

Ready, set, close! Assessing social values and community readiness for mine closure and post-closure transitions

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Abstract

This paper discusses two aspects often overlooked in planning for mine closure and transition to the next use of a former mine site: the social values that drive stakeholder perception of closure risks and opportunities as well as stakeholder readiness to be involved in closure planning and implementation.

It is well understood that closing a mine and transitioning to the next land use is more likely to be successful when stakeholder engagement is comprehensive and inclusive. If a company feels that stakeholder engagement has been done well and key community issues have been addressed, it would likely expect consensus on the proposed closure plan. However, this is not always the case. This can occur for various reasons, but is almost inevitable if there is a lack of understanding of, or alignment with, the social values that strongly affect community responses during closure engagement programs.

Social values are usually a complex configuration of environmental, community, economic and governance characteristics which can vary between individuals and groups depending on their context, interests, beliefs and experiences. Review of publicly available closure plans indicates that these usually outline key stakeholder issues, but seldom elucidate the social values that shape or underpin them, or allow for changes in them to be monitored over time, even though these changes could be material to closure planning processes and outcomes.

Twinned with understanding social values is assessing stakeholder readiness for a mine to close and move to its next use. This is because people will only support what they see as reasonable, logical and doable, and will base that judgement on their own sets of personal, professional and other values. Therefore, this paper not only outlines important considerations in defining and monitoring the social values that shape stakeholder concerns and priorities but also discusses the key factors influencing stakeholder preparedness to participate effectively in mine closure planning and implementation from the perspective of selected stakeholder groups.

Keywords: social values, socially inclusive stakeholder engagement, community readiness

1 Introduction

A mining region is defined not only by its geological, environmental and economic values, but also by its social and cultural values (Forget & Rossi 2021). These values and associated vulnerabilities evolve during the mine life cycle and mining companies are expected to proactively manage impacts through every stage of mine development, including the closure and post-closure phases, at least until the mine transitions to the next landholder and/or mining tenure is transferred, relinquished, surrendered or extinguished.

The type and extent of social impacts associated with mine closure vary from mine to mine and from region to region, and are often influenced by the level of local dependency on infrastructure, services, income and other types of capital (Bainton & Holcombe 2018a). These impacts can be negative, e.g. loss of jobs and services, a rise in poverty, deterioration of living standards and population loss due to outward migration, and/or positive, e.g. an increase in government initiatives aimed at helping the community, increased community cohesion and increased support for other forms of economic development (Siyongwana

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& Shabalala 2019). Smaller or more remote mines with few or no adjacent communities may have limited or highly localised impact. However, where mines are larger or occur in regions dominated by mining, the regional scale of mine closure impacts can be staggering. For example, Cole (2024) reports that in South Africa, which has 230 operating mines, over six million people living in urban and rural mining host communities will be significantly affected by mine closure. The closure of South African coal mines alone as the country transitions to cleaner energy sources will affect two and a half million people in 69 communities to some degree (Cole et al. 2023).

The social aspects of closure and post-mining transitions are a growing area of interest, but the knowledge base on engineering, environmental and other aspects of mine closure is significantly deeper and more developed than the social aspects. The paucity of literature on the social aspects of closure could be due to a lack of expertise in this discipline, the stage of development of relevant guidelines and other regulatory requirements or inconsistency in their implementation, low levels of publication of available knowledge, siloing of experiences and lessons learned, or other reasons (Bainton & Holcombe 2018a, 2018b). Whatever the cause, the social dimensions of mining and mineral processing continue to present major challenges for industry, government and community (Bainton & Holcombe 2018a).

Two of the aspects often overlooked in community planning for mine closure and post-closure transitions are the social values that drive stakeholder perception of closure risks and opportunities, and whether affected communities are ready to be involved in closure planning and implementation. However, success in mine closure and post-closure transitions relies, at least to some extent, on host communities sharing the post-mining vision for the site and having the resources to make the transition required to a post-mining economy. Therefore, it is important to know not only what mine closure might mean for local and regional communities and economies, but also to understand who has the willingness and capacity to bring about and take responsibility for change, and what might need to be done if these things are lacking.

This paper outlines important considerations in defining and monitoring the social values that shape stakeholder concerns and priorities. It then discusses the key factors influencing stakeholder readiness or preparedness to participate effectively in mine closure planning and implementation.

2 What are social values?

If a mining company feels that stakeholder engagement has been done well and that key community issues have been addressed, it would likely expect that there would be consensus on the proposed closure plan and how this will be executed. However, this is not always the case. This can occur for various reasons but is almost inevitable if there is a lack of understanding of, or alignment with, the social values that strongly affect community responses to closure planning and implementation.

For the purposes of this paper, social values are the principles or standards that guide the behaviours of individuals and groups in a society (Nickerson 2024). Put simply, they represent 'what matters' and 'what's important' to individuals and groups (Castañeda et al. 2012), and what could affect their quality of life (Cox et al. 2021). They are focused on people, are inherently local to a particular area, depend highly on context, and are influenced by a range of environmental, social, economic and other parameters (Cox et al. 2021). In turn, they influence the way in which people live, work and play, how they relate to one another and organise to meet their needs, and how they cope generally as members of society (Vanclay 2002). Consequently, social values can look very different in different settings (Cox et al. 2021).

In essence there are two types of values. Absolute values (or core values) are those that stem from moral convictions, spiritual principles or cultural drivers. They are usually stable and cannot be easily traded-off as changing absolute values requires a fundamental change in identity. By comparison, relative values are malleable. Some may evolve gradually while others can change quickly following certain events. New values can be introduced and could replace existing values, or could add an additional layer. Newly introduced values may be at odds with previously-held values, which can lead to friction or contest within and/or between stakeholders (Measham et al. 2021).

In regions with a strong mining identity, social values tend to be closely related to mining (Forget & Rossi 2021). Planning for social transition following the closure of Germany's coal mines commenced long before the transition itself started and was aimed at ensuring not a single miner would be forced out of work (O'Malley 2019). Pits were closed progressively across the region and employees were transferred to other mines, retrained for alternative employment opportunities or given voluntary payouts. When coal mine closures commenced in the Ruhr Valley, and despite the long period of preparation and engagement, local residents experienced a sense of loss due to impacts on their mining identity:

'Dying industries take more than jobs with them. Towns built around a single industry, like coal mining, develop a shared identity. For many workers and their families, it's not as simple as picking up and finding a new line of work when the mine closes. Mining is seen as a calling, an inheritance, and people want their way of life back.' (Urry 2017)

Not only are mining lifestyles valued by local communities, but the mines themselves can develop social value where sentimental attachments to a site form and accrue over time (Bainton & Holcombe 2018a). For example, in interviews with residents from two communities in a lignite-mining region in the Czech Republic, Svobodova (2019) found that most of those interviewed use post-closure landscapes in their leisure-time activities and appreciate their high natural, recreational and aesthetic values, with place attachment, a sense of belonging, an experience of the positive results of mine rehabilitation and economic benefits playing key roles in this perception.

It is unlikely that complete agreement on social values will be achieved among stakeholders, especially as these can vary widely across social contexts and geographies (Measham et al. 2021). However, it is usual for some values to take precedence over others, either implicitly or explicitly, and for different values to have greater (or lesser) impact on decisions regarding mine closure and transitions. This can be exacerbated when there are inequitable power relationships (Holcombe et al. 2022), noting that levels of power and influence can vary considerably between different stakeholders and stakeholder groups (Measham et al. 2021).

Attributing social value involves evaluation during which those processes or outcomes that align with one's values are seen as positive and dissonant ones are regarded as negative (Measham et al. 2021). Importantly, both process and outcome dimensions are considered, and it is common to see intertwined references to social value (i.e. social outcomes) and social values in the literature.

There are many methods that can be used to understand social values and desirable social closure outcomes. These include social development needs analysis (Esteves & Vanclay 2009), mapping of social values, social network analysis, place-based assessments (Worden et al. 2024), and stakeholder engagement and participation (Kozłowska-Woszczycka & Pactwa 2024). These and other types of assessments allow the range of social values within communities to be identified and explored, along with the inter-relationships between values. In particular, effective stakeholder engagement not only facilitates development of a holistic understanding across stakeholders and identification of shared values, it also helps to reveal biases and potentially break them down, and provides a sound starting point to assess and negotiate social closure outcomes (Measham et al. 2021).

3 Social value considerations in closure planning and execution

Where closure plans discuss the social aspects of mine closure, they tend to focus on stakeholder issues or concerns informed mainly by the outcomes of stakeholder engagement programs rather than evidence-based analysis and impact management (Vivoda et al. 2019). Seldom do these plans elucidate the social values that shape or underpin stakeholder understanding or perception of these issues, even though these could be material to closure planning processes and outcomes. Ignoring the existence of social values and the role that they play in decision-making, or prioritising some values over others, leads to a blinkered view of what matters and can trigger responses from within the community that are not desirable (Measham et al. 2021).

Consideration of social values when planning for mine closure and post-closure transitions in local communities and regions is not simply about minimising risk, there are also significant benefits. As discussed by Measham et

al. (2021), these include increasing the likelihood of achieving outcomes with broad, equitably distributed and lasting benefits; reducing the potential for conflict and managing risks by being aware of existing and potentially competing values; maintaining reputation for corporate environmental and social responsibility; finding collaborators or successors to implement and maintain the next land use(s) of a mine site and associated assets; ensuring that processes such as trade-offs are used in an appropriate context; and building trust.

It has also been suggested that consideration of social values minimises the risk of a company losing its social licence to operate (Measham et al. 2021) and, by extension, its social licence to close. This is true, but there is merit in moving from a focus on social licence to adopting a social value approach. Both approaches are valid and useful in the right context, but social licence tends to have a generally near-term focus on maintaining those relationships and achieving the socio-economic performance and community investments or contributions needed to maintain stakeholder permission to operate. In contrast, the social value approach aims to proactively identify opportunities to build and strengthen relationships that help create meaningful and long-lasting change beyond a company’s operations. It comprises a long-term and more holistic approach that involves working with others to co-design plans for the future and solve problems, and considers the long-term environmental, social and economic outcomes in all decisions and actions (Foot 2023).

An important aspect of co-designing for the future is creating a vision for closure that is shared by the mining company and those communities affected by its activities. The process conceptualised by Mining Impact Specialists Ltd and illustrated in Figure 1 informed the closure visioning approach used in developing a mine closure plan submitted to mining regulators in British Columbia, Canada, in June 2023. Through this process, subject matter experts’ information was contextualised and validated with those members of communities having project interests, who also provided insight into the values that underpin post-closure needs and capabilities. This process allowed for co-development of a closure vision that accounts for the social context in which mine closure would occur (L. Boxill pers. comm.).

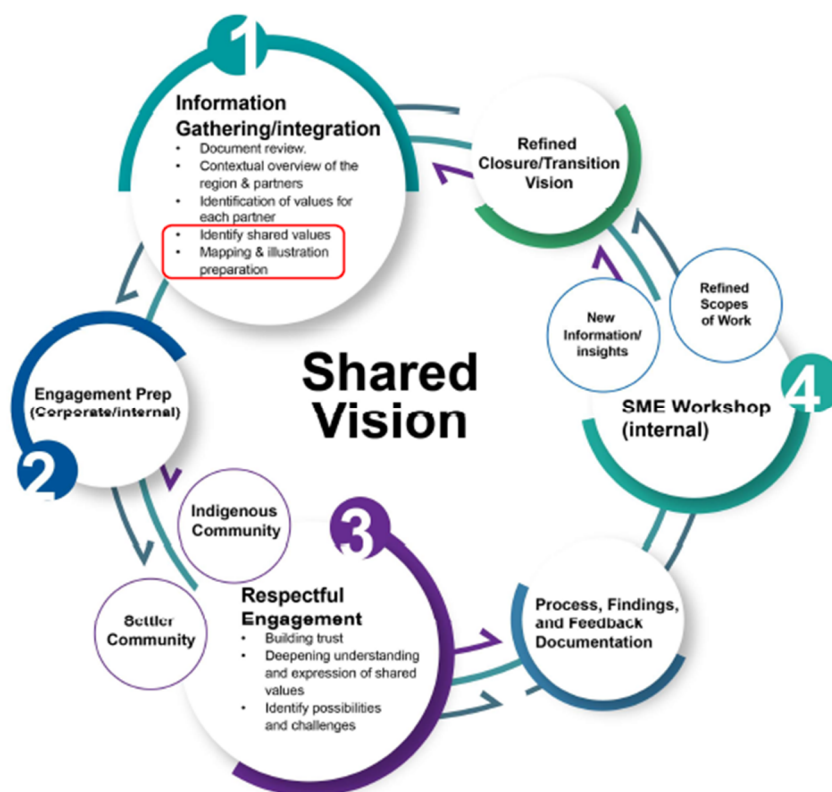


Figure 1 An approach to developing a shared vision for mine closure (reproduced with permission from Mining Impact Specialists Ltd)

4 Community readiness for closure and post-closure transitions

4.1 What does it mean to be 'ready'?

As discussed by Goksoy (2012), change represents something new. It means moving from the status quo to a new destination or in a new direction. This movement can cause fear and uncertainty, and people can feel a loss of control and security, and sometimes even danger. Communities will support change if they are ready for it, but low readiness for change leads to active resistance (Goksoy 2012).

Goksoy (2012) states that not being able to manage change in a way that successfully achieves positive social outcomes is a failure to create readiness for change in the first place. So, what does it mean to be 'ready' for change? The Community Tool Box developed by the University of Kansas (2024) defines community readiness as 'the degree to which a community is ready to take action on an issue' and identifies four key characteristics as follows:

- Community readiness is issue-specific. It is possible that a community is ready to address one issue while at the same time being at the very earliest stages of readiness in relation to another issue.
- Community readiness can vary across different segments of the community. Some groups within a community may be more ready to address an issue than others, or move at a different speed in progressing towards readiness.
- Community readiness can vary across dimensions. For example, a community may be more prepared to address an issue in some ways than in others.
- Understanding community readiness is essential knowledge for addressing an issue. People will only support what they see as reasonable, logical and doable. The action or solution proposed by a company may meet all of those criteria but, if the community's perception is otherwise, the effort is unlikely to be successful.

Readiness for change begins with a group's or individual's perception of the demands and benefits of the change and the risks of failing to change. It may vary due to the type of change being introduced, the characteristics of those triggering the change and those affected by the change, as well as other internal and external circumstances (Goksoy 2012).

The Community Readiness Model (CRM) was developed by the Tri-Ethnic Center for Prevention Research (TCPR) at Colorado State University for the health industry (Edwards et al. 2000; Harris et al. 2019), but has also been applied to other industries including transportation (Keefe et al. 2024) and social marketing (Kelly et al. 2003). On review, it is considered that the CRM (TCPR 2014) is a useful tool in understanding community readiness for mine closure and post-closure transitions as it defines issues in the context of a community's needs and resources, and addresses the complexities involved with community change. Including community members at each stage of the process not only promotes trust, but may also increase community support of the changes needed to close a mine and transition to the next use of the site. Further, the CRM lends itself to application in rural and remote communities where logistically it can be more difficult to engage with community members (Harris et al. 2019). The stages of community readiness identified by the CRM are described in Section 4.2 of this paper.

4.2 The Community Readiness Model

The CRM defines nine stages of stakeholder readiness, which are illustrated in Figure 2. A description of these stages is provided below based on information provided in Edwards et al. (2000) and Peers for Progress (2021) with modifications made by this author to apply the model to an assessment of community readiness for mine closure and post-closure transitions.



Figure 2 Stages of stakeholder readiness presented in the Community Readiness Model, modified from the Tri-Ethnic Center for Prevention Research at Colorado State University (TCPR 2014)

The first stage of the CRM essentially comprises no awareness of an issue. At this stage, any community issues associated with mine closure and post-closure transition are either generally not recognised by the community or its leaders, or if recognised as issues, are not seen as problems. This is not uncommon in the early stages of a project life when the focus is on project startup. Even though stakeholder engagement during early impact assessment and permitting processes may include discussion of closure issues, this may not be meaningful or even memorable, particularly if closure is not expected to occur for years or even decades.

The second stage of the CRM is denial. At this point at least some members of the community are aware that closure of a mine could create local issues, but there is a general feeling that nothing needs to be done about this locally. This sometimes occurs when communities become used to mine life extensions occurring or expect them to occur, which defers the need to discuss social closure planning in any detail. Further, some community members might feel that ‘it’s not our problem’ or ‘we can’t do anything about it’. At this stage, community climate tends to be passive or may be guarded.

During the third stage, vague awareness starts to appear. There is a general feeling among some members of the community that mine closure may create issues about which something ought to be done but there is no immediate motivation to do anything, at least not at this stage. This increase in awareness may be fuelled through the provision of information about the issue, or stories and anecdotes about the same type of issue arising in other communities. However, ideas about why the issue could arise and who is experiencing or has experienced the issue tend to be vague and/or stereotyped. Further, there is no identifiable leadership or existing leadership lacks the motivation and energy needed to address the issue. At this stage, community climate does not serve to motivate local leaders.

The fourth stage of the CRM comprises preplanning as there is now clear recognition within at least some of the community that mine closure is indeed a local issue and that something may need to be done in response. At this point, the community is beginning to acknowledge the necessity of dealing with the issue and identifiable leaders have emerged, and possibly even a committee, but efforts are not focused or detailed.

Focus during the fifth stage of the CRM is on preparation. Planning for mine closure and what happens next is focusing on practical details. That does not mean that mine closure is imminent, but that there is general information available on local issues likely to be associated with the mine closing, and about the opportunities and constraints of the policies and forward work program relevant to social closure planning and implementation. These may not yet be based on formally collected data, but it is likely that decisions will be made about what will be done and by whom. At this stage, industry and community leadership is active and energetic, and resources are being actively sought or have been committed, but the community is offering only modest support of these efforts.

The sixth stage of the CRM comprises initiation of activities or actions. There is enough information available to justify policies and actions, and increased resourcing, but these are still viewed as new effort. There may be great enthusiasm among industry and community leaders, and staff are in training or have just finished training. There is a modest involvement of community members in the efforts, which is reflective of improved attitude in the community climate.

The seventh stage of the CRM is characterised by stabilisation. At this stage, one or a few programs relating to social closure planning are running and are being supported by administrators or community decision-makers along with trained and experienced staff. Efforts (activities and/or policies) are viewed as stable and while limitations are known, there is little perceived need for change or expansion. This may be reflective of the stage of mine life or the stage reached in closure planning, but at this stage there is neither in-depth evaluation of the effectiveness of the efforts, nor a sense that change is needed to address known limitations. The community is generally supportive of efforts. There may be some form of routine tracking of perception.

The penultimate stage of the CRM comprises improvement/expansion. The original efforts (activities and/or policies) are evaluated and modified, and there is support from authorities and/or community decision-makers for these improvements and expansions. Data on the type and extent of local issues are being obtained on a regular basis and effort is being made to assess risk factors and causes of the issues. New efforts are being planned or implemented to address these issues and reach more people and/or groups, particularly those more at risk as a result of the mine closure and post-closure transition. Resources for new efforts are being sought or committed. Community members appear more comfortable in utilising efforts and, while they may challenge specific efforts, increased knowledge and desire for improved programs and better closure outcomes see the community as being fundamentally supportive.

The final stage of the CRM is characterised by professionalism. Detailed and sophisticated knowledge of prevalence, causes and risk factors exists in relation to the social aspects of mine closure. Leaders are supportive and highly trained, and experienced staff are running the programs and activities. Effective evaluation processes are used to test the programs, with assessment findings used to modify the programs if needed. Community support and involvement are high although it is considered appropriate that community members should continue to hold the company (or other responsible parties) accountable for meeting community needs. While some efforts may be aimed at the general population, others target specific risk factors and/or high-risk groups. It could be said that the community is ready for the changes brought about by mine closure.

Not all stages of the CRM take the same amount of time, with the time needed to move to a higher level of readiness varying according to the issue, intensity and appropriateness of company and community efforts, and by external events (TCPR 2014).

4.3 Dimensions of readiness

Community readiness can influence whether changes triggered by the closure of a mine can be absorbed by those communities. Readiness is multidimensional, with the six key dimensions of stakeholder readiness identified by the CRM as stakeholder knowledge of the issues, the efforts in place in relation to those issues, community knowledge of those efforts, leadership, community climate, and available resources and capacity (University of Kansas 2024). Where these dimensions co-exist, communities are better able to cope with the changes associated with mine closure and post-closure transitions, and to support change efforts (Castañeda et al. 2012). These dimensions are discussed in Sections 4.3.1 to 4.3.6.

4.3.1 *Community knowledge of the issues*

When considering community readiness for mine closure and post-closure transitions it is important to understand how much the community knows about mine closure and the way in which it will be affected by closure of nearby or regional mines. The key question in this regard is: 'What do stakeholders know about the issue and its causes, consequences and impacts?' (University of Kansas 2024).

Mining companies are responsible for exiting communities in a way that leaves a sustainable legacy which benefits future generations (Lamb & Coakes 2012). It is well understood that this is more likely to occur when stakeholder involvement in closure planning and implementation is comprehensive and inclusive. Therefore, it seems logical to assume that much of the knowledge held by a community in relation to the closure of a mine will come from the mining companies themselves. However, when the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development assessed the state of mine closure readiness in 30 countries, it found community involvement in developing and implementing mine closure plans and post-mining transition to be highly variable, with less than half (40%) of jurisdictions reporting some involvement of communities and less than a quarter (23%) reporting a high level of involvement (Stevens 2021). Further, less than 60% of jurisdictions have policy or legislation that encourages planning and consideration of social transition and community impacts as part of mine closure (Stevens 2021). It is crucial to authentically involve a diverse range of interests, including local and regional communities, from the early phases of a mine's life cycle, ideally through early consultation and collaboration, partnership and/or co-design where practicable (Measham et al. 2024).

Preparing for and implementing closure is a long process and may involve several company practitioners and consultants over the mine's life, along with many community representatives and other stakeholders. Therefore, it is important that effective systems and processes are in place to ensure that historical data and other forms of knowledge are retained and are accessible. This is particularly important for tracking community commitments and obligations (Keenan 2020).

Stakeholder knowledge can also arise through previous experience with mine closures and post-closure transitions. This includes the way in which individuals have been treated during periods of change as this affects their perception about the fairness of the process and responses to subsequent changes. If there is perceived fairness in previous change processes they are more likely to trust decisions about subsequent changes, have less fear and concerns, and consequently have increased readiness for the change (Goksoy 2012). However, residents in economically disaffected or 'left behind' communities will likely have different social and political attitudes. For example, Abreu & Jones (2021) found that residents of former coal-mining communities in the United Kingdom were highly politically disengaged, with low levels of trust, political efficacy and involvement in political processes. Abreu & Jones (2021) concluded that 'community narratives of economic peripherality are strongly inter-linked with trust in government and political engagement'.

In addition to the scientific data and other knowledge provided by the mining company, stakeholder perception of, and response to, closure risks and opportunities will be influenced by other factors, some of which may not be immediately evident. Table 1 lists the key factors affecting stakeholder perception of risk and opportunity as identified by Slovic (2001), Ropeik (2002), Slovic & Peters (2006), and others, and summarised by Finucane-Woodman & Finucane (2019).

Table 1 Factors affecting stakeholder perception of risk and opportunity, adapted from Finucane-Woodman & Finucane (2019)

Factors	Description
Dread	Dread can occur when we try to predict what will happen under certain circumstances. This prediction is often pessimistic and terrible outcomes are imagined, resulting in feelings of dread. If this occurs we tend to see the risk as being higher than is actually the case.
Control	There are times when we believe that we have a high level of control over a situation, which leads us to perceive risks as being less than they are. Conversely, if we have little control over a situation we often perceive the risks to be higher than they are.
Natural versus man-made	Natural disasters are often seen as less risky than those created by humans. This may be because we feel that we have more control over anthropogenic events, disturbances and disruptions than over natural ones.
Choice	If we have a choice between two equally risky actions or items we often perceive that the risk resulting from making that choice is lower than it is in reality, simply because having a choice tends to propagate a sense of control.
Children	If a situation only affects adults the risks often seem lower. However, if children are involved, the risks seem higher.
Novelty	If we encounter a risk with which we are familiar or have had previous experience of, we often consider it to be less concerning than a risk which has not been encountered previously, possibly because we allow an additional Factor of Safety for unknown risks.
Publicity	We are more likely to perceive a risk as being of higher significance if it has received a lot of public attention.
Proximity	If there is a sense of nearness to the source of a risk, we are likely to perceive the risk as higher than it really is.
Risk-benefit trade-off	If a situation presents both benefits and hazards, we may perceive the associated risk(s) as less significant.
Trust	If a risk involves the actions of others, the way in which we assess this depends on the extent to which we trust the other party or parties involved in the action.

The way in which stakeholder perception can be influenced by some of the factors listed in Table 1 became apparent when this author was engaging with community and government representatives during the impact assessment and closure planning for a new gold mine in Eritrea, north-east Africa. Following site visits and meetings with stakeholders, a general consensus (or compromise) was reached on a range of topics including location of a new tailings dam, the environmental management plan for the dam, and associated closure and rehabilitation strategies. However, one key government stakeholder remained conflicted. When asked how he felt about this storage facility he said, 'I am worried about the tailings dam leaking after closure. It feels like the dam is a poisoned pillow, and I will be asking my children to sleep on that pillow in the future' (Finucane et al. 2024). This was an unexpected response because this stakeholder was a regulator with significant experience in tailings dams.

To understand why this stakeholder felt this way we talked more about his values and priorities. I learnt that he was not only a regulator, but also a senior community leader, and his family lived in a village downstream of the proposed mine site. Each of these roles comes with somewhat different sets of values and concerns which do not always align, and this had triggered internal conflict for him. Once this was understood it was

possible to have further conversations about his personal and professional values, along with the inter-relationship between these values; identify shared and diverging values, and understand which of these should be prioritised; and consider and negotiate appropriate outcomes (Finucane et al. 2024).

4.3.2 Efforts in place in relation to the issue

In relation to the socio-economic impacts of mine closure and post-closure transitions, a key question to ask is, 'To what extent are there existing efforts, programs and policies that address the issue?' (University of Kansas 2024).

Once a mine becomes established it not only changes the environmental characteristics of that region, it can also have significant impact on communities and cultures, particularly if mining becomes the main economic activity within a region (Forget & Rossi 2021). In particular, mining development can provide an opportunity for local governments and communities to obtain resources and infrastructure, and to improve the quality of life and living standards in those communities (Svobodova 2019). However, mining is a temporary land use and all mines will eventually close, thereby triggering further social and other changes and impacts.

Recent reviews have found that the body of work on the social aspects of mine closure and post-mining transitions is growing, but social input to closure planning and closure risk management is still overlooked to some extent (see, for example, Bainton & Holcombe 2018a, 2018b; Keenan 2020; Keenan & Holcombe 2021; Marais et al. 2022; Ndaguba & Marais 2023; Measham et al. 2024). If regulations do include social aspects, these are often not as rigorous as environmental regulations and associated guidance is less developed or not as prescriptive (Vivoda et al. 2019; Marais et al. 2022). Consequently, efforts to address the socio-economic and other impacts of mine closure, and to plan for post-closure transitions, is typically not driven by legislative or other regulatory requirements. However, significant research on post-mining transitions is underway. For further information on this work and to understand how it is shaping the research agenda for post-mining transformations and transitions, see (for example) Keenan & Holcombe (2021), Beer et al. (2022), Boggs et al. (2022) and Measham et al. (2024).

Much of work being completed in this regard has a common goal: to facilitate good social outcomes and legacies. The concept of social closure legacies captures the imagination because 'it speaks to something quite fundamental about the intersection of people and place, and how our role within that relationship can influence quality of life,' (Cox et al. 2021). However, being able to understand the social values relevant to a mining project and how to deliver strong social closure outcomes continue to be two of the biggest challenges facing closure practitioners.

No matter where it occurs, mining plays a significant role in structuring local society, both in terms of social and cultural structures (Forget & Rossi 2021). Consequently, mine closure can fundamentally change how people live, work and play in mining communities and the wider region. If mines open and expand concurrently with the closure of another mine or mines, social patterns and stability are unlikely to change significantly (Forget & Rossi 2021). However, mine closure can induce strong territorial destabilisation (Bainton & Holcombe 2018b), and there is concern about the likely socio-economic legacy of mining for various transition options and post-mining land uses (Everingham & Mackenzie 2024).

As discussed by Chaloping-March (2008), 'mine closure is more than a managerial-technical-engineering aspect within the life cycle of a mine. It is a social episode in the lives of individuals, households, families, communities and local governments'. Whether this episode goes smoothly often depends as much, or at least in part, on the psychological reaction of community members and their process of adaptive behaviour (Goksoy 2012) as it does on the engineering and environmental elements. Further, the way in which people relate to place affects how they express what they value, so it is possible that place attachment could determine or at least influence the success or failure of any closure planning efforts at a community level (Svobodova 2019). Consequently, the ways in which companies, communities and governments navigate and manage the social dynamics of closure including community sustainability and wellbeing have important implications, particularly in relation to Indigenous communities. However, more work is required in this regard.

Wellbeing in Indigenous communities extends beyond the conventional health and material wealth metrics to encompass physical, mental, emotional and spiritual dimensions, all of which are closely connected to their relationship with the land and culture (Leyton-Flor & Sangha 2024). During Social and Emotional Wellbeing Gathering #4 held in Garramilla (Darwin) in late July to early August 2023, Professor Helen Milroy AO stated that:

'It is important we understand that we live in both a creative and cognitive world. But we rely far too much on the latter. Cognitive approaches don't bring you love, don't bring you joy, don't bring you peace... culture and creativity do' Transforming Indigenous Mental Health and Wellbeing Project (2023).

For local Indigenous communities, land is a repository of cultural knowledge, spirituality, identity and sustenance. Cultural practices, storytelling, ceremonies and community cohesion are vital for belonging and wellbeing (Leyton-Flor & Sangha 2024). Therefore, culturally and socially relevant approaches to rehabilitation and closure need to be adopted and traditional ecological knowledge be integrated into closure planning and implementation (Bainton & Holcombe 2018a; Holcombe et al. 2022).

4.3.3 Community knowledge of those efforts

It is important to not only ensure that sufficient effort has been made in relation to the issue (see Section 4.3.2), but also that the community is aware of these efforts. The key questions in this regard are defined by University of Kansas (2024) as: 'To what extent do stakeholders know about existing local and other efforts, and their effectiveness?' and 'Are these efforts accessible to all segments of the community?'

It will come as no surprise that strong communication and engagement processes are key to ensuring that stakeholders have the information needed in relation to mine closure and post-closure transitions, and can provide their feedback. However, in the words of playwright George Bernard Shaw, 'The single biggest problem in communication is the illusion that it has taken place'.

Stakeholder engagement is a learning journey that requires trust, reciprocity and cultural security along with long-term, reciprocal and dynamic processes that rely on listening as much as the provision of information (Holcombe et al. 2022). Much has been written on the benefits of stakeholder engagement in planning and implementing mine closure so it will not be discussed further in this paper. Instead, this section focuses on the second of the questions raised by the University of Kansas (2024) in relation to whether the efforts are accessible to all segments of the community.

To enable community readiness for closure and post-closure transitions, it is important to provide the community with the information they need to make informed and independent judgements about risks and opportunities. Developing and delivering generic (one-size-fits-all) information is not usually well aligned with people's specific information needs. Instead, communicators need to ensure that information provided is readable (i.e. matches the reading level of the intended audience, recognising that some members of the community will have limited literacy), comprehensible and accessible (Fischhoff et al. 2011).

Based on early work by Fischhoff et al. (2011), it is proposed that three tests for effective stakeholder communication be applied when providing the community with information. These are as follows:

- Test 1 — Content — Do your communications provide the information that the community needs for to participate effectively in closure engagement processes and make informed decisions?
- Test 2 — Accessibility — Can stakeholders access that information given their normal search patterns? Has the information actually reached the stakeholders?
- Test 3 — Comprehension — Can stakeholders understand the information they have accessed?

Regular analysis provides valuable insights on the most effective channels of communication and messaging, and helps to refine engagement approaches (Finucane et al. 2024).

4.3.4 Leadership

In most mining regions, economic values often take precedence over other values during the operational phase of a mine (Forget & Rossi 2021), but the challenges and risks associated with social values tend to become heightened towards the end of a project's life cycle when multiple pressures align (Bainton & Holcombe 2018a). At this point, a range of interrelated and conflicting interests, values and agendas can arise among the various stakeholders, each of whom will have their own vision of a post-mining future (Bainton & Holcombe 2018a).

When assessing leadership related to community readiness, the University of Kansas (2024) considers that the key question to ask is: 'To what extent do appointed leaders and influential community members understand the issues and support proposed solutions?' However, Beer et al. (2024) asks a different and perhaps more pertinent question when it comes to community readiness: 'Who has the capacity to bring about change?'

In practice, planning for and implementing mine closure, and ensuring that communities are ready for these changes, involves multiple parties whose respective values and interests may differ, but may converge under certain circumstances (Chaloping-March 2008). This premise is supported by Beer et al. (2024), who highlight the diverse sources of leadership from within the private sector, public sector and community required to bring about positive transformation. Through assessment of 11 case studies on mine site repurposing in Australia, it was found that key agents for change not only include current mining companies and government representatives, but also former mine workers able to mobilise community interest and exert political influence, and even businesses outside of the mining sector looking to develop new opportunities (Beer et al. 2024).

4.3.5 Community climate

Community climate is defined as 'the degree to which current community conditions promote positive versus negative behaviours' and is an essential feature of readiness for change. In this regard, the University of Kansas (2024) states that it is important to ask about the prevailing attitude of the community towards the issue(s) and determine if it is one of helplessness or if there are elements of responsibility/empowerment, the extent to which current conditions promote positive versus negative behaviours, and what prevailing norms will determine if stakeholders will accept or reject proposals for change. If the community climate is characterised by a sense of responsibility and empowerment, these may serve as a catalyst for action and future change (Castañeda et al. 2012). However, low community readiness for change leads to active resistance, especially if people feel a loss of control and/or security (Goksoy 2012).

Active community resistance to closure was clearly evident in 2023 within the town of Glenden in a rural part of the Isaac region of Queensland. Glenden was constructed in 1981 by the Mount Isa Mines company (now Glencore) to provide accommodation for workers at the Newlands coal mine and their families. The site's closure had originally been proposed for June 2014, the announcement of which prompted an industry union representative to say that 'Obviously we're disappointed about the closure ... and Newlands is a close-knit community so this will have a major effect on the town and workers'. However, mine closure was subsequently delayed to 2015 and then to 2016 (Creagh 2016), and it was not until February 2023 that it was finally announced that the mine had come to the end of its life (Glencore 2024).

The original mine approval included a commitment to completely rehabilitate the area when the Newlands mine closed, which included removal of the town. The impending loss of homes, services and livelihoods triggered community outrage which was exacerbated as the mine closure announcement came at a time when a shortage of homes in Queensland was causing high levels of homelessness. Following an emotional campaign to save the town, the Queensland Premier committed to new legislation to save Glenden (Bagshaw & Walsh 2023). This included a requirement that workers at a new coal mine being developed approximately 20 km from the town (Byerwen) progressively take up housing in Glenden instead of the workforce being accommodated in a purpose-built camp at the mine. While some parties welcomed the legislation, the Queensland Resources Council voiced its concern about the possible consequences of this decision, saying that:

‘The State Government should have properly consulted all parties to find a solution that doesn’t have such a deep personal impact on the lives of mine workers and their families. If Byerwen mine’s ability to operate to its full potential in the future is impacted by this decision and flow-on staff shortages, the economic consequences will be felt by business right across the region’s supply chain’ Thomson (2023).

4.3.6 Available resources and capacity

Even when closure planning has included comprehensive stakeholder engagement, communities can still find themselves inadequately prepared for closure and/or lacking the capacity to offset mining impacts (Ross & Bond 2008). It is not enough for communities to be willing to undertake or undergo change, they also need the capacity to make and manage those changes.

In the context of mine closure and post-closure transitions, community capacity can be defined as ‘the interaction of human, organisation and social capacity within a given community that can be leveraged to solve collective problems and improve or maintain the wellbeing of that community’ (Chaskin 1999). Similarly, Keenan (2020) describes community capacity as the ‘ability to identify and mobilise individual and community assets’ and suggests that relevant variables include community visions and plans, the capacity of local institutions and community members, economic viability and access to finance, and whether there has been a history of community investment.

As mentioned previously in this paper, communities will more likely support change if they are ready for it, with low readiness for change leading to active resistance (Goksoy 2012). Consequently, readiness assessments are essential to proactively gauge the strengths and weaknesses of a community to determine enablers and barriers, and identify what capacity-building strategies will be needed to allow a mine to close and the site transition to the next land use. These may include changes to policy instruments, incentives and other governance mechanisms along with public investment to incentivise new industries, repurpose mining infrastructure and/or develop new infrastructure in order to support new activities, and provide access to markets (Measham et al. 2024).

It is worth mentioning here that community capacity and community resiliency are closely-aligned concepts as they both contribute to the ability of societies and communities to cope with, and adapt to, challenging and adverse perturbations that may affect the systems on which they depend (Amadei 2020). Resilience is defined as the ability of a system (such as a community) to absorb disturbance and still retain basic function and structure (Lerch 2018). The foundations that support the development of community resilience are summarised in Table 2.

Table 2 Foundations that support the development of community resilience, adapted from Lerch (2018)

Foundations	Description
People	The power to envision the future of the community and build its resilience resides with the members of that community.
Systems thinking	Systems thinking is essential for understanding the complexity of a situation and what it means for our similarly complex communities.
Adaptability	A resilient community is one that adapts to change. As the communities and challenges they face are dynamic, adaptation is an ongoing process.
Transformability	Some challenges are so big that it is not possible for the community to simply adapt. Instead, there may be a need for fundamental, transformative changes.
Sustainability	Community resilience is not sustainable if it serves only us and only now. It needs to work for other communities, future generations and the ecosystems on which we depend.
Courage	As individuals and as a community, we need courage to confront challenging issues and take responsibility for our collective future.

Development of adaptive capacity is critical to resilience, with social learning being an essential tool in this regard (Pelling et al. 2015). Building community resilience requires improving social connectedness; increasing government integration and involvement in planning, response and recovery; ensuring effective risk communication with the community and especially with vulnerable or at-risk groups; bolstering the physical and mental health of the population; and building the social and economic health of the affected community (Figure 3). These characteristics do need to be innate to a community, but can be encouraged and improved (Urban Footprint 2024). In addition, building resilience means intentionally guiding the system’s process of adaptation in an attempt to preserve some qualities while allowing others to fade away, all while retaining community identity and recognising that it is essentially determined by what people value about where they live (Lerch 2018).



Figure 3 The relationship between actions, resources and capabilities, and learning in developing community resilience (adapted from Pelling et al. 2015)

5 Conclusion

At their core, social closure outcomes are about people and places, with impactful outcomes building on existing community assets and enabling local stakeholders to become stewards of place. To achieve good outcomes, we need to shift our mindsets and be thinking about how today’s solutions will become tomorrow’s legacies.

Legacy planning requires anticipation of risks, opportunities, aspirations and assets, and the use of suitable participatory and adaptive management processes which start with an understanding of community assets and local context (Everingham & Mackenzie 2024). Central to local context are social values so the ability to share, explore and reconcile value differences is a key component in ensuring successful post-closure transitions and transformations in mining economies (Measham et al. 2021).

Effective mine closure planning and implementation that includes the social aspects of closure is key to achieving long-term sustainability and social gain in affected regions (Svobodova 2019). When mine closure planning is adequately resourced and managed in an integrated manner from early in the mine’s life it has

the potential to minimise social risk and create the foundations for positive regional transformation (Bainton & Holcombe 2018a). The challenge now is for mining companies to move from being a ‘good neighbour’ to being a ‘good ancestor’ who has laid a solid foundation for impactful social closure initiatives and outcomes that stand the test of time.

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