Lessons for community-based management approaches to mine water pollution problems: a comparative study of four cases in northeast England

Abstract

This paper examines the role of community-based management (CBM) in dealing with the problem of mine water pollution (MWP) in four ex-pit sites in northeast England. The outcomes of CBM can be divided into two categories: ecological (environmental improvement); and social (community improvement). The ecological outcomes range from problem recognition to investigation and remediation; the social outcomes range from community awareness to participation and enhanced cooperation. Both kinds of outcome were completely achieved in only one site (Quaking Houses). In the other three sites, varying degrees of success were achieved in each category. The main lessons learned are two-fold: first, even if CBM does not achieve its ecological aims, it may nonetheless be valuable in achieving social outcomes; second, its chances of achieving either ecological or social outcomes are linked to the resources (human, technical, financial, experiential, structural, legitimacy, and network) that the community possesses.

Keywords: community-based management; mine water pollution; northeast England ex-pit sites

1. Introduction

Dealing with the problem of mine water pollution (MWP) in the UK is not high on the political agenda of either local or central government, yet it can be a major issue for small communities. One way of addressing the problem is for these communities to take the initiative by mobilising their own resources to generate a strategy for remediation. This study examines four sites of abandoned coal mines in northeast England where community-based management (CBM) approaches have been tried, with acclaimed success in one case (Quaking Houses), and with varying degrees of success in the other three cases. The objective of the study is to examine the ecological and social outcomes of their respective CBM approaches, and the human, technical, financial, experiential, structural, legitimacy, and network resources possessed by the communities, in order to determine what lessons can be learned for community attempts to deal with localised MWP.

In the next section, the nature and significance of the problem of mine water pollution (MWP) is explained. In section 3, the community-based management (CBM) approach is outlined. Section 4 briefly describes the four case studies - Quaking Houses; East Cramlington; Blackhall Mill; and Chopwell Wood – and identifies their respective degrees of success in achieving ecological and social outcomes. In section 5, the four cases are analysed for their possession of the seven resources required for successful CBM – human, technical, financial, experiential, structural, legitimacy, and network. Section 6 discusses the relationship between the two outcomes and the seven resources. Section 7 concludes the paper by affirming, first, that even when CBMs do not produce successful ecological outcomes, they may well deliver some worthwhile social gains; and second, that the more a community possesses of the seven resources, the more likely it is to achieve both ecological and social outcomes.

2. Mine water pollution (MWP)

Mine water pollution (MWP), which is caused by the egress of water from disused mine shafts and the run-off from pit heaps (spoil heap leachate), is a widespread environmental problem in the UK (Potter et al. 2004), threatening to contaminate aquifers (underground potable water supplies) and to pollute streams, rivers and coastlines (Jarvis and Younger 2000, De Nicola and Stapleton 2002). Indeed, Younger (1997) claims that in some areas of the UK, MWP is the single greatest cause of fresh water pollution, and that in the UK as a whole, approximately 400km of watercourses are degraded by abandoned coal mine discharges (Younger 2001). Moreover, these impacts may persist for centuries or even millennia (Younger 2007). Technical solutions to remediate MWP include measures which aim to neutralize acidity, increase oxygen, and remove iron and other significant pollutants present in the mine water, and a variety of remedial treatment options are now available. Before 1980, active treatment systems – defined as methods that require artificial energy and bio-chemical reagents - were the only proven technology, but since the 1980s, passive treatment systems – defined as methods (such as wetlands or reed-beds) that use only naturally available energy sources and require only intermittent maintenance – were introduced from the USA (Younger 2002).
However, implementing such technical solutions is fraught with difficulties. First, there are thousands of abandoned coal mines in the UK - in the northern coalfield alone it is estimated that over 20,000 pits have existed (Doyle 1997, p. 143), all of which are now closed, and an unknown number of them are discharging polluted waters. Which cases should be chosen for investigation/remediation, and on what criteria? Second, investigation and remediation treatment are very expensive, because they are resource-intensive and time-consuming processes. For example, even a modest wetland solution typically costs in excess of £100,000 to implement, not including prior investigation and subsequent maintenance and monitoring costs. Third, it is unclear in many cases precisely whom is legally liable to pay for investigation and remediation. The Water Resources Act (1991) effectively relieved the UK government and historic private mine owners of any legal liability for water pollution from mine workings abandoned before 1999, resulting in a significant number of so-called ‘orphan’ mine water problems across the UK for which no organization bears responsibility. Fourth, there may be logistical considerations that rule out the technically-preferred remediation method: for instance, wetlands and reed beds require large areas of land adjacent to the MWP discharge point, but such land may not be available. Fifth, community opposition to certain remedial systems may make them politically unfeasible. Given these difficulties, it is not surprising that relatively few cases of MWP have been remediated, and that many ‘known’ mine water discharges within the northeast region are left to flow unexamined and unabated.

3. Community-based management (CBM)

The idea of involving the community in decision-making about natural resources is not new. Indeed, for many developing countries, the traditional form of management of common resources such as fisheries was community-based (Crean 1999, Doulman 1993). More recently, there have been demands for other communities to be allowed to manage their own resources (Berkes 1989, Ostrom 1990, Wright et al 1994, Western and Wright 1994), and CBM has often been adopted when top-down state management has failed to protect those resources (Singleton 2000). Among the perceived advantages of CBM over state management are that communities have more extensive knowledge of their own resources (Carr 2004); that CBM drives environmental protection more effectively because it is more creative and flexible (Panigrahi 2006); that it empowers communities to participate in research (Wiber et al 2004); that it gives them the responsibility they need to look after themselves (Murdoch and Abram 1998); that it commits them to the objective of sustaining their resources (Maan et al 2006); and that it improves the prospects of justice and equity for local people (Ribot 2002).

This is not to deny that there have been many reservations expressed about the capacity of local communities to make wise decisions about their own natural resources. For example, Singleton (2000) noted that communities might not possess the informational, intellectual, social and material capital required to carry out investigations and implement solutions; Rowe and Frewer (2000) and Zanetelli and Knuth (2004) have pointed out that communities may not be willing to participate; and Barrow (2000) has argued that CBM may reflect and reinforce tensions and inequalities in communities. As we will see in our four cases of MWP, many of these issues were faced by the respective communities.

Nevertheless, the literature on MWP increasingly suggests that local public participation can play an important role in overcoming the obstacles to mine water remediation identified in section 2 (Younger 2007, Tremblay et al. 2004, Schmolke and Drennan 2002, Jarvis and Younger 2000). In the most authoritative analysis of CBMs dealing with watershed remediation, Steelman and Carmin (2002, p. 145) define CBM as “local groups working in partnership with agencies, local governments, or other organizations to address and manage environmental problems”. Steelman and Carmin (2002, pp. 147-149) state that CBMs aim at producing two kinds of outcomes: “substantive” and “social”. The substantive outcome is an environmental improvement, while the social outcome is a community improvement – including a deeper understanding of environmental issues; increased mutual trust; and greater clarity about the community’s values and preferences. Steelman and Carmin (2002, pp. 147-149) also state that CBMs depend on seven kinds of resources: human (leadership and volunteers); technical (scientific expertise); financial (funding); experiential (previous experience of community work); structural (organisational arrangements); legitimacy (local recognition as an appropriate body);

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1 This figure includes shallow workings as well as deep mines, and compares with the Coal Authority’s figure of 168,000 mine works recorded in the UK since records began, supplemented by many more unrecorded mines that are known to have existed (Doyle 1997).
and networks (social capital). This paper makes use of Steelman and Carmin’s analytical framework of two outcomes and seven resources as criteria for assessing the conditions of success or failure of CBM systems, building on previous work to develop such criteria (Singleton 1998). In section 4, the four cases are outlined and assessed for their production of ecological and social outcomes; in section 5, they are examined for their possession of the seven kinds of resources; and in section 6, the relationship between the outcomes and the resources in the cases is discussed.

4. The four case studies of MWP – Quaking Houses; East Cramlington; Blackhall Mill; and Chopwell Wood – and their CBM outcomes

The four cases are located in the North East region of England, which experienced a massive blow during the 1980s when the Conservative Government closed down the coal mining industry. In addition to the loss of their economic platform, the social structure of mining communities was undermined by the mine closures. Economic recovery since then has been particularly slow, and according to governmental statistics the North East of England still constitutes one of the most deprived areas in England decades after the mine closures (EID 2007, p.63).

Research into the cases was conducted simultaneously during the period 2004-2007. Information on the cases at Quaking Houses and Blackhall Mill was primarily collected from informal interviews with key players and local residents, and relevant literature/documentary evidence. The cases at East Cramlington and Chopwell were ongoing at the time of research and involved a more active participatory research role. This enabled participant/observation techniques to be employed throughout the development of the two cases, at numerous voluntary group and stakeholder meetings/events, and involved working alongside voluntary groups in the process of tackling the mine water problems. These observations were supplemented by informal semi-standardised interviews (Berg 2007, pp. 92-94) with key actors and local residents in which respondents were asked about their perspectives on the case events, mine water pollution, and the participatory process. The questions were framed to identify the pitfalls, benefits and barriers associated with a participatory approach to mine water remediation. The interview data also provided useful insights into the historical background and events/meetings which were not observed, in addition to providing confirmation of, or alternative perspectives to, observations made during participatory research. A total of 19 interviews were conducted, 16 formal stakeholder meetings attended/observed and 17 formal community/voluntary group meetings attended/observed. Additional participatory research was conducted at numerous case-relevant events and informal meetings. Case relevant information was also derived from documentary analysis of academic literature and technical reports.

4.1 Quaking Houses
Quaking Houses is a small village situated in northwest Durham near the town of Stanley, 12 miles south of Newcastle upon Tyne. Like many pit villages, it had developed around the coal seams exposed by sinking pits. The loss of the mine, therefore had a devastating impact on this relatively isolated community, compounded by Durham County Council’s attempt to classify the village as Category D - warranting no further investment. Although the residents were successful in their fight against this classification, the neighbouring communities of Annfield Plain and Stanley remain in the 10% most deprived areas nationally, while South Moor falls within the 20% most deprived areas in England (Durham 2007).

Quaking Houses provides an outstanding example of the success of using a CBM approach in dealing with MWP. In 1995, persistent pressure exerted on the Environment Agency (EA) by community residents led to a treatment feasibility study of the discharge of acidic, ferruginous, and aluminium-rich water into Stanley Burn near the village (Younger et al. 1997). The community group, Quaking Houses Environmental Trust (QHET), in collaboration with scientists from Newcastle University (NU), carried out a pilot scheme of wetland remediation treatment, the success of which led to its obtaining funding from charities, and a full-scale wetland mine water treatment scheme was constructed in 1997, which completely restored the healthy stream ecosystem at Stanley Burn, thereby achieving a 100% successful ecological outcome. Its social outcome was also very successful in that CBM increased the

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2 Though the term ‘ecological’ is substituted for Steelman and Carmin’s term ‘substantive’ to refer to ecological improvement
community’s understanding of the environmental problem by residents working alongside scientists in
data collection, environmental impact assessments, and day-to-day monitoring and maintenance of the
treatment scheme. Also, the project improved the community’s degree of mutual trust and collective
value clarity through successful collaboration, the sourcing of local materials to construct the remedial
system, and physical participation in the construction of the wetland, which developed into a social
community event (Kemp and Griffiths 1999).

4.2 East Cramlington
East Cramlington is located in the southeast corner of Northumberland, ten miles inland from the North
Sea, and mid-way between Blyth and Newcastle upon Tyne. Unlike at Quaking Houses, mine closures
in communities around East Cramlington (in the Blyth Valley) were accompanied by many new
housing and industrial developments in the local vicinity, which contributed to the semi-urban
character of the area. However despite these regeneration and development initiatives, the 10% most
deprived wards in Northumberland are situated in the Blyth Valley and Wansbeck districts, and Blyth
Valley is placed within the 1% most deprived wards nationally in the employment domain

In the 1970s, following the closure of the East Cramlington colliery in 1969, Northumberland County
Council (NCC) undertook reclamation and landscaping work, and the site was designated as a country
park in 1977, and has been used for recreation by the general public ever since. However, when signs
of MWP from spoil leachate on the then ‘orphan’ site became visible during the 1990s, a local
voluntary environmental group, Friends of Holywell Dene (FoHWD), established as a result of a
suggestion from Blyth Valley Council to deal with the environmental decay of a nearby dene, became
involved. With the help of funding from PURE (Planning for Urban River Environment - an EU
Regional Development Fund INTEREG IIIB project) and technical support from Newcastle University
(NU) scientists, two members of FoHWD (one of whom had technical expertise) carried out water
quality tests in and around the MWP site over a period of two years (2002-2004), and engaged in a
partnership approach with NCC and NU to investigate remedial options to tackle the MWP.

The ecological outcome of FoHWD’s CBM initiative was, however, limited. There was no
environmental improvement, since no remedial treatment scheme was put into place. However,
FoHWD did provide a report for NCC on a technical investigation of the site, together with an outline
of the remedial options. The social outcome was more successful, in that FoHWD succeeded in
involving the whole community, as well as outside volunteers, in addressing the MWP problem. It did
so by organising awareness-raising events, community courses, and projects to enhance the amenity
value of the site (e.g., improving access and providing picnic facilities), all of which served to stake a
public claim to the area. However, the partnership between FoHWD, NCC and NU fractured because
the group were dissatisfied by the technical report; by the ecological outcome; and by the way they felt
they had been used during the partnership to fund the site investigation and remedial report for a local
developer to build a golf course entailing dumping 500,000 tonnes of inert waste during its
construction.

4.3 Blackhall Mill
Blackhall Mill is an ex-pit village located in the Derwent Valley, 15 miles from the North Sea coast,
and 10 miles southwest of Newcastle upon Tyne. Unlike Quaking Houses and East Cramlington,
Blackhall Mill has become part of the commuter belt attracting incomers from the urban areas, a
development reflected by higher property prices.

Problems with MWP first emerged as a public issue at Blackhall Mill following the spring floods
affecting the Derwent River in 2000. A nearby tributary known as Milkwell Burn, which joins the
Derwent River at Blackhall Mill, had become visibly polluted with iron and aluminium precipitate.
Local residents were concerned about potential health risks, and in an attempt to tackle the MWP,
several residents from the local community arranged a meeting to discuss the problem. This led to the
formation of a local community group - the Derwent Valley Environmental Trust (DVET) - with the
primary objective of addressing the MWP in the Milkwell Burn.

However, the ecological outcome of DVET’s CBM effort was negligible. Obtaining technical advice
from NU which suggested a remedial solution of an aerobic wetland, DVET’s internal divisions
prevented any investigation into the suitability of this proposed remedy, let alone its implementation.
The social outcome was little better, since, because of its internal conflict, DVET was officially
disbanded in 2003. Its members felt disillusioned: the experience of community participation had not been effective or fulfilling. Moreover, the problems that emerged in the group spilled out into the wider community at Blackhall Mill, thereby exacerbating the level of social mistrust that already existed.

4.4 Chopwell Wood

The fourth case study is the ex-pit village of Chopwell Wood, which is located close to Blackhall Mill. Following mine closure, the village of Chopwell was amongst those classified as 'Category D' (warranting no further investment) by Durham County Council. Although planners were forced to drop this classification following vociferous local opposition, there has been little investment in Chopwell or the surrounding villages in the decades since mine closure. Although, like Blackhall Mill, Chopwell has become part of the commuter belt, it remains within the most 20% deprived districts nationally as measured by the English ID 2007 (Gateshead 2007, p.14).

During the late 1990s, waters discharging into Chopwell Wood from the neighbouring Gareshfield golf course showed a visible deterioration in quality, with evidence of pollution apparent in the watercourse. This problem was exacerbated by a period of heavy rain in 2000 which caused increased volumes of polluted waters to discharge into Chopwell Wood. Anxieties about the water quality were expressed by residents and discussed at a meeting of a local voluntary community-based group - Friends of Chopwell Wood (FoCW) – which was formed in November 1991 to fight against small woodland areas being sold off and privatised or clear-felled for the land to be used for commercial purposes.

The ecological outcome of FoCW’s CBM work was limited. It organised volunteers to clean the site; to install log cascades in the stream to aerate the water; and to place charcoal filters to filter the precipitates out of the water. These actions did not, however, improve the water quality, though they did enhance the visual appearance of the site, normalising the MWP problem. Also, FoCW met with officials from Gareshfield Golf Club and obtained new information about the problem, as well as permission to access club land to carry out water quality assessments. But no remedial solution was implemented, because NU was unable to provide technical advice except on a fully-funded basis, the money for which was not forthcoming. The social outcome was much more successful. FoCW members worked alongside NU scientists in providing local knowledge and historical information on the MWP site, in turn gaining considerable environmental understanding of the complexities of the MWP issue. Another positive social outcome was FoCW’s successful application to the Local Heritage Fund to construct a trail round Chopwell Wood, in which the MWP was highlighted as an element of local and environmental education, involving the wider community and the general public. Also, contact with Gareshfield Golf Club enabled FoCW to develop a good working relationship on other issues (e.g., water drainage), thereby breaking down barriers that had previously existed between them. On the other hand, FoCW’s relationship with NU deteriorated because of NU’s changing advice on remediation.

5. Comparative assessment of the resources of the four cases of CBM of MWP

This section presents in tabular form a comparative assessment of the extent to which the four communities possessed the seven kinds of resources required for success of CBM of MWP.

Table 5.1: Human Resources

<table>
<thead>
<tr>
<th>Human Resources (leadership and volunteers)</th>
<th>Quaking Houses</th>
<th>East Cramlington</th>
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<tbody>
<tr>
<td>The community group, the Quaking Houses Environmental Trust (QHET), initially had only a small number of active local participants, but they pulled in the wider community through project-related events, demonstrating strong leadership qualities</td>
<td>FoHW provided leadership of the PURE Seaton Valley (PSV) project steering committee, and had about a dozen active volunteers (out of about 60 members), though only one member attended the steering committee meetings. <em>“The ongoing bit is the biggest problem with volunteers. Creating something, making a visible result, then they are really keen. They are not so keen on year to year maintenance”</em> (FoHW member Interview 9.6.2005). This dependence on one key individual proved to be problematic when a combination of personal issues and disagreements about the remedial process resulted in this participant withdrawing from the partnership process, and no replacement from</td>
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the group came forward. With the link between the voluntary group and other participants effectively removed, the PSV partnership disintegrated.

**Blackhall Mill**

DVET initially constituted a group of around 10 members, but issues of leadership, democratic decision-making, and perceived self-interest undermined the group, and led to its dissolution. Also, "it is very difficult to sustain momentum when people involved already have full time jobs and are trying to keep a large project going voluntarily in their limited spare time" (ex-DVET member. Personal communication 11.8.04)

**Chopwell Wood**

Some FoCW members showed considerable leadership qualities (the project manager played a key leadership role) and there were many volunteers (in 2006, there were 158 subscribed members). However, FoCW was a 'hands on’ or DIY group, keener to carry out the remedial work itself than to generate the political momentum needed to have the problem solved by other organisations.

Only at Quaking Houses was the community group sufficiently determined and resilient to fully withstand the pressures of organising a sustained community response to the MWP problem. However, at both East Cramlington and Chopwell Wood, the community groups demonstrated considerable skill in mobilising their respective communities to address their MWP issues. By contrast, at Blackhall Mill, the community group was weak and fatally divided by internal conflict.

**Table 5.2: Technical Resources**

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<th>Technical Resources (scientific expertise)</th>
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<tr>
<td><strong>Quaking Houses</strong></td>
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<tr>
<td>NU’s expertise was sought and accepted from the beginning, and the community participated in technical research under the direction of NU, which gave the project enthusiastic public support. So, whilst the wetland project was based on scientific and technical understanding, active community residents were involved in various stages of the wetland project, contributing their understanding of the issues and local knowledge about the mine water problem.</td>
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<tr>
<td><strong>East Cramlington</strong></td>
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<tr>
<td>NU expertise produced a technical report on its investigation of the site. However, there were intractable technical disputes between the proposed developer (supported by NCC), the scientists, and FoHWD’s two technical experts. NCC disparaged the technical capacity of the FoHWD’s ‘experts’, and failed to exchange with NU some technical data that it held on the site. NU said that FoHWD’s remedial solution (to install a reed bed) was premature. Relations between FoHWD and NU cooled to the point that the scientists’ final report on their investigative research into MWP on the site was not even sent to FoHWD, and the community group turned its attention away from remediation to improving the recreational amenities at the site.</td>
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<tr>
<td><strong>Blackhall Mill</strong></td>
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<tr>
<td>DVET contacted NU for technical advice. Although NU was not overly enthusiastic about giving advice, it suggested a remedial scheme (an aerobic wetland). However, DVET’s internal row over a member’s proposal to sell land adjacent to the MWP for this purpose, undermined the group’s support for the scheme</td>
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<tr>
<td><strong>Chopwell Wood</strong></td>
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<tr>
<td>FoCW asked NU for technical advice, though NU was cautious. Subsequently, however, FoCW clashed with NU over both the source of the MWP, and the treatment required to remove it. On the source, some members believed the pollution was caused either by farm pesticide run-off or golf course septic tank discharge, rather than MWP. On treatment, FoCW’s own remediation plans were judged by NU to be both technically and legally flawed. Also, NU expressed concern about the competence of public volunteers wishing to participate in the technically challenging problems associated with mine water pollution. For its part, FoCW judged NU’s (confusingly contradictory) proposals unacceptable for environmental and/or cost reasons. These conflicts of opinion, which were never resolved, reflected different views of the role of technical expertise: FoCW’s project manager was hoping for technical advice</td>
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3 The remedial advice offered by NU to the group varied from low key measures which might be implemented by the group, to a full-scale scientific intervention which would depend on technical involvement and significant funding.
that would enable the voluntary group to physically participate in appropriate actions to improve the situation; but NU held that offering technical advice on this basis was problematic, because of legal, economic and socio-political implications.

Only at Quaking Houses was there agreement on technical issues between the community group and the scientists. At both East Cramlington and Chopwell Wood, there were differences of opinion between the community groups and the scientists over the remedy for MWP, while at Blackhall Mill, the technical issues were overshadowed by tension within the community group.

Table 5.3 Financial Resources

<table>
<thead>
<tr>
<th>Location</th>
<th>Financial Resources (funding)</th>
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<tr>
<td>Quaking Houses</td>
<td>The collaboration of a local community and NU mine water specialists provided an attractive proposition for prospective funding bodies and helped secure the funding necessary to implement a scientific remedial intervention</td>
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<tr>
<td>East Cramlington</td>
<td>PURE provided some funding for investigation, but no funding was obtained for treatment, and NCC said they had no funding available. FoHWD clashed with NCC over the PURE funding for investigatory work, and when the ‘Partnership’ was dissolved, NCC was left to pick up the bill for the costs</td>
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<tr>
<td>Blackhall Mill</td>
<td>DVET was unable to attract support from outside stakeholders such as the EA who were potential financiers of remediation, and its application for government funding through the Single Regeneration Budget (SRB) in partnership with a local agency also failed. “it’s difficult knowing about relevant funding bodies. I had a list of about 40 but it was all word of mouth” (ex-DVET member and local resident Interview 20.7.2004)</td>
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<tr>
<td>Chopwell Wood</td>
<td>“The problem is complex and it will be expensive to implement a solution” (FoCW Sec. FoCW Meeting AGM.May 2006). Although FoCW raised funding for its previous environmental work, it did not obtain funding for MWP remedial treatment, though NU footed the bill for some limited investigatory work</td>
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Only Quaking Houses managed to obtain the necessary funding for both investigatory work and remediation treatment. At East Cramlington and Chopwell Wood, some funding for investigation was obtained, but at Blackhall Mill, no funding at all was obtained.

Table 5.4 Experiential Resources

<table>
<thead>
<tr>
<th>Location</th>
<th>Experiential Resources (previous experience of community work)</th>
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<tr>
<td>Quaking Houses</td>
<td>QHET was formed by the villagers in 1991 to undertake a ‘Village Appraisal’ to improve the environment (Younger 2007). Its first successes were to reclaim and landscape waste land on which the Billy Pit had stood, and to raise funds to create a Community Garden. QHET then turned to the problem of MWP in Stanley Burn, and enlisted the help of Professor Paul Younger, who suggested they take on the task of remediation themselves</td>
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<tr>
<td>East Cramlington</td>
<td>On the suggestion of Blyth Valley Council, FoHWD was formed in 1999 to clean up a local dene. It carried out extensive environmental improvements under the PURE Seaton Valley project. “we proved ourselves through doing a lot of voluntary activities ” (FoHWD member Interview 14.6.2005). According to one FoHWD member (interview 07/07/05), “From Holywell to the coast it has been very much improved as far as natural beauty [is concerned]”</td>
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<tr>
<td>Blackhall Mill</td>
<td>DVET was formed to deal with the MWP problem, primarily as a means to meet charitable funding requirements, so had no previous experience of community work. “the pollution was noticed about six years ago and a community action group set up to tackle the problem” (ex-DVET member and local resident Interview 20.7.2004)</td>
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<tr>
<td>Chopwell Wood</td>
<td>FoCW was formed in 1991 to campaign for woodland parks, in which it was very successful. FoCW held monthly meetings, and organised many activities, projects and events to conserve, improve and enhance the local environment</td>
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around Chopwell Wood. However, by contrast to this positive experience of community work, one NU scientist was wary of participating with FoCW, because of his previous negative experience of working with community groups on MWP problems.

In three of the four cases, the community group had carried out considerable work on environmental projects to improve the quality of local amenities in their respective localities. Only Blackhall Mill’s community group had no such previous experience.

**Table 5.5 Structural Resources**

<table>
<thead>
<tr>
<th>Structural Resources (organisational arrangements)</th>
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<tr>
<td><strong>Quaking Houses</strong></td>
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<td><strong>East Cramlington</strong></td>
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<td><strong>Blackhall Mill</strong></td>
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<td><strong>Chopwell Wood</strong></td>
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All of the four cases were ‘orphan’ sites, so there was no organisational structure already in place for dealing with MWP that the community groups could simply slot into, but in the three cases where the groups had already developed their own structures for dealing with other environmental issues (all except Blackhall Mill), they had an advantage. However, only at Quaking Houses did the community group prove itself up to the task of mobilising the necessary resources to accomplish the task of remediation.

**Table 5.6 Legitimacy Resources**

<table>
<thead>
<tr>
<th>Legitimacy Resources (local recognition as an appropriate body)</th>
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<td><strong>Quaking Houses</strong></td>
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<td><strong>East Cramlington</strong></td>
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<td><strong>Blackhall Mill</strong></td>
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FoCW’s work on MWP was quite low down the public agenda, and more of a concern to the voluntary group than to the residents in and around Chopwell. Only at Blackhall Mill did the community group lack recognition as a legitimate body representing the interests of local residents, though there was a challenge to its authority in East Cramlington, while at Chopwell Wood, the comparatively low salience of the MWP problem weakened its political clout.

Table 5.7 Network Resources

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<thead>
<tr>
<th>Network Resources (social capital)</th>
<th>Quaking Houses</th>
<th>East Cramlington</th>
<th>Blackhall Mill</th>
<th>Chopwell Wood</th>
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<tr>
<td>Quaking Houses</td>
<td>Very strong relationships were formed within the group (QHET) and within the community, and also between the group and NU.</td>
<td>FoHWD was a close-knit group, though there were reports of internal disagreements over the technical investigation, and it was rather hierarchically organised. FoHWD initially forged quite good relations with most of its partners on the PSV project, including the EA, NU, BVC, NTC, and Northumbrian Water, but it became impatient at the slow pace of investigation by NU, and there was a lack of transparency in NCC’s dealings with FoHWD.</td>
<td>DVET members were not in harmony with each other. There was a conflict of interest over land selling proposed by one member, and there was tension over DVET’s style of decision-making (democratic versus cronyist). “volunteer groups are set up but don’t always engage with the community” (ex-DVET member. Interview 13.9.04). This disharmony reflected splits within the community: “We talked about getting outside representatives included...but there is a divide between the two sides of the village, separate pubs and concerns” (ex-DVET member Interview 20.7.2004). However, DVET did manage to work with NU.</td>
<td>The considerable cohesion which had already been achieved within FoCW, as well as with outside groups such as the Forestry Commission, was carried through to the MWP issue. But FoCW’s relationship with the EA was not fruitful, and its relationship with NU deteriorated when NU insisted on a fully-funded technical investigation, after having earlier suggested a remedial solution that was low-cost and compatible with volunteer involvement.</td>
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In three cases (all except Blackhall Mill), the community groups forged very close relations within their memberships, and quite good relationships with outside organisations, though in both East Cramlington and Chopwell Wood, tensions developed with some of these outside organisations. In Blackhall Mill, however, internal dissension within both the community group and the community itself undermined links with outside organisations.

6. Discussion

This section discusses the findings of sections 4 and 5. The first finding is that there is a clear rank order in the outcomes, ecological and social, of CBM in the four cases. By far the most successful in ecological outcomes was the CBM in Quaking Houses; the next most successful was that in East Cramlington; followed closely by that of Chopwell Wood; but very far behind was Blackhall Mill’s CBM, with virtually no element of ecological success whatsoever. In terms of social outcomes, the rank order is equally clear. Again, the most successful was the CBM in Quaking Houses (though by a lesser margin than in ecological outcomes); and the next most successful was the CBM in East Cramlington; followed closely by that in Chopwell Wood; with Blackhall Mill’s CBM again very far behind, having a negative impact on local community life.

Another finding is that there is a strong consistency between the successful/ unsuccessful outcomes achieved by a given CBM and its high/low quantity and quality of resources. This consistency suggests that communities which spend time and effort building up appropriate resources improve their chances of successful ecological and social outcomes. Steelman and Carmin do not rank order the seven resources, but we have found that the most important resource for both ecological and social outcomes

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4 One FoHWD member (interview 07/07/05) claimed that it was “a little bit top down – not big on democracy…Issues are identified and driven by the chair – it is a bit too dominant in that respect”.

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is human resources, because without leadership and volunteers, no CBM is viable, but with these human resources, most of the remaining resources may be obtained over time. Linked to human resources are experiential, legitimacy, and network resources, which can play a very important role in achieving both ecological and (particularly) social outcomes. However, technical resources, while essential for ecological outcomes (especially investigation and remediation) are not vital for the achievement of many social objectives; indeed, conflict over scientific expertise may actually frustrate some social outcomes. Similarly, while financial resources are necessary for expensive kinds of scientific investigation and remediation, many social outcomes (and even some do-it-yourself remediation measures) do not depend on large-scale funding. As for structural resources, if they already exist, they make the achievement of ecological and (to some extent) social outcomes much easier, but structures can be developed reasonably readily where there is a strong human resource base.

A further finding is that despite the fact that only the CBM in Quaking Houses succeeded in implementing a full-scale remediation system that solved the MWP problem, in two of the other three cases (East Cramlington and Chopwell Wood) CBM managed to achieve very favourable outcomes, especially social outcomes, but also some ecological outcomes. This is important because it indicates that CBM may bring valuable benefits to a community which falls short of cleaning up the MWP. Indeed, it could be argued that in the case of Chopwell Wood, the decision not to clean up the MWP was itself a positive community decision, rather than, as in the case of Blackhall Mill, a negative outcome of community failure. Living with MWP – even weaving it into the fabric of community life by featuring it in a Heritage Trail, as at Chopwell Wood – can be a rational decision of a self-determining neighbourhood. Local public participants may thus bring an unexpected perspective in evaluating the costs and benefits of remediation, which, as in the case of Chopwell Wood, may not favour funding a scientific intervention.

Following this line of argument, the significance of the CBM approach in Blackhall Mill was not so much that it failed to produce a remediation treatment scheme for its MWP, than that its attempt to do so exposed and reinforced divisions within the community. Similarly, it could be argued that the significance of the CBM approach in Quaking Houses was not so much that it succeeded in producing a remediation treatment scheme for its MWP (for which it has been celebrated), but that in its attempt to do so, it exemplified and reinforced the bonds which held the community together and reinforced its unique identity. On this reading, the social outcome may be more important than the ecological outcome: a community may live better with MWP than with dissension.\(^5\) Interestingly, therefore, MWP may be as much of a mental construction as is the social fabric.

7. Conclusion

In this paper, an assessment has been made of the outcomes and resources of four cases of community-based management (CBM) of the mine water pollution (MWP) problem in northeast England. The findings are that in Quaking Houses, CBM served to remove the MWP and in doing so, enhanced community identity; in East Cramlington and in Chopwell Wood, CBM did not remove the MWP, but in coming to terms with MWP, it enhanced community identity; in Blackhall Mill, CBM did not remove the MWP, and in attempting to do so, it damaged community identity. The main lessons to be learned from this analysis are that even if CBM does not result in the removal of the MWP, it may produce important community benefits, and that its chances of doing so are linked to its resources. If the community already possesses many of the resources listed in section 5, particularly the human, experiential, legitimacy and network resources, then it is likely that CBM will reach a high level of success in ecological and (especially) social outcomes. However, if the community’s holdings of these resources are limited, then CBM could fail to address MWP and even damage the fabric of community life.

References


\(^5\) Significantly, one tension between FoHWD and NCC occurred over the role of community involvement in MWP remediation. For NCC, public involvement was not the central issue; its priority was to get the technical aspects of remediation right. But the FoHWD chair (interview 23/9/05) stated that “PURE was about participation and water quality, the idea was to get as many people involved in finding a method of solving the problem at East Cramlington”


