

Spoil heap leachate remediation: some social considerations

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Abstract

Legislation and regulations in relation to waters from abandoned deep mines is aimed at protecting the environment from problems associated with present and future mining activities. Problems related to the remediation of waste waters from abandoned coal mines in the UK are adopted by the Coal Authority. Water courses polluted from abandoned coal mine discharges are prioritised using Environmental Impact Assessment (EIA) carried out by the regulator – in England this is the Environment Agency. EIA includes social considerations. Remediation schemes are ranked, and dealt with accordingly, by agreement with the Coal Authority under a Memorandum of Understanding. The water draining from spoil heaps, however, generally remains the responsibility of current landowners; primarily the Local Authorities and Government Development Agencies. As such they are generally excluded from the Coal Authority ranking and treatment programme. There is no national strategy to deal with spoil heap drainage as such. The impact of pollution from spoil heaps has specific characteristics, and its impact is often more acutely perceived at a local level. Spoil heaps are commonly considered as problematic brown-field sites and policies addressing these problems encourage private re-development, favouring hard end use. Reclamation of spoil heap land may introduce further environmental problems, and consideration should be given to alternative views such as the contribution the spoil heap can make to landscape and heritage, adding historic understanding to local identity, and the potential to accentuate biodiversity as a relatively unique ecosystem. The regulatory and locally immediate qualities of these problems lead to ideas of the potential of long term solutions afforded by their being considered in tandem, and contribute to their making remediation of spoil heap drainage suitable for public participation and community involvement. This paper examines ways of engaging local resident communities as participatory stakeholders in environmental remediation works. It further explores theoretical and practical issues involved when contemplating or dealing with community and public participation.

Mine water and colliery spoil

Polluted mine water associated with abandoned mines may be broadly categorised as either mine water related to sub-surface cavities of deep mines, or alternatively water leaching or draining from mine waste or spoil heaps discarded on land. While mine water discharges from sub-surface coal mines are generally handled by the Coal Authority (CA) the situation is less clear for abandoned metal mines and spoil heap drainage.

Spoil heaps are a common feature in many areas with a mining history, although now relatively uncommon in the North East of England. Typically located close to the mined area, on land that was previously productive wildlife habitat or farmland, the disposal of spoil and mine waste frequently results in a barren unproductive area and may have a profound effect on the local ecosystem. Spoil heaps may be chemically unstable and mine spoil typically contains high levels of pyrite – the chief perpetrator in the production of acidic mine water, as well as a range of other metals which may leach from waste rock contacting the acidic drainage. In general, spoil heap drainage is more acidic than deep mine drainage promoting dissolution of a variety of secondary phase toxic metal species. The flow rate and composition of resulting drainage is often variable, dependant on rainfall or land/spoil heap formation, and disturbance introducing oxygen. Remedial measures may include consideration of ‘source’ control such as capping, covering, treating, isolation or removal of spoil or mine waste, or a variety of established low maintenance mine water treatment methods such as constructed wetlands, Rapid Alkalinity Producing Systems (RAPS), Permeable Reactive Barriers (PRB’s) or Anoxic Limestone Drains (ALD’s).

The spoil heap issues and resulting drainage may come under ‘contaminated land legislation’ in addition to relevant water regulations, and theoretically there may be legal redress with current landowners, unable to claim exemption via the legal loophole relating to abandoned mines under S.89(3) Water Resources Act 1991. The responsibility for polluted spoil heap drainage falls to the current land owner. Typically, although by no means exclusively, it is the landowner who has responsibility for the spoil heap area (often derelict or contaminated land with limited value) rather than the CA. This excludes spoil heap and associated drainage from the national CA rolling mine water remediation programme leaving a double local environmental problem, comprising both the derelict or contaminated land or mine spoil and issues with

associated mine water pollution. This tends to have a significant impact on both the local environment and local community. The current authors believe this leaves the issue of spoil heap as one well suited for local community involvement, thereby engaging with the principles underpinning sustainable development related to balancing social, human and environmental development.

“The ‘environment’ is where we all live, and ‘development’ is what we all do in attempting to improve our lot within that abode”

Recognising the profound changes that have undergone in the “relationship between the human world and the planet that sustains it”, in 1983 the United Nations proposed strategies for sustainable development – examining ways of improving human well-being without threatening the environment: addressing potential conflicts between the interests of the environment and economic development. The United Nations Commission, chaired by Gro Harlem Brundtland, published the report ‘Our Common Future’ in 1987 (Brundtland 1987) and led to the Earth ‘Summits’ of 1992 and 2002 – UN Conference on Environment and Development (UNCED, Rio 1992), and the World Summit on Sustainable development (WSSD, Johannesburg 2002), and a comprehensive programme of citizen participation through Agenda 21. The concept of sustainable development has gained popularity at the international level and filtered down to a local level, although the term has multiple layers of meaning and is often misunderstood or applied as a selling point for a policy or product.

The fundamental principle of sustainable development is to improve human and environmental well being, without compromising the needs of future generations: focusing on finding the balance among corporations, states and communities, and between rich and poor. Meeting the mid ground between eco-centric and anthropocentric views, the concept of sustainable development incorporates environmental considerations with the need to consider social as well as economic development.

Economic and environmental development is often prioritised due to financial incentives; however the social dimension of development is usually neglected and rarely integrated into environmental and economic decision making processes. ‘Capital’ can be represented in more than just financial terms, but may also be considered in terms of:

- natural capital – relating to the natural environment, ecosystems and clean air, soil and water;

- human capital – relating to knowledge, skills, health and cultural heritage;
- social capital – which concerns social practices and the development of groups and communities
(e.g. MMSD 2002, Roteberg 2001).

To achieve the ideal of sustainable development therefore, equal consideration must be given to gain in terms of human/social capital, promoting social development that is both sustainable and beneficial to future generations. Although mining, in its time, has contributed massively to national economic development, it has fallen behind in terms of environmental and social development, particularly in relation to the ex-mining communities in North East England who now live in some of the poorest electoral wards in Britain. Indices of Deprivation for every ward in England are measured through combination of several indicators which cover a range of domains (income, employment, health deprivation and disability, education skills and training, housing and geographical access to services) into a single deprivation score for each area.

Current indices point to the fact that 36% of the population of the North East – i.e. 930,000 people – now live in wards ranked in the top 10% most deprived in England, and four of the top ten most deprived areas in England are in the North East. Of this one third of the region's most deprived wards are to be found in former coalfield communities (ODPM *Creating sustainable communities*).

Participation

Public participation and inclusion in the decision making process has frequently been emphasized as the means to move towards the ideal of sustainable development, evident by increasing governmental rhetoric as well as various international, national and local policy documents which call for increasing public participation and local involvement in environmental decision making. Agenda 21 was endorsed by over one hundred Heads of Government at the UN Conference on Environment and Development. Chapter 28 called for Local Authority to develop environmental programmes (LA21's) which attempt to combine environmental considerations with issues of social justice.

Social scientists have for many decades been suggesting that public participation is essential to a democratic society as well as intrinsically valuable for the individual. The theoretical social benefits arising from public participation in environmental issues may include:

- Promotion of democracy and deliberative participation -rising to the challenge of promoting renewed democratisation of public space and institutions set by Habermas (1989), and active citizenship and social inclusion.
- Promotion of science.
- Promotion of social learning - developing mutual understanding through discussion and deliberation.
- Promotion of sustainable development engaging with principles of citizenship, environmental justice.
- Increase in level of care for the local environment.
- Community participation in particular may contribute to community building and increased feeling of community spirit. [Younger (2004) describes how a community involvement during remediation of mine water pollution led to the formation of a robust community organisation that went on to tackle other social and environmental problems.]

EIA is intended to identify and predict impacts on people's health and well-being, and to interpret and communicate such impacts. In most engineering or industrial projects or procedures with environmental implications public support is a statutory requirement as part of any EIA. Benefits for environmental decision makers of including the public in the decision making process can be measured in terms of the trust which is built with them. Transparency in the decision making process enhances public confidence. Furthermore developers, policy and decision makers who perform extensive consultation process are generally perceived as being more professional and legitimate bodies (Bloomfield *et al.*, 2000). The participatory approach provides a means to further understanding of social impact. It introduces lay-person stakeholder knowledge, local knowledge, common sense, sensory experience or thoughtful speculation long term understanding of the particulars of an area (Corburn 2003). Issues can be identified which assist in the assessment of the site, such as specific risks or hot spots, or potential degradation from some forms of use (the elucidation of 'pathways and receptor' as defined by current UK risk assessment procedure), which may in turn lead to alternatives proposals for treatment or development. Local involvement can also ensure acquisition of resources such as finances and local sourcing of materials. Volunteers

from the community can assist the long term maintenance of a scheme through monitoring and the identification of future problems. People involved in the decision making process are more likely to assume these responsibilities.

Arnstein's Ladder (measurement of qualities of participation)

EIA relates to ways in which the general public are involved in environmental decision making as stakeholders. On the other hand there are various factors which contribute to public apathy towards political participation. In the North East England after mass colliery closures the general public, and mining communities in particular, have rightly felt that they have had no influence in the decision making processes. Consultation is seen as an unconvincing prop to state paternalism or technocracy. Citizens see no benefit or incentive from giving up their free time for 'yet another' consultation exercise.

Many of the potential social benefits of participation may not be realised unless participation is meaningful and extends beyond information or consultation. Arnstein (1969) presented the idea of public participation and sharing planning power with the image of a ladder. *"The idea of citizen participation is a little like eating spinach: no one is against it in principle because it is good for you. Participation of the governed in their government is, in theory, the cornerstone of democracy - a revered idea that is vigorously applauded by virtually everyone. The applause is reduced to polite hand claps, however, when this principle is advocated by the have-not blacks, Mexican Americans, Puerto Ricans, Indians, Eskimos and whites. And when the have-nots define participation as redistribution of power, the American consensus on the fundamental principle explodes into many shades of outright racial, ethnic, ideological, and political opposition"*.

Partnership is located at a high level on the ladder. In her ladder analogy the rungs represent an ascending ordering of meaningful public interaction with planners. The ladder has eight rungs. Each rung represents a degree of citizen influence upon planning and policies from 'manipulation' to 'citizen control'. Higher up the ladder there is more meaningful participation and power sharing. The lowest rungs represent 'manipulation' and 'therapy' as non-participatory public-relations exercises. 'Informing' is the first step to legitimate participation,

nevertheless remaining tokenistic as the flow of information is one way. 'Consulting' and 'placating' are the next rungs, planning authorities attempt to fulfil their participation responsibilities while still maintaining the dominant power structure. The top rungs represent the means by which participants are able to establish a partnership and have the power to share decision-making responsibilities and finally to influence and control outcomes. The sixth highest of the eight rungs is 'Partnership', through which power is distributed, through negotiation, between citizens and power holders – and planning and decision-making responsibilities are shared e.g. through joint committees. The two highest rungs are 'delegated power' and finally 'citizen control'. The dynamics of environmental decision making have over recent decades developed from a cost-centred, science-based, approach to risk based decisions. More recently developments in the environmental decision making arena, have aimed towards increasing social inclusion and sustainable environmental decisions through the community dimension (Pollard *et al.*, 2004). However in practice constraints on time and resources, and development led-decisions, increase pressure to reach decisions quickly with little consideration of social impact and public involvement.

Currently the typical environmental decision making process related to contaminated land within the UK will follow the following steps: identification of issues; raise issues onto an agenda; desk study; site assessment (physical/visible characteristics ascertained from visits); sampling strategy; chemical analysis; risk assessment (current regulations recommend risk assessment which is related to end use of site: alternative end use will require different risk assessment); remediation; monitoring; maintenance (Petts *et al.*, 1997). The first step in a typical environmental decision making process involves the identification of an issue and getting the issue onto the political agenda or bringing it to the public and competent authority's attention. Environmental issues usually come to public attention through proposal for development or change of use, or due to perceived risk or concern about the current state of the environment. The environmental issues that will be privileged tend to be those involving land use change or development associated with economic value, and are placed on the agenda during the planning procedure. Levels and timing of public consultation and participation may vary considerably between different developers (or private consultants) despite recommended practice advocating early participation with all interested parties. When environmental issues, risks or concerns are perceived by members of the public the procedure for getting the issue onto the agenda is far less clear

and relies on key individuals devoting their free time, energy and commitment.

The desk study is a system of collating all information relevant to site history, previous use, ecology, previous research and knowledge and as such is an obvious candidate for considering local community involvement. As well as gathering information this provides an early opportunity to inform local residents of any site relevant plans, proposed development or problems, ensuring that the decision making process is transparent and open, and allowing an opportunity and time for public deliberation and input before any plans are implemented. Lack of access to information and control of technical input (admissible data deemed as admissible and its interpretation) can disenfranchise communities, who are then left to depend on either 'volunteer experts' or emotional arguments against scientific understanding. In identifying the need to promote public interest, awareness and education, technical language or scientific jargon can create barriers to understanding. This fact is recognised by a number of scientific research councils including Natural Environmental Research Council and Engineering and Physical Sciences Research Council (Pearson 2001).

The importance of gathering all information possible on the site is due to the judgemental nature of most sampling strategies and chemical analysis, and again knowledge of site history and previous use is a vital consideration in any judgemental site investigation. The risk assessment procedure promoted by regulatory agencies is a site specific method which depends on site end use. Although experts are also often unwilling to admit uncertainties in the public domain (Petts 1997) scientific prediction of the complex interactions in natural uncontrolled systems is particularly problematic, and the risk assessment approach may be improved by use of local knowledge relating to the local environment, social use, pathways and receptors.

The decision making process should consider information from all sources such as site assessment, risk assessment EIA data, remedial alternatives, development plans and opinions of local residents or those most affected, the placing of technical knowledge in the hands of the public allows opinions to develop/change as the situation is better understood, and can in some cases empower communities to contribute to the selection or implementation of remedial solutions to challenging local environmental problems (Kemp and Griffiths 1999, Younger 2002). Assuming meaningful participation is practised, additional problems may be raised

when considering which values should be prioritised or selected and the trade offs which may result in winners and losers.

Conclusion

Environmental decisions should balance social, human and natural capital with financial gain. When all of the information required to enable a professional and publicly acceptable environmental decision in the framework of sustainable development is considered, there is a clear case for involving local residents' participation. Involving the public in mine water remediation projects can provide new ways in which people engage with heritage issues, and renews democratic citizen engagement in public spaces. EIA must take into consideration the impacts of environmental actions on resident communities, in terms of health and well being. Active social inclusion engaging with principles of citizenship and the promotion of social learning and understanding is a means of promoting sustainable development, engaging with principles of citizenship and environmental justice. Community participation in particular can in some cases contribute to community building and increase community spirit

When considering more practical matters, the contribution of local people often begins with the identification of a specific problem: resident communities identify problems which are overlooked by statutory authorities. Where the landscape spoiled by industry has no legislative guardianship local people becoming involved is often the first step towards the consideration of remediation projects. Local community engagement is often therefore the only reason for the development of a remediation project. Local communities can assist the implementation of remediation schemes by sourcing materials, assisting with volunteers, and increasing the possibility of accessing project funding from sources which support community participation schemes. Local participation during monitoring helps to identify future problems. Local resident communities can be seen as both the reason for engagement with remediation projects on spoil heaps, and the means to their successful implementation.

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ODPM Creating sustainable communities

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