

Mining and Biodiversity

Rehabilitating Coal Mine Sites

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The money currently being spent on environmental rehabilitation at mine sites could be better used to meet other goals such as the promotion of biodiversity.

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Concerns about environmental impacts have become widespread over the past four decades. In most of regional Australia, these concerns have focussed on the activities of the agricultural and mining industries, as these are often the only economic activities in many regions.

The mining industry affects only a very small proportion of Australia's landmass (less than 0.1%) but the environmental impacts can be very intense on each site without management. Agriculture has very small scale impacts but over large areas, so that the cumulative effects of some environmental impacts, such as salinity risks, can also be substantial. Direct regulation has been the dominant approach to addressing and preventing environmental problems in the mining industry, while in agriculture the levels of regulation tend to be low.

The mining industry has become a greater contributor to the Australian economy and to exports than the agricultural sector. Minerals and metals, for example, account for around 31% of national exports, while agricultural produce accounts for some 20%. With approximately one-third of the workforce of agriculture, and higher growth rates, mining can be characterised as an industry with relatively high returns per employee.

These economic strengths partly explain some differences in public funding for environmental issues. The mining industry is routinely expected to pay for its environmental costs, but the public purse is usually opened when it comes to solving problems caused by agriculture. The current initiatives to cap bores in the Great Artesian basin and to redress salinity problems across Australia are examples of the latter.

There are some very good economic and institutional reasons why such broad differences exist, and these are

discussed below. These differences raise a number of questions about the expectations of the Australian community and governments regarding standards of environmental protection and the approaches to achieve it. Among them are the broad issues of whether direct regulation remains the best way to control mining activities, the extent to which flexible offsets are allowed, and whether different standards should be allowed across different populations. These issues are discussed with references to the coal industry.

The black coal industry

Coal mining is a major industry in Australia, with most activity located in the Hunter Valley of New South Wales and the Bowen Basin in central Queensland. Coal accounts for approximately 29% of the value of mineral production in Australia, and around 11% of the total value of merchandise exports. To achieve efficiencies of scale, mines are usually large operations, with many producing more than three million tonnes of coal a year. In 1997, Australia produced 271 million tonnes of coal, and overall production has continued to rise. Most coal—72% in 1997—is produced from open cut mines, but many of the new developments are in underground mines using longwall equipment.

There are environmental tradeoffs associated with coal mining, particularly with the open cut mines where large areas of overburden may need to be removed to expose the underlying coal seams. Environmental impacts can be classified into three broad categories: air pollution and

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noise, water quality flowing off the mine site, and environmental losses at the mine site.

By the 1970s, most mining companies in Australia were obligated under their mining lease to address air and water pollution concerns, and to rehabilitate mine sites. There has since been major progress on all fronts. In the Bowen basin, for example, most new townships have been built some distance from the mine sites to avoid any noise impacts. Air pollution and water quality issues are minimised to the extent that most questions about environmental impacts are focused on site rehabilitation.

Mining companies routinely rehabilitate their worked areas, although it is usually impractical to completely restore areas to their previous landform and condition. Site rehabilitation has usually involved returning the land to agricultural use. In the open cut mines, the spoil piles need to be reshaped to fill in voids and mirror more natural landforms, and then contoured and toppedressed with topsoil before pasture or vegetation is planted.

Regulating rehabilitation

The preferred approach to controlling environmental problems in the mining industry has been one of direct regulation by government. There are a number of reasons for this relating to the size and specific location of environmental impacts. As past disasters have shown, failure to consider environmental consequences can have very substantial and long term effects. The bare hills around Queenstown in Tasmania and the scars of coal mining at Mt Leigh in South Australia are a case in point. The large potential risks associated with uranium mines adjacent to Kakadu National Park, or at other sites where there may be downstream effects from air and water pollution, are other examples.

The structure of the mining industry makes direct regulation relatively easy. It is a large industry comprised of a few companies operating at a limited number of locations. As a result, direct monitoring and verification are relatively unproblematic. The profitability of the coal industry (relative to other sectors of the Australian economy) has also made it possible for companies to meet the costs of complying with environmental standards.

Misguided regulations

The pattern of environmental regulation was set for mining in the 1960s and 1970s, with the focus on direct

regulation and government standards arising from the politics surrounding environmental issues at that time. Mining companies had a poor public image, and were often viewed as being driven by profits and exploiting the natural environment.¹ The large size of many companies and foreign ownership issues reinforced some negative images. Mining companies in turn often accepted the additional costs of regulation because they wanted certainty at times of major growth.

To a large extent, direct regulation has been very successful in ensuring that mining companies addressed environmental issues. The coal industry, for example, has a good record in complying with the conditions that have been set by successive governments, and there are many examples of successful rehabilitation occurring.

But this has come at a cost. In the Bowen basin, rehabilitation costs have often been around \$40,000 per hectare,² although these may be lower depending on the mine site and schedule of soil movement. By comparison, prices for adjoining grazing land are usually in the \$200–\$300 per hectare range. Between

1990 and 1996, 11,000 hectares of mined areas were rehabilitated in Queensland, largely in the coal industry.³

In economic terms, the downside of direct regulatory approaches is that environmental outcomes are often set with little regard for the costs and benefits incurred by different firms in achieving them. For example, similar goals of rehabilitation tended to be set for open-cut coal mining operations in the Hunter Valley of New South Wales and the Bowen basin of Central Queensland. Both were required to be returned to agriculturally productive uses, mostly by the establishment of pasturelands.⁴ Such rehabilitation is very expensive, particularly the reshaping of the spoil piles.

This can be seen from the Bowen basin example, where coal companies are spending up to 200 times the value of grazing land on rehabilitation purposes. The incongruous nature of such expenditure is highest at mines where the rehabilitated areas are probably unsuitable for livestock grazing in any case. This is because of the poor characteristics of the underlying spoil, the limited amount of topsoil available, the elevation and slope of the final landscape, and the harsh climatic conditions of the region.⁵ At many mine sites, the regulatory imperative to rehabilitate sites for agricultural use appears to have been misguided.

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Alternative rehabilitation strategies

The regulatory approach to coal mine rehabilitation has generated three broad deficiencies. First, there are no clear guidelines for determining what level of rehabilitation and other environmental impacts are demanded by the general community. Second, it is not clear what the benefits of different rehabilitation options are relative to the costs, and, third, it is not clear that rehabilitation should be the major focus of environmental resources within local regions. Each of these deficiencies has been addressed by industry and government in recent years, but much more can be achieved.

In Queensland, mining operations are required to prepare an Environmental Management Overview Strategy (EMOS) which covers the life of a mine. A Plan of Operations is also required, which focusses on specific operations in shorter time frame (one to five years). These two documents effectively set out the level of environmental tradeoff and rehabilitation, and represent an opportunity for mining companies to negotiate with the appropriate department the conditions attached to individual sites.

What is currently missing is the involvement of the wider community in determining what are acceptable tradeoffs. In natural resource management issues it has become more commonplace to either involve community representatives in making decisions about local or regional strategic directions, or to gauge community attitudes towards the relevant issues as a part of the assessment process. In contrast, there are very low levels of community involvement in the mining industry generally about where resource use tradeoffs should be made.

One novel approach recently trialled at BHP Cannington's silver mine in northwest Queensland involved using an environmental organisation to evaluate its mining practices. The North Queensland Conservation Council was employed to assess the mine on corporate compliance, regulatory compliance and ecologically sustainable development principles. These types of initiatives will help mining companies to develop more public trust in their activities.

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Flexible tradeoffs

To evaluate the overall value of mine site rehabilitation, it is normal to weigh up the benefits and costs of different options, even though some of these may be difficult to compare.

It is clear that zero rehabilitation is not an option, particularly at some of the mines in the Hunter Valley where there are major aesthetic and landscape impacts. In addition, some degree of rehabilitation is normally necessary to avoid off-site impacts with issues such as water quality.

Yet it is also clear that full restoration of landscapes is not an option. The extremely high costs involved in moving from rehabilitation to full restoration preclude this as a viable option.⁶ At some point between these two extremes, companies and regulators must therefore decide what level of rehabilitation is necessary to meet community expectations.

There has been some progress in achieving greater flexibility and coordination of rehabilitation outcomes, as one isolated example of salinity credits in operation demonstrates. Many coal mines produce excess water, which is often saline and can only be released into local streams at high flow levels. In the Hunter Valley, the amount of available release is governed by a 'salinity credit' scheme, which allows available discharges to be traded among mines.⁷

Most flexibility occurs through the planning and approval processes. The EMOS framework in Queensland allows companies some leeway in determining how they might meet the objectives set by the relevant department. Consequently, there is some variation between mines in the approaches taken to rehabilitation.

Biodiversity as a rehabilitation goal

In the Bowen basin, there have been gradual moves away from the goal of rehabilitating sites to pastoral lands in favour of developing native bushland.⁸ This is because mine sites are being increasingly recognised as important potential habitats for the long term protection of native fauna and flora. In these cases the key issues are to ensure that no long term off-site impacts can occur through air or water pollution, to re-shape and re-vegetate the sites, link them to native corridors and biodiversity areas, and to encourage wildlife to return.

One key advantage in promoting biodiversity as a



rehabilitation goal is that it may be a more realistic use for land where the benefits from pastoral use were low in the first place.⁹ It may also be cheaper because of different landscape design requirements, and it may provide more public benefits in terms of biodiversity protection. For example, part of the Gregory mine in central Queensland is being targeted for the establishment of a colony of the critically endangered bridled nailtailed wallabies.

If biodiversity is to become the main goal of minesite rehabilitation, however, it is not clear that so much effort needs to go into reshaping spoil piles into undulating grassland. The Oaky Creek mine in the Bowen Basin has been experimenting with reshaping its overburden into a series of 'ponds' which help to keep rainfall within the rehabilitation site and allow a mixture of trees and grasses to be established.¹⁰ This is a more cost-effective option, and would allow more resources to be focussed on the successful development of nature refuges on-site.

Yet if biodiversity protection is to become a major goal of rehabilitation, it may be best achieved within a site by focussing less on the actual site rehabilitation process and more on the integration of the site with surrounding vegetation corridors.

Moreover, it is not clear whether on-site rehabilitation is the best use of environmental funds. The amount of money spent on rehabilitating one hectare of minesite in the Bowen basin, for example, could be used to purchase between 200 and 400 hectares of untouched woodland in the same region.

In the central Queensland region, there are two critically endangered mammal species—the northern hairy-nosed wombat and the bridled nailtailed wallaby—as well as a number of other fauna and flora species that are listed as endangered. Yet much more money is being spent on mine rehabilitation in the region than the preservation of endangered species! If biodiversity conservation on a regional basis is the goal, it may be worth spending less in total at each mine site and more on offsetting site environmental damage with investments in other areas.

The principles of using offsets to achieve more cost-efficient solutions have been accepted in the carbon debate. In that case, the potential for environmental damage caused by greenhouse gas emissions may be countered by developing sinks, such as forests, which absorb carbon

from the atmosphere. Large scale emitters that would find it difficult or very costly to reduce their emissions levels may be able to offset these by planting forests or developing other ways to sequester carbon. Why can't mining companies get environmental credits for helping to protect endangered species?

Clearly, there is a need to look at the current expenditure on environmental rehabilitation, and to determine if resources devoted to other environmental goals might be a better use of funds. The current framework that focusses on on-site rehabilitation does not encourage companies to pursue other goals, either on-site or off-site, that would deliver better environmental outcomes at a regional level.

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Different environmental standards

One of the more contentious issues in the mining industry is whether standards of environmental protection should be allowed to vary between countries. Although it is consistent for Australian mining companies to operate to different environmental standards than those in Australia when working on overseas ventures, it also makes good economic (and political) sense to minimise environmental and other external effects. As a result, Australian companies do normally maintain high environmental standards when working in overseas locations.

The same rationale applies within Australia. There is sometimes debate over whether mines in sparsely populated areas should meet the same level of environmental standards as mines closer to major population centres.

Again, values for rehabilitation are likely to vary according to site location. Most mines will need to minimise off-site impacts, but mines that are close to major population centres will have additional requirements to avoid unsightly landscape impacts. There will be less value in mines further from population centres restoring the landscape to pristine or farmland standards.

Australians are unlikely, however, to support reductions in environmental standards in remote locations that simply deliver windfall profits to mining companies. It seems that the Australian community expects all mining companies to have a commitment to minimising environmental damage, but that this commitment may have different focusses in different regions.

Conclusion

Many mining companies already support environmental issues for philanthropic and corporate image reasons. What is needed is to expand the horizons so that companies consider more carefully the options to offset certain levels of environmental impacts with commitment to other environmental goals. This will not only deliver better overall outcomes to Australia, but will also amount to a much more efficient use of available resources.

It means, however, moving further away from a regulatory framework to one of negotiation and goal setting between mining companies, governments and communities. There are real gains to make in allowing private industry to compete for a wider range of environmental outcomes.

Endnotes

- ¹ M. Griffiths, *Of Mines and Men* (Sydney: Kangaroo Press, 1998).
- ² See for example P. Baker, 'Some Aspects of Rehabilitation at South Blackwater', *The Australian Coal Journal* 41 (1993), 17–25.
- ³ Environmental Protection Agency, *State of the Environment Queensland 1999* (Brisbane, 1999).
- ⁴ See J.C. Hannan and R.M. Gordon, 'Environmental Management of Coal Mines in the Hunter Valley, New South Wales', in *Environmental Management in the Australian Minerals and Energy Industries: Principles and Practices*, D. Mulligan (ed), (Sydney: University of New South Wales Press, 1996). See also P.A. Roe, D.R. Mulligan, and L.C. Bell, 'Environmental Management of Coal Mines in the Bowen Basin, Central Queensland', in *Environmental Management*, D. Mulligan (ed).
- ⁵ Baker, 'Rehabilitation at South Blackwater'.
- ⁶ Roe, Mulligan and Bell, 'Environmental Management of Coal Mines'.
- ⁷ J.C. Hannan and R.M. Gordon, 'Environmental Management of Coal Mines in the Hunter Valley, New South Wales', in *Environmental Management*, D. Mulligan (ed).
- ⁸ Roe, Mulligan and Bell, 'Environmental Management of Coal Mines'.
- ⁹ R. McNamara, N. Lefebvre and J. Joyce, 'Assessment of Mine Site Rehabilitation Performance at the Oaky Creek Coal Mine, Bowen Basin, Central Queensland', *Indicators of Ecosystem Rehabilitation Success*, in C.J. Asher and L.C. Bell (eds), (Kenmore, Queensland: Australian Centre for Mining Environment Research, 1999).
- ¹⁰ McNamara, Lefebvre and Joyce, as above.