J A G E	0 4 4	B	Dispatch: 9.5.06	Journal: JAGE	CE: Benjamin
Journal Name	Manuscript No.		Author Received:	No. of pages: 17	PE: Dipu

Journal of Agricultural Economics, Vol. 57, No. 2, 2006, 1–17

Learning from Doing Participatory Rural Research: Lessons from the Peak District National Park

A. J. Dougill, E. D. G. Fraser, J. Holden, K. Hubacek, C. Prell, M. S. Reed, S. Stagl and L. C. Stringer[1]

1 (Original submitted xxx 200x, revision received xxx 200x, accepted xx 200x.)

Abstract

Understanding the socio-economic and environmental implications of rural change requires the active participation of many research disciplines and stakeholders. However, it remains unclear how to best integrate participatory and biophysical research to provide information useful to land managers and policy makers. This paper presents findings of a RELU scoping study that has formulated and applied a research framework based on stakeholder participation and adaptive learning to model rural change in the Peak District National Park in the north of England. The paper describes a learning process that integrates different types of knowledge to produce future scenarios that describe possible economic and environmental changes due to a national review of burning practices on heather moorland and blanket bogs. We stress the need for using social network analysis to structure stakeholder engagement and outline how a range of participatory approaches can facilitate more inclusive environmental planning and policy development.

[1] Dr Andy Dougill and Drs Fraser, Hubacek and Reed for correspondence and is in the Sustainability Research Institute, School of Earth and Envrionment, University of Leeds, Leeds, LS2 9JT, UK. E-mail: adougill@env.leeds.ac.uk. Dr Holden is in the School of Geography, University of Leeds. Dr Prell is in the Department of Sociological Studies, University of Sheffield. Dr Stagl is in the Science and Technology Policy Research Unit, Freeman Centre, University of Sussex, while Dr. Stringer is in the Institute for Development Policy and Management, School of Environment and Development, University of Manchester. This work was carried out as part of project RES-224-25-0088, funded through the Rural Economy and Land Use Programme (RELU). RELU is funded jointly by the Economic and Social Research Council, the Biotechnology and Biological Sciences Research Council and the Natural Environment Research Council, with additional funding from the Department for Environment, Food and Rural Affairs and the Scottish Executive Environment and Rural Affairs Department. The research was conducted in close collaboration with staff from the Moors for the Future Partnership who are supported by the Heritage Lottery Fund (http://www.moorsforthefuture.org).

Keywords: *Adaptive learning; moorland burning; Peak District National Park; rural land use; social network analysis.*

2 **JEL classifications:**

1. Introduction

In the past, managers of designated landscapes and protected areas, such as National Parks, generally had very narrow mandates, such as promoting a specific species for hunting or conserving particularly valuable habitats. Today, however, society expects a range of recreational, agricultural and environmental outputs and services from the land. A growing body of literature proposes that participatory 'multi-stakeholder processes' help to resolve conflicts and promote landscapes that offer many things to many people (e.g. Rowe and Frewer, 2000, 2005; Bloomfield *et al*., 2001; Abelson *et al*., 2003; Fraser *et al*., 2006). Local knowledge is increasingly valued by the research community in the developing world (e.g. Chambers, 1994, 2005; Cornwall and Pratt, 2003; Pound *et al.,* 2003; Holland and Campbell, 2005); however, there are few examples in the developed world of meaningful interaction leading to two-way learning between stakeholders and researchers (e.g. O'Connor 2000; Robertson and McGee, 2003; Stringer and Twyman, 2005; Reed *et al*., in press). Consequently, although such an interdisciplinary and participatory approach is widely advocated, it remains unclear as to the best way to facilitate such a process. There is a need for research to test and refine participatory frameworks that can facilitate multi-stakeholder land-use decision-making.

This paper summarises the authors' reflections at the conclusion of a 1-year scoping study in the Peak District National Park in the north of England. An interdisciplinary team of academics worked closely with a range of public and private stakeholders to apply, test and refine a participatory process for discussing and evaluating land-use policy options. Specifically, the objectives of this paper are to:

- Briefly review the theoretical basis for participatory processes used to engage a wide range of public and institutional stakeholders in land management decision-making.
- Describe how an adaptive learning process was applied using a range of participatory methodological tools during a 1-year study focused on burning management practices in upland Britain.
- Reflect on our experiences in carrying out research involving interdisciplinarity, stakeholder participation and collaborative learning.

The outputs of the scoping study described here will be used to guide a 3-year follow-on study. This will extend the work in the Peak District and apply similar approaches to two other upland settings in the UK with different social, political and environmental contexts.

2. Scoping Study Context: Drivers of Change in the Peak District National Park

Established in 1951, the Peak District National Park (subsequently termed Peak District) was the UK's first National Park. It is situated at the southern end of the Pennine Hills (Figure 1), straddling four Government regions (East Midlands, West

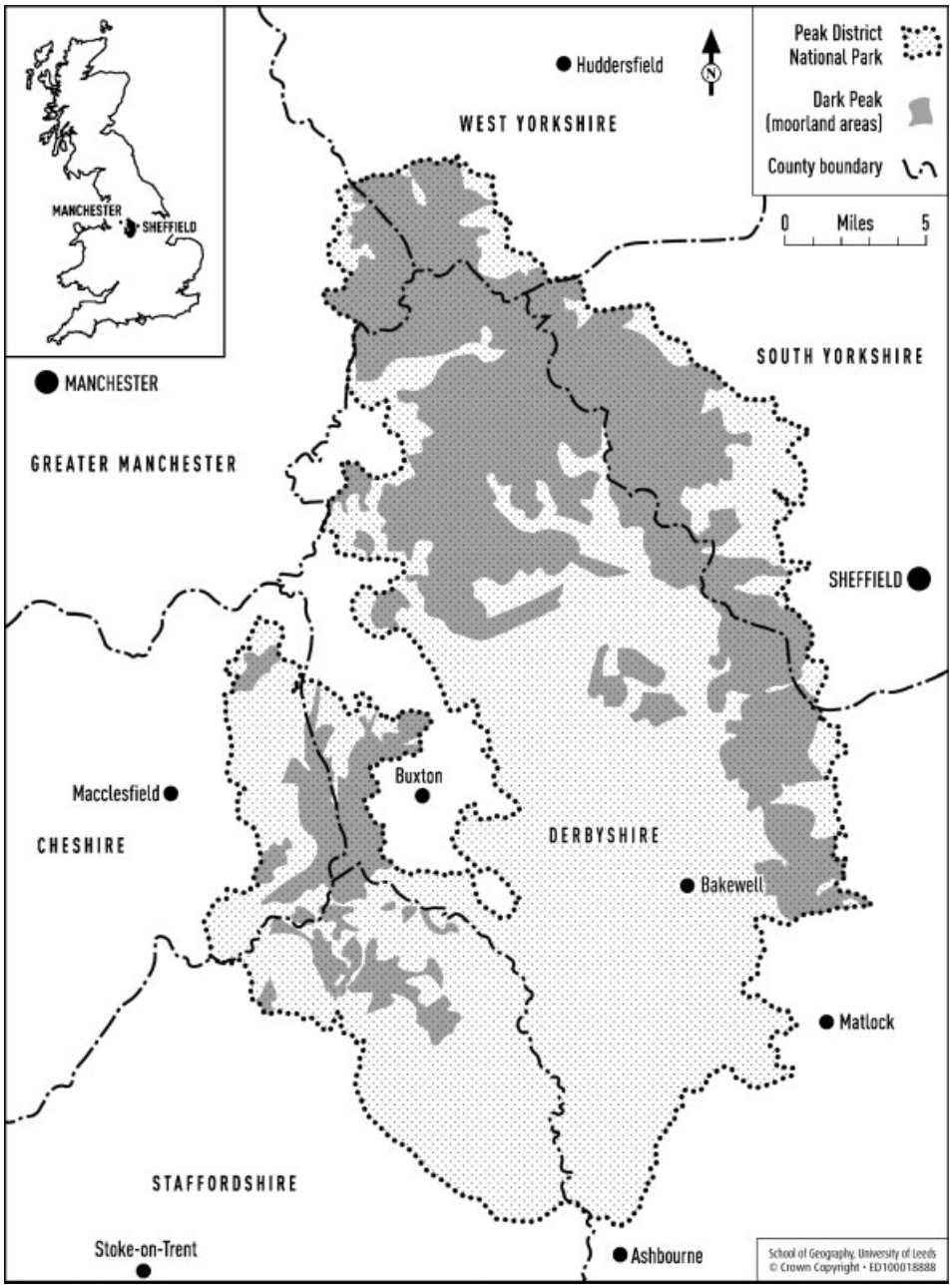

Figure 1. Map of Peak District National Park

Midlands, North West, Yorkshire and Humber) that together contain around 48% of England's population, making it one of the world's most visited national parks with over 22 million visitors a year (Peak District National Park, 2004). In addition to the demands that these visitors put on the landscape, the area has a resident human population of 38,000 (Office of National Statistics, 2003). As with many

other UK uplands, the Peak District has undergone significant demographic changes. Many new residents have moved to the Park to retire or to purchase holiday homes whereas younger, unskilled workers have been priced out of local housing markets. This has created labour shortages for traditional land management practices. Both farming and grouse-shooting activities operate at the margins of financial viability, and are reliant on agricultural subsidies. Some 93% of the Park qualifies for funding under the European Commission Directive for special assistance to Less Favoured Areas (75/268).

The Park also contains two Environmentally Sensitive Areas that provide payments to land managers to maintain certain landscapes, wildlife or historical features. Of particular ecological interest is the Dark Peak area, characterised by extensive heather moorland and blanket bog habitats, surrounded by enclosed pastures in deep, narrow valleys. Blanket bogs are ecological communities characterised by cotton grasses, sphagnum mosses and dwarf shrubs. They form on flat or gently sloping land that is subjected to heavy and infrequent rainfall over acid peat that is over half a metre deep. Dry heaths represent another major habitat and are dominated by dwarf shrubs (typically heather, crowberry and bilberry). These are generally found on well-drained slopes with acidic and infertile soils. Both these habitats are internationally important, being recognised as key biodiversity habitats (UK Biodiversity Steering Group, 1995), containing a number of 'Sites of Special Scientific Interest' (SSSI) (English Nature, 2003), and listed in the EU's Habitats Directive (92/43/EEC) as requiring special conservation measures as 'Special Areas of Conservation' (SAC) and 'Special Protection Areas' (SPA).

Changes to the farming subsidy system are currently progressing with reform of the EU's Common Agricultural Policy (CAP). The CAP reform has replaced output-based subsidies with Single Farm Payments for 'environmentally sensitive agriculture' that rewards farmers for using more sustainable management practices and promoting wildlife habitat (Lowe *et al.*, 2002). Rural land managers are also trying to adapt to the EU's Water Framework Directive that requires all inland waters to be in 'good status' by 2015. This demands significant changes to land management practices in order to reduce polluting runoff and limit the amount of erosion from upland catchments.

This complex and changing background makes the Peak District typical of a range of rural settings within and outside the UK where traditional upland management is under pressure. This made the Peak District a relevant locale in which to apply and refine a multi-stakeholder participatory process. In addition, considerable logistical support is available in this region from a partnership project 'Moors for the Future' (http://www.moorsforthefuture.org.uk). This organisation combines governmental bodies, non-governmental institutions and the three water companies based in the region and aims to identify suitable approaches for restoring some of the degraded and eroded moorland found in the Peak District.

3. Finding Solutions through Adaptive Learning and Management

Despite awareness from policy-makers of the environmental and economic importance of this region, serious problems exist. For example, even though approximately 80% of Peak District moorlands are designated as SSSI, many of these areas are classified as being in an 'unfavourable condition'. This is due to a range of pressures including overgrazing and the use of inappropriate burning methods that fail to

maintain the ecologically diverse and economically productive mix of young and mature stands of heather and other dwarf shrubs (English Nature, 2003).

One reason these problems persist is that the broad range of stakeholders place complex and competing demands on the landscape, whereas current management practices fail to integrate the range of social, economic and environmental pressures. Another problem is that our understanding of the natural processes within these landscapes remains limited, with reductionist scientific approaches unable to provide improved understanding on a landscape scale. Consequently, there is a need for management plans that can adapt to social values and changing scientific understanding. This requires all stakeholders (e.g. recreational users, land managers, regulators, decision-makers and researchers) to work together so that different sources of knowledge can be integrated and reconciled. Such co-operation has the potential to minimise the risk of conflicts, not just between traditionally conflicting ecological and economic values but also among environmental management interests (Walters, 1997). However, collaboration between stakeholders, and in particular between researchers and rural stakeholders, is often limited by a lack of effective communication and hence mutual learning (Lee, 1999). As yet, there is no consensus on how to integrate scientific and local knowledge and perceptions (Abelson *et al.*, 2003), let alone on how to incorporate such diverse opinions into policy or land management advice (Folke *et al.*, 2002).

To address these challenges, we draw from the literature on adaptive management to identify approaches that can actively engage stakeholders in a collaborative research process. Adaptive management, sometimes referred to as 'learning while doing', is a methodological approach that sets up policy options as if they were experiments to be studied (Holling, 1978; Walters, 1986). To accomplish this, experiential learning theory suggests that it is necessary to reflect on and learn from past experiences to ensure that planning captures the complexity of a multi-stakeholder world. These ideas were first presented in Confucius's (*c.* 450 BC) famous maxim: 'Tell me, and I will forget. Show me, and I may remember. Involve me, and I will understand'. However, our rationale emerges from Kolb's (1984) work, which proposes that learning takes place in four generic phases: concrete experience, reflective observation, abstract conceptualisation and active experimentation. The four-phase cycle begins with tangible experiences which serve as a basis for observations and reflections upon those experiences. These reflections are then assimilated and developed into abstract concepts from which new actions can be planned. These action plans can then be actively tested before they are implemented to create new experiences. Although a learning experience can arise based on any one of these phases, it is most effective when all four phases are experienced in an iterative process (kolb, 1984). Although experiential learning theory is not without its critics (e.g. Illeris 2002), it remains one of the most influential and widely applied theories of learning (Kayes, 2002; Kolb and Kolb, 2005; Fazey *et al.*, 2005).

4. Adaptive Learning in Practice

To put such an adaptive learning approach into practice and use it to develop and test management options, we began with a basic learning cycle that follows Kolb's work (Figure 2).

The cycle contains three phases. The aim of the first phase is to establish the context of the system and boundaries of the project. This is to ensure that key

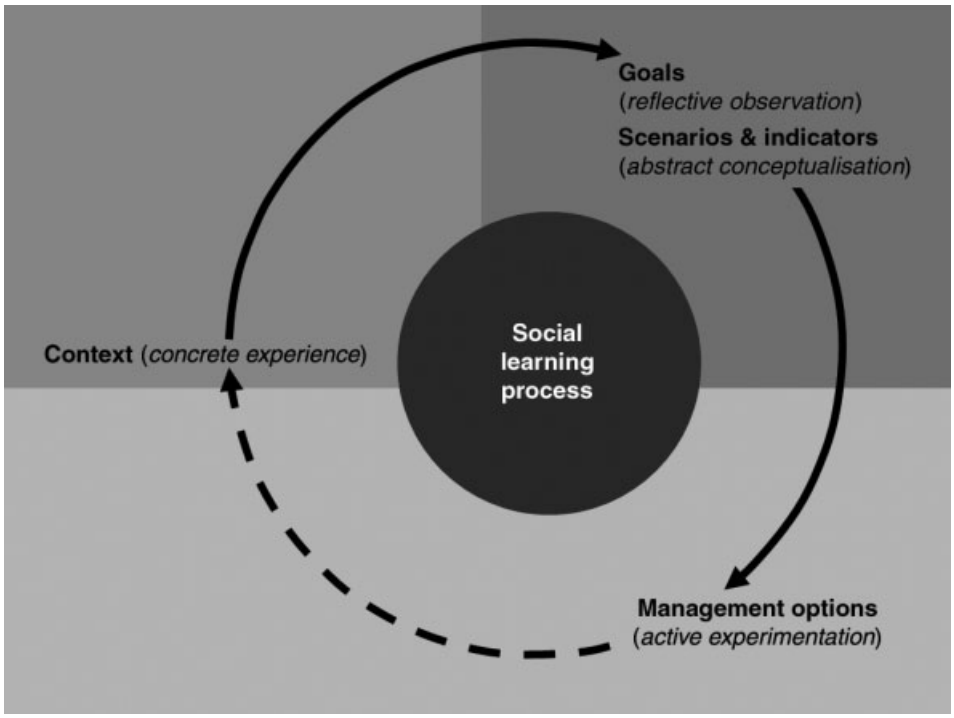

Figure 2. Adaptive learning cycle used to facilitate learning between stakeholders in the Peak District National Park
***Note*:** Comments in parenthesis refer to the four stages of experiential learning (Kolb, 1984).

stakeholders and the socio-ecological factors to be studied are identified. The second phase involves developing goals, scenarios and models that help bring stakeholders together to learn from each other. Finally, the third phase aims to identify and refine management options that feedback into context and goal setting. The cycle emphasises that managers must continually re-evaluate their basic starting assumptions and use their shared experiences to develop new management options through a collaborative process of elaboration and refinement between all stakeholders. Although Figure 2 provides general guidance on how activities should be arranged, to actually turn this simple framework into practice, many more steps are required. Figure 3 shows how specific methods were used in applying this framework in our study. In the next section of the paper we consider each phase in turn, though the iterative nature of such research implies that learning continues across all the phases and that flexibility is essential.

4.1. Phase 1: Context: Establishing system and project boundaries

In the first phase of the study, stakeholders and researchers explored land-use management in the Peak District, allowing different stakeholders to learn from each other. This involved: (i) identifying the boundaries of the system to help focus the project; and (ii) identifying those with a stake in the future management of the system (i.e. the stakeholders). This corresponds to Kolb's concrete experience phase,

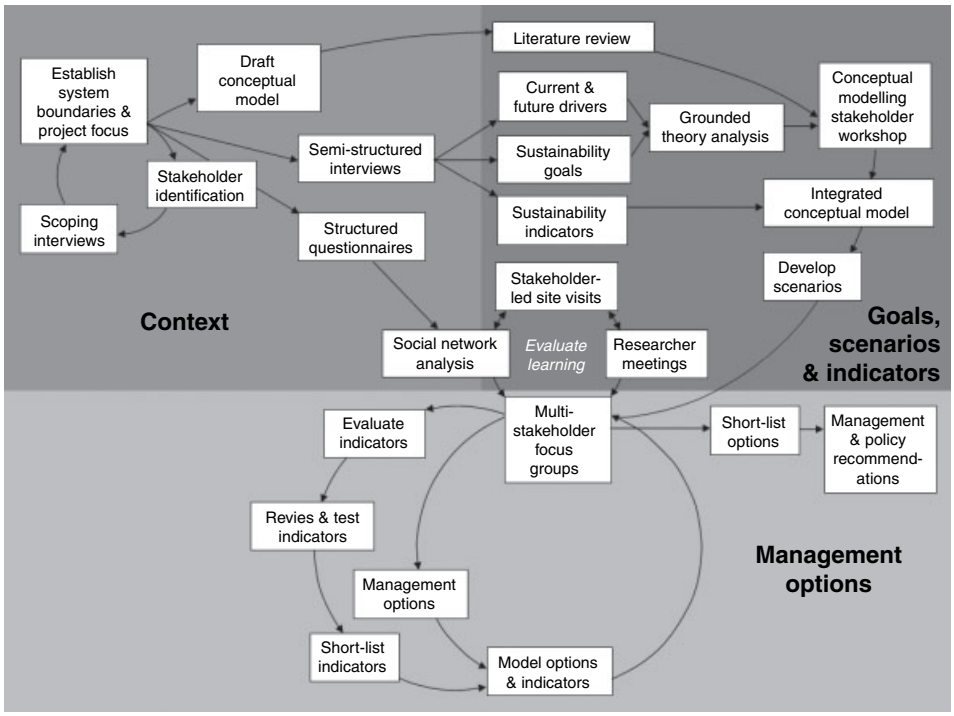

Figure 3. Methods used to bring stakeholders together in an adaptive learning process

exploring stakeholders' tangible experiences of their social, economic and environmental contexts.

4.1.1. Establishing system boundaries

System boundaries were identified and refined through eight scoping interviews with stakeholders from the Moors for the Future Partnership group (consisting of representatives of the National Park, Farmer Union, Land Owners' organisation, conservation agencies and private water companies). These interviews demonstrated the close economic and biophysical connections between the uplands and lowland valleys. For example, the same landowners manage both upland moorland and lowland pastures, with grazing animals seasonally moved between the two. Despite these connections, there was a need to impose strict boundaries on what would – and would not – be included in the study, to keep activities manageable. As such, altitude (uplands), soil (peatlands) and vegetation type (moorlands) were all discussed alongside political borders as potential system boundaries. Ultimately, the researchers and stakeholders resolved that we should work within the geographical and geological boundaries defined by the Dark Peak area, as it represented a more or less discrete biophysical (e.g. hydrological), social (e.g. location of dwellings) and economic (e.g. sheep movements) system.

One of the key results from the scoping interviews was that all stakeholders indicated that burning heather moorland was central to many parts of the system. Burning patches of heather on a regular basis maintains a significant number of the young plants that are needed by both sheep and grouse. As such, controlled

burning is practised widely and is a principal factor affecting the Peak District landscape and its biodiversity. Nevertheless, in many cases, burning has not been conducted appropriately and is blamed for causing soil erosion and degrading the moorland. This also results in lower water quality (Rothwell *et al*., 2005). More specifically, intense fires and soil erosion may have caused gullies to form. Gullying is a principal cause of discolouration in drinking water that is extremely costly to remove, increases carbon emissions (Worrall *et al*., 2003) and alters drainage networks and downstream flows. Notably, low flows may be exacerbated during dry periods and higher peak flows are more likely if large areas have extended drainage networks through gullying (Holden *et al*., 2004).

The debate over how and when land managers should burn heather has exposed a series of fundamental questions. The economy of the Peak District depends on its role as providing a supply of clean surface water for surrounding cities. It is also valued as a landscape used for recreation as well as being home to longstanding farming and grouse-keeping communities. Many stakeholders argued that burning to maintain young heather communities required for grouse and sheep populations conflicts with these other land uses. To try and balance these conflicting issues, the UK Government has established a Biodiversity Action Plan and intends to enforce better burning standards so that 95% of SSSI are classified as of 'favourable' or 'recovering' condition by 2010. Additionally, the Department for Environment, Food and Rural Affairs (DEFRA) is undertaking a review of its Heather and Grass Burning Code that will tighten regulations on where, when and how burns take place. Under consideration is an outright ban on burning on blanket bog, a shortened burning season and designating 'no burn areas' to preserve key habitats. However, these issues are complex and there is no resolution as to how to implement such proposals in revised management plans. Given the wide-ranging importance of burning practices and the conflicts that exist between different stakeholders, this offered an important and timely land management issue on which to focus our study.

4.1.2. Identifying stakeholder groups

Participatory research on natural resource management issues often casually refers to stakeholders as if their identity as homogeneous groups is self-evident. Within rural Britain, these dangers are compounded by the strong network of formal organizations that serve people with clear interests in rural management (e.g. farmers union, land owner groups, conservation bodies, recreational groups, regulatory bodies and private companies). Consequently, there is a danger of simply identifying a pre-selected group of vocal stakeholders who are already engaged in land use and policy debates and asking them to define problems. In our own research, we used the existing Moors for the Future Partnership group to identify the stakeholder groups in the Peak District, a process that produced a list of over 200 potential stakeholder groups and organisations. From this list and discussions in scoping interviews, we classified stakeholders into eight main groups (water companies, recreation industries and organisations, agricultural community, conservationists, grouse moorland owners and managers, tourism-related enterprises, forestry agencies and other statutory bodies) each of which having an active and direct involvement in land management debates. The focus on land management meant that the views of the 38,000 Peak District residents were not explicitly sought other than through their affiliation to the groups iden-

tified. As part of this stakeholder analysis, we identified the existing relationships and conflicts between the different groups. This way of identifying stakeholders helped us to quickly highlight the key players and avoid intensification of any existing conflicts.

The classification of stakeholder groups was checked as part of subsequent semi-structured interviews with 24 stakeholders from across all the identified groups, by specifically asking if any groups were marginalised. This interview was then followed up by a social network analysis (with the same respondents) aimed at quantifying the social networks that exist between and within different stakeholder groups. Social network analysis is a method widely used in quantitative sociology that enables analysis of both the nature and structuring of social relations between different groups of stakeholders (Wasserman *et al*., 1995). Specifically, it helps to identify marginalised groups and those individuals who are well known and centrally positioned within networks (Rogers, 2003). It also provides a means of gathering baseline data on actors' attitudes and views. To this end, we implemented a structured questionnaire to determine: (i) which stakeholders interacted with one another and the frequency of these interactions; (ii) whether these were 'positive' or 'negative' interactions; (iii) the extent to which stakeholders viewed others as trustworthy; (iv) the extent to which stakeholders perceived other stakeholders as holding similar views as their own; and (v) how long stakeholders had known one another. Figure 4 is one output from this activity and shows the extent to which individuals from the main stakeholder groups (which were collapsed into five groups) interacted with one another on a monthly or more frequent basis. The figure clearly identifies stakeholders who interact with a greater number of members in the network and who may perform a bridging role across disparate sections of the network. Such individuals are valuable to include in information sharing and dissemination activities, as the likelihood of diffusing information gained from such activities increases when they participate.

Figure 4 also shows that three 'cliques' (or groupings of people in regular communication with each other) are evident in this network. Recreation forms its own clique, water and conservation form a second clique and grouse and agriculture form a third. Thus, farming and grouse moor stakeholders have little regular contact with conservation and water stakeholders.

Within the study, constraints on staffing and resource availability meant that the social network analysis was conducted after the semi-structured interviews with individual stakeholders. On reflection, we feel that much greater integration of methods and findings would have been possible if this analysis had been conducted as part of the semi-structured interview process. This information would have been especially useful in helping us to improve the facilitation process in subsequent multi-stakeholder focus groups. In designing participatory activities in follow-on research, we will use the information gathered from social network analysis to decide which stakeholders will be grouped together in workshops and site visits, to encourage ties between the different groups and help build trust and understanding across the network.

4.2. Phase 2: Goals, scenarios and indicators

The goals of the second phase of the research were: (i) to work with stakeholders to set management goals; (ii) to develop scenarios of probable future change

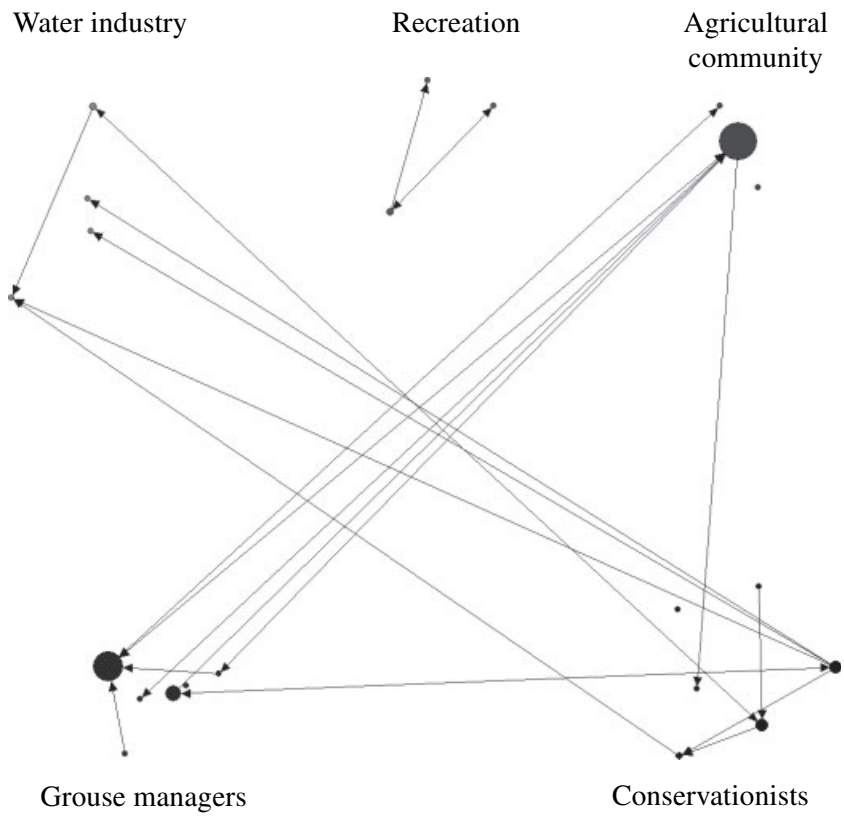

Figure 4. Communication ties between stakeholders who interact on a monthly or more frequent basis[a]

***Note*:** [a]Dots represent individuals from different stakeholder groups. An arrow between two dots indicates an individual who said s/he communicated with another individual on a monthly or more frequent basis. Two-way arrows indicate that this perception was reciprocated. Larger dots represent individuals who communicate most frequently with others in the network.

in the region and display these scenarios visually as a series of conceptual models; and (iii) to identify indicators that could be used to monitor progress towards management goals under the different scenarios. This information was gathered through semi-structured interviews with the 24 stakeholders taken from the five main stakeholder groups identified as having a direct role in land management decisions (as shown in Figure 4), who had also undertaken the social network analysis.

Interviews started by asking respondents to reflect on their experience of the Peak District's social, economic and environmental problems, in order to identify goals for future land management priorities and options. This matches Kolb's (1984) reflective observation phase. Second, scenarios of probable future change were developed through exploration of their perceptions of the drivers of change. Drivers of change and their probable effects on different environmental, economic and social components of the system were elicited and discussed in each interview. These

were analysed using the Grounded Theory Analysis[2] and used to develop a conceptual model from which future scenarios and likely outcomes were derived. Third, during the same interviews, indicators were identified that could be used by the stakeholders themselves to monitor progress towards management goals under these scenarios. These last two components equate with Kolb's abstract conceptualisation in that interviewees were asked to conceptualise the future and abstract indicators.

4.2.1. Goals

Preliminary results from the interviews show a wide range of conflicting goals for the region. These ranged from maintaining the *status quo* in burning practices to the re-wilding of upland landscapes through managed habitat creation and rehabilitation. Discussions on future goals of management practices invariably focused on burning practices. Notably, many conservationists stated a need to ban burning on blanket bog and reduce the extent of burning on dry heath sites (matching a key set of options proposed in DEFRA's consultation document for its review of the Heather and Grassland Burning Code). These issues were also raised by other stakeholders as a way of promoting cleaner water, reducing soil erosion and protecting biodiversity. However, this opinion was in stark contrast with many land managers who wanted to retain as much flexibility as possible in burning practices. Indeed, the most widely held opinion amongst the agricultural and grouse-keeping groups was that the region was already sustainable and that the best way forward would be to maintain the *status quo* in terms of both burning practices and agricultural subsidies, thereby keeping sheep densities constant and maintaining grouse numbers.

4.2.2. Scenarios

To make sense of conflicting goals, and help develop scenarios of future change, a working group comprising 10 research investigators used the information from these interviews to produce a conceptual model that showed how different socio-economic changes might result in new landscape patterns. The disciplinary expertise of this group ranged from qualitative social sciences, such as sociology and anthropology, to quantitative natural sciences, such as soil science and ecological modelling. This was facilitated by researchers with experience of such integration from work outside the UK (e.g. Dougill *et al.*, 2002; Hubacek and van der Bergh, 2006). This conceptual modelling process considered how social, economic and ecological factors might affect the system in the future. The model took the form of a diagrammatic flowchart and was based on a dynamic systems approach advocated by Sterman (2002). The flowchart also enabled us to identify key future scenarios that were then described in prose as storylines. This was to provide tools that would give a focus to subsequent discussions and a common language amongst researchers from different disciplines. The conceptual model also helped the project team anticipate and interpret stakeholders' understandings of the environment. As the flowchart for

[2] Grounded Theory is a qualitative method used to systematically analyse texts such as interview transcripts to construct theoretical models (Corbin and Strauss, 1990). This is performed by reading interview transcripts with specific questions in mind and coding passages with keywords. By sorting quotes using keywords, it is possible to develop an understanding of how different stakeholder groups perceive the interaction of different phenomena.

Box 1

Storyline of possible causes and consequences of reduced moorland burning derived from interviews with stakeholders

We begin with the DEFRA burning code review and anticipate that it will result in restrictions on burning, tighter controls on how and when burns occur, and the technology used to manage fires. In addition, an ageing population and reduced farm employment mean that there is a smaller pool of labour in rural areas to draw upon when conducting managed burns. Finally, lower economic returns from grouse result in fewer gamekeepers and fewer areas managed for grouse shooting.

These forces may lead to smaller areas of moorland being burned and fewer accidental fires (because of tighter controls and better burning management techniques). On blanket bog, the reduction in the total number of fires and the amount of area intentionally burned will likely result in: (1) more blanket bog species, (2) an increase in fire-sensitive species, and (3) an increase in vegetation overall. This may reduce soil erosion and improve water quality, lowering water-processing costs.

On dry heath or degraded blanket bog areas, this scenario has three possible implications. First, there might be fewer open patches and more vegetation cover. This will likely mean that sheep grazing is concentrated on the remaining burned areas and on the moorland fringe, resulting in overgrazing of these areas. This is also likely to result in fewer bryophyte species. Overall, this scenario will have unknown effects on the biodiversity of the ecosystem (thus this is an area of future research). A second implication may be that short heather declines and long heather increases. This will initially provide habitat for ground-nesting birds but will likely increase raptor numbers that may in turn affect grouse populations. This might have economic impacts for the grouse industry. Overall, this scenario will have unknown effects on the biodiversity of the ecosystem. A third possible outcome is that increases in long heather may also increase the amount of dry biomass in the region. This could increase the chance of accidental fires that will be difficult to control, and thus and may lead to increased soil erosion and water pollution.

the entire system proved too complex to be useful, simpler sub-models were used successfully as communication tools and starting points for group discussions. For example, Box 1 illustrates the storyline that was constructed to accompany the dynamic model that captures the possible consequences of the DEFRA burning code review (Figure 5).

4.2.3. Indicators

A preliminary list of indicators that could be used to monitor whether the Peak District was moving toward's the goals identified in phase 2 was also collected during the semi-structured interviews. These indicators overlap considerably with the UK Joint Nature Conservation Committee indicators for blanket bog condition assessment (JNCC, 2005), showing broad agreement of rural stakeholders with the published scientific literature.

4.2.4. Multi-stakeholder workshop

The final step in phase 2 was a multi-stakeholder workshop designed to refine both the scenarios and the indicators used to determine whether or not future management plans were moving towards the desired goals. Unfortunately, this multi-stakeholder workshop did not meet these targets because of difficulties in negotiating the

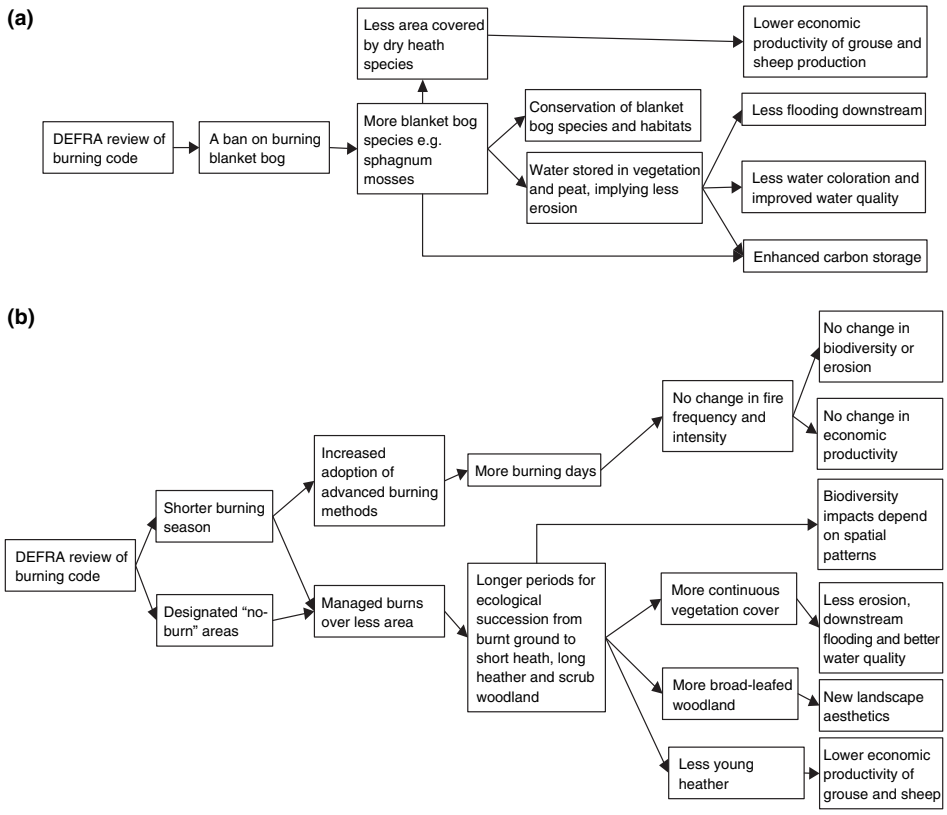

Figure 5. Conceptual models illustrating economic and environmental impacts of changes in burning practices proposed in the national review of Heather and Grass Burning Code. (a) Blanket bogi; (b) dry health or degraded blanket bog

competing expectations and demands of the different stakeholder groups who were present in the single workshop setting. It is specifically in this regard that we recognise that the outputs from the social network analysis should have been used to enable better facilitation of the workshop by highlighting existing conflicts. This would have helped the facilitators, who could have used this information to divide participants into smaller and more cohesive groups.

Some important progress was made in this workshop, however. One participant summed up a view that was expressed by a number of people during follow-up telephone calls and meetings:

> *This is the first time all these people have sat round the same table with each other. Until this project came along, I don't think any of us would have believed we'd be sitting here.*

As such, this process has laid a foundation for future work that can build relationships and trust between different stakeholders, and explore the issues relevant to them in greater depth. Careful use of social network analyses in the facilitation process will enable further collaborative learning opportunities to be realised in future workshops.

4.3. Phase 3: Management options

The third and final phase of research (illustrated in the bottom section of Figure 3) will be further developed, tested and refined in a follow-on 3-year research project funded by the RELU programme that will both continue work in the Peak District as well as in two other UK upland regions.[3] In this phase of the project, stakeholders and researchers will work together to identify future management options in multi-stakeholder focus groups. These focus groups will be supported by a series of stakeholder-led site visits in each region where researchers and stakeholders will discuss key management problems and future scenarios in a field setting. This approach was trialled in the scoping study and was viewed as an extremely valuable learning experience by both the researchers and stakeholders.

Focus group methods will begin by grouping like-minded individuals (i.e. of the same stakeholder group) with researchers to discuss future management scenarios. These scenarios will become the basis for an integrated set of formal predictive models. At its core, this integrated set of models will rest on an agent-based model that will provide future land-use maps as inputs for spatially explicit soil erosion, carbon flux, hydrological and ecological models. These will be used to predict the environmental consequences of the different scenarios and results will be displayed visually using digitally manipulated photographs and GIS maps that will show how key aspects of the landscape may change in the future to enable discussions between the different stakeholder groups at a second round of focus groups. In this way, multi-stakeholder focus groups are central to reconciling and elaborating shared understandings of the interactions between social, economic and environmental systems (as shown in Figure 3) and will be used to amend future management scenarios and policy recommendations.

5. Discussion – Learning from Doing Adaptive Rural Research

At least three lessons can be derived from our experience in undertaking the scoping study. First, management planning should include the full range of stakeholders relevant for the land use scenario under consideration. However, conflicts within communities, extreme opinions and polarised political viewpoints all mean that simply 'inviting all the stakeholders' along to workshops is not an effective way of developing environmental management plans. Social network analysis offers a potential tool for identifying conflicts as well as people who are isolated from existing decision-making networks. Social network analyses can also provide a means to identify those individuals in the network whose opinions carry particular weight and who are critical to forming opinions. These sort of influential people are key to ensuring that recommendations are disseminated and that new management strategies are communicated to as wide a group as possible.

The second key lesson is that environmental management planning should emphasise a learning process that encourages participants to actively explore the socio-economic and biophysical implications of management practices. This sort of learning and future scenario modelling requires natural and social scientists to use methods and report findings that are accessible to a range of communities. The

[3] See http://www.env.leeds.ac.uk/sustainableuplands.

conceptual modelling approach that we used in the study shows promise. By working with a range of academic disciplines and community members to develop flowcharts that showed how social, environmental, and political factors interact, we created a visual starting place that captured complex system dynamics. As a full dynamic systems flowchart was unmanageable, we extracted key 'storylines' that became the basis for discussion. Effective communication of complex issues between people with varying disciplinary backgrounds and knowledge remains the key challenge for such processes. In the future, we will use these sorts of flowcharts as the basis for integrated modelling that will link agent-based models that quantify stakeholders' likely decision-making with a range of spatially explicit biophysical models. To present results back to the stakeholders, we plan to use visual tools such as digitally manipulated photographs, storyboards and GIS maps.

Third, environmental planning needs to be a process of continued learning from experiences and adapting to socio-ecological changes. To accomplish this, the steps undertaken during this research included a number of key feedback loops, where the output from activities was reflected back to the stakeholders for refinement (Figure 3). The overarching structure on which the research is based (Figure 2) involves feedback between the formulation of management options and evaluating the socio-ecological context in which management takes place. To develop this approach, we feel that the next step is to develop formally integrated environmental and socio-economic models to anticipate possible impacts of proposed policies before they are implemented. By using these models, stakeholders should be able to develop a range of policies and management strategies leading towards sustainability goals.

6. Conclusions

The scoping study described in this paper developed and tested the first two phases of an adaptive learning-based research framework (Figure 3) with stakeholders in the Peak District. A 3-year extension of this research project is now underway to refine, replicate and expand this work, notably using a series of multi-stakeholder focus groups and stakeholder-led site visits to inform an integrated modelling process that should improve future land-use management decision-making. The key lessons from the scoping study include:

- Theneed for social network analysis at an early stage to provide information on existing conflicts between stakeholders, to identify marginalised groups and to provide guidance to policy-makers on how best to structure stakeholder engagement.
- Thevalue of providing a forum for stakeholders to both propose and then explore through integrated models the implications of different policies under a range of future scenarios that were themselves defined by the stakeholders.
- Theneed to put in place institutional mechanisms for environmental planning that use multi-stakeholder focus groups to stimulate shared learning by exploring the causes of future socio-ecological changes and novel ways of responding to these changes.

The process described in this paper does not provide a carefully prescribed set of solutions that fix the failings of past management practices. However, it has developed a flexible approach to deal with conflicting problems and complexities of land management that have often plagued participatory management projects. The developments in participatory management approaches suggested from this case study will

help identify best practices for participatory and interdisciplinary research that should be capable of informing future land-use decision-making on a broader scale across the UK uplands.

References

Abelson, J., Forest, P. G., Eyles, J., Smith, P., Martin, E. and Gauvin, F. P. 'Deliberations about deliberative methods: issues in the design and evaluation of public participation processes', *Social Science and Medicine*, Vol. 57, (2003) pp. 239–251.

Bloomfield, D., Collins, K., Fry, C. and Munton, R. 'Deliberation and inclusion: vehicles for increasing trust in UK public governance?', *Environment and Planning C: Government and Policy*, Vol. 19, (2001) pp. 501–513.

Chambers, R. 'Participatory rural appraisal (PRA): Analysis of experience', *World Development*, Vol. 22, (1994) pp. 1253–1268.

Chambers, R. *Ideas for Development*, (London: Earthscan, 2005).

Corbin, J. and Strauss, A. L. 'Grounded theory research – Procedures, canons and evaluative criteria', *Qualitative Sociology*, Vol. 13, (1990) pp. 3–21.

Cornwall, A. and Pratt, G. *Pathways to Participation: Critical Reflections on PRA* (London: ITDG Publishing, 2003).

Dougill, A. J., Twyman, C., Thomas, D. S. G. and Sporton, D. 'Soil degradation assessment in mixed farming systems of southern Africa: Use of nutrient balance studies for participatory degradation monitoring', *The Geographical Journal*, Vol. 168, (2002) pp. 195–210.

English Nature. *England's Best Wildlife and Geological Sites; the Condition of SSSIs in England in 2003*, (Peterborough: English Nature, 2003).

Fazey, I., Fazey, J. A. and Fazey, D. M. A. 'Learning more effectively from experience', *Ecology and Society*, Vol. 10, (2005) pp. 4.

Folke, C., Carpenter, S., Elmqvist, T., Gunderson, L., Holling, C. S. and Walker, B. H. 'Resilience and sustainable development: Building adaptive capacity in a world of transformations', *Ambio*, Vol. 31, (2002) pp. 437–440.

Fraser, E. D. G., Dougill, A. J., Mabee, W., Reed, M. S. and McAlpine, P. 'Bottom up and top down: Analysis of participatory processes for sustainability indicator identification as a pathway to community empowerment and sustainable environmental management', *Journal of Environmental Management*, Vol. 78, (2006) pp. 114–127.

Holden, J., Chapman, P. J. and Labadz, J. C. 'Artificial drainage of peatlands: hydrological and hydrochemical process and wetlands restoration', *Progress in Physical Geography*, Vol. 28, (2004) pp. 95–123.

Holland, J. and Campbell, J. (eds). *Methods, Knowledge and Power: Combining Qualitative and Quantitative Development Research* (London: Intermediate Technology Publications, 2005).

Holling, C. S. *Adaptive Environmental Assessment and Management* (New York: John Wiley and Sons, 1978).

Hubacek, K. and van den Bergh, J. 'Changing concepts of 'land' in economic theory: From single to multi-disciplinary approaches', *Ecological Economics*, Vol. 56, (2006) pp. 5–27.

Illeris, K. *The Three Dimensions of Learning*, (Frederiksberg: Roskilde University Press, 2002).

Joint Nature Conservancy Committee (JNCC). *Common Standards Monitoring Guidance for Upland Habitats*, (London: JNCC, 2005).

Kayes, D. C. 'Experiential learning and its critics: Preserving the role of experience in management education', *Academy of Management Learning and Education*, Vol. 1, (2002) pp. 137–149.

Kolb, D. A. *Experiential Learning: Experience as the Source of Learning and Development*, (xxxx, NJ: Prentice Hall, 1984).

Kolb, A. and Kolb, D. A. 'Learning styles and learning spaces: enhancing experiential learning in Higher Education', *Academy of Management Learning and Education*, Vol. 4, (2005) pp. 193–212.

Lee, K. N. 'Appraising adaptive management', *Conservation Ecology*, Vol. 3, (1999) pp. 3.

Lowe, P., Buller, H. and Ward, N. 'Setting the next agenda – British and French approaches to the second pillar of the CAP', *Journal of Rural Studies*, Vol. 18, (2002) pp. 1–17.

O'Connor, M. 'Pathways for environmental evaluation: A walk in the (Hanging) Gardens of Babylon', *Ecological Economics*, Vol. 34, (2000) pp. 175–193.

Office for National Statistics. *Census 2001: CD supplement to the National report for England and Wales and key statistics for local authorities in England and Wales*, (London: Office for National Statistics, 2003).

Peak District National Park (2004). *State of the Park Report (update)*. http://www.peak
5 district.org.

Pound, B., Snapp, S., McDougall, C. and Braun, A. *Managing Natural Resources for Sustainable Livelihoods: Uniting Science and Participation* (London: Earthscan, 2003).

Reed, M. S., Fraser, E. D. G. and Dougill, A. J. (in press) 'An integrated methodological framework for developing and applying sustainability indicators with local communities',
6 *Ecological Economics*, forthcoming.

Robertson, H. A. and McGee, T. K. 'Applying local knowledge: The contribution of oral history to wetland rehabilitation at Kanyapella Basin, Australia', *Journal of Environmental Management*, Vol. 69, (2003) pp. 275–287.

Rogers, E. M. *Diffusion of Innovations* (New York: The Free Press, 2003).

Rothwell, J., Robinson, S. G., Evans, M. G., Yang, J. and Allott, T. E. H. 'Heavy metal release by peat erosion in the Peak District, southern Pennines, UK', *Hydrological Processes*, Vol. 19, (2005) pp. 2973–2989.

Rowe, G. and Frewer, L. 'Public participation methods: A framework for evaluation', *Science, Technology and Human Values*, Vol. 25, (2000) pp. 30–29.

Rowe, G. and Frewer, L. 'A typology of public engagement mechanisms', *Science, Technology and Human Values*, Vol. 30, (2005) pp. 251–290.

Sterman, J. D. 'All models are wrong: Reflections on becoming a systems scientist', *System Dynamics Review*, Vol. 18, (2002) pp. 501–531.

Stringer, L. C. and Twyman, C. (2005). *Learning from the South: Small-scale Farming in Stressed Environments: RELU Workshop Summary Report*. http://www.sheffield.ac.uk/relu/
7 outputs.html.

UK Biodiversity Steering Group. *The UK Steering Group Report – Volume II: Action Plans* (London: HMSO, 1995).

Walters, C. *Adaptive Management of Renewable Resources* (New York: MacMillan, 1986).

Walters, C. 'Challenges in adaptive management of riparian and coastal ecosystems', *Conservation Ecology* [online] Vol. 1(2), (1997) pp. 1. Available from: http://www.consecol.org/
8 vol1/iss2/art1.

Wasserman, S., Faust, K. and Iacobucci, D. *Social Network Analysis: Methods and Applications* (Cambridge: Cambridge University Press, 1995).

Worrall, F., Reed, M. S., Warburton, J. and Burt, T. 'Carbon budget for a British peat catchment', *Science of the Total Environment*, Vol. 312, (2003) pp. 133–146.

Author Query Form

Journal: JAGE

Article: 044

Dear Author,
During the copy-editing of your paper, the following queries arose. Please respond to these by marking up your proofs with the necessary changes/additions. Please write your answers on the query sheet if there is insufficient space on the page proofs. Please write clearly and follow the conventions shown on the attached corrections sheet. If returning the proof by fax do not write too close to the paper's edge. Please remember that illegible mark-ups may delay publication.

Many thanks for your assistance.

Query reference	Query	Remarks
1	**Production Editor: Please supply dates.**	
2	**AU: Please provide JEL classification numbers**	
3	**AU: Please check 'In addition to the demands' or 'In addition to the Pressures'**	
4	**AU: Please provide location (city) in Kolb 1984**	
5	**AU: Please provide last accessed date**	
6	**AU: Please update Reed (in press), providing Vol. no. and page range**	
7	**AU: Please provide last accessed date.**	
8	**AU: Please provide last accessed date**	
9	**AU: Please approve the suggested short title running head.**	

MARKED PROOF

Please correct and return this set

Please use the proof correction marks shown below for all alterations and corrections. If you wish to return your proof by fax you should ensure that all amendments are written clearly in dark ink and are made well within the page margins.

Instruction to printer	*Textual mark*	*Marginal mark*
Leave unchanged	··· under matter to remain	Stet
Insert in text the matter indicated in the margin		New matter followed by
Delete	through matter to be deleted	
Delete and close up	through matter to be deleted	
Substitute character or substitute part of one or more word(s)	/ through letter or through word	New letter or new word
Change to italics	— under matter to be changed	
Change to capitals	≡ under matter to be changed	
Change to small capitals	= under matter to be changed	
Change to bold type	~ under matter to be changed	
Change to bold italic	≈ under matter to be changed	
Change to lower case	Encircle matter to be changed	
Change italic to upright type	(As above)	
Insert 'superior' character	/ through character or where required	under character e.g.
Insert 'inferior' character	(As above)	over character e.g.
Insert full stop	(As above)	
Insert comma	(As above)	
Insert single quotation marks	(As above)	and/or
Insert double quotation marks	(As above)	and/or
Insert hyphen	(As above)	
Start new paragraph		
No new paragraph		
Transpose		
Close up	linking letters	
Insert space between letters	between letters affected	
Insert space between words	between words affected	
Reduce space between letters	between letters affected	
Reduce space between words	between words affected	