RES-224-25-0039

Research Report

Background

Loweswater is a small lake owned by the National Trust (NT) in the far North West of the Lake District National Park. The catchment of Loweswater is small and land is owned and/or managed by just 13 sheep and cattle farmers. Crummock Water, the lake into which Loweswater flows, is a Site of Special Scientific Interest as well as a water body for which United Utilities have a licence to abstract drinking water.

From the late 1990s onwards, Loweswater has increasingly experienced blue-green algal blooms, indicative of deteriorating water quality. One hypothesis as to the cause of this pollution was that point and diffuse sources of phosphorous, deriving at least in part from farm slurry holdings and slurry and fertiliser applications, had increased. In response to the blooms a water quality investigation was initiated by the Environment Agency (EA) which looked at long-term EA records of lake water quality alongside investigating lake sediments (Bennion *et al.* 2000). Subsequently, inspections in the catchment by the agency led them to place enforcement orders on certain properties where there appeared to be clear sources of pollution which needed addressing.

The problem of deteriorating water quality resulting from land management practices as evidenced at Loweswater is widespread in the UK (Skinner et al. 1991) and elsewhere (Ulen and Kalisky 2005). There is a complex policy background to this. The EC Water Framework Directive (WFD) recognises the importance of catchment management for water quality targets and requires EU countries to achieve good ecological status of water bodies by 2015. The EA is responsible for working with government land management bodies, in particular the Rural Development Service (RDS) to achieve water quality targets. RDS will contribute to this through the requirement for land to be managed in Good Agricultural and Environmental Condition, minimising negative effects on water quality in order to qualify for the Single Farm Payment under CAP reform.

The pollution issue in Loweswater was therefore coming to the fore at a critical time for the environment in terms of policy. Helped by farmers support networks arising out of the Foot and Mouth crisis, at about the time of the Agency enforcement orders, in 2003, the 13 farmers managing and owning the land in the Loweswater catchment decided to try to take action towards helping to improve water quality in the lake. They organised themselves into the 'Loweswater Project' and attempted to gain information about how to alter their agricultural practices and to find ways of addressing potential pollution sources on their holdings through working together and with outside agencies and scientists.

Research rationale

In this context, it was considered that there may be significant value in carrying out a scoping study on Loweswater (with the idea that a larger study may ultimately be needed) for the following reasons:

1. An integrated perspective.

In 2003, ecological (both aquatic and terrestrial) studies, providing important contributions to the understanding of pollution issues in the lake, were on-going. However, consistent with one the basic premises of the RELU programme – that 'major challenges in the rural environment cut across disciplinary boundaries'[1] - the scoping study proposal was that a more integrated perspective, taking sociological, cultural and economic factors into account, may be necessary to understand this pollution problem.

2. Key stakeholders already 'on board'.

In line with much recent social scientific research on the environment (e.g. Irwin 1995, Grove-White 1996, Webler et al 1995), the RELU programme has promoted the idea that 'inclusive stakeholder engagement is crucial' [2]. Farmers' actions in creating their own 'Loweswater project' indicated a willingness for dialogue between farmers, environmental agencies and scientists around the issue of environmental change

[1] Phil Lowe, ' Introducing the Rural Economy and Land Use Programme' Plenary Presentation , Birmingham, 19th January 2005.
[2] Ibid.

within the catchment. This was an important signal of a research setting with good potential for involving stakeholders.

3. Science–society relationships.

The Farmers' 'Loweswater Project' implied new relationships between scientists, stakeholders and regulatory/policy institutions. Farmers' actions seemed to tie in with a more general 'turn' being discussed at higher levels of policy, away from a system of punitive measures delivered by institutions such as the EA, and towards the creation of new forms of dialogue between relevant social groups. Farmers in Loweswater, led by a local 'champion', Danny Leck, were already building the kind of dialogue between 'science' and 'society' that bodies such as the Royal Society, various Select Committees on Science and Technology (HMSO 2000) and the research councils (RCUK and OST 2002) had been trying to promote. In effect, farmers were already promoting what Gibbons et al. (1994) and Nowotny et al (2001) call 'socially robust science. In RELU's terms they were creating the links necessary for 'joined up science'[3].

4. Potential for interdisciplinary interaction.

Two Centre for Ecology and Hydrology (CEH) ecologists (Maberly and Norton) were already engaged in aquatic ecology and vegetation mapping in the catchment as well as in touch with the farmers' 'Loweswater project'. These ecologists had recently moved from CEH Windermere and Merlewood respectively to the Lancaster University campus where sociologists of the environment and of environmental knowledge (Waterton and Wynne 1996) had worked on issues of lay and scientific/policy expertise in relation to environmental policies (e.g. Wynne 1996, Waterton and Wynne 1996). From previous experience working in interdisciplinary teams, it was judged that a scoping study, based around a Lancaster-Loweswater axis, could provide the means of creating the commitment and time needed to talk to one another, interrogate different ways of making environmental knowledge, create mutual understanding between very different disciplines (Lele and Norgaard 1995, Jasanoff 2002).

[3] Ibid. Other RELU studies have looked at similar issues in relation to farmers' knowledge – e.g. Fergus' Lyon's project ' Farm Centred Learning in Rural Development', Middlesex University

Objectives

The RELU study we describe in this report was not an empirical research project in itself. There were three main objectives of the scoping study:

Objective 1

Early on in the scoping study, it was recognised that the project's first objective - ***to identify the range of factors that will need to be investigated in order to understand the catchment*** – was dependent upon how ' the catchment' was to be characterised. Physical scientists understood the catchment as a natural unit based around the idea of a watershed which could be demarcated on a map. Social scientists, on the other hand, were less familiar with the concept. The social life 'within' a local catchment is strongly connected to institutions, trends, and dynamics far beyond the physical catchment and so the unit becomes more problematic when considering local but also global or 'glocal' (e.g. Wellman 2000) sociological, cultural, policy and economic issues.

However, the RELU study was always based upon the idea that researchers would work towards *holistic* understandings of a *sustainable* catchment. This emphasis in effect stretched a physical understanding of catchment to include social, cultural, policy and economic issues. The researchers identified several strands of expertise considered to be important complements to those already on the scoping study research team, including:

- Agricultural economics
- Rural sociology (in particular of farm household dynamics and economies)
- Cultural history
- Catchment planning processes (with particular regard to democratic/participatory mechanisms)

The researchers made preliminary investigations into the literatures in these diverse areas and contacted and met with researchers from each of these fields to discuss the Loweswater study as part of the process of building up a team for future research[4].

[4] 1. Interview with Mervyn Edwards, date for Agricultural Economics aspects. 2. Day spent with Katy Bennet of CRE for the farm household and rural sociology. 3. Discussions with Dr. Mark Toogood

However, it was recognised that, ultimately, there are too many factors to study in a completely holistic way. The researchers have had to prioritise some above others in their proposal for future research (see *Feeding results into a future study*, below).

Objective 2

The second aim of the scoping study was – '***to identify and bring together the expertise and data required to address issues within the Loweswater catchment'***.

Loweswater is one of the lakes included in the Lakes Tour (Parker et al. 2001), effectively a long-term monitoring programme for the lakes. New data being collected on the lake, funded through the RDS Rural Enterprise Scheme involved an analysis of these CEH-held long term datasets on lake water quality, monthly lake and stream sampling and the construction of algal and nutrient load models in the catchment similar to models for other catchments (e.g. Elliott and Thackeray 2004, May et al. 1996). This work is due to finish by January 2006. As part of this work analysis of EA historic data on water quality has also taken place.

This work complements the work carried out by Bennion et al. (2000) which has been made accessible to CEH, alongside extensive EA datasets by the EA at Penrith; including lake water quality data, weather data (from a site on the edge of the catchment), flow measurements and water quality data from catchment streams and data on lake fish. The EA have also provided data collected under national monitoring programmes, including the use of Loweswater as an intercalibration lake for the WFD, for use in future projects on Loweswater. This data includes macrophyte surveys and surveys of a number of micro-fauna groups in the lake.

CEH carried out a baseline survey of vegetation in the catchment in 2003. This was done in order to provide information on vegetation composition in the catchment against which to measure any changes resulting from potential alterations in farm management aimed at minimising pollution. This survey was aided by RDS, who, with the farmers agreement, provided CEH with agreement maps for land under the Environmentally Sensitive Area scheme.

(UCLAN) re Cultural histories of agriculture. 4. Contact and discussions with Dr Nigel Watson, Geography, Lancaster University re participatory catchment level planning processes.

In 2003 farmers began the process of soil testing their fields (using a grant provided by the National Trust) in order to manage their applications effectively. Farmers were shown how to test their soil, the soil samples were analysed by ADAS, and on receipt of the results the farmers were taught to interpret the results and manage their applications accordingly. This exercise has been carried out 3 times (in 03, 04 and 05) and the farmers have agreed to allow the researchers access to both the questionnaires which they filled out about management practices/stocking densities etc (which enabled ADAS to advise on management changes) and to the results of the soil testing itself.

Farmers and residents in the catchment have provided a range of information, including; past stocking densities for comparison with current figures and estimates of numbers of people resident or visiting the catchment (for working out potential phosphorus loadings from septic tanks). The National Trust as both lake and land owners in the catchment have generated a range of information to use in the management of their holdings. They have given us access to all of this information which includes; woodland management information, biological surveys of all NT land in the catchment, ESA agreement information, other management documents for the farmland and data on the fish take off the lake, for which they are responsible.

For the social scientists working on the project information on farm ownership, farm size, type and status and farm families was gathered from anecdotal (farmers and residents) and ecological sources and a picture of land-ownership and use within the catchment was built up. A number of publications about the history of the catchment were attained through the National Trust. The kind of data that would be required to understand the present and future economics and sustainability of the catchment in agricultural terms was identified as being largely located within the Rural Development Service, Defra and local Farm Business Advice Services within organisations like Farm Connect.

Drawing on research on environmental knowledge (e.g. Irwin 1995, Bingham et al. 2003, Irwin and Wynne 1996) the social scientists thought it useful, in terms of ‘bringing together the expertise required to address issues within the Loweswater catchment’ to gather some qualitative data from farmers and other residents. By doing

this we could assess whether farmers and other residents had specific kinds of expertise relevant to the catchment's problems. Five day trips to Loweswater took place over a period of around six months from July- December 2004. During these trips, interviews and conversations (sometimes more than one with each family) took place with four different farming families, with the National Trust, and with the local hotelier at Loweswater. One day was spent at the lambing sale where it was possible to talk to farmers more informally. A morning spent with an individual from the Rural Development Service (Cumbria Offices) helped to interpret the funding regimes and policy changes that farmers were experiencing.

These visits resulted in the creation of new data in the form of field notes. Field notes provided the basis for understanding the local complexity of the pollution of Loweswater; what this pollution was thought to be related to, and how it occurred; how residents and farmers who had lived in the area for many years viewed the issues; how local views and official agency views of the problem differed and why; how communication around these issues flowed in the catchment; and how communication was sometimes 'blocked'. The 'anecdotal data' from farmers and residents came to be taken seriously as possible source of expertise and knowledge in relation to pollution in Loweswater.

A further source of data and expertise for the social scientists came from the one-day workshop that was held towards the end of the six month study. Field notes were typed up and sent back to participants of the workshop as a record of what had been discussed[5]. For the researchers they formed a useful insight into the kind of issues and ways of working that might be possible in a future study (see section on Workshops and Events for more detail).

Objective 3

The *third aim* ***– to hold structured discussions at Lancaster University in order to begin the process of understanding one another's interpretation of research visits and data findings, and how best to move forward and build from such insights*** – is

[5] The report of the workshop is appended to this End of Award report.

considered by all four researchers (located at CEH and Lancaster University) to have been fully carried out.

Structured discussions were held at intervals throughout the project. Initially these were simply based around understanding how the different researchers on the team (aquatic ecologist, terrestrial ecologist, sociologist of environmental knowledge, anthropologist) approached an understanding of catchment processes. Later on, meetings were oriented around events in the life of the project (e.g. Jake Morris returning from interviews; meeting with researchers outside the project with relevant expertise (see footnote 4), meetings to discuss how to approach the workshop, etc.). As the research progressed there were marked convergences of understanding between researchers.

A problem we encountered in the early stages of the project can be traced to the fundamental difference in the way we normally confront the issue of complexity in our respective disciplines. Natural scientists normally go about solving the 'problem' of complex processes by studying their individual components. Models may be built based on knowledge of each component, reflecting a growing understanding of how it relates to others in a system (for example phosphorus and phosphorus 'loading' in particular terrestrial or aquatic systems).

Sociologists of knowledge and anthropologists/ethnographers, especially those influenced by 'grounded theory' (Strauss and Corbin 1999) and ethnomethodological approaches (Garfinkel 1967), on the other hand, often begin by following the way that people generally conceptualise and talk about problems and issues that they face in their everyday lives. This leads them to look at the complex inter-relationships between different components in a system and to see how meanings develop or emerge from everyday encounters.

Differences in approach were culturally embedded, initially causing discomfort in meetings. This represented a significant challenge in a project that aimed to combine research expertise to understand the complex relationship between the ecological, social, economic and political processes affecting lake water quality. However, through shared experiences in the field, by talking together with stakeholders and

through a constant process of feeding back our growing understanding of events in Loweswater, we started to appreciate the contributions of each member of the team. We started to exchange literatures, to incorporate each others' languages into our own (reflecting broader conceptualisations of the research) and to enjoy the challenge of interdisciplinarity.

Shared field-trips, for example, an anthropologist accompanying aquatic ecologists on a sampling trip, put into stark relief the very different ways of approaching the question of creating knowledge about water pollution, providing useful reflections on disciplinary *difference* as well as convergence in the way that Verran (2002) describes. In a future study it is hoped that more of this kind of witnessing and questioning of research will help create deeper interdisciplinary understandings and cross-interrogation of research approaches and questions, as well as new hybrid approaches to collecting data, approaching problems, and designing research.

The researchers still recognise value in their own disciplinary domains and approaches, however, and these also will be built into future research subject to discussion and negotiation by those from other disciplines. What the scoping study illustrated was that it may be possible for both disciplinary and interdisciplinary work to proceed simultaneously (Lele and Norgaard 1995). The real challenge is to constantly cross-reference methods, aims, approaches and results. Future research plans to build a forum in which this cross referencing can take place by a pool of researchers, community representatives and stakeholders. The experience of the scoping study was essential in building up the trust and confidence that such a forum is possible and could be productive.

Methods

The three objectives were achieved through the following methods:

a. Desk studies
b. Research visits
c. Interdisciplinary discussions
d. A stakeholder workshop

Methodological issues:

a. Desk Studies

These were limited due to resources and therefore constrained the potential 'depth' of the study.

b. Research visits

The rationale for the use of research visits is described under objective 2 (above). Initially, access to farmers for interviewing was not as easy as anticipated due largely to farmers' anxieties about farm viability in the context of announcements about Single Farm Payments and the likely reduction of income for Loweswater farmers. This was evidenced by one farmer emphatically stating that, 'It's not about the lake!' which challenged us to understand different ways of 'framing' the research issues and to think about issues in Loweswater in a truly interdisciplinary way incorporating the farmers' perspectives. Another issue was that new researchers (Jake Morris, Claire Waterton) were viewed as outsiders who were 'getting paid': their question was, 'what good was any 'research' going to do in the present situation?'

One-to-one semi-structured interviews were, however, conducted underpinned by an initial theoretical understanding: that 'talk' both frames and constitutes reality (Garfinkel 1967, Shotter 1993) and that, if the aim is to understand other people's perceptions and understandings of the world (*their* reality), categories (like 'pollution', for example) should not be imposed *a priori* by the interviewer. Rather, the interviewer needs to guide the interview/conversation whilst allowing those being interviewed to use their own categories, their own vocabularies and their own ways of expressing meaning around a particular issue (such as pollution in Loweswater).

The experience of carrying out the interviews in Loweswater reinforced the often neglected methodological issue that it takes time to build trust with communities with whom academics may want to work. By the time the study had ended, the researchers had built a fragile trust, which is being sustained through on-going links. This was achieved through meetings with farmers in Loweswater and in Lancaster University, through letters and e-mails and through several phone calls and meetings between one researcher (Lisa Norton) and the farmer/leader of the Loweswater Project.

c. Interdisciplinary discussions

The methodological issues that came up here are discussed in the section '*Objective 3'* (p. 8).

d. Workshop

The aim of the workshop was to see if it was possible to create a for a in which diverse and highly contested understandings of the issues around Loweswater and pollution in the lake could be openly and constructively shared. Participants were given the opportunity and respect to define the issues as they understood them in the morning. In the afternoon, facilitators encouraged those present to work together in identifying common themes and ways in which different institutional perspectives could be brought into dialogue and into practical co-ordination.

Results

The RELU study we describe in this report was not an empirical research project in itself.

The kind of results we have created are:

1. An understanding that, among the factors needed to understand the catchment of Loweswater in a holistic fashion, rural sociology, an understanding of existing and potential decision making processes regarding pollution in the catchment, farm economies and policy change, local knowledge of farm and other dwelling's waste disposal (slurry and sewage) practices, as well as terrestrial and aquatic ecology will be necessary components of future research.
2. Understanding of, and access to, relevant expertise and datasets necessary for future research.
3. An understanding that interdisciplinary work of this kind needs a lot of time, especially for i. communication and sharing of experiences between those involved; ii. for making explicit and productive the deep *differences* in disciplinary approaches, as well as iii. exploring the ways in which research concepts and approaches can *converge,* creating new transdiciplinary or hybrid methodologies aimed at sustainable research, policy and management.
4. A good understanding by all of the relevance of stakeholder engagement and an excellent basis for its development in future studies.

Policy relevant results

As well as the above results a number of 'stories' were generated through discussions within the community and between researchers and stakeholders which would appear to carry lessons for policy. We give an example below.

Story 1: Farmers and residents have recalled how the application of the ESA scheme in the mid 1990s resulted in some negative feedbacks and ultimately a net worsening of environmental conditions in the catchment (increased income for farmers led to increased cattle stocking levels, grazed outside of the catchment, but over-wintered in the catchment).

These kinds of narrative highlight the existence of poor communication between policy and lay actors in respect to land management in Loweswater. We have suggested that recognising, analysing and solving incidences of dysfunctional communication should be key features of working round the environmental problems in Loweswater (Morris, Norton and Waterton, forthcoming). We also suggest that stakeholder involvement, handled in sensitive ways, could potentially mean avoiding similar negative feedback loops occurring in rural environments in the future.

Workshop results

The workshop provided an opportunity for stakeholders and scientists to listen to a range of different perspectives, to explore common goals for the future of the catchment and to try to identify potential routes towards achieving those goals. As well as revealing a very positive consensual vision of the catchment, the workshop also highlighted the constraints upon individuals and organisations preventing them from moving towards that vision. The ability to communicate those constraints made it possible for a greater understanding of the issues arising in the catchment for all present. For a brief period of time the workshop made it possible for stakeholders to distance themselves from their perceived roles and focus on working together to solve a common problem.

Feeding results into a future study

The most important result of this study is an agreement upon the scope of future research and the construction of a research proposal that will bring together

- understandings of terrestrial ecology, ecosystem function, biodiversity, landscape character;
- aquatic ecology, water quality and conservation;
- catchment economy, rural sociology and social change (historical, current and future);
- democratic and participatory catchment planning processes.

In consultation with the Loweswater project, local residents, Parish Council and other stakeholders, the researchers are all agreed that these will come together through the creation of a new institutional mechanism to address catchment issues using a bottom-up participatory community approach. We envisage this institutional mechanism to foster and steer a focused, interdisciplinary body of research that involves the local community and stakeholders, and which will contribute towards sustainable catchment management at Loweswater. This research will also explore the transferability of the participative research model to other parts of the rural landscape.

Workshops and Events

Please see section above 'Workshop results' (p. 15) for a description of the Workshop held at the Kirkstyle Inn, Loweswater, 7th December 2004. Four out of thirteen participants were researchers on the RELU scoping study (see **User Engagement and Impact (below).**

One difficulty the researchers encountered was in holding this workshop in the last few weeks of this short scoping study. This meant that good links and relationships built up over the course of the day were more difficult to sustain once the scoping study itself had ended.

User Engagement and Impact

Stakeholder engagement was already in train prior to the scoping study, significantly enhancing communication between 'actors'. The ecologists on the scoping study had been working alongside the Loweswater Project, the Environment Agency, the National Trust and RDS to identify potential funding sources and routes for ecological work in the catchment. A Rural Enterprise Scheme funded project co-funded by the

National Trust commenced during the scoping study. The scoping study work complemented the ecological work and was highly policy relevant both in terms of the impact of land management practices on water quality and stakeholder engagement.

List of stakeholders/workshop participants:

Mark Astley, NT Loweswater
Jeremy Barlow, NT Ennerdale
Andrew Booth, EA Penrith
Harry Kay, RDS Penrith
David Keddy, EA Penrith
Danny Leck, The Loweswater Project, Loweswater
Stephen Maberly, CEH, Lancaster University
Jake Morris, Institute for Environment Philosophy and Public Policy (IEPPP) Lancaster University
Jo Moysey, RDS Penrith
Shirley Muir, Lake District National Park Authority (LDNPA), NW region
Lisa Norton, CEH, Lancaster University
John Pinder, EA Penrith
Paul Thompson, EA Penrith
Claire Waterton, IEPPP, Lancaster University.

Interviewees:

Danny Leck (Farmer and leader of Loweswater project; July 2004, 5th October 2004)
Kath Leck (Farmer, Loweswater; July 2004, 5th October 2004)
Mark Astley (NT Warden, Loweswater; July 2004)
Mervyn Edwards (RDS, Penrith, September 2004)
Chris Todd (Farmer, Loweswater, November 2004)
Edna Vickers (Farmer, Loweswater, November 2004)
Johnnie Vickers (Farmer, Loweswater, November 2004)
Harry Spencer (Retired farmer, Loweswater, November 2004)
Alice Spencer, Retired farmer, Loweswater, November 2004)
Lorna Medley (Grange Country House Hotel, November 2004)

Co-funding received

- **Rural Enterprise Scheme – Rural Development Service/National Trust** Loweswater Improvement Project (£47K) Oct '04-Dec-'05**,**
- **National Trust** Soil sampling project (£8K) Sept '03- Nov '05,
- **Environment Agency/(CEH/Lancaster University) matched funding project** Developing potential for community catchment management in Loweswater (£38K) Nov '05-Mar'06.

Interdisciplinarity

The experiences of and lessons for interdiciplinarity are described in the section above '*Objective 3'* (p. 9) which describes the achievements and issues arising for interdisciplinarity from the scoping study.

Research Capacity and Training

Interdiciplinary capacity and thinking was built up both through the project itself and the attendance of two researchers (Norton and Waterton) at two RELU organised events, in Birmingham (January 2005) and York (May 2005) respectively.

Outputs

Seminar presentations and papers:

1. Norton, L. and Waterton, C. (2005) 'Understanding Loweswater', Presentation to Environment Agency meeting of senior scientists and managers, Lancaster University, 4 May 2005.
2. Norton, L. and Waterton, C. (2005) 'Understanding Loweswater', Presentation to RELU meeting, 'People and the Environment: Scoping the Research Agenda' at York, 18th May 2005.
3. Morris, J. Norton, L. and Waterton, C. 'Understanding Loweswater: generating stories for rural environments', Paper for special issue of the *Journal of Agricultural Economics*, submitted September 2005.
4. Norton, L. (2005) '*Understanding Loweswater'*, Planet Earth: Quarterly Journal of the Natural Environment Research Council, Autumn 2005.
5. Norton, L. Presentation of scoping study and proposed research to Parish Council, Loweswater, 1st November 2005.

Future Research Priorities

This scoping study has resulted in a proposal to create a new institutional mechanism to address sustainable catchment management at Loweswater using a bottom-up participatory community approach which is transferable to other catchments. We envisage this institutional mechanism as fostering and steering a focused, interdisciplinary body of research that involves the local community and stakeholders.

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