Towards a framework for the sustainable use of legacy mine land in Queensland, Australia

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Presentation overview

- Introduction
- Mining impacts
- Study area
- Measuring sustainability
- Criteria & indicators
- Future research
- Conclusions
Introduction

- Global mining industry embracing sustainability concepts
- Legacy, abandoned, derelict and orphan sites a major issue for industry, community & NGOs
- Low profile in the research community
Mining impacts in Australia

- Current practice leading edge
- Several major regional areas with a significant mining relationship
- Significant legacy of mining - acid rock drainage, acid rain, erosion, fatal explosions
## Estimate of abandoned mines in Australia

<table>
<thead>
<tr>
<th>State or Territory</th>
<th>Number of abandoned mines (approximate)</th>
<th>Quality of information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queensland</td>
<td>12,833</td>
<td>Average</td>
</tr>
<tr>
<td>New South Wales</td>
<td>570</td>
<td>Good</td>
</tr>
<tr>
<td>Victoria</td>
<td>2,000</td>
<td>Average</td>
</tr>
<tr>
<td>Tasmania</td>
<td>30</td>
<td>Good</td>
</tr>
<tr>
<td>South Australia</td>
<td>4,000</td>
<td>Average</td>
</tr>
<tr>
<td>Western Australia</td>
<td>11,000</td>
<td>Average</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>Unknown</td>
<td>Poor</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30,433</strong></td>
<td></td>
</tr>
</tbody>
</table>

* Updated from paper
Study area
Study area

- Located between Brisbane and Ipswich, Queensland Australia (combined population of 1.3 million +)
- Major coal producing region of Queensland from 1830s to 1960s
- Initial production from underground operations, with open cut operations beginning in 1967
Current activities

- Mining ceased in 2003
- Little rehabilitation of any mine land
- Approximately 2,300 ha disturbed by mining activity
- Current land use includes clay extraction, waste disposal and landfill operations
Future activities

- Plans exist for new industrial activities to be located in the area – paper manufacturing, metal fabrication and power generation
- The area will be virtually enveloped by current or planned urban development
Measuring sustainability

- Criteria and indicators becoming a well established paradigm in resource sectors – mining, forestry, fisheries
- Sustainability criteria and indicator sets need to balance social, economic and environmental concerns
- Indicator sets for active sites can be large eg. GRI 110; Azapagic 131
Measuring sustainability

- Legacy sites most closely relate to mines at the closure stage.
- Legacy mined land defined here as "land which has been mined and is now being used for another purpose or is abandoned, derelict of in need of remedial work"
A research review suggests legacy mine land sustainability criteria and indicators should:

- Consider equally environmental, social and economic factors;
- Criteria should be more specific than just these three principles;
- Indicators should be easy to identify and measure;
- Indicators should have a meaningful output;
Criteria & indicators

- Indicator numbers should be kept to the minimum needed to convey the message;
- Aggregate indicators could be used to provide a simple sustainability ‘snapshot’;
- Needs to consider particular requirements of the site being investigated – in this case, examples include complexity of land ownership, competing landuse proposals, relative proximity to future urban growth areas and capacity of third party agencies to undertake rehabilitation work.
An initial set of criteria and indicators has been developed.
The list is not yet comprehensive, but serves as a discussion point.
It is currently biased to the Queensland regulatory environment.
A more generic set is being developed.
## Legacy site criteria & indicators

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservation of biodiversity</td>
<td>Flora species, fauna species, ecosystems, endangered species</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>Area completed, area remaining, biophysical conditions</td>
</tr>
<tr>
<td>Off site impacts</td>
<td>Visual, noise, dust, hydrological</td>
</tr>
<tr>
<td>Integrated landuse planning</td>
<td>Government plans, future landscape scenarios, adjacent landuse plans, urban development</td>
</tr>
<tr>
<td>Ownership</td>
<td>Historically, current</td>
</tr>
<tr>
<td>Responsibility</td>
<td>Government level, private ownership, legal action</td>
</tr>
<tr>
<td>Cultural issues</td>
<td>Community engagement, indigenous concerns</td>
</tr>
<tr>
<td>Health and safety</td>
<td>Community safety</td>
</tr>
<tr>
<td>Productive land use</td>
<td>Area, current uses, future plans, economic benefit</td>
</tr>
<tr>
<td>Local economic contribution</td>
<td>Indirect and direct employment; multipliers</td>
</tr>
<tr>
<td>Cost of rehabilitation</td>
<td>Dollar cost, funding sources, agency responsibility</td>
</tr>
</tbody>
</table>
Future research

- Feedback will be gathered on the framework from an expert stakeholder group, using the Delphi methodology.
- This iterative process will be used as quality control for the final generic criteria & indicators set.
Conclusions

- The use of criteria & indicators as tools for measuring sustainability of mining operations is now well established.
- Legacy sites, an acknowledged issue for the global mining community, have received relatively little attention.
- Given the particular challenges of these sites, there is a need for appropriate criteria and indicators to guide decision-making.