



A proposal for engaging a stakeholder panel in planning post-mining land uses in Australia's coal-rich tropical savannahs



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ARTICLE INFO

Keywords:

Post-mining land use
Mine rehabilitation
Mine closure
Grazing
Stakeholder engagement
Visual landscape representations

ABSTRACT

In Queensland's Bowen Basin, a major Australian coal reserve, areas of post-mining land are increasing. These areas have been subject to decades of coal-mining and, without appropriate transfer to alternative use, may remain as vacant land unable to be used for grazing or other productive uses. Research that informs new and revised policies and processes to optimize rehabilitation and post-mining land use planning is critical in assisting regional economies to transition to post-mining contexts. This paper explores the potential for panels comprised of stakeholders to agree on a beneficial land use, which is one of the four goals of mine rehabilitation and closure specified by the Queensland regulator. Whilst current guidelines require stakeholder consultation, there is little real evidence that rehabilitation and closure planning processes incorporate the perceptions of potential future land users in terms of the utility of ex-mining leases, socio-economic value and associated opportunities and risks. In contrast, existing literature reveals the range of influencing factors that landholders, especially graziers, may consider in determining the utility and value proposition of land packages. These include physical, agronomic, ecological, economic, aesthetic and recreational characteristics.

This gives rise to two questions: (i) what role(s) can input from stakeholders and potential future land users play in considering the opportunities and barriers to incorporating ex-mine land into grazing properties; and (ii) what are the characteristics of an appropriate model for engaging and empowering a stakeholder panel to play those role(s)? This research identifies a potential role for stakeholders in adaptive management in collaboration with regulators and mining companies, via a process of long-term engagement among a cross-section of predominantly local people. Visual models of an authentic example are proposed as the basis for reaching agreements about the land use challenge and reconciling ecosystem, social and economic functions and values. This research thereby provides a narrative on both of the research questions raised and proposes a re-conceptualisation of rehabilitation goals in order to optimize post-mining futures.

1. Introduction

By 2021, on current trends, the state of Queensland will feature 12 times as much ex-mining land remaining disturbed as it has land that is rehabilitated and supporting alternative uses (Queensland Government Interdepartmental Committee on Financial Assurance for the Resource Sector, 2017). Attaining and maintaining an acceptable post-mining land use for future generations is integral to the concept of responsible mining. In Australia, mining activities are regulated by the various state governments. For instance, Queensland regulators require initial planning for mine closure at the mine-planning stage, with project proponents (companies) nominating a post-mining use aligned with prior uses, surrounding uses and pre- and post-mining site characteristics and

land suitability. This nomination is made in an environmental impact statement (EIS) which is submitted for approval with the mining lease application (White et al, 2012, p. 246). Concentrated attention to mine closure and completion usually focuses on the culminating two-step process. First, an operator achieves certification from the Department of Environment and Heritage Protection (DEHP now DES) that site-specific rehabilitation standards are satisfactory, prescribed conditions have been adhered to and the goals of rehabilitation have been achieved. Second, the mine lease is relinquished to the Department of Natural Resources Mines and Energy (DNRME), as an indication that residual risks are deemed minimal and that the financial assurance can be discharged and any remaining liabilities transferred or covered by a residual risk payment. This deferral in practice of post-mining decisions

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until end of production is imminent or production has ceased, is not effective since many earlier decisions and actions of operators influence the available options (Evans, 2011).

Currently, government approvals and environmental authority are designed around the future land use proposed by the mining company in the EIS and related documents. Conditions specified at an early stage in the mine's life are used to eventually certify satisfactory achievement of rehabilitation outcomes and endorse suitability for subsequent uses. This process has rarely gone full circle in Queensland with very few examples of mines achieving closure (Lamb et al., 2015) as well as many historic examples of abandoned mines (Unger et al., 2012). Current estimates suggest there are 20,000 ha of land disturbed by mining and that the gap between land disturbed and amount rehabilitated is widening (Queensland Government Interdepartmental Committee on Financial Assurance for the Resources Sector, 2017). Hence the state faces the prospect of large tracts of mined land in various stages of rehabilitation (Lechner et al., 2016b) that remain forever in the custody of mining companies or the state.

In Queensland, there are four specific goals of mining rehabilitation: land should be non-polluting, safe, stable and able to support an agreed use (DEHP, 2014). For about half of the rehabilitated land in the dry, sub-tropical region of central Queensland, the favoured rehabilitation strategy is pasture-based revegetation with grazing nominated as the post-mining land use (Grigg et al., 2000). Native bushland has recently gained popularity as an alternative. Given that most of the 37 open cut coal mines and 13 underground coal mines operating in Queensland in 2015–2016 have nominated grazing as a post-mining land use, this article concentrates on the involvement of stakeholders – including affected and interested landowners, local government, and community groups – in achieving this. Our paper focuses on the Bowen Basin in central Queensland where coal mining is now a mature industry with several mines reaching the end of their operating life.

This examination takes place against a background of considerable biophysical research that has identified threats to sustainability of grazing on rehabilitated land, suggesting that unanswered questions and obstacles exist in relation to rehabilitation for subsequent land use in Australian conditions (Baumgartl and Glenn, 2013; Doley and Audet, 2013; Lechner et al., 2016a; Perring et al., 2013). There is considerable variety in mining leases in terms of soils, landforms, substrate and rehabilitation vegetation. Perhaps it is not surprising, therefore, that there are few examples in the peer reviewed literature of long-term monitoring studies demonstrating successful rehabilitation for pastoralism in Australia. Nevertheless, one study of a north Queensland copper mine rehabilitation areas (1–7 years post-rehabilitation) and nearby comparison sites within surrounding grazed and un-grazed agroecosystems undisturbed by mining, suggested a sustainable post-mining land use was achievable with careful, locally attuned, management strategies (Vickers et al., 2012). Likewise, Maczkowiack et al. (2012) profiled risk factors for grazing in the Bowen Basin and suggested that where land is managed by local graziers and productivity will support commercial cattle grazing, this is likely to be a low risk post-mining land use. Other positive examples can also be found in the grey literature (Grigg et al., 2006; Melland et al., 2014; Mulligan, 2003).

While environmental science approaches continue to explore the factors determining the sustainability of grazing in these post-mining landscapes, researchers have acknowledged that science and technology will not provide all the answers any more than regulation and a legal frameworks can (Limpitlaw and Briel, 2014). Mines and the nascent post-mining landscapes being developed by rehabilitation activities are embedded within rural communities and there has been insufficient consideration of what that means for rehabilitation and closure planning (Collier, 2011). Besides evidence of the biophysical condition and productivity of post-mining landscapes, data about preferences and needs of stakeholders such as potential land users are also relevant. This means that it is valuable to consider input from those engaged in this livelihood in determining the specifics of post-mining

land uses because “what is ‘best’ depends in large part on the perception of farmers” (Milestad et al., 2012, p. 368; see also Palmer, 2012). In other land use contexts, research findings have recommended combining socio-economic insights from practitioners with biophysical modelling of potential productivity to achieve robust and practical development solutions (Alves-Pinto et al., 2017). With specific regard to post-mining land use projects, it is argued that many suffer from “lack of due diligence in assessing the markets, communities’ livelihood systems, experiences and knowledge base, and ... an absence of community participation” rather than from insufficient consideration of the science (Mborah et al., 2016, p. 15).

Until recently, land use planning in rural regions of Queensland has been mostly a top-down, technocratic, rationalist approach that paid little attention to wider land use values and the interests of stakeholders. However, it is land users who are expected to manage and eventually privately own these post-mining landscapes with their complex mix of domains (Harvey, 2016). Other directly affected stakeholders are local and state government, businesses and residents in proximate communities as well as civil society groups including NRM groups, environment protection groups and Indigenous interests. While in other land use planning contexts participatory decision making is regularly advocated (Lawrence and Deagen, 2001; Renn, 2006), within the context of land use planning for mining landscapes there are limited examples.

In this paper we consider the argument for including local community members with a stake in responsible stewardship of these land areas in contributing to some of the decisions; opportunities that may be realised by adopting inclusive and participatory stakeholder approaches to decision-making for post-mining land; and how such approaches may help address barriers to incorporating ex-coal-mining land into grazing properties in central Queensland's Bowen Basin. This involves a focus on the potential for involving stakeholders, including possible future land managers, in considering suitable post-mining land use as one of the four goals of the guideline that drives rehabilitation practices and programs in Queensland.

To explore these issues, we review and critically analyse the current mining, rural development and natural resource management literature in relation to two questions: 1) what role(s) can input from stakeholders and potential future land users play in mine closure processes in Queensland? and 2) what are the key characteristics of an appropriate model for engaging a stakeholder panel to play those role(s)? Our review focuses on coal mining in central Queensland, and on the dominating economic land use there (grazing), but has wider applicability to post-mining land use decision making. For instance, less intensive uses such as native vegetation, or alternative industrial uses such as solar farms may be more appropriate in areas with different landscape characteristics, populations and market access. We conclude by proposing an alternative approach to post-mining land use decision-making based on a goal of “utility” and then describe three focus areas for future research.

2. Opportunities from and barriers to incorporating mined land into a grazing property in central Queensland

The potential benefits from incorporating post-mining lands into grazing properties relate to restoring productive, social and aesthetic functions of the land as well as ecological ones. In some cases this may mean returning the land to an alternative productive use once mining is completed (Harvey, 2016; Unger, 2017). There is additional value in ensuring ongoing stewardship of parcels of disturbed land that could otherwise become wildfire risks or pose challenges to control of weeds and pests (Maczkowiack and Smith, 2012). Incorporating land into the surrounding land uses also minimises the impact of closure on local character and the regional economy (Pavloudakis et al., 2009).

Nevertheless, there are several challenges associated with incorporating mined land into grazing properties. The major issue is that

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