food from abroad?"*
	Third meeting of RELU's Food Chain Forum, London
	RELU Newsletter January – March 2006
Apr 06	**Invited address:** Roots Conference, the Rural Research Conference of the Royal Institution of Chartered Surveyors, Wadham College, Oxford *(Keynote address by Assistant Director on "RELU: Knowledge Transfer and the Unfolding Research Agenda")*
	Third Call Concept Note Workshop, Centre for Life, Newcastle

May 06	**Invited address:** British Academy Workshop "Working Together Across Disciplines: Challenges for the Natural and Social Sciences" , London *(Presentation by Director on "Interdisciplinary Research and the Rural Economy and Land Use Programme")*
	Invited address: Sustainable Development Research Network/Royal Institution of Chartered Surveyors lecture series, London *(Presentation by Director on "Sustainable Rural Economies")*
	Stakeholder meeting: Meeting with Tyne Rivers Trust, Newcastle on potential collaboration between RELU and the rivers trust movement
	First meeting of RELU's People and the Rural Environment Forum, UKWIR Headquarters, London (co-sponsored by UKWIR)
	RELU Workshop in collaboration with Advantage West Midlands Regional Development Agency *"Sustainable Food Chains and Rural and Regional Development"*, AWM, Birmingham
	Dissemination planning meeting with First Call researchers, Birmingham
	Briefing meeting with ESRC/SSRC Visiting Fellow Clare Hinrichs, London
	RELU Management Advisory Group Meeting, London
Jun 06	Meeting of ESRC's Energy, Environment and Climate Change Key Research Challenge Sub-Group, London, to discuss future ESRC funding programmes
	Meeting of historians and sociologists of science and veterinarians from Newcastle, Manchester and Imperial to discuss the nature of veterinary expertise and the history of animal disease regulation, Newcastle
	Stakeholder meeting: Meeting with Faraday Food Processing partnership to discuss commercialisation issues arising from RELU
	Invited address: North Yorkshire URBAL Interreg Conference "Connecting Town and Country", Harrogate *(Presentation by Director on "Sustainable Rural Economies in Peri-Urban Areas – the UK Experience")*
	RELU Briefing Paper 4 "*The UK Rural Economy and Land Use Debates 2006*"
	RELU Newsletter April – June 2006
Jul 06	RELU Journal of Agricultural Economics Special Issue published.
	Invited address: European Environment Agency Expert Meeting, Copenhagen "Classifying land use trends and rural areas in an environmental perspective" *(Presentation by Director on "The Rural Economy and Land Use Programme")*
	Invited address: ESRC Seminar Series: New Rural Economies – Building Researcher-User Alliances across the Devolved Territories, London *(Presentation by Director on "The Making of Interdisciplinary Rural Studies")*
	Invited address: Water, Environment and Society Seminar, Sheffield *(Presentation by Assistant Director on "Knowledge Transfer and Exchange: the Example of the Rural Economy and Land Use Programme")*
	Lesson learning: BBSRC Sustainable Agriculture Panel, London
	RELU Strategic Advisory Committee
	Foundation for Science and Technology Dinner/Discussion *"Sustainable development – how should policy and business decisions reflect pressures on natural resources and global climate?"*, Royal Society, London
Sept 06	**Stakeholder meeting:** English Nature's Socio-Economic Advisory Committee Meeting, Peterborough
	Invited address: Science and Technology Policy Research (SPRU) Conference on 'The Future of Science, Technology and Innovation Policy: Linking Research and Practice, Bristol *(Presentation by Director and Assistant Director on "Social Sciences and the Social Shaping of Agri-Food Technology")*
	Invited address: RIMIPS/Latin American Centre for Rural Development Rural Territorial Dynamics meeting, London *(Presentation by Director on "The RELU Programme and its Unfolding Research Agenda")*
	Stakeholder meeting: Meeting with Nigel Birch, Scientific Councillor for UK Embassy China to discuss potential Chinese scientific interest in the RELU

	programme
Oct 06	Second meeting of RELU's People and the Rural Environment Forum, Royal Horseguards Hotel, London
	Stakeholder meeting: Meeting with Dr Cheol Hi Lee, Director Farm Management Bureau, Rural Development Administration, Republic of Korea to discuss the RELU Programme and potential links.
	"European Foods Systems in a Changing World" ESF Forward Look, Wageningen, the Netherlands
	Stakeholder meeting: Meeting with Dr Michael Lester, Manager, Social and Institutional Affairs, Land and Water Australia to discuss the RELU Programme and potential links.
Nov 06	Fourth meeting of RELU's Food Chain Forum, London
	7th IPPR Launch Conference on Rural Policy, Brussels
	Invited address: Adult Learning in Rural Areas: Learning, Employment and Rural Need, Sheffield (*Presentation by Director on "The Ageing Countryside")*
	Interviews for RELU Science Communications Manager
	Interdisciplinary Early Career Fellowships Panel, MRC London
	Invited address: Women in Rural Enterprise (WiRE) seminar, Askham Bryan College, York *(Presentation by Director on "The Changing Prospects in the Rural Economy")*
Dec 06	ESRC Energy, Environment and Climate Change Sub Group meeting, Cardiff
	Invited address: Future Directions: A New Research Agenda for Rural Development, Queen's University Belfast *(Presentation by Director on "Rural Sociology and Geography")*
	Invited address: The Diversity of Rural Areas in the Enlarged EU: Characterisation, Typology and Modelling Workshop, Seville, (jointly organised by Joint Research Centre (JRC), the Institute for Prospective Technological Studies (IPTS) and Directorate General for Agriculture and Rural Development (DG AGRI) *(Presentation by Director on "Harnessing the Social and Natural Sciences for Sustainable Rural Development")*
2007	
Jan 07	**Invited address:** Regions and Regionalisation in and beyond Europe Colloquium, Lancaster University, Institute of Advanced Studies (Presentation on *"Rural Futures")*
	Seminar to debate Food Ethics Council report on *"Sustainable Farming and Food: Emerging Challenges"*, Newcastle University
	Energy, Environment and Climate Change Subgroup meeting, London
	NERC Open Meeting Launch of NERC's Draft Science Strategy
	Invited address: Integrated Rural Water Management-European Research Area-NET, Workshop, London (Presentation on *"Lessons on Managing Interdisciplinary Research Programmes"*)
	Relu Newsletter October – December 2006
	Planning meeting with First Call PIs, London
Feb 07	**Stakeholder meeting:** Roundtable to brief David Miliband on *"Challenges for Land Use",* London
	Invited address: Ageing and Rural Communities Conference, Queen's University Belfast (Presentation on *"The Ageing Countryside")*
	Meeting with Communications Heads of UK Research Councils by new Science Communications Manager, Swindon
Mar 07	Meeting with Peter Stevenson to discuss Defra funding of Relu
	CPRE Conference (David Miliband speech on Land Use), Royal Society
	Stakeholder meeting: Meeting between Relu Director's Office and senior SEPA policy staff, Stirling
	Stakeholder meeting: First meeting of Natural England's Science Advisory Committee, Oxford
	ESRC Festival of Social Science 2007, Relu Debates on Power and Responsibility: Who Decides : You Decide, Royal Academy of Engineering,

	London - 9 Mar: *"The environment would be fine, if only scientists were in charge"* - 12 Mar: *"Consumers cannot be left to themselves to decide what to eat"* - 14 Mar: *"Farmers should be responsible for controlling livestock diseases"*
	Third meeting of Relu's People and the Rural Environment Forum, London
April 07	UKERC/Relu Bio-Energy Meeting to bring together Research Council-supported bio-energy teams (EPSRC-led "Supergen" Biomass consortium, the Research Councils' TSEC BIOSYS consortium, Relu energy projects and UK Energy Research Centre, Oxford
	UKERC Bioenergy Research Roadmap workshop, Oxford
	Relu Newsletter January - March 2007
	Relu Data Services Management Group meeting, London
May 07	Fifth meeting of Relu's Food Chain Forum, London
	Relu/LARCI Conference "Research on Rural Resource Management an the Rural Economy: Addressing the Local and Regional Dimension", Royal Society of Edinburgh (Presentation on *Research on Rural Resource Management and the Rural Economy: Addressing the Local and Regional Dimension*)
	Induction Meeting with Third Call PRE Projects, Edinburgh
	Second and Third Call Projects Planning Meeting, Edinburgh
	Relu Strategic Advisory Group meeting, Swindon
June 07	**Invited address:** Workshop on The Social and Material Practices of Agriculture, Farming and Food Production. (Presentation on *"The Co-Production of Agriculture")*. Centre for Science Studies, Lancaster University
	Stakeholder meeting: Meeting with Natural England Evidence Team to discuss Relu/Natural England links, Leeds
	Stakeholder meeting: Meeting with Defra Farm Health Planning Team to discuss Abigail Woods' Relu Fellowship and interactions between Relu disease projects and Defra, London
	Invited address: UKERC Annual Assembly 2007 (Presentation on *"An Integrated Approach to Whole Systems in the Framing of Research Questions ")*, Cambridge
	Penn State/USDA Project: Design and Evaluation of Public Policies for Rural Development: An EU/US Comparison, Imperial College London (Discussant comparing EU/US rural policies)
	Lesson learning: ESRC Strategic Research Board, York – "The Management of inter-research council programmes" (Presentation on *"Fostering interdisciplinarity: the rural economy and land use programme"*)
	Briefing Paper No. 5 "*Power and Responsibility - Who decides? You decide!"*
July 07	CPRE Seminar *"Population Pressures and the Countryside"*, London
	Defra workshop *"England 2050: Trends and Pressures on Land Use"*, Reading
	Stakeholder meeting: Meeting with Defra Animal Health Agency, London
	ESRC Research Investment Directors Meeting, London
	Briefing Paper No. 6 "*Common Knowledge: An Exploration of Knowledge Transfer"*
	Relu Newsletter April – June 2007
Aug 07	Special Relu Session at the IBG: *"Interdisciplinarity within and beyond Geography"*, London
Sep 07	**Invited address:** BA Festival of Science, Biological Sciences Section (Presentation on *"The Future Yorkshire Landscape"),* York
	Invited address: BA Festival of Science, York (address as President of the Agricultural Section *"Challenges for Rural Land Use"*), York
	Meeting with Relu Land Use Policy Analyst and Defra, London
	Relu Interdisciplinary Training event for Junior research staff, York
	Special Relu Session at BA Festival of Science, York, 9-15 September: *"Working Together Across Disciplines: Challenges for the Natural and*

	Social Sciences"
	ReluSeminar by Professor Clare Hinrichs (ESRC-SSRC Relu Fellow), Pennsylvania State University ***"****Boundary Work in Interdisciplinary Research on Sustainable Food Chains"*
	International Interdisciplinary workshop. "*Can Interdisciplinary Research Produce 'Good' Knowledge?",* Durham University
	Relu Data Management Subgroup meeting, London
	Meeting with Veerle van den Eynden, Relu DSS, Newcastle upon Tyne
	Induction meeting with Third Call PIs, Newcastle upon Tyne
Oct 07	**Stakeholder meeting:** Meeting with Ken Roy (Commission for Rural Communities), Newcastle
	Stakeholder meeting: Meeting with Richard Ferris (UK Biodiversity Research Action Group), to discuss biodiversity research agendas and knowledge transfer.
	Science in Society End of Programme Conference, London
	Stakeholder meeting: Meeting with Scottish Government and Relu Land Use Policy Analyst for Scotland, Edinburgh
	Stakeholder meeting: Meeting of Natural England Science Advisory Committee, London
	"Biopesticides - The Regulatory Challenge", Relu Project Conference, Warwick
	Academy of Social Sciences Knowledge Transfer Conference, London
	Invited address: Launch of RCUK China office (Presentation on *"Researching environment-society relations*), Beijing
	Relu Farm Modelling Workshop, Sheffield, including presentation by Professor Jim Shortle (ESRC-SSRC Relu Fellow) from Pennsylvania State University
	Fourth meeting of Relu People and the Rural Environment Forum, London
	Relu Newsletter July – September 07
	Meeting with Relu Land Use Policy Analysts, Newcastle upon Tyne
Nov 07	**Stakeholder meeting:** Meeting with Jane Downes, Meat Hygiene Service, York
	Stakeholder meeting: Meeting with Christianne Glossop, Welsh Assembly Government, Cardiff
	Northern Rural Network seminar *"Developing the Regional Food Economy"* Beamish, Co Durham (Launch of Relu report: Relu Food Chain Research: Implications for Policy)
	Launch of RCUK Washington Office, Washington, USA
	Relu Conference *"Unlocking Change in the Food Chain",* London / Fifth meeting of Relu Food Chain Forum
	Briefing Paper No. 7 "*What is relu?"*
	Policy and Practice Note No. 1 "*The Role of Regulation in Developing Biological Alternatives to Pesticides"*
Dec 07	**Stakeholder meeting:** Meeting of England Implementation Group on Animal Health and Welfare Strategy, London
	Meeting of Relu Land Use Analysts Advisory Group, London
	Lesson learning: BBSRC Review of Environmental Change panel meeting (Presentation on *"The Rural Economy and Land Use Programme: Lessons for collaboration between biologists and social scientists"*)
	"Quantifying Biophilia", Wildlife Conservation Research Unit, University of Oxford.
	Stakeholder meeting: Meeting with and submission to Strategy Unit Project on Food Policy, London
	Relu Third Call Studentship Assessment Panel
	Relu Strategic Advisory Committee, London
	Planning Meeting with First Call Projects, London
	Meeting with Julio Berdegue, Head of Rimisp, Chile, and leader of programme on rural territorial dynamics in Latin America, London

2008	
Jan 08	**Stakeholder meeting:** Meeting with Officials of the British Veterinary Association, London
	ESRC Research Director's Meeting, London
	Stakeholder meeting: Meeting with John Moverley, Chief Executive, Royal Agricultural Society of England, London, to discuss links between RASE and Relu
	Stakeholder meeting: Foresight Land Use Meeting, London. Advice on scoping of Foresight study.
	Relu Newsletter January 2008
Feb 08	NERC Knowledge Exchange network meeting, Cambridge
	Tyndall Conference on Climate Change Adaptation, London "Living with climate change: Are there limits to adaptation"
	Relu media training day for researchers
Mar 08	Presentation at seminar *on "Relu and the Great Land Use Debate"*, School of Agriculture, Food and Rural Development, Newcastle University
	Relu Great Land Use on-line Debate (part of ESRC Festival of Social Science/National Science and Engineering Week)
	Invited address: ESRC Mapping the public policy landscape Seminar Series. Seminar on Change and Continuity in Scotland's fishing communities, Aberdeen. (Presentation on *"No 'one size fits all' solutions for fishing communities"*)
	Foresight Workshop, London "*The Future Uses of Land*"
	British Society of Animal Science reception, London
	Relu Data Management Subgroup meeting, London
Apr 08	Fifth meeting of Relu People and the Rural Environment Forum, London
	Relu Land Use Analysts Advisory Group meeting, London
	ESRC/RCUK Interdisciplinary Early-Career Fellowships interview panel
	Scottish Funding Council Knowledge Transfer Assessment Panel, Edinburgh
	Defra Evidence Strategy Workshop, Reading
	Relu Newsletter April 2008
May 08	Living with Environmental Change seminar with Secretary of State for Innovation, Universities and Skills, John Denham London
	Relu sponsored Workshop led by Michael Winter "*Land Use Management: the new debate*", London
	Relu Animal and Plant Disease Workshop, London involving researchers, stakeholders and policymakers.
	Living with Environmental Change Programme Partners Meeting, London
	Food Ethics Council Business Forum (*Presentation on "Land use and food security"*)
	Seventh meeting of Relu Food Chain Forum, London. This was the final meeting of the Food Chain stakeholder forum.
Jun 08	Launch of Living with Environmental Change Programme, London
	Relu Seminar by Laurens Klerkx , Assistant Professor, Communication and Innovation Studies Group, Wageningen University *"Matching demand and supply in the agricultural knowledge infrastructure: experiences with innovation intermediaries"* Newcastle University
	Director's office meeting with Relu Programme Management Group, Swindon
	Director's office meeting with LWEC, Swindon
	*"From a land of plenty to a land of uncertainty … finding the answer*s", Royal Overseas League, London, Conference organised by Sir Ben Gill and Chris Pollock. Relu Director acted as rapporteur.
	Invited address: SENS Seminar, Newcastle University (Presentation on *"The Relu programme and interdisciplinary research")*
	Relu Farm Modelling Workshop, Stirling (organised by Paul Armsworth and colleagues)

	Invited address: ESRC Research Methods Conference, Oxford (Presentation on *"Why social scientists should engage with natural scientists"*)
Jul 08	Relu sponsored Cambridge Conservation Forum Summer Symposium: *"Future farming in the UK: global implications for society and biodiversity"*
	VIP reception with Rt Hon Hilary Benn MP and RDAs at Royal Show
	Invited address: XII World Congress of Rural Sociology, Korea. (Presentations on *"The Localization of Farm Policy"* and *"New approaches to rural development"*) Also organised a workshop on agriculture and multi-
	Relu end of project event at North Wyke, Devon, *Livestock farming and microbial watercourse pollution*
	Meeting of Relu Strategic Advisory Committee, London
	Lesson learning: Meeting with Dr Andree Carter, UKCDS, London to discuss the lessons from Relu
	Relu Newsletter July 2008
Aug 08	**Stakeholder meeting:** Meeting with Kathryn Monk, Science Strategy Manager, Environment Agency Wales to discuss links to Relu, Newcastle
	Invited address: Relu sponsored RGS-IBG Annual Conference Session on Rural Geography and Public Policy Engagement, London. *(*Presentation on "*From Linear to Exchange Models of Knowledge Transfer")*
Sept 08	Defra Research and Evidence Strategy Workshop, Reading
	China-UK Sustainable Agriculture Innovation Network (SAIN) Round Table Meeting, Defra, London
	NERC Knowledge Exchange Network (KEN) Meeting, Liverpool
	Final stakeholder meeting Project 224-25-0073 *"Implications of Nutrition Driven Food Policy for the Countryside",* Reading
	Scottish Government *Rural Land Use Study: Launching a Programme of Research into the Current and Potential Contributions of Scotland's Rural Land*, Macaulay Land Use Research Institute, Aberdeen
Oct 08	Meeting with Paul Rouse and Owen Dowsett, ESRC, Swindon
	Meeting with Judy Parker and Owen Gaffney, NERC, Swindon
	Meeting with Ruth Lee, ESRC, Swindon
	Lesson learning: Environmental Research Funders' Forum (ERFF) and UK Collaborative on Development Sciences (UKCDS) joint Workshop, 21st Century Research Collaborations, Warwick University. (Presentation on "*Relu: Lessons Learnt")*
	Stakeholder meeting: Meeting with Sir Don Curry, Government adviser on the Food and Farming Strategy, to brief him about Relu Programme, Heddon-on-the-Wall
	Stakeholder meeting: Meeting with Ken Roy, Director of Evidence, Natural England, to discuss links to Relu, Newcastle
	Stakeholder meeting: Meeting with Derrick Jones, Head of Analytical Services and PK. Khaira of the Chief Scientist Team, Food Standards Agency (FSA) to discuss knowledge exchange between the Relu Programme and FSA.
	Stakeholder meeting: Meeting with Melissa Smith, Parliamentary Office of Science and Technology (POST), London
	Invited address: Birkbeck/Ecology and Conservation Studies Society (ECSS) Inaugural Lecture in series "What is land for? (Presentation on *"Whose Land is it Anyway?"*), Birkbeck College, London
	Land Use Policy Analysts meeting, Newcastle
	Stakeholder meeting: Meeting with Jim Egan and Chloe Palmer, Farming and Wildlife Advisory Group, Newcastle
	Relu Newslestter October 2008
Nov 08	**Invited address:** ESRC Communications Conference, London (Presentation on *"Relu and the Great Land Use Debate")*
	Sixth meeting of Relu People and the Rural Environment Forum.
	Lesson learning: Technology Strategy Board (TSB) Lunch & Learn Session, Swindon (Presentation on *"The knowledge exchange strategy of*

	the Relu Programme")
	Relu Land Use Analysts Advisory Group meeting, London
	Relu PI planning meeting, London
	Lesson learning: Relu - LWEC Meeting with Dan Osborne, NERC and Andrew Watkinson, LWEC Director
	Stakeholder meeting: Meeting with Nicola Lloyd, Head of Analysis, Commission for Rural Communities, Newcastle
	Relu Data Management Sub-Group, London
Dec 08	**Lesson learning**: Briefing Scottish Government on Knowledge Exchange and Stakeholder Engagement, Lessons from Relu, Edinburgh
	Lesson learning: Living with Environmental Change (LWEC) Objective D meeting, Edinburgh (Presentation on *"Lessons from the Relu Programme")*
	Relu Newsletter September-December 2008
2009	
Jan 09	Relu SAC, London
	Relu workshop on Expert Systems for Natural Resources Management, London
	Relu Newsletter January 2009
Feb 09	Meeting with Frances Rowe, ONE North East, Newcastle, to discuss Relu fellowship
	First meeting of Relu Animal and Plant Disease Forum, London
	Meeting with Relu Land Use Analysts, London
Mar 09	**Stakeholder meeting:** Meeting with Nicola O'Connor, Foresight Land Use Project, London
	CRC Seminar, Alnwick. Presentation on *"The state of the uplands"*
	"Land for the Future", Relu Workshop, ESRC Festival of Social Science, University of Exeter
	Invited address: "How will Energy Crops affect our Landscape: Results from Relu Biomass" National Science and Engineering Week/Festival of Social Science, Rothamsted. Presentation *"The rationale for Relu".*
	"What's Fair about the Countryside" Relu Workshop, National Science and Engineering Week/Festival of Social Science Workshop, Northallerton.
	Relu conference: "Strategic Rural Land Use" Relu/Northern Rural Network, National Science and Engineering Week/Festival of Social Science event, York.
	Meeting with Alan Woods, Relu Land Use Analyst, Newcastle
	Meeting with David Guy and Owen Dowsett, to discuss knowledge exchange, ESRC, Swindon
	Meeting with Frances Collingborn, Faith Culshaw and Simon Jackman, to discuss knowledge exchange, NERC, Swindon
	Meeting with Celia Caulcott and Brian Harris, to discuss knowledge exchange, BBSRC, Swindon
Apr 09	Meeting to brief Baroness Young on Relu Conference, London
	Northern Rural Network seminar on "Rural Economies: Coping with Recession", Newcastle (Chaired by Relu Director)
	Invited address: Natural Capital Initiative (NCI), London "Valuing our Life-support Systems: Securing a Healthier Natural Environment through Better Decision Making" Presentation on *"Strategic land use for ecosystem services"*
	Lesson learning: Meeting with Mari Williams, BBSRC, Swindon, to discuss Relu SIAM
	Relu PMG, Swindon
	Relu Newsletter April 2009
	First Vets Collaboratory, Newcastle University
May 09	Meeting with Frances Rowe, One North East, Newcastle to discuss Relu fellowship
	Invited address: BBSRC "Combating Endemic Diseases of Farmed Animals for Sustainability (CEDFAS)" Workshop, Wellesbourne.

	Presentation on *"Combating endemic disease in farm animals: an interdisciplinary approach"*
	Relu project workshop "Animal Welfare Policy", Warwick HRI, Wellesbourne
	Relu project workshop "Angling in the Rural Environment", York
	"Ecosystem services in dynamic and contested landscapes – an interdisciplinary perspective on UK uplands" Seminar given by Klaus Hubacek, Newcastle.
	Lesson learning: Visit of Murray Gardner, NERC, to discuss how knowledge exchange and stakeholder engagement within the Living with Environmental Change Programme can build on Relu.
	The Relu Knowledge Portal was showcased at the 2009 IASSIST/IFDO conference (International Association of Social Science Information Service & Technology; and the International Federation of Data Organisations for the Social Science) in Tampere, Finland.
Jun 09	**Lesson learning:** Presentation to Scottish Government Knowledge Exchange group on *"Relu stakeholder impact analysis matrix"*
	British Veterinary Association Annual Scottish Dinner, Edinburgh
	Meeting with Frances Rowe, One North East, Newcastle to discuss Relu fellowship
	Newcastle/University College London Foresight Workshop, Newcastle
	"The Future of Rural Land Use" Relu Conference, London. Presentation on "*The future of rural land use".*
	Meeting with Alan Woods, Relu Land Use Analyst, Newcastle
	Meeting with Andrea Turner, LARCI, Swindon
	Meeting with Ian Lyne, BBSRC, Swindon, to discuss skills and training agenda
	Meeting with Janet Allen, BBSRC, Swindon
	Meeting with Iain Jones and Anna Billingham, ESRC, Swindon
	Lesson learning: SIAM Sounding Board with ESRC, NERC, BBSRC Heads of Knowledge Exchange
	PMG teleconference
Jul 09	Sustainable Agriculture Innovation Network Governing Board meeting, Bejing
	"*Reconciling Competing Demands on Rural Land Us*e" seminar, Warwick HRI
	Relu SAC, London
	Relu end of project conference *"Social and Environmental Inequalities in Rural Areas"*, York
	Relu Newsletter July 2009
Aug 09	**Stakeholder meeting:** Meeting with Stephen Hunter, Defra, to discuss setting up of the Marine Management Organisation.
	Invited address: Science for the Marine Management Organisation workshop. Presentation on '*Integrating the Evidence Base and Making it Socially Accountable*'.
	Invited address: XXIII Congress of the European Society for Rural Sociology,Vaasa, Finland *"Re-inventing the Rural: Between the Social and the Natural"* Opening address by Relu Director
	XXIII Congress of the European Society for Rural Sociology,Vaasa, Finland *"Re-inventing the Rural: Between the Social and the Natural"* Working Group on Sustainable Fishing Communities (Chaired by Assistant Director)
Sept 09	**Stakeholder meeting:** Meeting with Ray Keating, LINK
	Teleconference with Claire Brown (Senior Programme Officer – Ecosystem Services and Assessment, UK National Ecosystem Assessment Programme) to discuss the relevance of Relu's findings for the Programme.
	UK Food Group Conference for World Food Day 2009 *" Rewriting the Rules … to secure our future food"*, Dragon Hall, London
	Relu Workshop "Regulating infectious disease in the 21st Century: Who is responsible or The Changing Landscape of Responsibility", The Innovation Centre, Reading. (Relu Director gave Opening Address)

	Scottish Rural Land Use Study Expert Review Panel meeting, Edinburgh
	First Relu/ Local Authorities meeting
	Invited address: Sustainable Livestock Production LINK programme (Defra) Presentation on *"Livestock and social scientists: Relu's experience of interdisciplinary research"*
	Meeting with Frances Rowe, One North East, Newcastle to discuss Relu fellowship
	Relu-sponsored session at FWAG Annual Conference in Newport on the Relu concept and programme.
	Invited address: European Knowledge Exchange Workshop presentation on '*Main drivers for successful re-use of research data*' (Berlin, 23-24 September 2009). (Relu DSS)
Oct 09	NERC KEN meeting, Lancaster.
	Filming at London Zoo for Research Councils' new promotional video on biosecurity.
	Meeting with Neil Ridley, Otley College, to discuss Relu Visiting Fellowship.
	Invited address: Beacon North East "Maximising IMPACT through Public Engagement" Stadium of Light, Sunderland. Presentation on *"Engaging thinking: knowledge exchange narratives and metrics"*
	Relu PMG teleconference
	Lesson learning: Meeting with Jeff Waage to discuss Relu and interdisciplinarity
	Eighth (final) meeting of Relu People and the Rural Environment Forum, London
	Relu Newsletter October 2009
	Lesson learning: SIAM/Research Councils workshop, Swindon. Presentation on *"Accounting for knowledge exchange: introducing SIAM"*, London.
Nov 09	Data Support Service visit to Director's Office
	Invited address: Govnet Conference on Science and Innovation at the QEII Conference Centre, London. RCUK seminar on *"Excellence with Impact: Benefitting from collaboration"*
	Relu Book Launch *"What is Land For: The Food, Fuel and Climate Change Debate"* , London
	Invited address: NERC Economic Impact Workshop. Presentation on *"Accounting for knowledge exchange: introducing SIAM"*, London.
	Webinar presentation to the Natural England Evidence Team on *"Natural England and the Rural Economy and Land Use Programme"*
	Invited address: Presentation to the Royal Veterinary College on *"The future of food animal veterinary practice".*
	Second Vets Collaboratory, Royal Veterinary College, Potters Bar
	Stakeholder meeting: SIAM Interview with Jonathan Fisher, Environment Agency on role as RELU stakeholder
	Stakeholder meeting: SIAM Interview with Dominic Mellor, Health Protection Agency on role as Relu stakeholder
	Data management for ESRC Research Centres and Programmes' seminar in London, 3 November (Relu Data Support Service showcased the data management planning approach in the Relu programme).
Dec 09	Relu Newsletter September-December 2009
	End of project conference "Knowledge Controversies in Rural Land Management", Oxford. Two presentations: *"Introduction to Relu"* and *"Knowledge exchange and Relu*"
	Teleconference with Jeff Waage, Laura Green, Stephen Hunter and Guy Poppy to discuss plans for the Relu special Theme Issue of the Philosophical Transactions of the Royal Society
	Second Relu/ Local Authorities meeting
2010	
Jan 10	

Feb 10	*Delivering ecosystem services through agricultural payments* Relu/SAGES seminar for Scottish policy advisers, Pentland House, Edinburgh
	Third meeting of Relu Animal and Plant Disease Forum, London
	Workshop for ESRC Investment Directors on the topic of *'Good Practice for Increasing Impact'*, Aston University, Birmingham.
	Lesson learning: Teleconference with Caroline Batchelor, EPSRC, to discuss joint Relu SUE workshop.
	Teleconference with Alan Woods, Relu Land Use Policy Analyst.
	Stakeholder meeting: Frances Rowe, One North East, Relu Fellow
	Defra Workshop on "*UK Low Carbon Farming to 2050"*, Innovation Centre, Reading
	Foresight Project Land Use Futures: Launch of Project Findings, Royal Society London
	Anne Liddon Workshadowing at NFU
Mar 10	Relu sponsored Northern Rural Network Seminar, Mickleton, Co. Durham *Future of the Uplands* included promotion of "*Drivers for Environmental Change"*, authored by Relu researchers
	Stakeholder meeting: Third Relu/ Local Authorities Steering Group meeting, Newcastle
	Stakeholder meeting: Alasdair Johnson, Defra, Newcastle
	Defra workshop, London "Rural Transformations and Rural Policies in the UK and US"
	"Understanding rural communities using social science data", Defra Innovation Centre, Reading. Commission for Rural Communities (CRC), the Rural Economy and Land Use programme (Relu) and the UK Data Archive (UKDA) seminar
	Relu sponsored Northern Rural Network *CAP Reform Short Course*, Newcastle.
	Meeting with Megan Power and Gareth Enticott to discuss plans for the Relu special Theme Issue of the Philosophical Transactions of the Royal Society
Apr 10	**Invited address:** Presentation on *"Why Social Scientists Should Engage with Natural Scientists: Lessons from a Major Interdisciplinary Research Programme in the UK"* Luigi Einaudi Lecture, Institute for European Studies, Cornell University, Ithaca, USA
	Invited address: Presentation on *"Why Social Scientists Should Engage with Natural Scientists: Lessons from a Major Interdisciplinary Research Programme in the UK"* Penn State University, USA
	Invited address: Presentation on *"The Creativity Claims of the Engaged Social Sciences: The Case of Rural Sociology in the US and Europe"* Development Sociology, Polson Institute, Cornell Center for Sustainable Future, Ithaca, USA
	Invited address: Presentation on *"Vets in Transition: Changing professional identities in the UK and US"* Cornell University Veterinary School, Ithaca, USA
	Invited address: Presentation on *"Vets in Transition: Changing professional identities in the UK and US"* University of Wisconsin, Madison
	Fourth Call Relu Assessment Panel, Medical Research Centre
May 10	ESRC Peer Review College, Leeds University
	Defra social research evidence review workshop
	Stakeholder meeting: Jonathan Fisher, Environment Agency, London
	Food and Environment Research Agency Workshop on *"Responsibility and Cost Sharing"* FERA, York
	Stakeholder meeting: Fourth Relu/ Local Authorities Steering Group meeting, Newcastle
	Marine Fisheries Science Advisory Group meeting, Defra, London
	Lesson Learning: Meeting with Caroline Batchelor, EPSRC, to discuss Relu/SUE collaboration, Newcastle.
	Relu workshop *Bovine Tuberculosis: Hosts, Pathogens and Environments,*

	Warwick HRI.
	Relu workshop *Regulating plant diseases; the role of stakeholders in governance?* London
Jun 10	Presentation to Chinese rural economics delegation from Beijing, Newcastle upon Tyne
	Lesson learning: Meeting with Ken O'Callaghan and Ruth Welters, LWEC, Newcastle
	Lesson learning: LWEC Workshop on *"Using Placements in Knowledge Exchange"*, Defra, London. Presentation on *"The contribution of placement fellowships to knowledge exchange: a Relu perspective"*
	Invited address: Presentation on *"Copying or subverting American models: the foundation of European Rural Sociology",* Wageningen, Netherlands.
	International Advisory Board (IAB) for the Evaluation of the Wageningen Institute for Environment and Climate Research (WIMEK)
	Stakeholder meeting: Jeremy Blackburn, Commission for Rural Communities, Newcastle
	Review of Defra Rural Research, London
	Stakeholder meeting: Bob Harris, Defra, Newcastle
	ESRC Peer Review Collge meeting, London
Jul 10	UK China Sustainable Agriculture Innovation Network (SAIN**)** Advisory Board, London
	Natural England, Science Advisory Council, London
	Adapting Rural Living and Land Use to Environmental Change: Launch event of Relu 4th Wave Projects, Manchester. Presentation on *"The rural model of knowledge exchange"*
	Teleconference with ESRC (Jacky Clake, Fiona Armstrong, Danielle Moore) to discuss Impact Toolkit
Aug 10	**Stakeholder meeting:** Nicola Lloyd, Commission for Rural Communities, to discuss the implications of Relu for rural policy
	Stakeholder meeting: Peter Costigan, Defra, to discuss the implications of Relu for Defra science policy, London.
	Stakeholder meeting: Peter Stevenson, Defra, to discuss the implications of Relu for animal disease policy, London.
Sept 10	**Lesson learning:** Meeting with Catherine Lyall and Wendy Marsden to discuss experience of Relu interdisciplinarity as part of QUEST review, Newcastle
	RERAD Strategy Research Programmes 2011-2016: Chairing Panel Review of Tenders
	Contribution of the Livestock Sector on the Environment and Society, BIS Conference Centre, London
	Lesson learning: Telephone interview with Emily Pearman, NERC Knowledge Exchange Team, to discuss development of Water KE programme and lessons from Relu.
	Lesson learning: Meeting with Ruth Welters to discuss Relu/LWEC communication links, UEA
	Invited address: Government Veterinary Service Conference, "Veterinary Education: A Global Perspective" Presentation on *"Vets in Transition: changing professional identities in the UK and US*", Warwick
	Invited address: IUCN UK Peatland Programme Conference, Durham University. Presentation on *"Telling stories: knowledge exchange across science, policy and practice"*
	Invited address: Scientific Advisory Board, Finnish Agri-Food Institute, Kirkkonummi Finland. Presentation on *"Stakeholder Engagement and Research Planning: Lessons from a Major Interdisciplinary Research Programme"*
	Relu end of project conference *"Integrated systems for farm diversification into energy production by anaerobic digestion"* University of Reading
Oct 10	**Invited address:** Presentation on "*The Lowe Report: One Year On*", British Cattle Veterinary Association Annual Conference, Torquay

	Invited address: Presentation on *"Rural policy and expertise"*, Countryside and Community Research Institute Annual Conference, Cheltenham
	Fourth meeting of Relu Animal and Plant Disease Forum, London
	Project Practitioner Panel for *"Assessing and Communicating Animal Disease Risks for Countryside Users", Birmingham*
	Project workshop *"Policy and disease containment strategies in Cryptosporidium: Living with uncertainty"* UKWIR, London
	Relu/ EPSRC Sustainable Urban Environment workshop, "Strategic Land Use: Crossing the Urban Rural Divide", London. Presentations on "*Relu: a Rural Land Use Interdisciplinary Programm*e" and "*Knowledge Exchange in Relu*"
	Project workshop ***"***Sustainable Uplands: how can policy address an uncertain future for UK uplands?***", London***
Nov 10	*"An Invitation to Shape the Nature of England"* Natural Environment White Paper Workshop – Defra, Birmingham.
	Lesson learning: Presentation to Programme Board of Global Food Security programme on experience of Relu interdisciplinarity
	Lesson learning: Meeting with Adam Vanbergen, Insect Pollinator Initiative, to discuss Relu experience of interdisciplinary working, Newcastle
	Lesson learning: Meeting with Sir John Beddington, Government Chief Scientist, to discuss lessons from Relu, London
	NERC Knowledge Exchange Network meeting, Leeds
	Stakeholder meeting: Fifth Relu/ Local Authorities Steering Group meeting, Newcastle
	Invited address: Presentation on *"Why Social Scientists should engage with Natural Scientists"*, Aberdeen Centre for Environmental Sustainability, University of Aberdeen
	Invited address: Presentation on *"Rural Policy and Expertise"*, Macaulay Land Use Research Institute, Aberdeen
	Invited address: Presentation on *"Why Social Scientists should engage with Natural Scientists: the Land Use Challenge"*, LYNET Conference, Espoo, Finland
	Relu conference on *"Risk and uncertainty in the context of animal and zoonotic disease management"*, York.
	Relu end of project conference "*Catchment management for protection of water resources"*, University of London
	Relu SAC
Dec 10	Relu end of project conference *"New forms of participatory environmental governance: experiences and challenges from Loweswater, Cumbria"*, Penrith
	LGA Rural Policy Review Group, London
	AHRC Steering Group meeting, London
	Stakeholder meeting: Meeting with Jeremy Blackburn, Relu Visiting Fellow, Newcastle
	Stakeholder meeting: Meeting with Dirk Pardoel, Relu Visiting Fellow, Newcastle
	RVC Seminar "*Economics of animal health and production",* London
	Stakeholder meeting: Meeting with Ken Clarke, Relu Visiting Fellow, Newcastle
	Loweswater Care Project Meeting, Penrith
	Teleconference with Paul Rouse and Owen Dowsett, ESRC
2011	
Jan 11	**Lesson learning:** ESRC Research Committee, RIBA, London. Presentation on *"The Relu Programme: Fostering Interdisciplinarity and Knowledge Exchange"*
	Invited address: Interdisciplinary Masterclass: Leadership training for Interdisciplinary Environmental Initiatives, University of Edinburgh. Presentation on *"Relu and Interdisciplinarity"*

	Stakeholder meeting: Meeting with Dirk Pardoel, Commission for Rural Communities to discuss Relu Visiting Fellowship, Newcastle
	Meeting with Peter Hetherington, Guardian journalist, **to** give an update on current rural socio-economic research for potential future media coverage, Newcastle
	ESRC Director's meeting, London
Feb 11	**Lesson Learning**: Skype meeting with Sarah Connell, QUEST Programme
	"Impact 360: Success Stories from the Sustainable Urban Environment", Sustainable Urban Environments ISSUES conference**,** London
	Stakeholder meeting: Sixth meeting of Relu/ Local Authorities Steering Group, Newcastle.
	Stakeholder meeting: Frances Rowe, One North East, Relu Visiting Fellow, Newcastle
	Invited address: *Reducing greenhouse gas emissions from agriculture: meeting the challenges of food security and climate change*", Royal Society, London. Presentation on *"UK Agriculture and Climate Change: Socio-Legal Perspectives"*
	"Catchment Management & Public Engagement" Relu/Northern Rural Network Short Course, Newcastle University
	Relu/LWEC Sustainable Uplands *"Transforming Knowledge for Upland Change",* York
Mar 11	SPRU / Royal Society Workshop *"Challenges in Policy Relevant Interdisciplinary Science",* Royal Society, London
	Defra's Secretary of State Launch of the "Uplands Policy Review", Newton Rigg College, Cumbria
	Stakeholder meeting: Relu's *Science in the Field* project meeting with Royal Veterinary College, London
	Dinner with Duke of Edinburgh at Buckingham Palace to discuss the rural economy
	Invited address: *Reducing greenhouse gas emissions from agriculture: meeting the challenges of food security and climate change*", Royal Society, London. Presentation on *"UK Agriculture and Climate Change: Socio-Legal Perspectives"*
	Lesson learning: Teleconference with NERC/LWEC to address lessons from Relu
	Lesson learning: Meeting with UK Environmental Observation Framework, Newcastle
Apr 11	**Invited address:** *"Food Security - Challenges and Opportunities for Animal Science",* University of Nottingham, organized by British Society of Animal Science, BBSRC Animal Science Forum, World Poultry Science Association (UK Branch) and the Association for Veterinary Teaching and Research Work. Presentation on *"UK Agriculture and Climate Change".*
	Lesson learning: Teleconference with NERC Natural Hazards Programme. Presentation on *"The Relu Experience".*
May 11	*New Horizons for Animal and Plant Disease from the Relu Programme* workshop**,** Regents College, London
	Invited address: Cardiff University Lecture Series, Cardiff. Presentation on '*Why social sciences should engage with natural sciences*'.
	Oral evidence to the House of Commons Environmental Audit Committee Sustainable Food Inquiry, London
Jun 11	**Invited address:** *"Engaging Academic Social Scientists in Government Policy Making and Delivery",* British Academy, London. Presentation on *'Promoting links between researchers and government'*
	Global Food Security and Foresight Workshop, Mary Sumner House, London
	Lesson learning: Teleconference with Ecosystem Services for Poverty Alleviation (ESPA) to discuss data management issues
	Invited address: LWEC meeting on *"Integrated Research and Decision-*

	making for the Land: Scope for Development of a Joint Approach to Knowledge Exchange" Defra, London. Presentation on *"Lessons for KE from Relu"*
Jul 11	Natural England Science Advisory Committee meeting, London
	Lesson learning/Invited address: NERC/LWEC "*Knowledge Exchange Good Practice"* event, Royal Institution, London. Presentation on *"The Relu Programme: Fostering Knowledge Exchange"*
	Lesson learning: Meeting with Ken O'Callaghan, LWEC
	Invited address: International conference *"Interdisciplinary progress in environmental science and management",* Newcastle. Presentation on "*Ordering knowledge: A response to G. W. Trompf's "The classification of the sciences and the quest for interdisciplinarity"* and lead discussant on "*Dilemmas in interdisciplinarity"*
Aug 11	*"Conservation Conflicts"* interdisciplinary conference, Relu Sponsored Event at Aberdeen Centre for Environmental Sustainability, Aberdeen Arts Centre
Sept 11	**Stakeholder meeting:** High Level Expert Panel (HLEP) for the Rural Economy Growth Review (REGR), Defra, London.
	Meeting with Owen Dowsett and Peter Stephenson, ESRC, Swindon.
	Uplands Policy Review and the Role of National Parks, Northern Rural Network seminar, Newcastle University. Launch of Relu Policy and Practice Note 33 "*Could protected landscapes have a leading role to play in the sustainable management of natural resources?"*
	Lesson learning: Meeting with Sam Hoste, British Society of Animal Science, to discuss Relu Knowledge Exchange and links to bioscience.
	Stakeholder meeting: Rural Economy Growth Review, Evidence Assurance Session, Defra, London.
	"Stakeholder views on involvement in academic led research" Relu sponsored workshop, Durham University
	UK Ireland Planning Research Conference, Birmingham. Relu session *"Managing Environmental Change at the Rural-Urban Fringe"*
Oct 11	Meeting with Peter Gingold of Tipping Point to discuss their planned event in Newcastle In February 2012 and potential cooperation on future projects.
	Invited address: National Centre for Research Methods "*What is knowledge? What role does user engagement, co-production and impact play?"* , British Academy, London. Presentation on *"Knowledge Exchange for Impact: Perspectives from the UK Research Councils' Rural Economy and Land Use Programme"*
Nov 11	**Invited address:** Rural Economy discussion and lunch, House of Lords, London. Presentation on *"The Rural Economy and Land Use Programme: Adventures in Science".*
	Invited address: European Commission conference on Axis 4 of the European Fisheries Fund. Presentation on "*Local fisheries governance and territorial development*", Brussels.
	NERC Knowledge Exchange Network, Cambridge
	Invited address: G8 Heads of Research Assessment meeting, London. Presentation on *"Accounting for Knowledge Exchange and Impact"*
	Relu Strategic Advisory Committee , Newcastle
	"Who should run the countryside", Relu Conference, SAGEGateshead
	Launch of Rural Growth Review, London
	Stakeholder meeting: Meeting with Helen Goodman MP
Dec 11	Visit of Laura Meagher to discuss Relu Evaluation, Newcastle
	Social Media Training Workshop, Newcastle
	Lesson Learning: Meeting with Sam Hoste, British Society of Animal Science, to discuss Relu Knowledge Exchange and links to bioscience.
	NERC Knowledge Exchange Event**,** London. Presentation on *"SIAM"*
	Going with the flow: Participatory approaches to river catchment management, Durham. Workshop run by "Building Adaptive Strategies for Environmental Change with Land Use Managers" project

2012	
Jan 12	**Stakeholder meeting:** Teleconference with FERA to discuss FERA social science event
	Stakeholder meeting: Meeting with Defra to discuss future rural economy research needs.
	Meetings with ESRC Relu Evaluation project team
Feb 12	NERC Oceans 2025 Conference, London
	Managing Environmental Change at the Rural-Urban Fringe, Millennium Point, Birmingham. (Relu project 240-25-0016) Alastair Scott
	Meeting Stephen Hunter.
Mar 12	FARNET Advisory Group meeting, Brussels
	Invited address: Food Standard Agency's General Advisory Committee on Science *"The Rural Economy and Land Use Programme: Adventures in Science"*
	Meeting Mark Reed to discuss LWEC ecosystems research
	Lesson learning: Teleconference with Jo Tudor NERC, to discuss LWEC Stakeholder Mapping Project and experience of Relu's Stakeholder Impact Analysis Matrix
April 12	Ministerial launch Rural Growth Networks, Durham
	Invited address: Meeting of Departmental Chief Scientific Advisers and senior scientists on experiences of building partnerships between social and natural sciences. Presentation on "*Building social and natural science collaboration in Government*". BIS Conference Centre, London.
	Invited address: *The Rural Economy and Land Use Programme: Adventures in Interdisciplinary Science ,* FERA Workshop, York
	Stakeholder meeting: Defra-DECC Social Science Advisory Panel
	LWEC Stakeholder Mapping workshop, London
	LWEC Ecosystem Challenge workshop, London
	LWEC Fellowship set-up meeting, Swindon
May 12	Defra DECC Social Science Expert Panel, London.
	Lesson learning*: The Rural Economy and Land Use Programme: Adventures in Interdisciplinary Science and Knowledge Exchange*, meeting with Research Council Heads, London
	Invited address: *Enabling Rural Economies: the challenge ahead"* Promoting Rural Economic Growth Rural Conference, Birmingham
	Meeting Dave Raffaelli and Piran White, York to discuss BESS programme and links to Fellowship
Jun 12	**Invited address:** *"Planning for Impact: Making a difference, why bother?"* Scottish Government for ESRC Impact Conference, Brighton
	Stakeholder meeting: Discussion with Peter Costigan, Defra to discuss LWEC Fellowship
	FARNET Advisory Group meeting, Brussels
	BESS Conference Launch, London
	Stakeholder meeting: Landbridge Advisory Group meeting
July 12	**Stakeholder meeting:** Meeting Rachel Muckle, Defra to discuss the societal challenge theme of LWEC, approach to the fellowship, and marine research.
	Lesson learning: Meeting David Hutchinson, to advise on knowledge exchange strategy within the Environmental Exposures and Health (EEHI) and Environmental and Social Ecology of Human Infectious Disease Initiatives, London.
	Tim Benton to discuss links between LWEC and Global Food Security programmes, Leeds.
Aug 12	**Lesson learning:** Adam Vanbergen and Lynn Dicks to discuss links between LWEC research programmes and advise on approaches to knowledge exchange within the Insect Pollinator Initiative, Edinburgh.
	Stakeholder meeting: Nicola Lloyd, Defra and Marine Management Organisation, to discuss marine science strategy of MMO and future marine research capacity needs, Newcastle.

Sept 12	LWEC Resources Challenge Group, Bristol
	Lesson learning: Teleconference with Barry Hague to input into LWEC Knowledge Exchange Guidelines.
	ESRC and Scottish Government workshop on 'Planning for Impact'. ESRC National Doctoral Training Centre Conference in Brighton. Presentation on *Impactful Careers*.
	Stakeholder meeting: Teleconference with Agricultural Industries Confederation to discuss AIC projects and Interprofessional Learning Network (Landbridge)
Oct 12	Workshop Launch of Landbridge network, 'Setting an agenda for rural inter-professional working and exchange' Newcastle.
	Defra DECC Social Science Expert Panel, London.
	FARNET Advisory Group meeting, Brussels
	Lesson learning: Evaluation Panel meeting of the EPSRC SUE/ARCC programmes, inputting experience on knowledge exchange, interdisciplinary working and programme management, Swindon.
	Lesson learning: Teleconference with Debbie Harding, BBSRC to discuss knowledge exchange mechanisms within Insect Pollinator Initiative.
	Lesson learning: Meeting with Robert Brotherton, Environment Agency, to discuss links to Landbridge, Newcastle.
Nov 12	Supporting the Journey to Adaptation, LWEC conference, Birmingham
	Invited address: *"Knowledge Exchange: where's the buzz?"* Insect Pollinator Initiative Conference, York.
	Lesson learning: Meeting with David Hutchinson to advise on knowledge exchange strategy within the Environmental Exposures and Health (EEHI) and Environmental and Social Ecology of Human Infectious Disease Initiatives, Newcastle.
	Meeting of Ecosystems Services Communications Stella Group, Birmingham
	Stakeholder meeting: Meeting with Jon Carling, Commission for Rural Communities, to discuss rural business considerations for their review of micro-enterprise, Newcastle.
Dec 12	Belmont Forum Food Security Scoping workshop, Sao Paulo, Brazil
	Teleconference with NERC and ESRC staff to discuss Belmont Forum initiative on Land Use and Food Security.
	Lesson learning: Meeting with Murray Gardner, NERC, to discuss new Agri-Food Club.
Jan 13	**Invited address:** *"Why social scientists should engage with natural scientists"* Uppsala University, Sweden.
	Lesson learning: Teleconference, Sarah Gledhill, Scottish Government to discuss Policy and Practice Notes and Impact Analysis Methods
	Scottish Government RESAS Research Board
	ESRC Big Idea Workshop, Birmingham
Feb 13	Defra DECC Social Science Expert Panel, London.
	Meeting LWEC Directorate, Swindon
	Meeting ESRC staff, Swindon
	Stakeholder meeting: AIC Teleconference to discuss report on private sector advice
Mar 13	**Stakeholder meeting:** Meeting with Jeremy Moody, Central Association of Agricultural Valuers.
	Westminster Forum conference on Food Security, London
	LWEC Partners Board meeting, Swindon. Presentation on LWEC Policy and Practice Notes and Landbridge.
	Valuing Nature Network Conference, London
	Lesson learning: Heather Campbell, N8 universities to discuss knowledge exchange strategy.
	Meeting of Ecosystems Services Communications Stella Group
	Meeting with Susan Ballard, LWEC

Annex C: Programme Outputs

C.1 Relu Briefing Papers

Briefing Paper No 1 *Rural Economy and Land Use Programme: Setting the Research Agenda* (2005)
Briefing Paper No 2 *Rural Economy and Land Use Futures* (2005)
Briefing Paper No 3 *The Unfolding Research Agenda* (2006)
Briefing Paper No 4 *The Rural Economy and Land Use Debates* (2006)
Briefing Paper No 5: *Power and Responsibility in the Food Chain - Who Decides? You decide!* (2007)
Briefing Paper No 6 *Common Knowledge? An Exploration of Knowledge Transfer* (2007)
Briefing Paper No 7 *What is Relu?* (2007)
Briefing Paper No 8 *Land to Mouth* (2008)
Briefing Paper No 9 *Landmarks for Policy* (2009)
Briefing Paper No 10 *Telling Stories: Accounting for Knowledge Exchange* (2010)
Briefing Paper No 11 *Water Framework Directive* (2010)
Briefing Paper No 12 *Informing the Reform and Implementation of Common Agricultural Policy* (2010)
Briefing Paper No 13 *Shaping the Nature of England: Policy Pointers from the Relu Programme* (2010)
Briefing Paper No 14 *Growing Concerns* (2011)
Briefing Paper No 15 *Changing Landscapes* (2011)
Briefing Paper No 16 *Adventures in Science* (2011)
Relu Data Support Service *Innovations in Interdisciplinary Methods - the Relu Experience* (2011)

C.2 Relu Policy and Practice Notes

Policy and Practice Note No 1 *The role of regulation in developing biological alternatives to pesticides* (2007)
Policy and Practice Note No 2 *Warm water fish production as a diversification strategy for arable farmers* (2008)
Policy and Practice Note No 3 *Eating biodiversity: an investigation of the links between quality food production and biodiversity protection* (2008)
Policy and Practice Note No 4 *Safe recycling of livestock manures* (2008)
Policy and Practice Note No 5 *Stakeholder participation in the management and communication of food chain risks* (2009)
Policy and Practice Note No 6 *Implications of a nutrition driven food policy for the countryside* (2009)
Policy and Practice Note No 7 *Catchment management for the protection of water resources: The Ecosystem Health Report Card* (2009)
Policy and Practice Note No 8 *Regional rural land use: a time for fresh thinking* (2009)
Policy and Practice Note No 9 *Assessing the social, environmental and economic impacts of increasing rural land use under energy crops* (2009)
Policy and Practice Note No 10 *Overcoming market and technical obstacles to alternative pest management in arable systems* (2009)
Policy and Practice Note No 11 *Comparative merits of consuming vegetables produced locally and overseas: Fair and evidence-based carbon labelling* (2009)
Policy and Practice Note No 12 *Social and environmental inequalities in rural areas* (2009)

Policy and Practice Note No 13 *The sustainability of hill farming* (2009)
Policy and Practice Note No 14 *Sustainable uplands: reshaping land use policy for our* hills (2010)
Policy and Practice Note No 15 *Integrated management of floodplains* (2010)
Policy and Practice Note No 16 *Policy-making for animal and plant disease: a changing landscape?* (2010)
Policy and Practice Note No 17 *Sustainable uplands: learning to manage future change* (2010)
Policy and Practice Note No 18 *Collaborative frameworks in land management: A case study on integrated deer management* (2010)
Policy and Practice Note No 19 *Bovine Tuberculosis: a problem for farmers, conservationists and policymakers* (2010)
Policy and Practice Note No 20 *The changing role of local government in managing water resources* (2010)
Policy and Practice Note No 21 *Angling in the rural environment* (2010)
Policy and Practice Note No 22 *Models, decision-making and flood risk: doing simulation modelling differently* (2010)
Policy and Practice Note No 23 *Is wildlife conservation compatible with arable farming? Evaluating the options for sustainable agriculture* (2010)
Policy and Practice Note No 24 *The Big Society: helping communities take action* (2010)
Policy and Practice Note No 25 *Memory and prediction in tree disease control*
Policy and Practice Note No 26 *Farm diversification into energy production by anaerobic digestion* (2011)
Policy and Practice Note No 27 *Protecting countryside users against zoonotic disease by influencing their behaviour* (2011)
Policy and Practice Note No 28 *Modelling the impacts of the European Water Framework Directive: implementing the ecosystem services approach* (2011)
Policy and Practice Note No 29 *The role of local government in managing disease risks in rural areas* (2011)
Policy and Practice Note No 30 *Field advisors as agents of knowledge exchange* (2011)
Policy and Practice Note No 31 *Plant disease risk, management and policy formulation* (2011)
Policy and Practice Note No 32 *A community approach to catchment management* (2011)
Policy and Practice Note No 33 *Could protected landscapes have a leading role to play in the sustainable management of natural resources?* (2011)
Policy and Practice Note No 34 *The governance of livestock disease: putting epidemiology in context* (2011)
Policy and Practice Note No 35 *Managing E coli 0157 disease risk in the British countryside* (2012)
Policy and Practice Note No 36 *Lost in translation: assessing knowledge sources, exchange and effectiveness in animal disease control* (2012)
Policy and Practice Note No 37 *Improving the success of agri-environment initiatives* (2012)
Policy and Practice Note No 38 *Sustainable agricultural landscapes: thinking beyond the boundaries of the* farm (2012)
Policy and Practice Note No 39 *Enhancing the environment through payment for ecosystem services* (2012)
Policy and Practice Note No 40 *Making partnerships work across landscapes - the role of Nature Improvement Areas* (2012)
Policy and Practice Note No 41 *Rural areas as engines of economic growth* (2013)

C.3 Relu Special Issues

Phillipson, J. and Lowe, P. (eds) (2006) Rural Economy and Land Use: The Scoping of an Interdisciplinary Research Agenda *Special Issue of the Journal of Agricultural Economics* 57 (2). This special issue considers the opportunities presented by an interdisciplinary approach and explores the range of methodological and conceptual challenges presented by the programme.

White, P. (ed.) (2008) Wild Mammals and the Human Food Chain. Special Issue of *Mammal Review* Volume 38, Issue 2-3, April/July. Proceedings of The Mammal Society Autumn Symposium held at the Zoological Society of London, 25-26 November 2005 Supported by Relu and by the Department for Environment, Food and Rural Affairs.

Phillipson, J. and Lowe, P. (eds) (2008) Towards Sustainable Food Chains: Harnessing the Social and Natural Sciences. Special Issue of *Trends in Food Science and Technology*. Volume 19, Issue 5. The articles are drawn from Relu food chain projects and explore the case for a strategic approach to research on sustainable food chains, combining social and technical perspectives

Phillipson, J., Lowe, P. and J.M. Bullock (eds) (2009) Special Profile: Integrating ecology and the social sciences in *Journal of Applied Ecology*, Volume 46, Number 2, April 2009. The Journal of Applied Ecology explores for the first time how ecology relates to the social sciences in this special interdisciplinary profile. This collection of papers from Relu projects includes contributions from across the breadth of Relu land and water research.

Lowe, P., Phillipson, J., Green, L.E., Hunter, S., Jeger, M.J., Poppy, G.M. and Waage, J. (eds) (2011) Theme Issue: Interdisciplinary perspectives on the management of infectious animal and plant diseases in *Philosophical Transactions of the Royal Society B*, Volume 366, Number 1573, July. In this Theme Issue Relu academics take a fresh look at infectious diseases of animals and plants, from an interdisciplinary perspective.

Krueger, T., Page, T., Smith, L. and A. Voinov (eds) (2012) Thematic issue on Expert Opinion in Environmental Modelling and Management *Environmental Modelling and Software,* Volume 36, October. As stakeholder involvement and expertise becomes an accepted feature of environmental modelling, this special issue brings together interdisciplinary research from Relu and the wider community, setting social science insights next to technical methodologies.

C.4 Relu Books

Bailey, A., Chandler, D., Grant, W.P., Greaves, J., Prince, G. and M. Tatchell (2010) Biopesticides: Pest Management and Regulation CABI: Wallingford

Bonn, A., Allott, T., Hubacek, K. and J. Stewart (eds) (2009) Drivers of Environmental Change in the Uplands Routledge: Oxon.

Winter, D. and M. Lobley, M. (eds) (2009) What is Land for? The Food, Fuel and Climate Change Debate Earthscan, London.

McEldowney, .J, Grant, W., and Medley, G., The Regulation of Animal Health and Welfare Routledge: Oxon

Smith, L., Porter, K., Hiscock, K.M, Porter, M.J., and D. Benson (forthcoming) Catchment and River Basin Management: Integrating Science and Governance. Routledge.

C.5 Director's Office Presentations

Lowe, P (2004) Programme presentation to UK Biodiversity Research Advisory Group (BRAG) Socio-economic Sub-Group, London. January.
Lowe, P. (2004) Programme presentation to English Nature Socio-Economic Advisory Group, Peterborough. February.
Lowe, P. (2004) Programme presentation to ESRC RELU Scenario Workshop, London. February.
Lowe, P. (2004) Programme presentation to ESRC Research Priorities Board meeting, London. March.
Lowe, P. (2004) Opening address at Age Concern Conference: "Ageing and the Countryside", London. April.
Lowe, P. (2004) RELU presentation to senior Defra civil servants, London. April.
Lowe, P. (2004) Programme presentation Local Government Association and Local Authorities Research and Intelligence Association (LARIA) Conference, Crewe. June.
Lowe, P. (2004) Keynote programme presentation given at Royal Show, Birmingham. July.
Lowe, P. (2004) Programme presentation to Land Use Policy Rural Affairs Group with representation of Joint Nature Conservation Committee, English Nature, Countryside Agency and Environment Agency. August.
Lowe, P. (2004) Programme presentation to English Nature Socio-economic Advisory Group, Peterborough. September.
Lowe, P. (2004) Opening address at Action for Market Towns Convention, Romsey, Hampshire. September.
Lowe, P. (2004) Keynote programme presentation given at Sustainable Development Research Network Annual Conference.
Phillipson, J. (2004) Programme presentation to NERC Science into Policy: Best Practice, Keyworth. November.
Lowe, P. (2004) Programme presentation to Food Ethics Council conference "Just Knowledge? Governing Research on Food and Farming", London. November.
Lowe, P. (2004) Programme presentation to Welcome Trust/NERC/Research Councils Conference on interdisciplinary research on environment and health, Hixton, Cambs. November.
Lowe, P. (2004) Programme presentation to LARCI Conference on "Research for Local Government", London. November.
Phillipson, J. (2004) Microbusinesses and the rural economy. Invited guest lecture, Waseda University, Tokyo, Japan.
Lowe, P. (2005) "*Introducing the Rural Economy and Land Use Programme"* Presentation to RELU conference Rural Economy and Land Use: The Challenge for Research 19-21 Jan 2005, Birmingham
Lowe, P. (2005) *"RELU's approach to knowledge transfer"* Presentation to English Nature 9 Feb 2005, Peterborough
Lowe, P. (2005) *"Sustaining Agri-food Systems: the Need for Interdisciplinary Research"* Presentation to OECD/Italian Government Conference on "Opportunities and Challenges in Agri-Food Research", May 2005, Rome.
Lowe, P. (2005) *"Accountable Science: Improving the Social Responsiveness of Research Programmes: the Case of RELU"* Presentation to ESRC-sponsored Transdisciplinary Seminar Series on Sustainable Agriculture, School of Geography, June 2005, University of Nottingham.
Lowe, P. (2005) *"The Changing Politics of the Countryside"* Presentation to ESRC-sponsored Governance of Sustainability Conference, June 2005, Norwich.
Lowe, P. (2005) *"Sustaining agri-food systems: rethinking public research"* Presentation to EURAGRI Members' Conference "Anticipating the future: knowledge based policy for European Agriculture", September 2005, York.

Lowe, P. (2005) "*Promoting Diversification into Non-Farming Activities and Developing the Rural Economy"* Presentation to Agra Europe Conference "Rural Development in Europe**:** Funding European Rural Development in 2007-2013", November 2005, London.

Lowe, P. (2005) *"Reflections on Nature and Society and Interdisciplinarity"* Presentation to the Mammal Society's Autumn Symposium on Wild Mammals and the Human Food Chain**,** November 2005, London Zoo.

Lowe, P. (2005) "*Strategies for Rural Development: Past, Present and Future"* Presentation to China-UK Symposium on "Appropriate Science and Technology for Rural Sustainable Development – The Challenges and Opportunities"**,** sponsored by DFID. Yangling, Shaanxi Province, China.

Lowe, P. (2005) *"Towards Rural Development Policies for Europe for the 21st Century"* Presentation to IPPR seminar "A New Rural Agenda" seminar, December 2005, Brussels

Lowe, P. and Phillipson, J. (2005) *"Agenda Setting and Accountability in Interdisciplinary Research Programmes"* Presentation to ESRC-sponsored "Interactive Agenda Setting in the Social Sciences" Seminar May 2005, Abingdon.

Phillipson, J. (2005) *"Research for evidence-based policies for rural economies"* Presentation to RELU sponsored conference, with Northern Rural Network "Understanding Rural Economies", 18 May 2005, York

Phillipson, J. and Lee, R. (2005) *"The social sciences and agri-food research"* Presentation to European Society for Rural Sociology Congress, August 2005, Keszthely, Hungary.

Phillipson, J. (2005) *"The changing research agenda for sustainable agri-food systems"* Presentation to Strategic Research Review of FPVII, Working Group on 'Environmental Issues Related to Food and Feed', European Commission, DG12, October 2005, Brussels.

Lowe, P. (2006) *"Interdisciplinary research: the challenge for agricultural economics"* Presentation to Agricultural Economics Society 80th Annual Conference, Paris, 29-30 March.

Lowe, P. (2006) *"Interdisciplinary research and the Rural Economy and Land Use Programme"* Presentation to British Academy Workshop "Working Together Across Disciplines: Challenges for the Natural and Social Sciences", London, 12 May.

Lowe, P. (2006) *"Sustainable rural economies"* Sustainable Development Research Network/Royal Institution of Chartered Surveyors lecture series, London, 16 May.

Lowe, P. (2006) *"Sustainable rural economies in peri-urban areas – the UK experience"* Presentation to North Yorkshire URBAL Interreg Conference "Connecting Town and Country", Harrogate, 15 June.

Lowe, P., Phillipson, J. and Lee, R. (2006) *"Social sciences and the social shaping of agri-food technology"* Presentation to Science and Technology Policy Research (SPRU) Conference on 'The Future of Science, Technology and Innovation Policy: Linking Research and Practice, Bristol, 11-13 September.

Lowe, P. (2006) *"The Rural Economy and Land Use Programme".* European Environment Agency Expert Meeting, Copenhagen "Classifying land use trends and rural areas in an environmental perspective", 3-4 July.

Lowe, P. (2006) *"The ageing countryside"* Presentation to Adult Learning in Rural Areas: Learning, Employment and Rural Need, Sheffield, 15 November.

Lowe, P. (2006) *"The changing prospects in the rural economy".* Presentation to Women in Rural Enterprise (WiRE) Seminar, Askham Bryan College, York, 29 November.

Lowe, P. (2006) *"Rural sociology and geography"* Presentation to Future Directions: A New Research Agenda for Rural Development, Queen's University Belfast, 13 December.

Lowe, P. (2006) *"Harnessing the social and natural sciences for sustainable rural development"* Presentation to The Diversity of Rural Areas in the Enlarged EU: Characterisation, Typology and Modelling Workshop, Seville, (jointly organised by Joint Research Centre (JRC), the Institute for Prospective Technological Studies (IPTS) and Directorate General for Agriculture and Rural Development (DG AGRI), 14-15 December.

Lowe, P. (2006) *"The making of interdisciplinary rural studies"* Presentation to ESRC Seminar Series: New Rural Economies – Building Researcher-User Alliances across the Devolved Territories, Defra, London, 12 July

Phillipson, J. (2006) *"Knowledge Exchange and RELU"* Presentation to Rural Economy and Land Use: Enabling Knowledge Exchange, University of Manchester, 18-20 January.

Phillipson, J. (2006) *"Knowledge transfer and exchange: the example of the Rural Economy and Land Use Programme".* Presentation to Water, Environment and Society Seminar, Sheffield, 11 July.

Lowe, P. (2006) "*The progress of RELU research"* English Nature's Socio-Economic Advisory Group meeting, Peterborough, February.

Lowe, P. (2006) *"The Rural Economy and Land Use Programme"* Losehill Hall, Peak District National Park Study Centre, Castleton, in collaboration with the Moors for the Future Partnership. February.

Lowe, P. (2006) *"Sustainable rural economies"* Sustainable Development Research Network/Royal Institution of Chartered Surveyors lecture series, London, 16 May.

Lowe, P. (2006) *"Sustainable rural economies in peri-urban areas – the UK experience"* Presentation to North Yorkshire URBAL Interreg Conference "Connecting Town and Country", Harrogate, 15 June.

Lowe, P. (2006) "*The Rural Economy and Land Use Programme"* European Environment Agency Expert Meeting, Copenhagen "Classifying land use trends and rural areas in an environmental perspective", 3-4 July.

Lowe, P. (2006) *"The ageing countryside"* Presentation to Adult Learning in Rural Areas: Learning, Employment and Rural Need, Sheffield, 15 November.

Lowe, P. (2006) *"The changing prospects in the rural economy".* Presentation to Women in Rural Enterprise (WiRE) Seminar, Askham Bryan College, York, 29 November.

Phillipson, J. (2006) *"RELU: Knowledge transfer and the unfolding research agenda"* Keynote Address at Roots Conference: The Rural Research Conference of the Royal Institution of Chartered Surveyors, Wadham College, Oxford,5 April.

Lowe, P (2007) *"Rural futures"* Presentation to Regions and Regionalisation in and beyond Europe Colloquium, Lancaster University, Institute of Advanced Studies.

Lowe, P , Donaldson, A. and Phillipson, J. (2007) *"The co-production of agriculture".* Presentation to Workshop on The Social and Material Practices of Agriculture, Farming and Food Production, Centre for Science Studies, Lancaster University

Lowe, P. (2007) *"An integrated approach to whole systems".* Presentation to UKERC Annual Assembly 2007, Cambridge.

Lowe, P. (2007) *"Challenges for rural land use".* Presentation to BA Festival of Science, York (address as President of the Agricultural Section).

Lowe, P. (2007) *"Research on Rural Resource Management and the Rural Economy: Addressing the Local and Regional Dimension"* Presentation to Research on Rural Resource Management and the Rural Economy: Addressing the Local and Regional

Lowe, P. (2007) *"Researching environment-society relations*". Presentation at launch of RCUK China office, Beijing.

Lowe, P. (2007) *"Social impacts and landscape change in Yorkshire".* Presentation to BA Festival of Science, Biological Sciences Section, York.

Lowe, P. (2007) *"The ageing countryside".* Presentation to Ageing and Rural Communities Conference, Queen's University Belfast.

Lowe, P. (2007) *"Unlocking change in the food chain: introduction".* Presentation to Presentation to Relu Conference "Unlocking change in the food chain", London, 7 November.

Lowe, P. and Phillipson, J. (2007) *"Fostering interdisciplinarity: the rural economy and land use programme".* Presentation to ESRC Strategic Research Board, York.

Phillipson, J. (2007) *"Lessons on managing interdisciplinary research programmes"* Presentation to Integrated Rural Water Management-European Research Area-NET, Workshop, London.

Lowe, P. (2008) *'Land use and food security'* Food Ethics Council Business Forum, London.

Phillipson, J. (2008) 'Fishing communities and territorial development'. Keynote presentation to Scottish Government / ESRC Mapping the public policy landscape Seminar Series, Aberdeen.

Lowe, P.(2008) '*Relu: Lessons Learnt'* European Research Funders' Forum (ERFF) and UK Collaborative on Development Sciences (UKCDS) joint Workshop, 21st Century Research Collaborations, Warwick University.

Lowe. P.(2008) *'Whose Land is it Anyway?'*, Birkbeck/Ecology and Conservation Studies Society (ECSS) Inaugural Lecture in series "What is land for? (Presentation in Birkbeck College, London)

Lowe, P.(2008) *'The knowledge exchange strategy of the Relu Programme'.* Technology Strategy Board (TSB) Lunch & Learn Session, Swindon.

Phillipson J (2008) 'Micro-businesses and neo-endogenous rural development'. Invited public address to 150 Japanese business leaders in Obihiro, Hokkaido, Japan. In association with Obihiro University of Agriculture and Veterinary Medicine.

Phillipson J (2008) 'Who should be responsible for farm animal diseases: the government or the farmers?' Invited lecture, Obihiro University of Agriculture and Veterinary Medicine, Japan.

Lowe, P (2009) *"The state of the uplands"*, CRC Seminar, Alnwick.

Lowe, P. (2009) "*Strategic land use for ecosystem services"* "Valuing our Life-support Systems: Securing a Healthier Natural Environment through Better Decision Making", Natural Capital Initiative (NCI), London

Lowe, P. (2009) *"Combating endemic disease in farm animals: an interdisciplinary approach"* BBSRC "Combating Endemic Diseases of Farmed Animals for Sustainability (CEDFAS)" Workshop, Wellesbourne.

Lowe, P. (2009) *"The future of rural land use",* The Future of Rural Land Use Conference, London.

Lowe, P. (2009) *"Re-inventing the Rural: Between the Social and the Natural"* Opening address at XXIII Congress of the European Society for Rural Sociology,Vaasa, Finland.

Lowe, P. (2009) *"Livestock and social scientists: Relu's experience of interdisciplinary research"* Sustainable Livestock Production LINK programme (Defra)

Lowe, P. (2009) *"Engaging thinking: knowledge exchange narratives and metrics"* Beacon North East "Maximising IMPACT through Public Engagement" Stadium of Light, Sunderland.

Lowe, P (2009)*"Natural England and the Rural Economy and Land Use Programme"* Webinar presentation to the Natural England Evidence Team.

Lowe, P. (2009) *"The future of food animal veterinary practice"*. Presentation to the Royal Veterinary College.

Phillipson, J. (2009) *"Integrating the Evidence Base and Making it Socially Accountable"*, Science for the Marine Management Organisation workshop.

Phillipson, J. (2009) *"Relu stakeholder impact analysis matrix"* Scottish Government Knowledge Exchange group.

Phillipson, J. (2009) *"Accounting for knowledge exchange: introducing SIAM",* SIAM/Research Councils UK workshop, Swindon, London.

Phillipson, J. (2009) *"Accounting for knowledge exchange: introducing SIAM",* NERC Economic Impact Workshop, London.

Lowe, P, Phillipson, J. and Proctor, A. (2010) Presentation on "*Rural Policy and Expertise*", Countryside & Community Research Institute Autumn Conference, Cheltenham, 19-10-11. Academics, rural policy-makers

Lowe, P. (2010) "*Stakeholder engagement and research planning: lessons from a major interdisciplinary research programme*" Scientific Advisory Board, Finnish Agri-Food Institute, Kirkkonummi Finland

Lowe, P. (2010) "*The Relu model of knowledge exchange*". At Adapting Rural Living and Land Use to Environmental Change: Launch event of Relu 4th Wave Projects, Manchester

Lowe, P. (2010) "*The Relu programme and animal and plant disease management*"**.** Risk Workshop 3rd- 4th November, 2010 The Royal York Hotel. Researchers, government departments, industry representatives

Lowe, P. (2010) "*Vets in Transition: Changing professional identities in the UK and US* " Cornell University Veterinary School, Ithaca, USA. Academics and veterinarians

Lowe, P. (2010) "*Vets in Transition: Changing professional identities in the UK and US"* University of Wisconsin, Madison. Academics and veterinarians

Lowe, P. (2010) "*Vets in Transition: changing professional identities in the UK and US*", Government Veterinary Service Conference, 'Veterinary Education: A Global Perspective' Warwick. Veterinary practitioners

Lowe, P. (2010) Key note speech on "*Lowe Report – One Year On*", at the British Cattle Veterinary Association Annual conference, Torquay, 14/15-10-10. Veterinary practitioners, academics

Lowe, P. (2010) Presentation on "*Why Social Scientists should engage with Natural Scientists: the Land Use Challenge*", LYNET Conference, Espoo, Finland

Lowe, P. (2010) Presentation on '*Relu: a Rural Land Use Interdisciplinary Programme*'. Relu/ EPSRC Sustainable Urban Environment workshop, "*Strategic Land Use: Crossing the Urban Rural Divide*", London. Academics and rural land use stakeholders

Lowe, P. (2010) Presentation on the "*Lowe Report*" to the North of England Veterinary Association 17-11-10. Veterinarians

Lowe, P. and Phillipson, J. (2010) "*The Relu Programme: fostering interdisciplinarity and knowledge exchange*" Presentation to Programme Board of Global Food Security programme

Phillipson, J. (2010) "*Knowledge exchange in Relu*" Relu/ EPSRC Sustainable Urban Environment workshop, 'Strategic Land Use: Crossing the Urban Rural Divide', London. Academics and rural land use stakeholders

Phillipson, J. (2010) "*Telling stories: knowledge exchange across science, policy and practice*". Academics, rural policy-makers and practitioners. IUCN UK Peatland Programme Conference, Durham University

Phillipson, J. (2010) "*The contribution of placement fellowships to knowledge exchange: a Relu perspective*" LWEC Workshop on 'Using Placements in Knowledge Exchange', Defra, London.

Lowe, P, (2011) *'UK Agriculture and Climate Change'.* Food Security - Challenges and Opportunities for Animal Science, University of Nottingham, organized by

British Society of Animal Science, BBSRC Animal Science Forum, World Poultry Science Association (UK Branch) and the Association for Veterinary Teaching and Research Work.

Lowe, P. (2011) International conference *"Interdisciplinary progress in environmental science and management",* Newcastle. Presentation on "*Ordering knowledge: A response to G. W. Trompf's "The classification of the sciences and the quest for interdisciplinarity"* and lead discussant on "*Dilemmas in interdisciplinarity"*

Lowe, P. (2011) *'Why social sciences should engage with natural sciences'*. Cardiff University Lecture Series, Cardiff.

Lowe, P. (2011) *'Challenges in Policy Relevant Interdisciplinary Science',* SPRU / Royal Society Workshop, Royal Society, London

Lowe, P. (2011) *'Lessons for KE from Relu'* LWEC meeting on Integrated Research and Decision-making for the Land: Scope for Development of a Joint Approach to Knowledge Exchange, Defra, London.

Lowe, P. (2011) *'Promoting links between researchers and government'* Engaging Academic Social Scientists in Government Policy Making and Delivery, British Academy, London.

Lowe, P. (2011) *'Relu and Interdisciplinarity'* Interdisciplinary Masterclass: Leadership training for Interdisciplinary Environmental Initiatives, University of Edinburgh.

Lowe, P. (2011) *'The Relu Programme: Fostering Interdisciplinarity and Knowledge Exchange"* ESRC Research Committee, RIBA, London.

Lowe, P. (2011) *'UK Agriculture and Climate Change: Socio-Legal Perspectives'* Reducing greenhouse gas emissions from agriculture: meeting the challenges of food security and climate change, Royal Society, London.

Phillipson, J. (2011) *'Knowledge Exchange for Impact: Perspectives from the UK Research Councils' Rural Economy and Land Use Programme'* National Centre for Research Methods What is knowledge? What role does user engagement, co-production and impact play? British Academy, London.

Phillipson, J. (2011) *'Accounting for Knowledge Exchange and Impact'* G8 Heads of Research Assessment meeting, London.

Phillipson, J. (2011) '*Local fisheries governance and territorial development*', European Commission conference on Axis 4 of the European Fisheries Fund, Brussels.

Phillipson, J. (2011) *'The Relu Programme: Fostering Knowledge Exchange'* NERC/LWEC Knowledge Exchange Good Practice event, Royal Institution, London.

Phillipson, J. (2011) *'The Rural Economy and Land Use Programme: Adventures in Science'* Rural Economy discussion, House of Lords, London.

Proctor, A., Phillipson, J., Lowe, P. and Donaldson, A. (2011) '*Rural professions and field-based expertise',* Royal Geographical Society Annual International Conference, London, 1-9-11.

Proctor, A, (2011) '*Rural Professions and field-based expertise"*, Scottish Agricultural College, Edinburgh, 13-10-11

Lowe, P. (2012) "*The Rural Economy and Land Use Programme: Adventures in Science"* Food Standard Agency's General Advisory Committee on Science

Lowe, P. (2012) *The Rural Economy and Land Use Programme: Adventures in Interdisciplinary Science ,* FERA Workshop, York

Lowe, P., Phillipson, J. and Liddon, A. (2012) *The Rural Economy and Land Use Programme: Adventures in Interdisciplinary Science and Knowledge Exchange*, meeting with Research Council Heads, London

Phillipson ,J. (2012) *Enabling rural economies: the challenge ahead* Promoting Rural Economic Growth Rural Conference, Birmingham

Phillipson ,J. (2012) *Planning for Impact: Making a difference, why bother?"* Scottish Government workshop at ESRC Impact Conference, Brighton

Phillipson ,J. (2012) *Knowledge Exchange: Where's the buzz?* Insect Pollinator Initiative, York.

Phillipson J (2012) Building social and natural science collaboration in Government. Meeting of the Departmental Chief Scientific Advisers and senior scientists on experiences of building partnerships between social and natural sciences. BIS Conference Centre, London.

Lowe, P (2013) *Why social scientists should engage with natural scientists* Uppsala University, Sweden.

C.6 Director's Office journal articles and other publications

Phillipson, J., Daymond, J., Lowe, P. and Lee, R. (2005) 'Harnessing the social and natural sciences for sustainable rural development: introducing the rural economy and land use programme'. *Journal of Farm Management*, 12 (5), 277-286.

Lowe, P. and Phillipson, J. (2006) 'Reflexive interdisciplinary research: the making of a research programme on the rural economy and land use' *Journal of Agricultural Economics*, 57, 2: 165-184.

Phillipson, J, and Lowe, P. (2006) 'Special issue guest editorial: The scoping of an interdisciplinary research agenda' *Journal of Agricultural Economics*, 57, 2: 166-164.

Lowe, P. and Ward, N. (2007) 'Sustainable rural economies - some lessons from the English experience' .*Sustainable Development,* 15, 307-317.

Lowe, P. and Ward, N. (2007) 'British rural geography: a disciplinary enterprise in changing times' 1-20 in Clout, H.(ed.) *Contemporary Rural Geographies - Land Property and Resources in Britain: Essays in Honour of Richard Munton.* London: Routledge.

Liddon, A. (2008) 'Collective action' *RICS Land Journal,* July/August p26.

Liddon, A. (2008) 'Forging positive links with consumers' *Farmers Weekly* 22 August 2008, p37

Liddon, A. (2008) 'Plain speaking' *RICS Land Journal,* Feb/Mar *p*19.

Liddon, A. (2008) 'Taking the heat' *RICS Land Journal* Sept/Oct 2008, p25

Liddon, A. (2008) 'The battle for biodiversity' *RICS Land Journal,* Apr/May p30.

Liddon, A. (2008) 'What does IAASTD mean for us?' *Food Ethics Magazine* Autumn 2008, p.29

Lowe, P., Phillipson, J. and Lee, R.P. (2008) 'Socio-technical innovation for sustainable food chains: roles for social science' *Trends in Food Science and Technology* Vol 19 (5**)** pp. 226-233

Phillipson, J. and Lowe, P. (2008) 'Editorial: Towards sustainable food chains: harnessing the social and natural sciences' *Special Issue of Trends in Food Science and Technology* Vol 19 (5**)** pp.224-225

Liddon, A. (2009) 'Farming in an age of uncertainty' *Farmers' Weekly* 6 March 2009 issue p. 29.

Liddon, A. (2009) 'Are agri-environment schemes effective?' *Rural Matters* spring 2009 issue p. 20.

Liddon, A. (2009) 'Does farm-scale energy production have a future?' *Rural Matters* summer 2009 issue p. 20.

Liddon, A. (2009) 'What do we want from the uplands?' *Rural Matters* autumn 2009 issue p. 21.

Liddon, A. (2009) 'What's the alternative?' *Rural Matters* winter 2009 issue p. 22.

Lowe, P. (2009) Good veterinary advice leads to a better product *Farmers' Weekly* 25 September 2009 issue p. 29.

Lowe, P. and Liddon, A. (2009) 'Milk and honey or weeds and birds? Strategic land use in a changing climate' *Royal Agricultural Society of England Journal* vol 107 pp. 11-14
Lowe, P. and Phillipson, J. (2009) 'Barriers to research collaboration across disciplines: scientific paradigms and institutional practices 2009' *Environment and Planning A* Vol 41(5) pp.1171-1184.
Lowe, P., Whitman, G. and Phillipson, J. (2009) 'Ecology and the social sciences' *Journal of Applied Ecology* Vol.46 (2) pp. 297-305.
Phillipson, J., Lowe, P. and Bullock, J.M. (2009) 'Navigating the social sciences: interdisciplinarity and ecology' *Journal of Applied Ecology* Vol. 46(2) pp. 261-264.
Lowe, P., Woods, A., Liddon, A. and Phillipson, J. (2009) 'Strategic land use for ecosystem services' in Winter, M. and Lobley, M. (eds) *What is Land For? : the Food, Fuel and Climate Change Debate* Earthscan, London.
Liddon, A. (2010) Ecosystem services and land use: a synoptic approach *Geography Review* 24(2) 36-39.
Lowe, P. and Phillipson, J. (2010) A response to Evans and Marvin. Letter to the Editor *Environment and Planning* 42, 3041-3042.
Phillipson, J., Lowe, P., Proctor, A., Ruto, E. (2012) 'Stakeholder engagement and knowledge exchange in environmental research'. *J. of Environmental Management*, 95(1), 56-65.
Proctor A, Donaldson A, Lowe P, Phillipson J (2012) 'Field expertise in rural land management'. *Environment and Planning A*. 44(7), 1696-1711.
Wilkinson, K., Grant, W.P., Green, L.E., Hunter, S., Jeger, M.J., Lowe, P., Medley, G.F., Mills, P., Phillipson, J., Poppy, G.M. and Waage, J. (2011) Infectious diseases of animals and plants: an interdisciplinary approach. *Philosophical Transactions of the Royal Society B*, 366 (1573), 1933-1942.
Proctor, A., Lowe, P., Phillipson, J. and Donaldson, A. (2011) Veterinary field expertise: using knowledge gained on the job. *Veterinary Record.* 169(16), 408-10.
Lowe, P., Phillipson, J. and Wilkinson, K. (2013) 'Why social scientists should engage with natural scientists' Contemporary Social Science.
Phillipson J., Proctor A., Lowe P. and Donaldson, A. (forthcoming) Veterinary field expertise and knowledge exchange. In Veterinary Business & Enterprise-Selected Case Studies (ed. C Henry) Chapter 9. Elsevier.
Fazey I., Everly A.C., Reed M.S., Stringer L.C., Kruijsen K., White P.C.L., Newsham A., Jin L., Cotazzi M., Phillipson J., et al. (forthcoming) Knowledge exchange: a review and research agenda for environmental management. *Environmental Conservation*.

C.7 Consultation responses

(2011) Sustainable Agricultural Intensification – Encapsulating and Motivating Policy Adjustment
(2011) Submission to the EFRA Committee inquiry into Farming Regulation
(2011) Evidence for Environmental Audit Committee Inquiry on Sustainable Food
(2011) oral evidence by Laurence Smith from Catchment Management for Protection of Water Resources project, to the House of Lords Agriculture, Fisheries and Environment EU Sub-Committee inquiry into EU Freshwater Policy;
(2010) Submission to Defining Animal Health and Welfare. Consultation on Draft Animal and Health Bill
(2010) Submission to the House of Lords Inquiry into EU Freshwater Policy Evidence relating to catchment management and means for protection of water resources at source

(2011) Rural Economies: Incubators and Catalysts for Sustainable Growth. Submission to Government's Growth Review – Stage 2, Centre for Rural Economy and Relu.
(2010) REF Consultation: Submission from the Relu Programme
(2010) Evidence to European Commission's consultation on CAP reform
(2010) Evidence to Select Committee on the Impact of CAP Reform on UK Agriculture.
(2010) Response to the consultation 'An invitation to shape the nature of England.
(2009) Response to the Welsh Assembly Government consultation document: 'A Living Wales – a new framework for our environment, our countryside and our seas'.
(2009) Submission to Scottish Government Future Rural Land Use Study
(2009) Submission to Natural England 'Vital Uplands' Uplands Vision, and 'Mapping Values'
(2009) Sustainable Uplands project contribution to England's Soil Strategy
(2009) Commission for Rural Communities (Inquiry into the Future for England's Upland Communities);
(2009) Submission to Government Foresight project on land use futures, and the land use challenges that the UK will face over the next 50 years
(2009) Submission to BBSRC Consultation on Food Security: An Interdisciplinary Perspective
(2008) Submission to government's consultation on Responsibility and Cost Sharing in animal health and disease prevention
(2007)Response to NERC consultation on next generation science for Planet Earth
(2007) Submission to the Cabinet Office Strategy Unit Project on Food Policy.

C.8 Director's Office Convening of Conferences and Workshops

Setting an Agenda for Rural Inter-professional Working and Exchange, Oct 2012, Assembly Rooms, Newcastle.
Planning for Impact, Making a Difference. Why bother? Sept 2012, Brighton. ESRC National DTC conference. Organised with Scottish Government.
Who Should Run the Countryside? Nov 2011, The Sage, Gateshead.
New Horizons for Animal and Plant Disease. May 2011, London.
Adapting Rural Living and Land Use to Environmental Change, July 2011, Manchester.
Strategic Land Use: Crossing the Urban Rural Divide. Oct 2010, London.
The Future of Rural Land Use. June 2009, London.
Rural Land Use in the North: Future Challenges. March 2009, Park Inn, York.
Animal and Plant Disease Management. May 2008, Regents College, London.
Unlocking Change in the Food Chain. Nov 2007, Congress House, London.
Research on Rural Resource Management and the Rural Economy: Addressing the Local Dimension. May 2007, Royal Society of Edinburgh, Edinburgh.
The UK Rural Economy and Land Use Debates. March 2007, National Science and Engineering Week/Festival of Social Science, London.
Sustainable Food Chains and Rural Development. May 2006, Aston Science Park, Birmingham.
The UK Rural Economy and Land Use Debates. March 2006, National Science / Social Science Week, Royal Academy of Engineering, London.
Enabling Knowledge Exchange. January 2006, Manchester Conference Centre.
Knowledges and the Technology-driven Food System. August 2006, XXII European Society for Rural Sociology Congress, Wageningen, Netherlands.
People and the Environment: Scoping the Research Agenda. May 2005, Univ. of York.

Rural Economy and Land Use: The Challenge for Research. Jan 2005, Millennium Point, Birmingham.
Rural Futures. Oct 2004, Royal Institution, London.
Rural Development and the New Rural Economy. Congress of the Regional Studies Association, April 2003, Pisa, Italy. Organised with the OECD.

C.9 Media articles facilitated by Director's Office

2004 December	The Times	*"Beetles are back on top of the crops"* by Mark Cocker, Times 4 Dec 2004. On "Re-Bugging the system: promoting adoption of alternative pest management strategies in field crop systems", PI Alastair Bailey.
2005 March	Farmers Weekly	*"New food comparison study",* p 14, March 18-24 On "Comparative Assessment of Environmental, Community & Nutritional Impacts of Consuming Fruit & Vegetables Produced Locally and Overseas", PI Gareth Edwards-Jones.
	HDC News	*"Making Science Acceptable",* pp28-29, March 05 On "Biological Alternatives to Chemical Pesticide Inputs in the Food Chain: An Assessment of Environmental and Regulatory Sustainability ", PI Wyn Grant.
	Biocontrol	*"Towards a Green and Pleasant Land: Biocontrol in UK Agriculture"* March 2005, Volume 26 No. 1 PEST CABWeb On "Re-Bugging the system: promoting adoption of alternative pest management strategies in field crop systems", PI Alastair Bailey.
May	Social Sciences ESRC Newsletter	Note on the launch of the *RELU Newsletter*.
	Social Sciences ESRC Newsletter	*"Sustainable Food Chains"* Introduction to "Implications of a Nutrition Driven Food Policy for Land Use and the Rural Environment", PI Bruce Traill
Summer	NERC Planet Earth and BBSRC Business	Advert for Briefing Papers, NERC Planet Earth and BBSRC Business
September	ESRC Social Science Newsletter	A number of articles in ESRC Social Science Newsletter, September 2005 pp 5, 13, 14, 18
October	Game Conservancy Trust	Press release Game Conservancy Trust "Flying predators are top at saving crops" Game Conservancy Trust, 10 October 2005 press release http://www.gct.org.uk/article.asp?PageId=78&ArticleId=148
2006 January	Seafood Intelligence	'*Novel Species: Scientists looking at potential of tilapia farming in UK; Niche production & market diversification'***.** Seafood Intelligence, 12th January 2006. Press Coverage in Seafood Intelligence daily online news updates. www.seafoodintelligence.com. (RES-224-25-0066 PI Little)
February	BBC Radio 4. Changing Places	'*Eating biodiversity'* 3 February http://www.bbc.co.uk/radio4/science/changingplaces_20060203.shtml (RES-224-25-0041 PI Buller)
	ESRC Society Today – What's On	Science Week debates
	NFU Science and Technology News Issue 3	Stakeholder workshop '*Involving stakeholders in the management of food chain risks in the rural economy'* (RES-224-25-0090 PI Shepherd) Report on Rural Economy and Land Use: Enabling Knowledge Exchange, University of Manchester, 18-20 January.

March	13-16 March 2006	Science Week – Energy Food Crops Debate
		10 Mar Press release
		13 Mar Farming Today (interview with Angela Karp) (RES-227-25-0020)
		13 Mar Radio Verulanium (interview with Angela Karp) (RES-227-25-0020)
		16 Mar Herts Advertiser (interview with Angela Karp) (RES-227-25-0020)
		1 Apr EnAgri Issue 1, April 2006 (report on debate)
	16-Mar-06	Science Week – Farming's No Place for Wildlife Debate
		13 Mar Press release
		16 Mar BBC News 24 Interview with Philip Lowe
	17-Mar-06	Science Week – Food Miles Debate
		16 Mar Press release:
		17 Mar BBC Green Room: Viewpoint (Gareth Edwards-Jones) (RES-224-25-0044)
	High Peak Radio and BBC Radio Sheffield	*'Safeguarding rural life in the Peak District'* University of Sheffield Media Centre. The press release led to a radio interview with High Peak Radio and BBC Radio Sheffield. (RES-227-25-0028 PI Armsworth)
	RCUK newsletter	*"Strategies for managing animal and plant diseases"*
	Rural Focus	*"£1 million to secure a better future for uplands".* Article reviewing Peak District focused RELU research projects. (available at: www.env.leeds.ac.uk/sustainableuplands/documents.htm (RES-227-25-0001 PI Hubacek)
April	BBSRC Business	RELU Briefing Paper 3 *"The unfolding research agenda"* advertised.
May	British Academy News	Report on BA workshop *'Working together across disciplines: challenges for the natural and social sciences'* convened by Wyn Grant (www.britac.ac.uk/news/release.asp?NewsID=199)
	NFU Science and Technology News	'*CEH project on farmer attitude and training'* (RES-227-25-0010 PI Bullock) *'New wave of RELU research'* (Third Call) RELU Science Week debates
June	Farmers Weekly	*'Pasture type might be marketing tactic'* Moorland pasture has winning taste. 22 June 2006 (Whittington, F) (RES-224-25-0041 PI Buller)
	BBSRC e-newsletter	Mention of RELU Discussion Lunch 6 July (www.bbsrc.ac.uk/media/pressreleases/04_06_28_Royal_Show2.htm)
July	BBC Radio Wales	*"Local food".* Radio interview for BBC Radio Wales, 4th July, 2006. (RES-224-25-0044 PI Edwards-Jones)
	University of Reading Press Release	*'Suppose we all ate a healthy diet'*. www.relu.rdg.ac.uk (and University press page). Extracts taken up by several farming/food outlets. (RES-224-25-0073 PI Traill)
	The Jellied Eel, London Food Link	Zeenat Anjari, July 2006 *''Truly sustainable fish'*. www.sustain.org. (RES-224-25-0066 PI Little)
	RCUK News	'Across the boundaries: Rural Economy and Land Use'
	RCUK What's New	RELU Briefing Paper 4 "*UK Rural Economy and Land Use Debates*" 20 July.
	Social Sciences News from the	RELU Briefing Paper 3 *"The unfolding research agenda"* Issue 63, p.13.

	ESRC	
	ESRC Annual Report and Accounts 2005-6	Case study by Philip Lowe, p.33. (+ other references to RELU)
	ESRC Summer Reception	RELU Director manned display stand, 12 July.
August	BBC Radio Wales	*'Local food and the environment'.* Television interview with G. Edwards-Jones 15th August (RES-224-25-0044)
	Devon Farming and Food News	*'Eating biodiversity'*. Devon County Council/Devon Rural Network; Edition 1;August 2006: p.1. (RES-224-25-0041 PI Buller)
	Devon Rural Voice	*'Eating biodiversity'* Issue 10, August 2006 (RES-224-25-0041 PI Buller)
Summer	GAP News	*"Eating biodiversity"*. GAP News, Grazing Animal Project, Summer 2006: p. 37. (RES-224-25-0041 PI Buller)
	NERC Planet Earth	Advert for RELU Briefing Paper 4 *"The Rural Economy and Land Use debates"*
	The Organic Way	'Biodiversity on your plate'. Vol, 884, Summer 2006, Henry Doubleday Research Association (Jones, O). (RES-224-25-0041 PI Buller)
September	Farmers Weekly	*'Plants have impact on fatty acid'* (RES-224-25-0073 PI Traill)
	Legal TV	Ten minute interview with Wyn Grant on project, 25 September. (RES-224-25-0048 PI Grant)
October	BBC Radio Wales	*"Climate change and agriculture".* Television interview for 30th October, 2006. (RES-224-25-0044 PI Edwards-Jones)
	University of Reading Press Release	*'How much are we prepared to pay for locally produced foods?'* Press release www.relu.rdg.ac.uk (and University press page). Extracts taken up by several farming/food outlets. (RES-224-25-0073 PI Traill)
	The Grower	*'PSD gets credit for positive UK biopesticide future'*, 26 October 2006. (RES-224-25-0048 PI Grant)
	RCUK News	'News from the Rural Economy and Land Use Programme'
	NFU Science and Technology News	*'The future of bio-pesticides'* (RES-224-25-0048 PI Grant) *'Defra co-funds biomass project'* (RES-227-25-0020 PI Karp)
Autumn	Grass and Forage Farmer	*'Tasty Lamb'*. British Grassland Society; No 86; Autumn 2006, p. 6. (Whittington, F) (RES-224-25-0041 PI Buller)
	ESRC Social Sciences	The UK Rural Economy and Land Use debates Issue 64, p.15
November	Sheep Farmer, Specialist Review	*'Eating Biodiversity'* Nov/Dec 2006: p.2 (F.M. Whittington. R. M. Dunn and J.D. Wood) (RES-224-25-0041 PI Buller)
	HDC News	*'UK set to lead Europe in biopesticides'*, November 2006, p.3 (RES-224-25-0048 PI Grant)
	RCUK News	*'RELU opens its doors to knowledge transfer'*
December	Farmer's Guardian	Fred Worrall was quoted in the Farmer's Guardian in December after contributing to a Natural England meeting about soil carbon. (RES-227-25-0001 PI Hubacek)
	HDC News	'All R and no D keeps bio agents under wraps', pp. 14-15 (RES-224-25-0048 PI Grant)
	The Economist	*'Good food'*, Editorial 9th December. (RES-224-25-0044 PI

		Edwards-Jones)
	The Economist	*'Voting with your trolley'*, 9th December, (RES-224-25-0044 PI Edwards-Jones)
Winter	NERC Planet Earth	*'Economics of healthy eating and land use'* (in NEWS, p.5) (RES-224-25-0073 PI Traill)
	South West Rural Enterprise Gateway website	*'Eating Biodiversity: an investigation into the links between quality food production and biodiversity protection*', online article and calls for interest 'News' South West Regional Enterprise Gateway (http://www.sw-gateway.com/index.html?news.cfm~mainframe) (RES-224-25-0041 PI Buller)
	Eat the View Website, Countryside Agency	*'Eating Biodiversity'* Project summary and links, Eat the View Website, Countryside Agency (http://www.countryside.gov.uk/LAR/Landscape/ETV/What/index.asp) (RES-224-25-0041 PI Buller)
2007 January	Relu Newsletter	October – December 2006
	Britain Today	"Rural development, is it sustainable?" by Relu Director
	RCUK newsletter	"Strategies for managing animal and plant diseases"
February	NFU Science and Technology News	Relu debates and project events for Festival of Social Science/Science and Engineering Week on www.nfuonline.com Issue 6
	Barn	"Herio'r consensws" interview with Gareth Edwards-Jones about food miles (RES 224-25-0044)
	RCUK newsletter	"Power and responsibility" Relu debates for Festival of Social Science/Science Week
March	The Times	Reference to Relu food debate for science week Science Notebook, The Times, 12 March
	Stirling Observer	"Farmers' cash plans" coverage of Reluproject's Fish in a barn event Stirling Observer, 14 March. (RES 224-25-0066)
	Relu press release	"Carbon offsetting could fund regeneration of the uplands" (RES 227-25-001)
	Farmers' Guardian	"Carbon offsetting could help fund upland peat restoration" Farmers' Guardian 23 March (RES 227-25-001)
	Yorkshire Post	"Moorlands could be used to combat global warming, researchers (RES 227-25-001) say", Yorkshire Post 26 March
April	Relu Newsletter	January - March
	RCUK Newsletter	Relu is building interdisciplinary capacity April/May
	BBC Radio 4	Gareth Edwards-Jones interviewed BBC Radio 4 on "The Investigation" into food miles 26 April (RES 224-25-0044)
May	Scottish Farmer	Spare room in your barn? - Scottish farmers encouraged to grow their income through fish (Res-224-25-0066)
	Scotland Food and Drink website	http://www.scottishfoodanddrink.com/view_item.aspx?item_id=52934&list_id=list1-7161&list_index=221 Growing tilapia project (Res-224-25-0066)
June	Relu Briefing Paper No. 5	Power and Responsibility - Who decides? You decide!
	Relu Briefing Paper No. 6	Common knowledge? An exploration of knowledge transfer
	Daily Telegraph	"Greener by miles" 3 June – article on food miles quoting Gareth Edwards-Jones (RES 224-25-0044)
	Green Futures	Lamb in Full Flavour, by Gail Vines, 64, May/June, pp 34-37. (RES 224-25-0041)

	Artisan Foods	'What kind of Grass?' Comment by Owain Jones Vol. 3, No 1, pp 10-11. (RES 224-25-0041)
	Malton Gazette and Herald website	"Flood Study" Knowledge Controversies project appealing for members of the public to take part in competency groups. On website 25 June. (RES 227-25-0018)
	Malton and Pickering Mercury	"People can help floods research" 27 June And on website. (RES 227-25-0018)
	Social Sciences	"Is there a social scientist on board?" article by Philip Lowe Summer issue 66
	RCUK newsletter	"Pioneering new approaches to knowledge transfer" publicity on Relu briefing paper
July	Relu Newsletter	April – June 2007
	RCUK Newsletter	Unlocking change in the food chain conference in November. July newsletter
	Channel 4 Dispatches	8 pm Monday 2 July programme on carbon offsetting and labelling etc featured Gareth Edwards-Jones. (RES 224-25-0044)
	Planet Earth – NERC magazine	Carbon offsetting could fund peatland regeneration Summer issue – Sustainable uplands: frameworks for adaptive learning. (RES 2127-25-0001)
	BBSRC business magazine	Institutes win agricultural awards Angela Karp awarded 2007 research medal of Royal Agricultural Society of England – her Relu work mentioned in report. (RES 227-25-0020)
	SDRN newsletter	Relu Briefing paper: Power and Responsibility: Who decides? You decide! Publication of briefing paper 5
	RCUK newsletter	"Unlocking change in the food chain" publicity for Relu conference
	RICS Land journal	"Growing energy" article on biofuels project in July/August issue (by Anne Liddon) (RES 227-25-0020)
August	Farmers' Weekly	Spare room in your barn? Article about David Little tilapia project at Stirling University 3 August. (RES 224-25-0066)
	Fishupdate	Tilapia offers diversification opportunity for uk farmers http://www.fishupdate.com/news/fullstory.php/aid/8269/Tilapia_offers_diversification_opportunity_for_UK_farmers_.html 7 August. (RES 224-25-0066)
	Intrafish	University turns tilapia red 13 August http://www.intrafish.no/global/archive/;jsessionid=274866ED8EA989770CDE6FA31E044BD2.intrafish.franc. (RES 224-25-0066)
	Guardian	Pursuit of the risk vaccine – article on history of FMD research by Relu research fellow Abigail Woods 7 August
	SDRN newsletter	Relu seminar "Boundary work in interdisciplinary research on sustainable food chains" 31 August
	Yorkshire FWAG newsletter	Relu note about discussions between Relu and FWAG and references to projects and website August
	Times Higher Educational Supplement	Collaboration in research a "tick-box" trick article re interdisciplinary session at RGS conference quoting Meg Huby and Geoff Whitman and citing Relu
	Bulletin of British Ecological Society	Special issue on Interdisciplinarity edited by Alison Holt and Tom Webb. Vol.38, no.3 (check)
	Yorkshire Post	24 August The growing threat to our countryside interview with Philip Lowe
	Exeter Express and Echo	Uni wants volunteers to sit on water pollution jury – livestock waste project 18 August. (RES 224-25-0086)

	Western Morning News	Uni wants volunteers to sit on water pollution jury – livestock waste project 18 August. (RES 224-25-0086
	Pirate FM	Interview with Rob Fish from livestock waste project 18 August. (RES 224-25-0086)
	Radio Devon	Interview with Rob Fish from livestock waste project 18 August. (RES 224-25-0086)
	RCUK Newsletter	Relu research informs land use policy Relu research highlighted in flooding review Aug/Sept
September	Town and Country Planning	The challenge of strategic rural land use by Terry Carroll, citing Relu research
	Aquaculture Association of S Africa	Tilapia article in vol 4 no 4. (RES 224-25-0066)
	BBC Radio 4 Costing the Earth	6 September Stuart Lane on flooding and land use http://www.bbc.co.uk/radio4/science/costingtheearth_archive.shtml. (RES 227-25-0018)
	BBC TV News 24	BA Festival of Science Angela Karp interviewed about Relu project (RES 227-25-0020) on energy crops and Philip Lowe interviewed about interdisciplinarity and the Relu programme 4.55 pm 10 September
	Times	How seeds of technology could turn the country green reporting from BA Festival of Science on biofuels (RES 227-25-0020) project on energy crops, quoting her and Philip Lowe 11 September http://www.timesonline.co.uk/tol/incomingFeeds/article2426427.ece
	Financial Times	Biofuel crops to transform landscape reporting from BA Festival of Science on Biofuels (RES 227-25-0020) project on energy crops, quoting her and Philip Lowe 11 September http://www.ft.com/cms/s/0/98e72728-5fc0-11dc-b0fe-0000779fd2ac.html
	RICS Land journal	Water pressure – article on the Relu project on WFD in Sept/Oct issue (by Anne Liddon) (RES 227-25-0024)
	RCUK newsletter	Relu research informs land use policy and Relu research highlighted in flooding review
October	Relu Newsletter	July – September 07
	ESRC website	Disease and Distress in the Countryside by Arild Foss in current news section, quoting Graham Medley and Abigail Woods, referencing their Relu work and also Lancaster led Relu project
	BBSRC business	Making connections in rural economy and land use research and Warwick HRI – three years down the track citing two Relu research projects
	Innovations report website	Bureaucracy threatens farmers' green revolution http://www.innovations-report.de/html/berichte/agrar_forstwissenschaften/bericht-93997.html Biopesticides project. (RES 224-25-0048)
	Scenta website	Red tape and green fields http://www.scenta.co.uk/Engineering/1708324/red-tape-and-green-fields.htm Biopesticides project. (RES 224-25-0048)
	Social Sciences News from ESRC	Autumn issue no 67 First ever interdisciplinary research into animal and plant disease And Biofuels to transform landscape biofuels project. (RES 227-25-0020)
	BBC News 24	10 October Call to breed fish in farm barns http://news.bbc.co.uk/1/hi/scotland/tayside_and_central/7037234.stm (RES 222-25-0066)

	BBC Scotland	Reporting Scotland; Tilapia research interview 10 October. (RES 222-25-0066)
	BBC Radio Shetland	Tilapia research – interview 10 October (RES 222-25-0066)
	Scotland on Sunday	21 October Could exotic fish provide economies of scale for struggling Scots farmers? http://news.scotsman.com/topics.cfm?tid=15&id=1678452007&format=print (RES 222-25-0066)
	Scottish food and drink website	http://www.scottishfoodanddrink.com/view_item.aspx?item_id=52934&list_id=list1-7161&list_index=221 (RES 222-25-0066)
	Dundee Evening Telegraph	Pioneering Ecoli project 11 and 12 October (RES 229-25-0012)
	Press and Journal	Experts launch Ecoli project 12 October (RES 229-25-0012)
	Journal Metro Scotland	Experts launch Ecoli project 12 October (RES 229-25-0012)
	BBC Radio Aberdeen	Experts launch Ecoli project 12 October (RES 229-25-0012)
	BBC NE Scotland News	Experts launch Ecoli project 12 October (RES 229-25-0012)
	Manchester Evening News	Experts launch Ecoli project 12 October (RES 229-25-0012)
	The Herald	Experts unite to solve Aberdeen bug boom 16 October (RES 229-25-0012)
	Aberdeen Evening Express	Experts launch Ecoli project 12 October
	Dundee Courier and Advertiser	Experts launch Ecoli project 12 October (RES 229-25-0012)
	BBC Wales S4C	Taro Naw Tuesday 16 October Current affairs programme takes a look at the renaissance in buying and sourcing locally-produced food, featuring Gareth Edwards-Jones. (RES 224-25-0044)
	RCUK newsletter October	Unlocking change in the food chain conference
	On line specialist news sites	Protecting our beaches – article on Livestock Waste project on safe recycling of livestock waste featured on a range of specialist news websites during September 2007 http://www.sciencedaily.com/releases/2007/09/070903204950.htm http://www.medicalnewstoday.com/articles/81345.php http://www.terradaily.com/reports/Protecting_Our_Beaches_999.html http://presszoom.com/print_story_140793.html http://marineanimalnews.blogspot.com/2007/09/protecting-beaches-from-agricultural.html http://www.firstscience.com/home/news/breaking-news-all-topics/protecting-our-beaches_35843.html http://www.scenta.co.uk/Home/1704012/key-to-cleaner-beaches.htm http://www.scienceworlds.co.uk/experts.cfm?faarea1=theme1.contentItem_show_1&cit_id=4626 http://www.nerve.in/news:25350088590 http://www.theuonline.com/Chadwick-University.php http://www.thew2o.net/archive.html?id=68 http://www.brightsurf.com/news/headlines/32598/Protecting_our_beaches.html

		http://allmedicalnews.com/medical_news_comments/protecting_our_beaches_uk.html (RES 224-25-0086)
November	Relu Briefing Paper No. 7	What is relu?
	Relu Policy and Practice Note No. 1	The Role of Regulation in Developing Biological Alternatives to Pesticides
	RICS Land journal	"Uplands under pressure" – article on Upland futures project, Nov/Dec issue (by Anne Liddon) (RES 227-25-0001)
December	Daily Telegraph	Worship for bog almighty 15 December article about Uplands Futures project. (RES 227-25-0001)
	RCUK Newsletter	Relu launches new policy and practice note series
	Britain in 2008 (ESRC magazine)	The UK's Food p 9-11, citing relu food chain projects Extreme Weather p 15 citing relu "Knowledge controversies" project on flooding Planning for a land with a changing climate article by relu Director Philip Lowe on rural land use. (RES 227-25-0018)
	Food Ethics Magazine of Food Ethics Council	How should we farm animals in 2050? series of personal views including Henry Buller Winter 2007, vol 2 issue 4 (RES 224-25-0041)
	PSA News	Working with Biological Scientists by Wyn Grant www.psa.ac.uk (RES 224-25-0048)
	The Times	Never mind organic feel the foodprint article citing Relu projects The Times 31 December http://www.timesonline.co.uk/tol/life_and_style/food_and_drink/real_food/article3114744.ece (RES 224-25-0073 and RES 224-25-0044)
	BBC News	Evan Fraser (Upland Futures Project) was interviewed by BBC national news to discuss implications of locally sourced food. Broadcast on Breakfast TV and 6 o'clock News on 20 December
2008 January	RELU newsletter	
	Western Mail	*How big is your foodprint article citing Edwards Jones project 3 January 2008 http://icwales.icnetwork.co.uk/search.cfm?what=gareth+edwards+jones+bangor*
	Daily Telegraph	*A taste of the good old graze feature about Henry Buller's Relu project and relu 19 January 2008*
	Guardian	*Peat bogs pelted with heather to slow Co2 emissions quoting Fred Worrall from Hubacek project on peat bogs as carbon sinks in story about NT/Moors for Future seeding Peak with heather 31 January 2008*
	RCUK Newsletter	*Relu's Great Land Use Debate*
	International Pest Control	*Biopesticides: the regulatory challenge article on Grant project Jan/Feb 2008 p41/42*
February		*P 19 February/March issue*
	RICS Land Journal	*Plain Speaking article by Anne Liddon on Morris Integrated Management of Floodplains project*
		Have your say in the great land use debate article on science week debate. Also link on members section of their website.

	RCUK newsletter	*Relu science week activities*
March	Relu Policy and Practice Note no 2	*Warm Water Fish Production as a Diversification Strategy for Arable Farmers*
	Relu Briefing Paper no 8	*Land to mouth. Exploring the links between sustainable land use and the food we eat*
	Newcastle Journal	*Two-page spread on Relu (p30/31): Food for thought in rural land use, Have your say in the Great Land Debate and Fishing for the benefit of us all (Oughton project)*
	Farming and Wildlife Advisory Group	*Relu Great Land Use Debate link on news section of website*
	Town and Country Planning Association	*Relu Great Land Use Debate featured in members' electronic bulletin and on website*
	Rural Matters (RASE magazine)	*Relu Great Land Use Debate featured in March issue of Rural Matters newsletter and on link on home page of RASE website*
	NFU Newsonline	*The Great Land Use Debate on front page 7 March 2008 http://www.nfuonline.com/x26253.xml*
	Campaign to protect Rural England	*Relu Great Land Use Debate link with CPRE debate web page*
	BBC Radio 4	*Farming Today Thursday 6 March featured interview with Philip Lowe on the Relu Great Land Use Debate with link to Relu website to join debate*
	ESRC Social Sciences	*Extended flood research funding article on Whatmore flooding project in Spring 2008 issue 68*
	Rural Europe	*On-line debate to establish rural land use p10*
	Agri-environment and Rural Development Policy	*Can the upland landscape be managed without farmers p14 March issue no 60*
	Guardian website	*http://www.guardian.co.uk/environment/2008/mar/06/greenagenda.march?gusrc=rss&feed=environment. Rachel Dixon rounds up this month's green-themed debates, campaigns and activities, including Relu Great Land Use Debate with link 6 March 2008*
	Guardian Comment is free website	*http://commentisfree.guardian.co.uk/anne_perkins/2008/03/fields_of_dreams.htm. Fields of dreams comment piece by Anne Perkins on rural land use citing Relu and Great Land Use Debate with links 6 March 2008*
	Farmers' Weekly interactive	*http://www.fwi.co.uk/Articles/2008/03/07/109735/farmers-urged-to-enter-land-use-debate.html. Farmers urged to enter land use debate 7 March 2008*
	The Times	*http://www.timesonline.co.uk/tol/news/environment/article3500963.ece. Price rises feed through to your shopping basket article by Valerie Elliott mentioning Great Land Use Debate 7 March 2008.*
	Daily Telegraph	*Oaks: next for the axe? Potter project on Dutch elm disease implications for Sudden oak death 8 March 2008 http://www.telegraph.co.uk/earth/main.jhtml?xml=/earth/2008/03/08/eaoak108.xml*
		ESRC 'Festival of Social Science'

	SDRN news bulletin	*The Great Land Use Debate is being hosted by the UK Research Council's Rural Economy and Land Use Programme to explore our varied expectations of rural land and to consider the extent to which these may be fulfilled by the UK countryside. See www.relu.ac.uk*
	Guardian	*Too many people not enough food – letters page responses to Prof John Beddington 11 March 2008 letter from Relu Director Philip Lowe calling for public debate on land use and flagging up Relu on-line debate http://www.guardian.co.uk/environment/2008/mar/11/food*
	ESRC Today website	*http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/about/CI/CP/Our_Society_Today/News_Articles_2008/DownsideCountryLiving.aspx?ComponentId=25990&SourcePageId=20654. Downside of country living news article citing Huby project on Social and Environmental Inequalities in Rural Areas*
	Guardian	*How the myth of food miles hurts the planet 23 March 2008 citing Gareth Edwards-Jones on food miles http://www.guardian.co.uk/environment/2008/mar/23/food.ethicalliving*
April	Relu Newsletter	
	Western Mail	*http://icwales.icnetwork.co.uk/countryside-farming-news/farming-news/2008/04/01/prof-questions-carbon-footprint-of-food-miles-91466-20699307/. Prof questions carbon footprint of food miles 1 April Gareth Edwards-Jones presenting at Oxford University conference*
	BBSRC Business	*Livestock disease: a multifaceted approach to a multifaceted problem April 2008 p 17 Graham Medley project*
	Timesonline	*How much your groceries will cost in 10 years 25 April 2008 quoting Relu interdisciplinary fellow Evan Fraser*
	RCUK Newsletter	*Great Land Use Debate Draws in Wide Range of Opinion April issue*
	RICS Land Journal	*The battle for biodiversity article by Anne Liddon on Bullock project April/May issue*
May	Relu Policy and Practice Note no 3	*Eating Biodiversity: an Investigation of the Links Between Quality Food Production and Biodiversity Protection*
	Continuity Central news website	*http://continuitycentral.com/news03902.htm. UK entering a 'flood-rich' period Stuart Lane from Whatmore project 7 May 2008*
	BBC Radio 4 Today	*Flooding will get worse Stuart Lane from Whatmore project interviewed on Today programme 6.55 am 7 May 2008*
	Metro	*Flooding risk "far greater than was thought" Stuart Lane 7 May 2008 from Whatmore project*
		UK flood defences "inadequate" warn MPs quoting Stuart Lane from Whatmore project
	Daily Telegraph	*http://www.telegraph.co.uk/earth/main.jhtml?xml=/earth/2008/05/07/eafloods107.xml*
	BBC News website	*Flood risk fear over key sites Stuart Lane from Whatmore project 7 May 2008 http://news.bbc.co.uk/1/hi/uk_politics/7386383.stm*
	Guardian	*Sinking feeling Fred Worrall quoted on Hubacek upland project research re peat being degraded and giving off carbon in Peak District, 21 May 2008 http://www.guardian.co.uk/environment/2008/may/21/carbonemissions*
	Rural Matters (RASE magazine)	*Land use – the great debate p 7 and What will the Water Framework Directive mean for UK farmers? p 19 Summer 2008*

	Guardian	*The rainforests on our doorstep referring to work done by Fred Worrall on Hubacek uplands project http://www.guardian.co.uk/environment/2008/may/21/carbonemissions*
	The Guardian	*Sinking feeling referring to work done by Fred Worrall on Hubacek uplands project 21 May 2008 http://www.guardian.co.uk/environment/2008/may/21/carbonemissions*
	ESRC eNews	*Land to Mouth: exploring the links between sustainable land use and the food we eat May issue*
June	Science and Public Affairs	*Democratising Science Sarah Whatmore, Catharina Landstrom and Sue Bradley on Knowledge Controversies project June 2008 http://www.britishscienceassociation.org/web/News/ReportsandPublications/Magazine/MagazineArchive/SPAArchive/SPAJune08/_WhatmoreBradleySPAJun08.htm*
	BBC Radio 4	*Joe Morris of the Integrated Management of Flood Plains project on Farming Today on the aftermath of the 2007 floods*
	RCUK newsletter	*Relu crosses interdisciplinary boundaries with new publication May/June article on Trends in Food Science special issue*
	Bangor and Anglesey Mail	*Research at Bangor University to reduce risk of contracting harmful pathogen Killham project*
July	Relu newsletter	
	Uckfield FM	*Neil Ward interview on flood work in Uckfield needs help from residents 10.30 am, Friday 4 July Whatmore Knowledge controversies project*
	Kent and Sussex Courier	*Views wanted for university flood project 4 July 2008 C:\Documents and Settings\nacl4\Local Settings\Temporary Internet Files\OLK25\The Views of Uckfield residents are wanted for a university project about flooding in the town (2).htm Whatmore Knowledge controversies project*
	BES blog	*Cambridge conservation forum conference http://ecologyandpolicy.blogspot.com/2008/07/future-farming-and-its-impact-on.html 4 July 2008*
	Mark Holdstock blog on Food and Farming	*Is healthy eating good for the countryside? 12 July 2008. http://markholdstock.blogspot.com/ citing Traill project*
	ESRC annual report	*The land-use debate goes on-line p 19 Food facts p20*
	RICS Land Journal	*Collective action article on Medley project by Anne Liddon p26 July-August 2008*
	ESRC Society Today electronic newsletter	*Relu sparks new thinking on animal and plant disease*
August	Farmers' Weekly	*Forging positive links with consumers "Talking Point" article by Anne Liddon p 37 22 August 2008*
	BBC TV 1	*Countryfile Anne Liddon interviewed for item on food security in UK 31 August 2008*
September	Food Ethics Magazine	*What does IAASTD mean for us? article by Anne Liddon on implications of IAASTD report for UK research p29 vol 3 issue 3 Autumn 2008*
	RICS Land Journal	*Taking the heat article on Banks anaerobic digestion research by Anne Liddon p 25 Sept-Oct 2008*
	Regeneration and Renewal	*Farms urged to emulate the French coverage of presentations by two Relu food projects at SDRN conference, 19 September 2008*

	magazine	
	South West Sound Radio	*Sustainable uplands story on Hubacek project work in Galloway on local radio 25 September news programmes throughout the day*
	Planet Earth on-line	*Podcast about Uplands project is first feature on new NERC Planet Earth on-line website 26 September 2008. http://planetearth.nerc.ac.uk/multimedia/story.aspx?id=5*
	RCUK newsletter	*Rising to the Rural Land Use Challenge – consultation and Slurry solutions Chadwick project*
	Rural Matters RASE newsletter	*Are willow and miscanthus the biofuels of the future? Article on Karp project autumn issue*
	NERC Using Science newsletter	*Relu consultation on land use autumn issue*
	ESRC Society Now	*Supermarkets key for biopesticides? Article on Grant project in Autumn issue*
	Crawley News	*Researchers head to Uckfield coverage of Whatmore Knowledge controversies project Friday, September 05, 2008*
October	International web news coverage	*Coverage of Grant Biopesticides project in international web news feeds:*
		Smash Hits Biological alternatives to chemical pesticides
		Argentina Star Biological alternatives to chemical pesticides
		Science Daily Biological Alternatives To Chemical Pesticides
		Malaysia Sun Biological alternatives to chemical pesticides
		innovations report Biological Alternatives to Chemical Pesticides
		Newstrack India Biological alternatives to chemical pesticides
		SourceSecurity.com HID Global, EMEA region (Europe,
		SINDH TODAY Biological alternatives to chemical pesticides
		Fresh News Biological alternatives to chemical pesticides
	Radio Cymru	*News item on food safety and malpractice in abattoirs – interview with Gareth Edwards-Jones from Killham project*
	Radio Minster	*Interview with Stuart Lane about Whatmore Knowledge Controversies project on breakfast show 27 October 2008*
	BBC Radio York	*Knowledge controversies project open day - Sarah Whatmore was interviewed at 7:05 (28th October 2008) on the Radio York Breakfast Show. Mike Potter (a local resident who is part of competency group) interviewed on the mid morning show, plus featured on evening news.*
	Malton & Pickering Mercury	*Dam plan to halt flooding 29 October 2008 http://www.maltonmercury.co.uk/news/Dam-plan-to-halt-flooding.4637108.jp. article on Whatmore Knowledge Controversies project*
	Ryedale Gazette and	*Together we'll make it work 30 October 2008 article on Whatmore Knowledge Controversies project*

	Herald	*http://www.gazetteherald.co.uk/search/3802329.Together_we___ll_make_it_work/*
	BBC Radio 4	*You and Yours 9 October Sarah Randolph (Quine project) interviewed about Lyme Disease*
November	Relu Policy and Practice Note no 4	*Safe recycling of livestock manures*
	RICS Land Journal	*Clear Course Now farmers can measure the risk of livestock waste contaminating watercourses p11 continued p17 article on Chadwick project by Anne Liddon*
	ESRC	*Meat production and the environment p15 Buller project*
	Britain in 2009	*Running buses on giant compost heaps p16 Banks project*
		Promoting greener pest controls p 20 Grant project
		Social sciences helping to solve animal and plant disease p88-89 article by Anne Liddon citing Relu animal and plant disease projects
	BBC Radio 4	*Living Memory Clive Potter on Dutch elm disease*
	Press and Journal	*Experts E coli findings Killham project 1 November 2008. http://www.pressandjournal.co.uk/Article.aspx/917148*
	Aberdeen Evening Express	*Highlighting E coli in north east study Killham project 2 November 2008*
	Northsound 2	*News item Killham project 2 November 2008*
	Original 106 FM	*News item Killham project 2 November 2008*
	STV North Tonight	*News item Killham project 2 November 2008*
	Radio Scotland	*Out of Doors Killham project 2 November 2008*
	BBSRC website	*http://www.bbsrc.ac.uk/media/releases/2008/081128_water_quality_manure_recycling.html Advice system for farmers improves water quality through better manure recycling 28 November 2008 Chadwick project*
	Science Daily website	*28 November 2008 Chadwick project http://www.sciencedaily.com/releases/2008/11/081128082941.htm Recycling manure safely to avoid polling rivers and streams*
	Space and earth science news website	*Researchers fly a kite for manure recycling 28 November 2008 Chadwick project http://www.news-about-space.org/story/147094914.html*
	AECC news website (Asociacion Espanola de Comunicacion Cientifica)	*Researchers fly a kite for manure recycling 28 November 2008http://www.aecomunicacioncientifica.org/portal/index.php?option=com_content&view=article&id=26883&catid=39:alphagalileo&Itemid=75*
		Researchers fly a kite for manure recycling 28 November 2008 Chadwick project
	Physorg website	*http://www.physorg.com/news147094914.html Chadwick project*
	BBC Radio Cymru	*On the Farm Risks of Ecoli Prysor Williams from Killham project 18 November 2008*

December	IPMNet News electronic newsletter	*Use of Biopesticides Lagging in the UK article about Wyn Grant project December 2008 issue*
	Planet Earth on-line	*E Coli kite mark shows manure pollution risk 02/12/2008 Chadwick project*http://planetearth.nerc.ac.uk/news/story.aspx?id=255
	Innovations report website	*Chadwick project*Researchers fly a kite for manure recycling 1 December 2008 http://www.innovations-report.com/specials/printa.php?id=123435
	Generef website	*Chadwick project* Researchers fly a kite for manure recycling 2 December 2008 http://www.generef.com/newsstory.rss.html?pid=57767
2009 January	Relu newsletter	
	Relu Policy and Practice Note No.5	*Stakeholder participation in the management and communication of food chain risks*
	RedOrbit news site	*Meat From Animals Grazing On Natural Grasslands Tastier, Healthier 14 January 2009 Henry Buller project* http://www.redorbit.com/news/science/1623082/meat_from_animals_grazing_on_natural_grasslands_tastier_healthier/index.html
	Hero news website	*Biodiversity passes taste test and is healthier too 14 january 2009* http://www.hero.ac.uk/media_relations/21469.cfm
	NERC Planet Earth online	*Biodiverse pastures make for tastier meat 14 January 2009* http://planetearth.nerc.ac.uk/news/story.aspx?id=291
	Source UK news site	*Natural food is better tasting and healthier 16 January 2009* http://www.sourceuk.net/article/12/12786/natural_food_is_better_tasting_and_healthier.html
	Scientific blogging news site	Grass fed cattle can taste as good as grain fed 13 January 2009 http://www.scientificblogging.com/print/36334
	Yorkshire Post	*High quality food from natural land 16 January 2009* http://www.yorkshirepost.co.uk/farming-news/Highquality-food-from-natural-land.4885321.jp
	Food Navigator news website	Biodiverse pastures yield better quality meat 14 January 2009 http://www.foodnavigator.com/Product-Categories/Dairy-based-ingredients/Biodiverse-pastures-yield-better-quality-meat-says-report
	Innovations report website	Biodiversity passes taste test and is healthier too 14 January 2009 http://www.innovations-report.de/html/berichte/agrar_forstwissenschaften/biodiversity_passes_taste_test_healthier_125386.html
	The Observer	*Demand for beef "harming the countryside" 25 January 2009 article about interdisciplinary fellow Evan Fraser's new book* http://www.guardian.co.uk/environment/2009/jan/25/farming-beef
	Western Morning News	Why the West is back in fashion 27 January 2009 article on Henry Buller project http://www.thisiswesternmorningnews.co.uk/news/Real-meat-West-fashion/article-645400-detail/article.html
	Scottish Farmer	Heather lamb good for your health Buller project http://www.thescottishfarmer.co.uk/search/display.var.2485594.0.heather_lamb_good_for_your_health.php 29 January 2009
	Western Mail	*Animal workers to be tested for ecoli Strachan project*
		http://www.walesonline.co.uk/news/health-news/2009/01/17/animal-workers-to-be-tested-for-deadly-e-coli-bug-91466-22713018/ 17 January
	Press and Journal	*Grampian scientists to test theory of livestock workers' e.coli immunity Strachan project 24 January 2009*

		http://www.pressandjournal.co.uk/Article.aspx/1032766
	The Guardian	*Beef: How Milk, Meat and Muscle Shaped the World by Andrew Rimas and Evan D G Fraser and February 28th, 2009 Book review by Steven Poole. http://www.guardian.co.uk/books/2009/feb/28/meat-history-review*
February	The Yorkshire Post	*Beef encounters with a world transformed by milk and meat 4 February, 2009 article on Evan Fraser's research and book review http://www.yorkshirepost.co.uk/features/Beef-encounters-with-a-world.4944131.jp*
	Daily Post	*Volunteers sought to probe E coli theory 24 February 2009 Strachan project http://www.dailypost.co.uk/farming-north-wales/farming-news/2009/01/17/volunteers-sought-to-probe-e-coli-theory-55578-22712653/*
	Society Now	*Saving the planet starts in the kitchen article on Gareth Edwards Jones project, spring issue*
March	Farmers' Weekly	*Farming in an age of uncertainty opinion piece on use of science for farmers citing Relu projects by Anne Liddon 6 March 2009*
	Planet Earth on line	*Organic Farms Could Form Hotspots for Biodiversity 13 March Stagl project article http://planetearth.nerc.ac.uk/news/story.aspx?id=357*
	BBC 1 TV	*The One Show 19 March item on Quine project*
	Society Now	*Badger TB controversy in brief story on new interdisciplinary fellow's research spring 2009 p5*
	Pickering on line	*Pickering Flood Defence Experiment to Receive Funding 18 March http://www.pickering.uk.net/news/*
	Yorkshire Post	*Pilot project to tackle flooding risk 18 March 2009 http://www.yorkshirepost.co.uk/latest-york-and-humberside-news/Pilot-project-to-tackle-flooding.5086202.jp*
	Planet Earth on line	*Biofuels crops bring biodiversity benefits Karp project article http://planetearth.nerc.ac.uk/news/story.aspx?id=361 19 March*
	Food Ethics Magazine	*Kristian's fish and chip restaurant review by Jeremy Phillipson spring issue p47*
	Planet Earth on line	*Scientists probe vegetables' carbon cost article on Edwards Jones project http://planetearth.nerc.ac.uk/news/story.aspx?id=373 30 March*
	FWAG News Yorkshire	*Eating Biodiversity article on Buller project issue 22 Spring 2009*
	Planet Earth	*Sustainable uplands: Where there's bogs there's brass spring issue 2009 p30-31 article by Mark Reed on sustainable uplands project*
	Rural Matters RASE Magazine	*Are agri-environment schemes effective? Article on Bullock project, spring issue p20*
April	Relu Newsletter	
	Relu Policy and Practice Note No.6	*Implications of a Nutrition Driven Food Policy for the Countryside*
	Imperial college news website	*Is the UK prepared for sudden oak death? 28 April http://www3.imperial.ac.uk/newsandeventspggrp/imperialcollege/newssummary/news_28-4-2009-8-59-17*
	NFU online	*Relu policy and practice note on Bruce Traill project highlighted April 2009 http://www.nfuonline.com/Documents/Publications/Reading%20Uni%20study.pdf*

May	The Guardian	*The Countryside Turf Wars editorial quoting Philip Lowe and Relu on land use policy 16 May 2009 http://www.guardian.co.uk/commentisfree/2009/may/15/rural-policy-conservation-farmers-cpre*
	Farming Today BBC Radio 4	*Research at the University of Reading suggests that if we all ate the recommended five portions of fruit and vegetables a day we would need to grow many more crops under plastic, leading to a marked change in the way the countryside looks – lead item on Bruce Traill project 20 May 2009*
	The Today Programme BBC Radio 4	*Following healthy eating guidelines would lead to changes in landscape – Bruce Traill project featured on 8 am news bulletin 20 May 2009*
	BBC Radio 2 News bulletins	*Following healthy eating guidelines would lead to changes in landscape – Bruce Traill project item on morning news bulletins 20 May 2009*
	BBC News website	*Healthy eating alters landscape – Bruce Traill project 20 May 2009 http://news.bbc.co.uk/1/hi/uk/8058695.stm*
	Farmers' Weekly interactive website	*Five a day could lead to big changes in land use – Bruce Traill project http://www.fwi.co.uk/Articles/2009/05/19/115682/five-a-day-policy-could-lead-to-big-change-in-land-use.html 20 May 2009*
	Farmers' Weekly	*Meeting 5-a-day demand could hit landscapes hard – Bruce Traill project 22 May 2009*
	BBC Radio Berkshire	*Interview with Philip Jones from Traill project broadcast on evening news bulletins 20 May 2009*
	Reading 107 FM	*Interview with Philip Jones from Traill project broadcast on morning news bulletins 21 May 2009*
	Reading Chronicle	*"Healthy eating will destroy countryside" Feature on Traill project 21 May 2009*
	Horticulture Week	*More polytunnels needed to meet government targets on fruit and veg consumption 21 May 2009 http://www.hortweek.com/channel/OrnamentalsProduction/article/907391/polytunnels-needed-meet-government-targets-fruit-vegetable-consumption/*
	Garden Organic	*More polytunnels needed to meet government targets on fruit and veg consumption 22 May 2009 http://www.gardenorganic.org.uk/research/news/story.php?id=1805&PHPSESSID=6af67eaaffe103cd0172891966dff598*
	The Guardian	*Letter from Phlip Lowe in Education section on need for government support for interdisciplinary research re climate change mentioning Relu projects 26 May 2009 http://www.guardian.co.uk/education/2009/may/26/education-letters*
	Norwegian Broadcasting Youth Channel	*Banden News Programme interview with Philip Jones for news item on Bruce Traill research 4.15 pm 26 May 2009*
	WalesOnLine	*Healthy eating could leave Welsh farming looking sick article on Bruce Traill project 26 May 2009 http://www.walesonline.co.uk/countryside-farming-news/farming-news/2009/05/26/healthy-eating-could-leave-welsh-farming-looking-sick-91466-23708173/*
	Yorkshire Post	*Healthy eating "threat to farmers" article on Bruce Traill project 26 May 2009 http://www.yorkshirepost.co.uk/news/Healthy-eating-39threat-to-farmers39.5296683.jp*
	Farmers' Guardian	*Unintended consequences of healthy eating article on Bruce Traill project 27 May 2009 http://www.farmersguardian.com/story.asp?sectioncode=1&storycode=26418*

June	Science Daily web news	*How healthy is your river? 1 June 2009 ecosystem report card Lawrence Smith project http://www.sciencedaily.com/releases/2009/06/090601221356.htm*
	Western Morning News	*Changing diets are a threat to farmers 1 June 2009 Bruce Traill project http://www.thisiswesternmorningnews.co.uk/foodanddrink/CHANGING-DIETS-THREAT-FARMERS/article-1037150-detail/article.html*
	Rural Matters	*Does farm-scale energy production have a future? Article on Charles Banks project, summer issue p 20*
	Science Daily web news	*Is rural land use too important to be left to farmers? Article on land use conference 9 June 2009http://www.sciencedaily.com/releases/2009/06/09060814387.htm*
	Digg Life of Earth blog news	*Is rural land use too important to be left to farmers article on land use conference June 2009 http://lifeofearth.org/2009/06/is-rural-land-use-too-important-to-be-left-to-farmers.html*
	AECC-Noticias de comunicación científica web news	*Is rural land too use important to be left to farmers? Article on land use conference June 2009 http://aecomunicacioncientifica.org/portal/index.php?option=com_content&view=article&id=41848&catid=39:alphagalileo&Itemid=75*
	RASE RuSource news briefing	*Briefing 832: Regional rural land use: a time for fresh thinking? Relu policy and practice note http://www.arcresources.org.uk/projects/rusource_briefings/rus09/832.pdf*
	Yorkshire Post	*Sir Paul chews over the facts about meat and saving the planet quoting Relu interdisciplinary fellow Evan Fraser 16 June 2009 http://www.yorkshirepost.co.uk/features/Sir-Paul-chews-over-the.5368936.jp*
	Farmers Weekly Interactive blogging site	*http://www.fwi.co.uk/community/blogs/motley/archive/2009/06/18/the-future-of-rural-land-use.aspx 18 June 2009 Detailed comment on Future of Rural Land Use conference*
	Veterinary Times	*'Together Forever? Animal health and animal welfare' article by Relu interdisciplinary fellow Abigail Woods, 28 June 2009, p8-9.*
	SDRN news bulletin	*Relu policy and practice note no 8: 'Regional rural land use: a time for fresh thinking? 29 June 2009 http://www.sd-research.org.uk/post.php?p=1034*
July	Relu newsletter	
	BBC TV	*The One Show item on sustainable agriculture mentioning Relu tilapia project 15 July 2009 http://www.bbc.co.uk/iplayer/episode/b00lplv2/The_One_Show_15_07_2009/*
	Planet Earth	*British trees and shrubs face sudden death news on Potter sudden oak death project p6 issue summer 2009*
	Society Now	*Changing land policy article on Mark Reed winner of Michael Young Prize p 16*
	ESRC annual report	*Rural land use findings from Bruce Traill research project p 16*
	BBSRC annual report	*Advice system that helps farmers recycle manure David Chadwick research project p 9*
	NERC annual report	*Developing more nutritious food Bruce Traill research project p17 Kite mark for manure pollution risk David Chadwick research project p17, Great land use debate p 27*
	Ruralbiz online newsletter for E Midlands	*Regional rural land use policy and practice note http://www.ruralbiz.net/neres_news.php?ID=820 July 2009*

	RDA	
	TCPA members' news bulletin	*Relu policy and practice note no 8: 'Regional rural land use: a time for fresh thinking? Regional rural land use policy and practice note July 2009*
	RICS members' news bulletin	*Relu policy and practice note no 8: 'Regional rural land use: a time for fresh thinking? Regional rural land use policy and practice note July 2009*
	BBC TV	*The One Show item on sustainable agriculture mentioning Relu tilapia project 15 July 2009 http://www.bbc.co.uk/iplayer/episode/b00lplv2/The_One_Show_15_07_2009/*
August	BBC Radio 4	*Farming Today lead item on Lowe report including interview with Philip Lowe 6 August 2009*
	Pig Progress news website	*Report calls on rethink on farm vet service – coverage of Lowe report http://www.pigprogress.net/news/uk-report-calls-for-rethink-on-farm-veterinary-service-3260.html 6 August 2009*
	The PigSite.com	*Defra sees future of farm animal vets – Lowe report http://www.thepigsite.com/swinenews/21737/defra-sees-the-future-of-farm-animal-vets 6 August 2009*
	Farmers' Weekly Interactive	*Report calls for rethink on farm vet service – coverage of Lowe report http://www.fwi.co.uk/Articles/2009/08/06/117034/report-calls-for-rethink-on-farm-vet-service.html 6 August 2009*
	Intute academic news blog	*Veterinary students and farm animal work – coverage of Lowe report http://www.intute.ac.uk/blog/ 6 August 2009 And on Intute Twitter and Facebook feeds*
	The Herald	*Marginalised farm vets require help to unlock potential – Lowe report http://www.heraldscotland.com/business/corporate-sme/marginalised-farm-vets-require-help-to-unlock-potential-1.821924# 6 August 2009*
	NFU Online	*Your farm vet and you – coverage of Lowe report http://www.nfuonline.com/x41289.xml 6 August 2009*
	World Poultry news website	*Report calls for rethink of farm vet service coverage of Lowe report http://www.worldpoultry.net/news/uk-report-calls-for-rethink-of-farm-vet-service-id4193.html 6 August 2009*
	Farmers' Guardian	*Vets urged to unlock their potential – coverage of Lowe report http://www.farmersguardian.com/vets-urged-to-unlock-their-potential/27094.article 6 August 2009*
	Science Daily web news	*Report calls for rethink on farm vet services – coverage of Lowe report http://www.sciencedaily.com/releases/2009/08/090806080347.htm 6 August 2009*
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	The Beef Site web news	*Defra sees the future of farm animal vets – coverage of Lowe report http://www.thebeefsite.com/news/28088/defra-sees-the-future-of-farm-animal-vets 6 August 2009*
	The Dairy Site web news	*Defra sees the future of farm animal vets – coverage of Lowe report http://www.thedairysite.com/news/28088/defra-sees-the-future-of-farm-animal-vets 6 August 2009*
	eGov Monitor	*Defra receives key report on future of farm animal practice coverage of Lowe report http://www.egovmonitor.com/node/26933/print 6 August 2009*
	World Veterinary Association website	*BVA welcomes challenges set out for profession – coverage of Lowe report 6 August 2009*

	Eng2pl news site	*Veterinary students and farm animal work – Lowe report http://www.eng2pl.pl/Society/Issues/Human_Rights_and_Liberties/Free_Speech.html*
	Bahcesel web news	*UK report calls for rethink on farm vet services Lowe report http://www.bahcesel.com/newsel/all_news/animal_production_news/43909-uk_report_calls_for_rethink.html 6 August 2009*
	Teknoport web news	*Independent report calls for rethink on farm vet services Lowe report http://www.teknoport.com.tr/2009/07/20/alphagalileo-science/ 6 August 2009*
	Meat Trade News Daily	*Shortage of vets coverage of Lowe report http://www.meattradenewsdaily.co.uk/news/070809/united_kingdom___shortage_of_vets.aspx 6 August 2009*
	Aberdeen Press and Journal	*Report urges Britain's vets to take more active role - coverage of Lowe report http://www.pressandjournal.co.uk/Article.aspx/1340788 6 August 2009*
	Vetsonline	*BVA welcomes challenges set out for profession – Lowe report http://www.vetsonline.com/professionnal-news/id103-22106/bva-welcomes-challenges-set-out-for-profession.html 6 August 2009*
	Arts-humanities.net blog	*Vets and farm work – Lowe report http://www.arts-humanities.net/aggregator?page=1 6 August 2009*
	Clive news feeds (computer aided learning in vet education)	*Vet students and farm work – Lowe report http://www.clive.ed.ac.uk/newsfeed.asp?id=heass 6 August 2009*
	Newcastle Journal	*Vets aim to seize the initiative on farm animal practice policy – coverage of Lowe report http://www.nebusiness.co.uk/farming-news/farming-news/2009/08/07/vets-aim-to-seize-the-initiative-on-practice-policy-51140-24336945/ 7 August 2009*
	First4 Farming News Site	*Report calls for rethink on farm vet service – Lowe report http://www.first4farming.com/F4F/news/index.jhtml;jsessionid=2L4X5GUH51ZEBWNJH4WCFEQ?article_id=fwi117034 7 August 2009*
	Vet Med Resource	*Independent report calls for greater role of vet profession in ensuring food safety – coverage of Lowe report http://www.cabi.org/vetmedresource/default.aspx?site=149&page=424&LoadModule=NewsArticle&FV=1&FP=19787&WC=VE 7 August 2009*
	The government says website	*Defra receives key report on farm vet services – Lowe report http://london.thegovernmentsays.com/?/philip%20lowe 7 August*
	Meat Trade News Daily	*Vets and Farmers – Lowe report follow-up http://www.meattradenewsdaily.co.uk/news/070809/unirted_kingdom___vets_and_farmers.aspx 7 August 2009*
	Farmers' Weekly	*Farm vet service in sharp decline coverage of Lowe report Farmers Weekly7 August 2009 p 10*
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	Scienceomega.com	*Human factor ignored in animal disease 16 May 2012 http://www.scienceomega.com/article/353/human-factor-ignored-in-animal-disease-studies*
	Farming Monthly	*Animal Disease research misses the human perspective say researchers 15 May 2012 http://www.farmingmonthly.co.uk/livestock/animal-health/5116-animal-disease-research-misses-the-human-perspective-say-researchers/*

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	RCUK website	*Excellence with impact Sustainable uplands case study May 2012 http://www.rcuk.ac.uk/media/brief/impactcase/policy/pages/Reed.aspx*
June	Speed tv.com	*Is Prevention really better than cure for animal disease? 15 June 2012 http://news.speedtv.com/article/0at19ssdzG9VP*
	Horsetalk.com	*Is Prevention really better than cure for animal disease? 16 June 2012 Horsetalk: World equestrian news and information » Is prevention really better than cure for livestock diseases? Comments Feed*
	NIReS newsletter	*Who should run the countryside feature on Relu conference June 2012*
July	Overthecounter.com	*Is Prevention really better than cure for animal disease? Talking Point 5 July 2012 2012 Over the Counter - National magazine for animal health advisers & country store buyers*
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	CEH website news	*Training could improve value of agri-environment schemes researchers say 9 July 2012 http://www.ceh.ac.uk/news/news_archive/agri-environment-schemes-training-enhancement_2012_38.html*
	RuSource newsbulletin	*Training for agri environment schemes 11 July 2012*
	BBSRC web news	*Report highlights impact of Relu programme 31 July 2012 http://www.bbsrc.ac.uk/news/food-security/2012/120730-n-relu-programme-impact-report.aspx*
August	BBSRC newsletter	*Report highlights impact of Relu programme 10 August 2012*
	Warwick University web life science news	*Impacts of Rural Economy and Land Use programme 13 August 2012 http://www.esrc.ac.uk/impacts-and-findings/impact-assessment/policy-practice-impacts.aspx*
	University of Westminster web news	*Rural Economy and Land Use Programme (Relu): Societal and Economic Impact Evaluation 14 August 2012 http://site.westminster.ac.uk/psc/2012/08/rural-economy-and-land-use-programme-relu-societal-and-economic-impact-evaluation/*
September	RSN Online	*Whose Rural Urban Fringe? 3 September 2012 article citing Scott project http://www.rsnonline.org.uk/analysis/whose-rural-urban-fringe*
	Science Daily	*Food production and wildlife can coexist if land used planned at a bigger scale 10 September 2012 Food production and wildlife can coexist if land use is planned at a bigger scale*
	Nanopatents and innovations	*Food production and wildlife can coexist if land used planned at a bigger scale 10 September 2012*
	Scienceway.com	*Food production and wildlife can coexist if land used planned at a bigger scale 10 September 2012 Food production and wildlife can coexist if land use is planned at a bigger scale*
	Silobreaker	*Food production and wildlife can coexist if land used planned at a bigger scale 10 September 2012 Food production and wildlife can coexist if land u... - Silobreaker*
	Farm Business	*1. Food production and wildlife can coexist if land used planned at a bigger scale 10 September 2012 News - Farm Business*

	LWEC Web news	*2. Food production and wildlife can coexist 10 September 2012 Food production and Wildlife can coexist | LWEC*
	Farmers Weekly interactive	*Food production & wildlife can coexist if land use/subsidy is planned at bigger scale than just farm, say researchers http://www.relu.ac.uk/news/policy%20and%20practice%20notes/38%20Benton/PPN38.pdf …Large-scale farming offers wildlife benefits 10 September 2012 Large-scale farming offers wildlife benefits - 9/10/2012 - Farmers Weekly*
	Leeds University web news	*Bigger thinking needed to make farming more sustainable http://www.leeds.ac.uk/news/article/3288/bigger_thinking_needed_to_make_farming_more_sustainable*
	EU Science News	*Food production and wildlife can coexist if land used planned at a bigger scale 10 September 2012 EU Science News :: Sustainable farming part of larger ecological picture*
	Stratageye	*Food production and wildlife can coexist if land used planned at a bigger scale 11 September 2012 http://digitalmedia.strategyeye.com/digimedia.ico*
	News Whip	*Food production and wildlife can coexist if land used planned at a bigger scale 11 September 2012 www.newswhip.com/.../Food-production-and-wildlife-can-coexist/73*
	RTPI bulletin	*Food production and wildlife can coexist if land used planned at a bigger scale 12 September 2012 Researchers: Food Production and Wildlife can Coexist if Land Use is Planned at a Bigger Scale - FoodIngredientsFirst*
	RuSource bulletin	*Sustainable landscapes 12 September 2012*
	Scottish Farmer	*More wildlife, more food 13 September 2012 http://www.thescottishfarmer.co.uk/news/more-wildlife-and-more-food.18871955*
	Farmers Guardian	*Boost wildlife more effectively 14 September 2012*
	The Guardian	*Liberty but no livelihood, opinion piece by Peter Hetherington quoting Philip Lowe on land ownership and a charter of rights and responsibilities for landowners The Countryside Alliance cares for liberty but not livelihoods | Peter Hetherington | Comment is free | The Guardian 22 September 2012.*
	Planet Earth	*The plight of the pearl mussel by Louise Bracken and Liz Oughton, citing Relu research project http://www.nerc.ac.uk/publications/planetearth/2012/autumn/aut12-mussel.pdf autumn 2012*
	Geography Review	*Sustainable Uplands article September 2012 vol 26 no 1*
October	LWEC web news	*Pros and cons of paying to protect wildlife Relu PPN 30 8 October 2012 http://www.lwec.org.uk/node/1217*
	EU Science News	*Nature Improvement Areas need good planning responses 9 October 2012 http://www.science-news.eu/environment-news/cluster187569/*
	Environmental News Today	*Nature Improvement Areas need good planning responses 9 October 2012 http://environment.einnews.com/*
	RuSource newsletter	*Payment for Ecosystems Services Relu PPN 39 10 October 2012*
	BBC news and BBC news website	*Badgers, splitting public opinion for more than 200 years quoting Angela Cassidy 11 October 2012 http://www.bbc.co.uk/news/science-environment-19870587*
	Government Gazette	*Playing around in the Rural Urban Fringe by Alister Scott and Anne Liddon October 2012 p 56*

	BBSRC Business	*Highlighting impacts of the Rural Economy and Land Use Programme autumn 2012 p 7*
	Food climate research network webnews	*Sustainable agricultural landscapes: thinking beyond the farm 25 October 2012 http://www.fcrn.org.uk/research-library/agriculture/policy-brief-sustainable-agricultural-landscapes-thinking-beyond-bounda*
	Food climate research network webnews	*Enhancing the environment though payment for ecosystems services 25 October 2012 http://www.fcrn.org.uk/research-library/agriculture/policy-brief-enhancing-environment-through-payment-ecosystem-services*
November	BBC webnews	*Campaigners angry at growth and infrastructure bill quoting Alister Scott 6 November 2012 http://www.bbc.co.uk/news/science-environment-20199470*
	RuSource news briefing	*Briefing 1633: Landbridge - rural inter-professional working and exchange 11 November 2012*
		http://www.arthurrankcentre.org.uk/images/stories/rusource/1633_Landbridge.pdf
	Britain in 2013	*Farmland opportunity p 15 on Bullock project*
		Room for improvement p 15 on Relu and NIAs
		Making nature pay p 18 opinion piece by Philip Lowe on payment for ecosystem services November 2012
	Research Fortnight	*Ash dieback shows that history's lessons are yet to be learnt by Clive Potter 28 November 2012 http://www.researchprofessional.com/news/article/1272901?i=1273190&__mhid=41380780*
December	BBC Radio Lancashire	*Sally Naden Show interview with Simon Haley mentioned Relu's new Landbridge networking initiative 12 December 2012 http://www.bbc.co.uk/programmes/p011659h 1hr19mins*
	Farming Futures website	*Landbridge experimental knowledge sharing initiative 12 December 2012 http://www.farmingfutures.org.uk/blog/landbridge-experimental-knowledge-sharing-initiative-rural-professionals*
	LWEC web news	*Landbridge provides knowledge exchange for rural professionals http://www.lwec.org.uk/news/2012/december/landbridge-provides-knowledge-exchange-rural-professionals 13 December 2012*
	IEEM website	*Landbridge new networking website for rural professions 13 December 2012 http://www.ieem.net/news/79/landbridge-new-networking-website-for-rural-professionals*
	RICS website	*Landbridge – connecting the rural economy 14 December 2012 http://www.rics.org/uk/knowledge/news-insight/news/landbridge-connecting-the-rural-economy/*

Annex D: Advisory Committees

Relu was advised by a Strategic Advisory Committee (SAC) that met biannually, chaired by Sir Howard Newby, which includes representatives from Defra, Countryside Council for Wales, Scottish Government and the Joint Nature Conservation Committee. Membership in 2011 comprised:

Professor Sir Howard Newby (Chair), Chief Executive, HEFCE
Michael Bradshaw, University of Leicester
Peter Costigan, Science Co-ordinator, Defra
Dr Les Firbank, Head of Soil, Environmental and Ecological Sciences, IGER
Professor Maggie Gill, Chief Scientific Adviser Rural & Environment, Scottish Government
Dr Laura Green, Department of Biological Sciences, University of Warwick
Brian Harris, BBSRC
Professor Louise Heathwaite, Lancaster Environment Centre, University of Lancaster
Andrew Impey, NERC
John Lloyd Jones OBE, Chairman, Countryside Council for Wales
Chris Lea, NERC
Professor Terry Marsden, Department of City & Regional Planning, Cardiff University
Caspian Richards, Scottish Government
Dr Paul Rose, Joint Nature Conservation Committee
Paul Rouse, ESRC
Peter Stephenson, ESRC
Professor R Kerry Turner CBE, CSERGE, University of East Anglia
Professor Jeff Waage, Director, London International Development Centre

Since its inception, Relu has also engaged successfully with stakeholders via several thematic forums. The forums have been used as sounding boards on research programme and project development, including Relu. They had a major impact on the programme and included key stakeholders from the public, private and voluntary sectors who could represent their organisations and also act as conduits for knowledge transfer.

The *Relu Food Chain Forum* met on seven occasions. The group was chaired by John Lloyd Jones OBE**,** Chairman, Countryside Council for Wales. Terry Marsden of University of Wales, Cardiff was vice-chair. In addition members included: Ian Baker, Advantage West Midlands; Helen Browning, Eastbrook Farm Organic Meat; Judy Buttriss, British Nutrition Foundation; Lord Ewen Cameron, Dillington Farms; Helen Ferrier, National Farmers' Union; Bill Goldsworthy OBE, Agri-food Partnership; David Gregory, Marks and Spencer; Michelle Harrison, Henley Centre; Brian Harris, BBSRC; Mark Kibblewhite, Cranfield University; Charlotte Lawson, Food from Britain; Chris Lewis, Fields Farm, Crewe; Tom MacMillan, Food Ethics Council; Sarah Mukherjee, BBC; Steve Parry, Unilever; Howard Petch, Commission for Rural Communities; Sue Popple, Defra; Dr Bill Vorley, International Institute for Environment & Development; Peter Russell, Head of Rural Group, Scottish Government.

Relu's *People and the Rural Environment Forum* met on eight occasions. The group was chaired initially by James Curran Head of Strategic Planning, Scottish Environment Protection Agency, and latterly by Chris Lea, Head of Technical Services Division, Welsh Assembly Government, with Roger Clarke of the Woodland Trust as alternate chair. Other members included: Mark Avery, Head of Conservation, RSPB; Helen Baker, Research Co-ordinator, Joint Nature Conservation Committee; Katherine Bass, Manager, Climate and Agriculture Programme, Defra; Ian Brown, Tenant Farmer/Director Fresh Element/Member North

East Regional Environment Protection Advisory Committee; Tony Burton, Director, The Civic Society Initiative; Lord Cameron of Dillington, Dillington Farms; Tamsin Cooper, Institute for European Environmental Policy; Julian Dennis, Director of Quality, Environment and Sustainability, Wessex Water/UKWIR Board member; Mike Farrimond, Director, UKWater Industry Research; Tony Hams, Board Member, Natural England; David Macdonald, University of Oxford/Council Member of Natural England; Frances Rowe, Rural and Environment Manager, One North East; Archie Ruggles-Brise, Association of Rivers Trusts; Susan Steer, Organic farmer/Chair of RICS Countryside Policy Panel; Mark Tinsley, Managing Director, P.C. Tinsley Ltd; John Varley, Clinton Devon Estates; and Paul Woodcock, Regional Director, Environment Agency (East of England).

Relu's *Animal and Plant Disease Forum* met on four occasions. It members included: Jeremy Blackburn, Commission for Rural Communities; David Brown, Policy Adviser, Horticultural Trades Association; Helen Browning, Director, Eastbrook Farm Organic Meat; Pieter van de Graaf, Scientific Adviser, Scottish Government; Ian Crute, Chief Scientist, Agriculture and Horticulture Development Board; Helen Ferrier, Chief Science and Regulatory Affairs Adviser, NFU; David Gregory, ex-Technical Director, Marks and Spencer; Brian Harris, BBSRC; Stephen Hunter, Former Head of Plant Health at Defra; Chris Lewis, Fields Farm; John Lloyd-Jones, Countryside Council for Wales*;* Jeff Waage, Director, London International Development Centre; Robbie McDonald, Head Wildlife Disease Ecology, Food and Environment Research Agency; Tom Macmillan, Executive Director, Food Ethics Council; Martin McPherson, Director, Stockbridge Technology Centre; Ken O'Callaghan, LWEC Programme; Bill Parish, Exotic Diseases Policy Programme, Defra; Howard Petch, Board Member, Commission for Rural Communities; Philip Sketchley, Chief Executive Officer, National Office of Animal Health; Christopher Wathes, Chairman, Farm Animal Welfare Council; and Abigail Woods, Imperial College London.

Annex E: Programme Budget including co-funding

The programme was a collaboration between the ESRC, BBSRC and the NERC. It had a budget of £26,644,000, including initial co-funding of £750k from the Scottish Government and £1m from the Department for Environment, Food and Rural Affairs. Additional funding for RELU Phase IV on 'Adapting Rural Living and Land Use to Environmental Change' was also provided by NERC and the Scottish Government.