

Enduring community value from mining: conceptual framework

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Working paper

CW007

2012



An Australian Government Initiative



ISBN: 978-1-74158-217-8

Citation

Davies J, Maru TY and May T. 2012. *Enduring community value from mining: conceptual framework*. CRC-REP Working Paper CW007. Ninti One Limited, Alice Springs.

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Acknowledgements

The project was conceived and developed with the support of a project management committee comprising Murray McGregor, Kieren Moffat and Fiona Haslam McKenzie. The conceptual framework was progressed with valuable input of project management committee members and several other researchers: Nick Abel, Mike Dockery, Aileen Hoath and Vigya Sharma. They participated in a project workshop and subsequently contributed further to the development of scenarios for enduring community value. Thanks are also due to Ashley Sparrow for inspiring workshop facilitation, to Jane Addison for making a comprehensive record of discussions and to Kieran Moffat and three anonymous reviewers for comments that have helped us improve the report.

The project was supported by funding from the CSIRO Minerals Down Under Flagship's Mineral Futures Stream, Ninti One Pty Ltd and the Cooperative Research Centre for Remote Economic Participation. The CRC-REP receives funding through the Australian Government Cooperative Research Centres Program. The views expressed herein do not necessarily represent the views of CRC-REP or its Participants.

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Summary

Enduring Community Value (ECV) from mining refers to lasting benefit to groups of people and entities who have some kind of stake in mining. Our interest in this concept is focused on communities in remote regions of Australia, particularly communities with strong place-attachment. The aim of this analysis is to develop a conceptual framework for realising the ECV from mining as a foundation for further research and associated action.

We developed the conceptual framework for ECV through analysis of literature and a researcher workshop. For the literature analysis, we interrogated literature at the six intersections of four concepts: mining, remote communities, sustainability, and resilience. We searched the Web of Knowledge database to identify literature at the six intersections of these four concepts. Articles identified by each search were then culled against relevance criteria. The resulting six sets of journal articles and conference papers were analysed to identify the content and implications of each publication that are relevant to the concept of ECV. Each set highlighted various issues and experiences. Key points are:

Mining and resilience: Resilience in the mining industry means the competitiveness of companies. In contrast, in social-ecological systems theory, resilience means the capacity of a system to absorb disturbance and reorganise, retaining essentially the same structure and function. Resilience in some aspects of a social-ecological system can be realised at the expense of other parts of the system. Hence, analysis needs to consider dynamic interconnections between parts of the system, at various scales, rather than focusing narrowly on single components.

Mining and sustainability: Sustainability, in the mining context, requires transformation of assets (or capitals) during the life of a mine into forms of value that are distributed equitably, and that will endure beyond the life of a mine, including for future generations.

Mining and remote communities: Mining may bring substantially enhanced economic opportunities for remote communities. However, it also brings substantial risks of entrenching remote community dependency because of low initial human capital, weak endogenous governing institutions, rent-seeking behaviours and a lack of effective established government–community partnerships.

Resilience and remote communities: Long-term persistence of remote communities in spite of shocks and stresses indicates their resilience. However, resilience is not necessarily a positive quality, since it can involve entrenched disadvantage. Information, new ideas and expanded support networks are important for remote communities to address disadvantage.

Sustainability and remote communities: Approaches to sustainability tend not to account well for the multiple integrated values and intersectoral linkages that characterise remote areas and the frequent tensions between endogenous and external institutions.

Resilience and sustainability: Mining may potentially trigger desirable system transformations by inputting knowledge, skills and financial resources mobilised at higher scales through globalised corporations into local communities. Important considerations for realising ECV include appropriate governance principles that are explicit, transparent and well supported by shared norms, together with maintaining local traditions and activities that promote coherence between social and ecological system components.

Achieving ECV from mining requires an integrated approach between social, environmental and economic components of social-ecological systems. An existing framework, the Sustainable Livelihoods Framework (SLF), which has wide currency in international development and has had some application in Australia, provides the basis for a conceptual framework and systems model for ECV. Enhanced attention to risks,

institutions and to interactions and feedbacks between processes operating at different scales is important to effective application of the SLF in the context of mining and remote communities.

Different people have different aspirations for what they see as a desirable scenario for their lives in the future. Establishing a vision or set of aspirations is critical to a community developing the shared value and purpose that is necessary for promoting alignment between individual and collective aspirations and promoting desirable resilience characteristics. Scenario planning is useful to challenge conventional thinking about the future, encouraging openness to the prospect that the future will not be shaped by a continuation of current trends, but impacted by a range of new unforeseen factors that can have rapid and dramatic impact on established ways of operating. Collaborative planning is essential in order to achieve alignment between the aspirations of communities, mining corporations, government and other prospective partners. Planning for ECV needs to start at the time a mine is proposed. Institutional innovation is required to ensure that necessary resources are available at that time.

The asset transformations that a community levers from mining in its vicinity should seek to generate a diverse mix of capitals, including diverse skills, knowledge and relationships, in order to expand the livelihood strategies available to community members after the life of a mine. Too strong a focus on mine employment may not foster this diversity. A more resilient strategy would lever from the economic stimulus that a mine provides to a region to enhance existing industry sectors or develop sectors producing goods and services that will be in demand after closure of a mine. Important foci are import substitution for local markets and enhancing ecosystem services flows.

Effective institutions are needed to bridge the extreme scale difference between the perspectives, networks and aspirations of place-attached remote communities and those of often globalised mining corporations. Environmental assessment processes can support ECV by including criteria that mines contribute positively to sustainability and resilience in the mining region rather than only avoiding and mitigating impact. Multi-party agreements about how a mine will be developed in order to promote ECV are important to help manage the risk that corporate investments in building community assets are synergistic with those of government, rather than substitutions. Communities will need to develop new rules, norms and strategies, in order to ensure that they can effectively transform flows of financial resources that they may gain during mining into assets that will provide them with enduring value beyond the life of a mine.

1. Introduction

1.1 Aims

The aim of this analysis is to develop a framework for realising the concept of Enduring Community Value (ECV) from mining. The framework aims to inform design of policy, action and research that promote ECV from mining through the sustainability and resilience of social, economic, cultural and ecological systems. It is a foundation for identifying robust opportunities for enduring value through visions and plans developed synergistically by communities, mining companies and other partners.

We first discuss the meaning of ECV, sustainability and resilience and the context of mining in remote regions of Australia. We then present our methods and analysis of peer-reviewed international literature that addresses the six intersections of four domains of knowledge and action relevant to realising ECV in these regions: mining, remote communities, sustainability and resilience (Figure 1). We used these concepts to select literature for analysis in order to identify prevalent, novel or insightful ideas and experiences across multiple disciplines. The final section of the report presents a conceptual framework for ECV drawing on elements from the literature analysis that are particularly pertinent to communities and mining in remote regions of Australia and on deliberations from a researcher workshop to develop a conceptual framework for ECV.

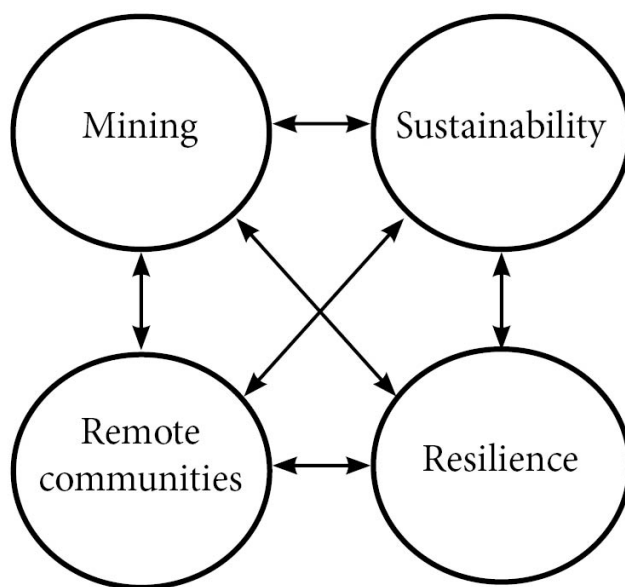


Figure 1: Intersections of four domains of knowledge and action analysed to identify factors relevant to realisation of enduring community value from mining in remote regions of Australia

1.2 What is Enduring Community Value?

The Macquarie dictionary definition of the term ‘endure’ is to hold out against, to sustain without impairment of yielding, to bear with patience, to tolerate, to continue to exist, to suffer without yielding (The Macquarie Library 2004). A similar meaning is conveyed by ‘indefatigable’, which conveys a state of being that cannot become tired or worn out. These literal meanings of ‘enduring’ resonate well with technical terms such as ‘resilience’ and ‘sustainability’ that we will discuss later.

Explorations by stakeholders of how the mining and minerals industry can deliver long-term benefit for a more sustainable Australia have identified five key strategies: new governance structures that enable long-term strategic thinking and planning; investment in new technologies that reduce environmental impact; greater emphasis on involvement with mining communities over the whole of mine life cycle and the wider Australian community; consistent reporting and monitoring, including new measures of wealth that align with community desire for a sustainable future; and greater investment in human capital and new skills sets (Vision 2040 2010, Giurco 2012). The concept of ECV reflects key elements of these strategies.

‘Community’ attracts different definitions. It can refer to groups of people who interact and share a place (community of place – such as local, regional or even national communities), or interact and share a practice (community of practice – such as farmers or miners) or share an interest and are related (community of interest – such as a community of stakeholders, current and future generations related through resource-holding). Generating and preserving value from mining for remote communities in the vicinity of mining operations (community in place) and their future generations (community of interest) are of prime concern to this framework development. Nevertheless, we recognise that mining has to generate and preserve values for communities of stakeholders at different places, times and spatial scales. Tensions between the values of these different communities will necessitate trade-offs.

Value has at least two categories of meaning. One category refers to beliefs and principles that one person or a group of people uphold. The other category of definitions of value refers to benefit, importance, or worth. It is mainly in the sense of the second category that we use the term value in this paper.

Communities in place and communities of interest expect a variety of values from mining operations. These values will also vary depending on the type, place and context of the mining and across time. Economic benefit to different stakeholders is one obvious value from mining. This is not just related to direct financial benefit, such as royalties or royalty equivalents. For example, jobs and opportunities to establish or expand enterprises are other economic opportunities, while there may also be indirect economic benefits from infrastructure established for a mine. Other types of value are social, psychological, cultural, aesthetic, political or environmental. These may be generated by mining or may need to be protected from adverse impacts of mining operations. While communities located in the vicinity of mines will have expectations for value from a mine, these expectations may not be well informed by broader-scale issues and trends. For example, expectations for employment by residents of remote communities will be impacted by the trend to markedly reduced mine workforces. Equally, broad communities of interest may be poorly informed about local issues.

‘Enduring community value from mining’ thus refers literally to lasting or persistent benefit to groups of people and entities who have some kind of stake in this economic activity. The emphasis on ‘enduring’ contrasts with the relatively short-term and extractive nature of mining operations. Values beyond economic benefits need to be considered because of the potential positive and negative impacts of mining on other social-ecological dimensions. Values that need to be generated from, and/or maintained during, mining will also be affected by special features of communities in and around the vicinity of mining operations.

1.3 Resilience

Resilience, as the term is used in social-ecological systems theory, is the capacity of a system to absorb disturbance and reorganise while undergoing change so as to still retain essentially the same function, structure, identity and feedbacks (Walker et al. 2004, p. 2). Resilience thinking is one of few approaches that integrates ecological, social and economic sustainability over various temporal and spatial scales. In

particular it shows that it is necessary to move away from assumptions of equilibrium thinking – centred on linearity, predictability, optimisation, homogeneity and simplification – and to account for stresses (enduring pressures, insidious) and shocks (sudden disruptions). Linking of multiple spatial scales is also a particular strength of resilience thinking, for example, shocks from global events, impacting on local production or market price (Darnhofer et al. 2010).

The term ‘resilience’ is increasingly used in policy and in everyday language in ways that imply it is a desirable property. However, resilience is not always a desirable property (Walker et al. 2004). A system can be trapped in resilient disadvantage and poverty, which seems the case in some remote Aboriginal and Torres Strait Islander communities (Maru & Chewings 2011, Maru et al. 2012).

Mining as a potential positive perturbation needs to support the capacity to manage for desirable resilience, what Walker et al. (2004) termed ‘adaptability’. Adaptability is not about preserving the status quo but about maintaining elements of the system that are desirable because they are widely valued (for example, language, culture and biodiversity) but facilitating change in resilient yet undesirable states of the system (for example, poverty and rigidity traps). Managing for desirable resilience may involve transformation or ‘regime shift’ (Walker et al. 2006, Maru 2010).

Pertinent questions concern how mining affects the resilience of the communities in and around the vicinity of the mining site, and the role of mining in transforming systems that are in resilient but undesirable states to new, healthier configurations.

1.4 Sustainability and sustainable development

Two interrelated principles associated with sustainable development are important to note here. These are the importance of ensuring (1) equity and (2) sustainability in the process and outcomes of development activities (WCED 1987, Pearce et al. 1990). Pertinent questions concern how mining contributes to, or detracts from, each of these two sustainability principles in remote areas.

Equity has two aspects: intra-generational and inter-generational. Intra-generational equity is about a fair distribution of access to resources and services to satisfy needs among people of the current generation. Inter-generational equity suggests that at a minimum, future generations should be left no worse off than the current generation (Tietenberg 1988). Inter-generational equity is the ethical obligation that one generation enters into with the next generation with respect to equitable capacity to satisfy needs (Pearce et al. 1990, Tisdell 1993, Turner 1993).

Sustainability refers to continuity of a social-ecological system. Sustainability depends on maintenance of resources and ecological processes over time in order to provide the capacity to generate goods and services for human needs and wellbeing (Pearce et al. 1989, Turner 1993). Sustainability is ensured if the human activity system operates within the regenerative and absorptive capacity of the ecosystem (Daly 1996). The stocks of resources that need to be maintained to ensure sustainability comprise human-produced capitals (including human, social, cultural, physical and economic) as well as natural capital (including minerals, fossil fuels, land, biological diversity, habitat, clean air and water) (Pearce & Turner 1993). More generally, ‘sustainability’ or ‘sustainable’ often has a similar meaning to ‘enduring’: to keep something going over time.

Sustainability can be ‘weak’ or ‘strong’ depending on the substitutions that are considered between natural capital and human-made capitals. The concept of strong sustainability reflects a conservative approach to sustainability, emanating from deep ecology, in which it is considered that various capitals are complementary and that both natural and human-produced capitals must be preserved in order for

economic activity to continue (Enriquez & Drummond 2007). This has a fundamental conflict with mining; by its nature, mining converts natural capital to human-made capital, utilising other resources and sinks in the process. Sustainability in the strong paradigm requires investment of proceeds from mining into alternative natural resources (Blignaut & Hassan 2002).

In contrast, ‘weak’ sustainability conceives of natural capital and human-produced capital as interchangeable. In this approach mining promotes sustainability by generating a flow of income and other benefits that allow human welfare to be maintained into the future, even after the exhaustion of the mineral resource (Enriquez & Drummond 2007), by investments that include development of human capital, physical capital and social capital. The focus is on maintaining the total stock of assets such that they continue to produce a benefit stream, rather than only being on the maintenance of natural capital (Blignaut & Hassan 2002, Brand 2009).

The concept of ‘critical natural capital’ emerged as a trade-off between strong and weak sustainability. Critical natural capital is that part of natural capital that is necessary for important environmental functions and that cannot be substituted. Examples are fertile soils or freshwater resources. However, ‘criticality’ is conceived of in different ways, depending on cultural perspectives (Brand 2009). Mining is not in fundamental conflict with sustainability that is conceived in a way that requires maintenance of critical natural capital. Environmental assessment and management processes of a mining operation would seek to maintain critical natural capital, or at least to understand, minimise and account for adverse impacts.

An important link to ECV is found in the concept of ‘sensible’ sustainability. This extension of the weak and critical natural capital approaches considers the equity principle of sustainability. Sensible sustainability provides that the exhaustion of a mineral deposit (natural capital) contributes to sustainability if the income obtained from the sale of the ore is converted into forms of human-produced capital that promote equity. That is, capital transformations should support improvements in intra-generational social welfare. Inter-generationally, capital transformations should ensure that future generations are guaranteed at least the same level of social welfare as current generations (Enriquez & Drummond 2007). The concept of sensible sustainability is particularly pertinent to ECV given imbalances in human welfare between remote and other regions of Australia and between Aboriginal and Torres Strait Islanders and other Australians. Sensible sustainability would address these imbalances, providing for fairness and justice by promoting equity in the capability that all people have to choose between different kinds of lives and to live lives that they have reason to value (Sen 2009). Mining offers an important pathway if it can generate ECV in ways that address these imbalances.

1.5 Characteristics of social-ecological systems in remote Australia

The social-ecological systems of remote Australia have specific characteristics that interact to generate significant challenges for sustainability. These include uncertainties generated by climate variability; resource scarcities; cultural distinctiveness; and remoteness from markets, services and public decision-making processes (Stafford Smith 2008). Similar characteristics are shared by remote tropical regions of Australia (Larson 2010). These factors help to account for socio-economic characteristics of remote communities, for example, heavy dependence on social security among Aboriginal and Torres Strait Islander populations of remote regions. Pertinent questions for ECV concern how mining operations in remote regions interact with these characteristics, and what the consequent impacts are for communities in and around mining operations.

1.6 The nature of mining

Mining is an extractive economic activity that converts often scarce non-renewable natural assets into other forms, mainly into financial assets. Australia's mineral wealth underpins the current strong performance of the national economy. Individual mining operations often have a short life span: 20–50 years.

The stakeholders of mining operations include a variety of communities who do not live in proximity to mines, such as shareholders, politicians concerned with the national economy, fly-in/fly-out (FIFO) workforces, and enterprises along the minerals value chain both in the vicinity of the mine and elsewhere, together with their workers and families. Mining is driven by demand for commodities, and the location of mining operations is determined by mineralisation, information, and accessibility (physical, social, financial) of mineral resources and of other resource inputs needed (water, workforce, etc).

A mining operation reduces the stock of natural capital in an area, by definition, and changes levels of local human, social, physical and financial capital. Mining operations also bring new values and new social interactions, representing the transformation of natural capital, through the medium of financial capital, to increase human, social and physical capital. Large mining operations may require significant local resources such as land, water, energy, housing and other physical infrastructure. Among other negative impacts they may produce dangerous waste that increases the risk of contamination and pollution or generate new types of traffic hazards. However, mining may also enhance aspects of natural capital in the vicinity of a mine, such as through mining company investments in addressing prevalent threats to biodiversity or land condition. Australian jurisdictions typically have strong regulatory frameworks for managing the impacts of mining on the natural environment, but impacts in the social domain are not as amenable to regulation.

In remote Australian regions, mining has been variously associated with:

- a. substantial growth in regional towns (e.g. Roxby Downs), sometimes accompanied by a crisis in infrastructure, housing and community services (e.g. Pilbara)
- b. conflicts between production and local community aspirations, including cultural heritage conservation, requiring innovative and flexible strategies to overcome (e.g. Argyle Diamond Mine)
- c. empowerment of Aboriginal landowners through community-based management that applies resource rental and compensation payments to progress community aspirations (e.g. Mereenie gas field, Tanami gold mines in central Australia)
- d. boom conditions in regions that then decline as mineral resources are exhausted (e.g. Broken Hill)
- e. extensive opportunities for Aboriginal employment that are realised in some cases (e.g. Argyle) and that struggle to achieve targets in other cases (e.g. Tanami gold mines)
- f. increased uncertainty for local and regional planning due to unknown or changing market conditions and corporate strategies (e.g. Wingellina)
- g. sophisticated negotiation strategies to secure significant opportunities for Aboriginal peoples to pursue aspirations for economic and community development in ways that stay true to their cultural values (e.g. Kimberley LNG).

Mining can be considered as a perturbation to a social-ecological system. Several aspects of the social domain in a locality or region may be challenged and changed by mining. These may include relational, political, cultural, institutional and spiritual domains as well as the collective cognitive structures that local people have in relation to how things are organised and run in their locality.

The process and outcomes of such challenges and changes are neither necessarily negative nor positive. Pertinent questions for ECV are how mining operations can most effectively support sustainable development and desirable dimensions of resilience in a locality or region. The ‘enduring’ norm of ECV draws particular attention to outcomes well beyond the life of a mine. This post-closure period of mine project life cycles and its implications for communities and their environment has only attracted attention relatively recently (Hodge 2004).

2. Methods

2.1 Literature search methods

This review interrogates literature that sits at the six intersections of the four concepts outlined above: mining, remote communities, sustainability and resilience (see Figure 1). Literature at the intersection of each pair from this set of four concepts was searched using Web of Knowledge, including all databases in the search. Databases searched were the Citation Indexes and Conference Proceedings for Science and Social Science and Humanities plus Current Contents Connect, CAB abstracts and MEDLINE. Literature identified through this search consists of papers from peer-reviewed journals and conference proceedings. The literature review did not encompass books, technical reports or other material that is not included in these indexes. Although we recognise that corporate and community reports include valuable relevant material, this analysis focused on peer-reviewed literature sources in order to provide a manageable data set that has had a degree of validation through the peer-review process.

The search parameters are shown in Table 1, together with the number of publications returned by the search. For each of the six searches undertaken, Web of Knowledge search results were sorted by relevance using the Web of Knowledge automated function. We then read the titles and abstracts of the first 220 articles in the sorted search and culled against our relevance criteria (RC). Full articles were downloaded and analysed where it appeared from the title and abstract that the entire article, or a significant part of it, would be *directly relevant* to understanding the relationship between the two concepts in each pair (RC#1). Abstracts were downloaded and analysed where they and the paper’s title indicated that the article was *indirectly relevant* in that it provided contextual information that could be important to understanding the relationship between the two concepts in each pair (RC#2).

The literature we analysed covered a range of themes, as indicated in Table 2. It was also varied in terms of its disciplinary basis, the sector that it appeared to be directed to, the nature of its content and the type of evidence it presented, as indicated in Table 3. Our search strategies meant that themes that dominate the relatively small peer-reviewed literature on Australian remote communities and mining, such as <Indigenous benefit sharing agreements> and <Indigenous employment> were not specifically targeted for analysis, although we do draw on some of them in the concluding chapter. Within the literature that we analysed, corporate perspectives were well represented in papers from conference proceedings, while community perspectives were often only represented in journal papers that report on research projects and their findings.

2.2 Literature analysis

When reading each paper/abstract, we asked the following questions to guide our analysis:

- What does this paper/abstract say is particular about the interaction between [first concept] and [second concept]?
- What does this paper/abstract say directly about ECV?
- What does this paper/abstract indicate are drivers of ECV? Or drivers of factors that the paper/abstract indicates are important to ECV?
- What are the implications from this paper/abstract for ECV? This included noting our own thoughts on the issues raised by the paper/abstract in relation to other matters that it did not address.

A synthesis of points noted for the various papers in each set is presented in Sections 3–8 of this report.

The sections follow the same general structure, reflecting the questions above. However, subheadings have been modified to reflect the different content in each body of literature.

Table 1: Method for identifying literature for analysis

Relevance Criteria (RC)

1. Directly relevant: Based on title and abstract, entire article or a significant part is directly relevant to relationship between [first concept] and [second concept]. (Analysis undertaken of full article)
2. Indirectly relevant: Based on title and abstract, the article provides contextual information that could be important to understanding the relationship between [first concept] and [second concept]. (Analysis undertaken of article abstract only)

Step	Description	Parameter	Concepts and Search Strings applied					
			Mining and resilience	Mining and remote communities	Mining and sustainability	Resilience and remote communities	Sustainability and remote communities	Sustainability and resilience
1	Keyword search by topic or title of ISI Web of Knowledge (all databases), all years, English only; 5th May 2011	Search String	Title=((mineral* and industr*) or ("resource* industr*") or mine or mining) AND Topic=resilience	Topic=((mineral* and industr*) or ("resource* industr*") or mine or mining) AND Topic=(desert or arid or rangeland or dryland or semi-arid or (remot* not "remot* sens*") or margin* or peripher*) AND Topic=(communit* or social or people or population or town or settlement)	Title=((mineral* AND industr*) or ("resource* industr*") or mine or mining) AND Title=(sustaina*)	Topic=resilience AND Topic=(desert or arid or rangeland or dryland or semi-arid or (remot* not "remot* sens*") or margin* or peripher*) AND Topic=(communit* or social or people or population or town or settlement)	Title=(sustaina*) AND Topic=(desert or arid or rangeland or dryland or semi-arid or (remot* not "remot* sens*") or margin* or peripher*) AND Topic=(communit* or social or people or population or town or settlement)	Title=(sustaina*)AND Topic=resilience
		No. of articles	17	497	315	141	426	220
2	Sort Step 1 results by Relevance, using ISI Web of Science function; examine title, and abstract if necessary, to identify articles that meet Relevance criterion 1 or 2.	No. of articles examined for relevance.	17	220	220	141	220	220
		Excluded because no abstract available	0	4 (small scale mining focus)	27	1	11	
		No. of articles full text analysis (RC#1)	3	28	38	16	18	16
		No. of articles abstract only analysis (RC#2)	0	4	9	4	8	0

Table 2: Major theme of analysed papers/abstracts

	INTERACTION					
	Mining and resilience	Mining and sustainability	Mining and remote communities	Resilience and remote communities	Sustainability and remote communities	Sustainability and resilience
MAIN THEME						
System characteristics and controls	0	0	0	5	0	7
Macro-economics of mining industry	0	2	0	0	0	1
Mine and corporate operations	1	18	3	0	0	1
Mine–community relationships	0	1	1	0	0	0
Mining industry employment practices	0	3	4	0	0	0
Biophysical issues and impacts of mining	1	7	4	4	2	0
Corporate–government relationships	0	2	1	0	0	0
Mineral resources and their management	0	2	0	1	0	0
Local economies and development trajectories	1	7	8	5	13	2
Social welfare trajectories	0	1	0	2	0	6
Remote area characteristics	0	0	1	2	3	0
Remote mining towns' social dimensions	0	0	4	0	0	0
Services in or for communities	0	1	0	1	5	0

Table 3: Disciplinary basis, sectoral orientation, nature of content and type of evidence of papers analysed

	INTERACTION					
	Mining and resilience	Mining and sustainability	Mining and remote communities	Resilience and remote communities	Sustainability and remote communities	Sustainability and resilience
DISCIPLINARY BASIS						
Social	1	12	17	6	9	5
Economic	0	7	0	0	2	4
Ecological	0	4	1	6	0	1
Engineering	1	0	5	0	3	1
Multi-disciplinary or interdisciplinary	1	15	3	4	4	5
SECTORAL ORIENTATION						
Industry	1	19	9	0	0	1
Community	1	2	3	2	1	2
Policy	0	11	10	5	16	2
Mixed	0	4	1	0	0	2
Academic	1	2	3	9	1	9
NATURE OF CONTENT						
Descriptive	0	10	9	2	7	2
Analytical	2	26	10	11	9	9
Comparative	0	1	3	1	1	0
Review	0	1	3	0	0	4
Speculative	1	0	1	2	1	1
TYPE OF EVIDENCE						
Empirical	0	22	9	7	8	1
Theoretical or conceptual framework	2	3	5	3	3	10
Dynamic model	0	3	0	3	0	1
Descriptive	1	2	10	0	3	2
Opinion/advocacy	0	8	2	3	4	2

2.3 Researcher workshop

A small focused workshop of researchers was held in June 2011. Invitations were extended to researchers engaged with social development and mining in remote and rural areas, familiar with or interested in systems approaches, and within the research networks of CSIRO project researchers, CSIRO Minerals Down Under Flagship's Mineral Futures Collaborations Cluster and the CRC for Remote Economic Participation. The workshop considered preliminary outputs of the literature analysis presented here. Discussions focused on enduring benefit for a remote community, encompassing but not limited to Aboriginal and Torres Strait Islander communities, from mining in their region or on their land. The prospect that a community might preclude mining in their region (or resist mining such that government or corporate action abandons mining proposals) was recognised but considered to be outside the scope of the concept of ECV since generating ECV presumes that mining is happening or planned to happen. It was recognised that a conceptual framework for ECV from mining would likely be applicable to oil and gas production.

Participants recognised that different people and communities have different aspirations and different conceptions of what they want for the future. A range of scenarios ('desired futures') that together encompass a possible range of aspirations was identified by participants. Extreme scenarios were identified in an effort to explore what processes during the life of a mine would be common across all scenarios and which would be different. Participants identified risks and institutions (rules, policies, agreements) required to govern how investments are made during the life of the mine (by governments, companies, communities) and applied to managing risks and achieving the various alternative scenarios at the end of the life of the mine. Discussion about institutions, capitals and outcomes (scenarios) raised parallels with the Sustainable Livelihoods Framework and its potential value in illustrating the generation of ECV as a dynamic process.

Outputs from the workshop and subsequent further development of the scenarios by workshop participants are incorporated in the conceptual framework for ECV presented in the final chapter of this report.

3. Intersection of MINING and RESILIENCE

3.1 What is particular about the interaction between MINING and RESILIENCE?

3.1.1 Interactions and drivers

The articles in this dimension of the framework raised the importance of resilience of different elements in the context of mining. These elements are the 1) mining companies themselves (Kuruppu & Golosinski 1998); 2) critical water resources in semi-arid regions (Barrett 2009); and 3) individuals and communities, particularly those who depend on primary resources (Marshall et al. 2007).

Mining companies have to maintain competitiveness in the world market. Resilience in this sense refers to maintaining competitiveness. Adopting new technologies as they emerge, particularly technologies that improve efficiency and reduce the cost of operations, helps maintain competitiveness, that is, a company's resilience. Most Australian gold companies were found to adopt new technologies as they emerge, although remoteness, availability of maintenance facilities and spare parts were among the factors that hindered adoption of new technology by some (Kuruppu & Golosinski 1998).

Mining is increasingly happening in very remote semi-arid and arid regions, where water resources are limited and there may be strong competition for consumption by non-mining sectors as well as ecosystem needs. A strategic view for sustainable management of current use and future supply of water and its related ecosystems services is required. This is particularly important as some carbon sequestering methods, though cost-effective for mining companies, may have significant negative impacts on moisture and water resources in water-scarce semi-arid and arid regions. Increasing the resilience of water and related ecosystems to heavy demand and discharges from mining, or in other words the ability of water and ecosystems to buffer these disturbances, is one of the strategic views that mining companies need in order to engage with communities in those semi-arid regions (Barrett 2009).

High and direct resource dependency, as is the case in agriculture and fisheries, is found to reduce individual and social resilience to resource-user and institutional changes (Marshall et al. 2007). Resilience here is defined as a function of a person's 1) perception of risk associated with change; 2) perception of the ability to plan, learn, and reorganise, 3) perception of the proximity to the threshold of coping; and 4) level of interest in change.

Resource dependency is an expression of several linked attachments including to place, to occupation, to lifestyle, etc (Marshall et al. 2007). Heavy attachment and dependency on resources is associated with low flexibility and low adaptive capacity to change in resource-user relationships, for instance by the introduction of a mining operation. A similar reduction in resilience can also happen to communities and individuals who develop dependency on mining. Understanding why and how people depend on resources is important to assist effective transitions.

3.2 Enduring Community Value

In all three articles in this small literature, resilience is considered to be a normative concept, that is, it is seen as a good thing and something that is necessary for the systems described in each of these articles to have. However, assuming that resilience is a good thing is inappropriate in that it dulls the analytical power of the concept of resilience (Maru et al. 2012). Although none of the articles directly address enduring community value from mining, resilience of the components that the articles discuss (mining companies, natural resource-dependent livelihoods and water) and the interactions between them, is pertinent for generating enduring community value.

Resilience of all three of these components will be important in the case of a mining development in a desert region that is remote, with limited water resources, and with communities that are highly attached to and dependent on the ecological system for their livelihoods. However, what are the implications of enhancing resilience of each component separately? For instance, improving resilience through adoption of technologies that automate mining operations may reduce cost but may have significant impact on local employment. Resilience of one component of a system may be borne out of increased vulnerabilities of other components.

4. Intersection of MINING and SUSTAINABILITY

4.1 What is particular about the interaction between MINING and SUSTAINABILITY?

The concept of ‘sensible’ sustainability provides that the exhaustion of a mineral deposit (natural capital) should contribute to improvements in social welfare, intra and inter-generationally (Enriquez & Drummond 2007). Effective institutions are needed to capture resource rent into these kinds of investment in order to produce a sustainable income stream from renewable natural capital and human-produced capital. This has not been happening effectively in some countries, for example, South Africa (Blignaut & Hassan 2002) and Ghana (Kumah 2006). Gross domestic product and other standard macro-economic measures do not capture accounting for sustainability (Figueroa et al. 2010).

Mining operations can be an accelerator for regional sustainable development if mineral resources are transformed first into financial capital then into other forms of capital. (Kumah 2006, Wibowo & Rosyid 2008). However, transformations into human capital (skills) need to consider the apparently low spill-over of skills from mining into other economic sectors (Figueroa et al. 2010), implying that consideration needs to be given to developing human capital directly in non-mining that may be sustained beyond a mine’s life.

Scale issues are important in assessing sustainability. Often the concept is seen in terms of mining industry contribution to sustainable development at a national or regional scale. However, local-scale assessment is also important (Sinha et al. 2007) and the local scale is most immediately able to be influenced by an individual mine.

Knowledge asymmetries and differences between stakeholders’ knowledge systems complicate assessments of sustainability. For example in Peru, local people did not trust quantitative modelling of water volumes and were sceptical about the corporate assessments of mining impacts on water because of historical contamination. Conversely, the mining sector had no faith in the indicators used by local people (Bebbington & Bury 2009).

Companies tend to define sustainable development in terms of meeting the needs of present and future communities in the mine area (McAllister et al. 1999) and not in broader social terms such as the transformation between natural (minerals) assets and other asset classes that definitions of weak or sensible sustainability specify (Kumah 2006). Sustainability is commonly equated with the ‘triple bottom line’ or ‘three pillars’ for assessing corporate operations: economics, social equity and sound environmental performance (Musee & Lorenzen 2007). However, this can restrict considerations of community wellbeing to engagement processes and procurement processes, without any consideration of local economies or human wellbeing beyond the life of the mine (e.g. Musee & Lorenzen 2007). Seven questions for sustainability were developed by the Minerals, Mining and Sustainable Development North America Project as a tool to guide sustainability planning. These cover engagement; maintenance or improvement of wellbeing, integrity of environment; economic viability of the mining project; improvements in local economies, traditional and non-market activities; institutions and capacities; and learning processes (McPhie & Hodge 2002) during the life of the mining operation and post closure (Hodge 2004). The treatment of post closure is closely allied to the concept of ECV (see below).

The mining industry is said to have embraced the concept of sustainable development to varying degrees and taken a proactive stance toward environmental issues and to a lesser extent, socio-economic and community matters (Hilson & Murck 2000, Hilson 2001). However, it is also observed that industry operators have considerable hesitancy about embracing sustainability or sustainable development in their

operations (Laurence 2011). The wide range of conceptions of sustainable development in various literatures contributes to difficulties in establishing what it means from a corporate perspective (Laurence 2011). One meaning of sustainability that is relatively easy for industry to embrace is ‘extending’, or ‘prolonging’. Other meanings are confusing in the context of a mine (Laurence 2011). A common mistake is to conceive of sustainable development purely in environmental terms (Hilson & Basu 2003). In that narrow view, some see innovation as the way that sustainability will be achieved, such as through reduced waste and other impacts (e.g. Ghose 2009).

Change in the industry towards sustainable development was said to be apparent by about 2000 (McAllister et al. 1999, Hilson 2001). While this change was perhaps not so apparent in relation to community matters (Hilson 2001), there was a growing appreciation that sustainability for mining should encompass equity and involve long-term improvements in quality of life in local communities and environmental stewardship (McAllister et al. 1999). Social dimensions of sustainable development saw increasingly greater attention over time from 2001 to 2006 (Perez & Sanchez 2009).

Frameworks and indicators for assessing sustainable development, corporate contribution to sustainable development or corporate sustainability reporting are reported in several papers (Azapagic 2004, Hodge 2004, Aguado & Nicieza 2008, Yu et al. 2008, Laurence 2011). These include social and economic components as well as environmental/ecological dimensions. The existence of multiple different reporting frameworks has been seen as a problem (Hilson & Basu 2003, in Laurence 2011). The Global Reporting Initiative is the most popular sustainability reporting protocol (Mudd 2010). It includes a range of core and voluntary indicators covering social, economic and environmental aspects. However, on the environmental side at least, analysis indicates that there are ambiguities in some of the indicators, which raises a number of issues for consistency and transparency in how the protocol is being used by various corporations (Mudd 2010). While there has been a trend to improved reporting, there is room for further improvement in relation to benchmarking, disclosure, third party review and attention to stakeholder expectations (Perez & Sanchez 2009).

Corporate sustainability reporting and other reporting for corporate social responsibility (CSR) are essentially the same thing according to the Global Reporting Initiative (Viviers & Boudler 2010). There was a clear evolution in the comprehensiveness and depth of corporate sustainability reporting between 2001 and 2006, with ‘social performance’ and ‘context and commitment’ showing the best results and regular improvement and also constant evolution in ‘environmental performance’ (Perez & Sanchez 2009). Analysis of reporting by five major companies from 2005 to 2008 shows that HIV/AIDS and health and safety issues were the most important CSR issues reported (Viviers & Boudler 2010). Economic empowerment of local people was not well considered (Viviers & Boudler 2010).

Indicators have been proposed by Azapagic (2004) to address social issues for sustainability, building on the Global Reporting Initiative. However, these do not appear to address the temporal dimension of community benefit – inter-generational equity, ongoing or enduring benefit – other than development of a community sustainability plan. Only wealth distribution might relate specifically to intra-generational equity. Aguado and Nicieza (2008) indicate social dimensions of sustainability by adding units of level of satisfaction (estimated at three levels: company, country and regional – with the largest weighting to the latter); employment (as the number of jobs created compared to the regional unemployment rate); development level (being new infrastructure and facilities or degree of cooperation with existing projects); and improvement level, which puts higher scores where higher numbers of inhabitants are affected.

In spite of increasing attention to social issues, managers of mining companies tend to have little concern about social impacts of the mine. Most of their concern is directed to environmental impacts. Researchers

and mining company general staff were the groups most concerned about social impacts (Aguado & Nicieza 2008). However, industry and society demand is driving the inclusion of sustainable development in mining engineering education (Costa & Scoble 2006), which is likely to influence mining managers' attitudes over the medium term.

4.2 What does this literature say about Enduring Community Value?

Little of the literature talks directly to ECV, but a relatively large number of papers talk in some way to sustainable development, including social and economic dimensions that are pertinent to ECV.

'Sustainable community benefit' (Gifford & Kestler 2008) is one term that has a meaning directly analogous to ECV.

4.2.1 Dimensions of ECV

Different communities or stakeholder groups have different assessments of the contribution of mining to sustainability, because of different values, frames of reference and experiences (McPhie & Hodge 2002, Hodge 2004, Bebbington & Bury 2009).

Environmental/biophysical issues and 'resource intensity' (key environmental aspects such as water use, greenhouse gas emissions) (Mudd 2010) have social and economic consequences that are important considerations in sustainability (de Roos 2006, Sinha et al. 2007). These issues increase as mines target increasingly low ore grades (Mudd 2007a, 2007b, 2007c, 2008, Mudd & Diesendorf 2008, 2009, Mudd 2010). Communities have a high level of concern whenever the environment is left in a worse condition than pre-mining (Mudd & Diesendorf 2009). Mine closure and rehabilitation carries particular expectations from government and community (Fourie & Brent 2006).

However, a corporate approach to sustainability goes beyond stewardship or avoidance of impact. It should encompass responding to needs of present generations and anticipating needs of future generations, that is, long-term improvements in quality of life and environmental stewardship. Local communities should be in a more viable, durable and equitable condition at the end of a mining project than they were at the start (McAllister et al. 1999, Hodge 2004). This does not occur in many regions. For example, there is little evidence for positive effects from mining on rural livelihoods in Peru (Bebbington & Bury 2009).

Mineral exploitation can contribute to growth in other forms of capital: human, social, cultural and economic (Thomson & Joyce 2006). Mineral wealth needs to be used during the mining phase to develop other forms of local capital in other economic sectors that can expand to keep the economy going after mining winds down (Wibowo & Rosyid 2008).

Sustainability for place-based communities means viable and durable livelihoods after the mine closes. A mine can be a bridge to this sustainable future if environmental assessment of the mine proposal is sustainability-based (Gibson 2006), with mechanisms to provide durable benefit explicitly identified during mine planning (McAllister et al. 1999, Hodge 2004).

Local employment in mine and mine-related enterprises is said to be critical to the minerals sector contributing to sustainability in developing countries (Reichardt 2009). However, other research shows that most people who live near a mine do not become involved in mining employment. They continue customary livelihoods regardless of mining. Investment during the term of a mine in enhancing local livelihoods is important to ensure that mining improves local-level sustainability during and beyond the life of a mine. Investment from a corporation in one mining region in India was via forest protection groups; self-help groups for empowerment; health and hygiene programs; and increasing land productivity

by irrigation, multi-cropping, aquaculture and livestock (Sinha et al. 2007). In Peru, conflict over the impact of mining on local communities led to institutional reform: a tax transfer arrangement returned 50% of taxes paid to the mine-affected region. However, the capacity of local authorities to use this new income effectively proved to be limited, such that the income itself became a trigger for further conflict (Bebbington & Bury 2009).

Interactions between multinational corporations and communities in developing countries are often dominated by efforts to develop western-style economic institutions and business relationships. However, these offer no point of engagement with poor local communities. Social licence and legitimacy are generated in these situations by partnerships built on local institutions, co-research to identify community needs, and investment in developments that enhance social fabric and physical infrastructure. In Peru, Newmont used this local legitimacy approach in developing a community health program. This example shows a company, triggered by a crisis of legitimacy, engaged in institutional change: acting in a novel way and setting new expectations for other multi-nationals (Gifford & Kestler 2008).

Issues for social sustainability in the metallic, construction and industrial minerals sectors identified through the Global Mining Initiative and associated work are bribery and corruption, creation of employment, employee education and skills development, equal opportunities and non-discrimination, health and safety, human rights and business ethics, labour/management relationships, relationships with local communities, stakeholder involvement, and wealth distribution (Azapagic 2004). These can be interpreted variously as dimensions of, enablers, or constraints to ECV.

4.2.2 Drivers for corporate attention to ECV

Great pressure developed on the mining industry in the 1990s to improve practices and demonstrate positive contribution to sustainable development. This pressure came from scrutiny by investors, non-government organisations and communities, and from global media attention to local incidents (Sanchez 1998, Hodge 2004, Thomson & Joyce 2006, Aguado & Nicieza 2008). By 2006 mineral exploration was coming under similar pressure (Thomson & Joyce 2006). There was growing activism in developing countries about mining because of environmental impacts (Kumah 2006). Globalised communications means that media attention can readily impact on corporate reputation and competitiveness (Gifford & Kestler 2008).

Commitment by companies to sustainable development principles reduces conflict and builds public confidence and trust in mining companies (Cragg 1998). It is also important in relation to investors, since mining companies are increasingly required to report to shareholders on environmental and social dimensions of performance (Aseel & Kehulu 2010). There is increasing stakeholder pressure for companies to contribute to sustainable development (Atkins et al. 2005, Aseel & Kehulu 2010). This is driven by unprecedented economic gains to shareholders in recent years (Aseel & Kehulu 2010).

Innovations to address environmental issues and adoption of more sustainable practices are said to reduce a company's direct costs of production and potentially improve returns on capital in mining (Humphreys 2001, Mackay & Bangerter 2006). When corporations obtain certification of their operations on social and environmental dimensions, it has improved their economic performance and market share (Enriquez & Drummond 2007).

The need to build public confidence and trust and reduce conflict is a driver for companies to commit to principles of sustainable development. Sustainable development is one of the core values (with clarity, honesty, transparency and defensibility) that is correlated with level of trust and respect between mining companies and stakeholders (Cragg 1998). For exploration companies, sustainable development policies

and planning frameworks give a competitive advantage in being able to pass on prospects to mine developers without hidden risks or liabilities (Hodge 2004).

Companies came to recognise the adverse impacts that environmental, social and corporate governance risk factors can have on future profitability if left unmanaged (Viviers & Boudler 2010). For mine closure, reluctance of governments to issue mine closure certificates prematurely is a driver for early corporate attention to closure, and to some extent to social aspects of closure (Stacey et al. 2010).

Globally, community expectations on companies are rapidly changing, demanding increased attention to environmental and social issues such that it is not tenable for companies to rely on standards set in legislation (Mackay & Bangerter 2006). Further, full commitment to sustainable development principles allows industry to move ahead of regulation and be active in developing the regulatory framework (Thomson & Joyce 2006).

Shareholder activism is said to have had an impact on how companies do their business. (Azapagic 2004, Atkins et al. 2005, Amezaga et al. 2011), for example, development of voluntary industry codes that exceed legislative requirements. In other cases regulatory frameworks have been important. For example, in South Africa legislated targets have been important in driving a shift to local employment and contracting, although some companies also recognise self-interest in that local employment will be cheaper in the long run, with more staff continuity and hence more efficiency (Reichardt 2009). In India, government policies to support tribal people's empowerment and relationship to forests have influenced corporations to give attention to sustainability at local scale (Sinha et al. 2007). Such policy interventions are seen as particularly important in developing country contexts where environmental regulatory frameworks are weak.

4.2.3 Drivers for government attention to ECV

National and regional aspirations for economic development (Wibowo & Rosyid 2008, Reichardt 2009) have been drivers for government attention to sustainability. In China, environmental and social issues and legacies in mining cities are driving attention to sustainable development. Mining cities were often developed in remote regions and now have entrenched problems, including poorly educated labour force, inability to self-organise and lack of regional economic multipliers. These are attributed to the unbalanced attention that has been given to mineral industry development, with a focus on extraction and no attention to also developing processing, service industries and a mixed economy (Long 2004).

4.2.4 Necessary conditions indicated for developing ECV

While mining can have important social and economic benefit, sustaining this requires attention to unmanaged environmental issues, which are particularly prevalent in developing countries (Amankwah & Anim-Sackey 2003).

ECV is most likely to be developed where empowered communities intersect with corporations who have adopted certification standards, including social as well as environmental certification. That is, the extent to which benefits from mining for a community are able to be sustained depends on capacities and will within both the community and the company. Corporate commitment and certification are not enough – communities must themselves set policy agendas that establish standards, goals and instruments for sustainable development (Enriquez & Drummond 2007).

4.2.5 Other supporting factors for developing ECV

Important factors for sustainable development are improved planning, communication with and responsibility to stakeholder groups, partnerships, an emphasis on training, and improved environmental and waste management (Hilson & Murck 2000). To achieve enhanced community wellbeing beyond the life of a mine, planning for mine closure needs to be considered at feasibility stage of mining and revisited during the life cycle of mine (Welchman 2000, Stacey et al. 2010). An environmental impact assessment process that was centred on considerations of sustainability for local communities through mining was important in Voisey's Bay mine in Labrador, Canada. But so too were contextual factors, including a history of empowerment and power redistribution amongst Indigenous peoples and others in the region, proponent capacity and political commitment (Gibson 2006).

In the context of developing countries, partnerships are critical to address barriers and constraints that inhibit development of local employment. These barriers include a lack of appropriate skills, poor availability of training in the vicinity of the mine, language barriers, and accustomed reliance on expatriates (Reichardt 2009).

Sustainability approaches are integrated, having come out of a variety of disciplines, and sustainability in mines should be approached in an integrated way (Hodge 2004). A systems approach is warranted for mine operations to identify and implement innovations that support sustainable development (McAllister et al. 1999, Mackay & Bangerter 2006). This should identify key variables and recognise the need to accommodate change, complexity, uncertainty and conflict. Holistic management systems should be used at the mine. A broad range of partnerships is important to broadening ways of thinking about sustainability (McAllister et al. 1999). Genuine intersectoral dialogue is needed to pro-actively foster mining that embraces sustainable development (e.g. Peruvian national Mining Dialogue Group) (Amezaga et al. 2011). Multi-disciplinary research promotes collaboration needed for innovation for sustainability (Batterham 2004).

4.2.6 Constraints on developing ECV

Assessment of social sustainability is not easy, due to different views, and variables being hard or impossible to measure (Azapagic 2004). While guidance is available to mining corporations in how the concept of sustainable development applies to their operations (Hilson & Murck 2000), there is a gap in terms of guidance in how to operationalise sustainability frameworks (Laurence 2011).

Mining often occurs before there has been adequate development of new institutions to effect capital transformations that are necessary to provide ECV for local populations (Bebbington & Bury 2009). Sustainability (in terms of improved wellbeing of community after the mine) is generally not fully considered at early stages of mine planning, or else it is not revisited and kept up to date. Often, closure planning is seen as an environmental issue, not also a social issue (Stacey et al. 2010).

Companies may say they are using triple bottom line evaluation, but their reporting still emphasises economic dimensions (Aseel & Kehulu 2010, Viviers & Boudler 2010). There can be a gap between policy and practice where mining companies have taken on social responsibilities and put sustainable development onto their agendas, but the impact of this does not reach communities (Whitmore 2006, Enriquez & Drummond 2007, Cronje & Chenga 2009). For example, social welfare in one mining region in Brazil has not been widely improved: income inequalities have been exacerbated and economic benefits have not spread regionally, beyond the mine community itself (Enriquez & Drummond 2007). Among bauxite miners, there is a goal of ensuring that benefits are shared throughout the community and among future generations, but these goals are not prominent in corporate expenditure and other action for

community development (Atkins et al. 2005). Hence it is important to triangulate corporate commitments to sustainability or ECV with those of communities and others.

There is a need for understanding social sustainability in a community's own terms. For example, corporations dealing with First Nations peoples in Canada were not able to shift strategies towards the community-based communal support systems that those communities wanted, which led First Nations people to be ambivalent towards mining (Cragg 1998). Mining on First Nations land and on natural/wilderness areas were two areas where the Canadian non-ferrous metals industry had made little progress towards sustainable development after a decade of marked progress in other areas (Sanchez 1998).

Information and knowledge asymmetries between company and community are a problem for developing ECV strategies. Institutional innovation is needed to span the boundaries between knowledge systems. In a situation of mine–local community conflict in Peru, the Ombudsman's office was most effective at translating and mediating across these boundaries and facilitating dialogue among holders of different kinds of knowledge. This dialoguing is an important process in order to generate knowledge that everyone considers to be salient, credible and legitimate. Co-production of knowledge is also important (e.g. collaborative research and monitoring). However, some knowledge is too specialised to be co-produced and therefore must be generated by specialists in ways that each party trusts (Bebbington & Bury 2009).

In the context of developing countries, there is a lack of alternative economic opportunity to mining and also a lack of managerial and entrepreneurial skills in local populations. This makes sustainable closure of mines (including sustainable economic opportunities and diversification) difficult to achieve (Stacey et al. 2010). However, rural and remote communities in developed countries such as Canada and the USA can also have high economic dependence on mining, with substantial impact from mine closure (McAllister et al. 1999, Hodge 2004).

4.2.7 System components and interactions that impact on realisation of ECV

Real impact on the ground from corporate commitment to sustainable development requires dealing with underlying factors: acculturation stress, power relationships, communication and priorities – and identifying who takes responsibility for various facets of development (Cronje & Chenga 2009).

Sustainability assessments are sensitive to ore grade: lower-grade ores have a more substantial environmental footprint, such as through embodying more water, and generating more waste. The trend in mining is to a greater environmental footprint because lower-grade ores are exploited (Mudd 2007a, 2007b, 2007c, 2007d, 2008, Mudd & Diesendorf 2008, 2009).

Premature mine closure has a serious impact on realisation of ECV. Significant numbers of mines closed prematurely during the global financial crisis because they were opened to exploit low-grade ore deposits when commodity prices were high, which did not last. Other reasons for premature closure include safety and environmental reasons (Laurence 2011). This analysis suggests that attention to the sustainability of the mine in terms of its capacity to sustain itself throughout its planned term is important to realisation of ECV.

Changeover of mine ownership is indicated as a time of risk for sustainability and ECV strategies. For example it is the time when there is the biggest failure of mine infrastructure, due to inadequate transfer of information (Amezaga et al. 2011). The same risk is likely to affect ECV.

5. Intersection of MINING and REMOTE COMMUNITIES

5.1 What is particular about the interaction between MINING and REMOTE COMMUNITIES?

The local economic impact of mine employment is relatively greater in remote regions than other regions, because there are few other economic opportunities (Bebbington et al. 2008). Mining is happening in increasingly remote regions as a result of market demand (increased mineral value allowing exploitation of lower-grade deposits (Bebbington et al. 2008)) and technological changes that have reduced costs of operating in remote areas. These changes include shift to long-distance commuting (O'Faircheallaigh 1995), also known as fly-in/fly-out (FIFO), which changes the cost profile of mine operations, reducing capital up-front cost (Szwedzicki 2000).

Communities near remote-region mines tend to be either formed because of the mine, or else are pre-existing communities that are very small. These two community types have contrasting capacities. For example, the strengths of remote Aboriginal towns are generally quite different from those of towns established because of mining. The former tend to have high natural and bonding social capital and the latter tend to have high human, physical and financial capital (Stafford Smith et al. 2008). These contrasting situations, as well as hybrid or evolved community forms, are considered in various sources in the literature, as outlined below.

5.1.1 Small remote communities that pre-exist mines

Small communities in remote regions that pre-exist mines tend to have strong place-attachment. In Australia many of their residents are Aboriginal or Torres Strait Islander people. People in such communities generally have relatively few options for economic diversification because of low natural resource productivity and small populations (Stafford Smith et al. 2008). Globally, it is not uncommon for people in such small remote communities to be unable to participate politically, due to poverty or political repression (Glauser et al. 2005, McFerson 2010) or cultural difference (Ali & Grewal 2006). In some places there is a clear causal link between mining and poverty (the so-called 'resources curse') since revenues from extractive industries allow ruling elites to buy control and repress opposition, as McFerson (2010) notes is widespread, though not universal, in Africa.

Like other sources of livelihood in remote regions, opportunities from mining are not evenly distributed. Opportunities vary spatially, depending on mineralisation and transport routes, and over time, reflecting fluctuations in global commodity and financial markets. Thus, from the point of view of local people in place-based communities, opportunities for local wealth creation from mining tend to be seen as unpredictable and as outside their control (Foran 2007, Stafford Smith et al. 2008).

Some such communities, generally less affluent ones, welcome new mines (Epps 2003, Fletcher 2010). Local communities that oppose mines are often either affluent or Indigenous (Epps 2003). Conflict over a mine is relatively more likely when Indigenous groups are present because mining issues build on past grievances over state and corporate actions in other sectors (Ali & Grewal 2006). Conversely, some Indigenous groups see economic development, such as a mine might offer, as important to self-government/self-reliance as long as the process of development respects local control, benefits the community and is good for the land (Parlee et al. 2007). However, the high wages paid, compared to other forms of economic activity in small place-attached communities, tend to undermine Indigenous social structures based on reciprocity (O'Faircheallaigh 1995).

In some cases, remote Aboriginal communities have preferred to retain minimal engagement with dominant society and associated modes of economic engagement, even if this means entrenched disadvantage (Tonkinson 2007). Such attitudes may generate local opposition to a mine as part of broader social aspirations that local people have to maintain their ability to control their territory and safeguard the security and integrity of their existing livelihoods (Bebbington et al. 2008). Corporations have been advised to recognise the importance of sensitivity and care in such situations (Epps 2003). Compared to conventional mine employment, long-distance commuting/FIFO reduces the impact on remote Indigenous people from increased non-Indigenous residential populations in their region, for example making it relatively easier for Indigenous people to maintain traditional activities (O'Faircheallaigh 1995). While nothing can reconcile impacts of a mine on cultural and spiritual values important to Indigenous groups, opportunities that thoughtful, innovative mining companies might design to enhance education, employment and services are considered to be able to offset such impacts (Epps 2003).

Expanded global environmental awareness is increasing the range of issues that are raised by local residents about mine development (Nagae & Ikeda 2000). 'Unspoilt' landscape values and biodiversity are often relatively higher in remote areas (Elalfy & Atkinson 1993) which may cause mining to be disallowed even when social impact is low at a national scale because local communities are very small (Norman 2001). These values also drive expectations for post-mine rehabilitation, rather than simply stabilisation (Gardner & Bell 2007). In Australia, most biophysical impacts from mining are well covered by regulation (e.g. Beckingham & Stocker 2001). However, where remote areas are arid, planning for sustainability of mine water use, in relation to other uses and other mines in a region, is a key consideration and institutions for managing incremental impact are often weak (Luba et al. 2006).

5.1.2 Remote towns formed because of a mine

People move to remote mining towns mainly for financial reasons, to access high paid work (Sharma 2009). Corporations tend to offer high pay rates as compensation for remote work locations, recognising that remoteness reduces the attractiveness of mining as a career, especially for young people from urban/non-local populations (Hissey 2005).

Prevalent workplace practice (long shifts, 10 day-on/5 day-off rosters, etc.) and other aspects of the social structure of remote mining towns are not conducive to developing healthy modes of social capital (Lightfoot et al. 2009, Lovell & Critchley 2010) or family wellbeing (Sharma & Rees 2007, Sharma 2009). For families that move to the town for work, these values are traded off against the unique opportunity provided by remote location and high pay rates to accumulate financial assets to meet later-life goals in other locations. However, educated, high-income people do not stay long (Robinson & Wilkinson 1995).

5.1.3 Corporate–community interactions

Mining companies become important actors in service provision and governance in remote regions through corporate–community partnerships. In other settings, partnerships tend to be community–government (rural areas) or business/corporate–government (urban areas). This difference is explained by the 'failed state' situation in remote areas where government has devolved responsibility locally without adequate financial and institutional support (Cheshire 2010). Corporate actors may never be able to truly 'close' the mine, because of economic and other dependencies that have been generated (Cheshire 2010) or because community expectations about satisfactory rehabilitation are unclear (Currey 2003). Unmet expectations can impact on the corporate bottom line (Currey 2003).

Employing local people is one benefit that can be brought in early in a mine's operations, whereas other benefits need to wait until profits are achieved (Beckingham & Stocker 2001). Remote contexts provide

opportunity for innovative human resource management to suit local cultural norms (Gignac 1998). Such innovation is important to sound operation of the mine because failure of mine workplaces to accommodate the cultural norms, obligations and living conditions of workers from remote area local communities is a safety risk, impacting on fatigue (Fletcher 2010).

One view is that corporate efforts to generate local workforces are driven by cost reduction (Stafford Smith et al. 2008). This is supported by the observation that technological changes in mining such as FIFO are reducing reliance on local populations for labour (Bebbington et al. 2008). A converse view is that CSR and agreement obligations (related to legal agreements and also Social Licence to Operate, SLO) are more significant than cost considerations in driving mining company efforts to promote employment of people from remote place-based communities (Stuart 2005). Nevertheless, where FIFO arrangements are in place for mine workforces, remote area people who live in the mine's region may need to negotiate specific access/transport provisions if mine work is to be accessible to them. This is because remote communities are not serviced by standard FIFO arrangements since these are designed to facilitate commuting by workers from major population centres (O'Faircheallaigh 1995).

5.2 What does this literature say about Enduring Community Value (ECV)

None of the literature talks directly to ECV though some of it is concerned with issues that will impact after the life of a mine, notably the need for alternative economic trajectories, or with the benefits that should come to communities from a mine. Nevertheless a number of factors relevant to realising ECV from mining in remote regions are apparent from this literature.

5.2.1 Scale dimensions of ECV

The key scale for generating ECV in relation to purpose-built mining towns is likely to be regional or national, rather than local. This is because the value of mining to residents of these towns derives from their capacity to earn through mine employment and save for aspirations that will be realised later in life and away from the town, notably through home ownership elsewhere (Sharma 2009). There are few attractors for the population to stay when mining employment is not available (Sharma & Rees 2007, Sharma 2009, Lovell & Critchley 2010).

Achieving ECV for local place-attached communities in remote arid regions requires capturing value from spatially and temporally lumpy production (big money earned during the life of a mine) and transform this value in ways that buffer the typical state of low productivity and high environmental and policy variability (Stafford Smith et al. 2008). Building value for regional/remote populations is argued as a more important consideration than building value at the national scale, because remote regions get limited attention from city populations (Foran 2007).

5.2.2 Capital transformations for post-mine economies

Economic futures independent of mining are seen to be required as part of building value from mining for regional/remote populations (Buultjens et al. 2010). The literature analysed notes many challenges in achieving such futures, as indicated below, and there are very few examples presented of how these challenges have been overcome. For example, none of the literature analysed considers interactions between mining and pastoral or service sectors in remote regions.

In remote towns that have developed or been developed mainly for mining, low levels of bonding social capital and the proportion of time that residents spend working in mining (Sharma & Rees 2007, Sharma 2009, Lovell & Critchley 2010), as well as low place-attachment, are factors that limit motivation and

capacity of residents to attend to development of ECV in relation to the town and its region. One exception is Broken Hill, a purpose-built mining town whose long history has developed place attachment among some residents. It has managed to generate a cultural and service economy that sustains some elements of the town post-mining (Andersen 2010).

Notwithstanding low bonding social capital in purpose-built mining towns, social capital together with cultural resources are noted as being among the least variable sources of livelihood in remote arid regions, and under greatest local control (Stafford Smith et al. 2008). This indicates that post-mine strategies should build on these capitals, particularly in remote place-attached communities. Tourism is often identified as an option for such communities to develop an economic future independent of resource extraction, providing a pathway that can build on cultural capital as well as on natural landscape values (Buultjens et al. 2010). However, tourism planning needs to engage the interest of community members and fit with their cultural norms. A consistent finding from a number of studies globally is that the greater place-attachment that exists among people – measured by length of residence, which may not be a good predictor – the weaker their support for developing tourism (Nepal 2008). Aboriginal and Torres Strait Islander people of Weipa, far north Queensland, were found to be little interested in tourism development, notwithstanding advocacy about its potential value (Buultjens et al. 2010). Conversely, most residents of a mountain mining community in British Columbia were positive about socio-economic and recreational opportunities from tourism development (Nepal 2008).

One important economic opportunity identified for Aboriginal people in remote place-attached communities is in the local service sector, including building, maintenance and natural resource management (Stafford Smith et al. 2008). This sector is seen as having potential to be locally controlled and as one of limited opportunities to generate local economic multipliers. Realising this opportunity may require building stocks of human, bridging social, physical and financial capital during the life of a mine that can be sustained beyond the mine life (Stafford Smith et al. 2008). For example, some of the physical infrastructure established for mining in and near Weipa is considered as also having value for ECV since it could be used in tourism development (Buultjens et al. 2010).

Experience from two Canadian examples of mining interactions with remote First Nations communities (O'Faircheallaigh 1995, Gignac 1998) indicates the need to take a nuanced and critical view of 'community' in assessing how capitals accumulated during the life of a mine might contribute to ECV. These examples illustrate that local communities are not homogenous in their engagement with mine work force opportunities. Thus individuals may accumulate human, financial and physical capital during the life of a mine through engaging in mining employment (O'Faircheallaigh 1995, Gignac 1998). However, inequalities and conflict among Indigenous kinship groups can be heightened by wealth discrepancies fuelled by mine employment (O'Faircheallaigh 1995). This can readily work against community cohesion and the capacity for communities as a whole to engage the capitals of these individuals (O'Faircheallaigh 1995) in any community-wide strategy for ECV. More extreme impacts are also possible. For example, radical changes to the identity of Indigenous people are forecast as a result of rapid large-scale resource development in a third Canadian example, leading to potential health crises because these people perceive health emically; that is, health is integrally related to the integrity of their values, knowledge and institutions which are being impacted by economic and environmental change (Parlee et al. 2007). Adverse impacts on local people's capacity to work cohesively in developing ECV are also likely to result, given that the literature reviewed draws attention to the need for community development in remote places (and arguably elsewhere) to be guided by a common vision shared by diverse community members (Nepal 2008) or at least a range of distinct visions (Bebbington et al. 2008). These three Canadian experiences

suggest that while bonding social capital is important for remote communities to generate ECV, it may decline as a result of mining engagement.

Other literature indicates the importance of bridging social capital generated during the life of a mine for generating ECV. The degree of cooperation – among corporate, government and community actors (Norman 2001, Ali & Grewal 2006, Bebbington et al. 2008, Nepal 2008, Buultjens et al. 2010), and with a diversity of other actors relevant to alternative development trajectories (Nepal 2008) – can be expected to impact on bridging social capital and the capacity of these various interests to work together in realising ECV. Corporate factors that build and maintain community trust, and hence foster bridging social capital, are identified in the literature reviewed as:

- corporate transparency, flexibility (Ali & Grewal 2006)
- effective community engagement and understanding of how community sees issues (Epps 2003)
- management of community expectations via clear roles and responsibilities and communication (Epps 2003)
- measurable goals and progress reporting (Epps 2003)
- safe, productive work environment (Fletcher 2010)
- absence of any environmental or other mine disasters, which can readily destroy trust (Epps 2003)
- consistent attention to relationships, which can be destroyed by precipitate changes to corporate key people (Epps 2003)
- capacity, including appropriate partnerships and mobilisation of core competencies in the company and beyond (Epps 2003)
- a flexible and understanding approach to environmental and community concerns (Norman 2001)
- community perceptions of a mining project as socially and environmentally sound and confidence in the regulatory framework for environmental impact (Ali & Grewal 2006).

5.2.3 Supportive institutions and processes for ECV

Local community support for, or at least tolerance of, a mine is critical to generating ECV. In extreme cases, operation of the mine may not be feasible without that tolerance or support. If conflict over mining becomes entrenched, local populations forgo new opportunities. They are either ignored or dispossessed, while mining proceeds with support of the national community, or else no mining occurs and no alternative local livelihood trajectories are enabled (Bebbington et al. 2008).

Community engagement in project design and in planning for social issues from the earliest stages of the mine are considered critical to gaining community support for a mine (Norman 2001, Epps 2003), yet rarely achieved (Epps 2003). Such processes can contribute to a sense among local people that they have control over development, which the literature reviewed considers important to gaining the support of place-attached remote communities for externally driven development trajectories (Ali & Grewal 2006, Parlee et al. 2007, Bebbington et al. 2008, Nepal 2008, Stafford Smith et al. 2008, McFerson 2010). Recognition of Indigenous ownership is often particularly important for gaining Indigenous people's support for a mine (Ali & Grewal 2006).

Government can contribute to promoting engagement and effective planning for ECV in remote communities by a policy environment that recognises heterogeneous community aspirations and enables, or at least does not stifle, community self-organisation (Stafford Smith et al. 2008). Corporate support to communities should address local community constraints, including access to financial capital and skills

development. It should also be flexibly applied to avoid the risks of locking into a non-responsive model (Buultjens et al. 2010). For example, in remote Aboriginal and Torres Strait Islander communities, corporate support should be available to community members either via community organisations or by direct arrangements between a mining company and interested community members (Buultjens et al. 2010). Flexibility maximises the prospects of communities self-organising around the diverse aspirations of their members.

Good governance (accountability, transparency, rule of law, participation) in government–mining company interactions is particularly important to equitable benefit from mining (McFerson 2010) given that it impacts on community cohesion and hence on community capacity to engage with generating ECV. Attention to principles of sustainability is important to good governance during the life of the mine and may contribute to fostering change in corporate and civil cultures; strengthening environmental and labour legislation; and improving biophysical, social and ecological conditions (Glauser et al. 2005). Corporate attention to these issues is driven by global initiatives, including the Minerals Mining and Sustainable Development final report; the ‘Equator Principles’ adopted by nine international banks in 2003; World Bank Social Policies (Epps 2003); and transparency initiatives requiring corporations to publish payments made to governments (McFerson 2010). CSR and, more pragmatically, SLO (Cheshire 2010), are taking into account likely future changes in community expectations, such as may result from civil society giving increasing attention to environmental ethics (Glauser et al. 2005). Some companies also recognise that good corporate performance can drive even higher expectations (Gardner & Bell 2007), such that SLO is dynamic and evolving. Nevertheless, reliance on SLO is indicated as a weak basis for generating ECV. For example, SLO focuses most corporate attention on landowners and heritage custodians who have rights that can shut down a mine, rather than focusing companies more broadly on equity within a local community (Cheshire 2010). Further, SLO can be time-limited and readily out-weighted by mining company accountability to shareholders to manage costs. This can lead companies to stop investing in community social programs after mine production ceases, even where community expectations have not been met (Currey 2003).

The power of a mining company – which is related to its size and resources, its established relationships and the importance of its mining interests to national governments (Bebbington et al. 2008) – can affect its approach to community relations and to the question of ECV. For example, the capacity of a company to invest in community development at early stages of a mine as well as beyond a mine’s operating life is a function of size, capitalisation and forecast time to profit (Szwedzicki 2000, Beckingham & Stocker 2001, Ali & Grewal 2006). However, the more powerful mining companies also have greater political power at national scales or among elites. As a result, they have relatively less need to invest in strategies that will garner local support (Bebbington et al. 2008, McFerson 2010).

5.2.4 Challenges for developing ECV

The emphasis in the literature reviewed is on corporate–community relationships and capacities.

Government is portrayed as having a key role in generating an enabling environment and as a party to development initiatives. However, the lack of effective linkages between government and community in remote regions can mean that there is no governance/partnership structure that corporations can work with and strengthen in developing ECV. Government may be absent completely in remote regions.

Alternatively, as in remote arid Australia, government may be active in service delivery but operate inefficiently because of a lack of effective mechanisms for local people to express demand for services (Stafford Smith et al. 2008). In the absence of effective local governance, mining company support to local communities can inadvertently direct, rather than support, community development (Cheshire 2010). This

can generate dependency and short-term fixes, inhibiting development of a broader partnership approach to generating ECV.

The literature reviewed indicates that to engage effectively in the planning, cohesive action and the adaptive approaches that are required for generating ECV, remote communities need capacity to understand and manage for uncertainty (Stafford Smith et al. 2008). They need to be able to accommodate a range of distinct visions for a region, mediate tensions and manage conflict (Ali & Grewal 2006, Bebbington et al. 2008, Stafford Smith et al. 2008, Buultjens et al. 2010). They also need to be able to partner for critical mass and skill synergies (Stafford Smith et al. 2008). These capacities are affected by the esteem or standing of the local community and its willingness to take risks (Ali & Grewal 2006). This in turn is influenced by the extent of control that the local community has been able to effect over past decisions that affect their environment (Glauser et al. 2005, Ali & Grewal 2006, Parlee et al. 2007, Bebbington et al. 2008, Nepal 2008, Stafford Smith et al. 2008, McFerson 2010). Small place-attached communities can lack strong capacity in these arenas due to factors such as low populations, marginalisation, and historical experience. Rentier attitudes among remote place-attached communities present further challenges for ECV. These attitudes lead remote people to focus on economic return through rental strategies (e.g. royalty equivalents from mining on Aboriginal lands) rather than investing their available human and social assets into economic production (McFerson 2010).

The literature reviewed indicates a number of challenges for corporate capacity to support communities to address such challenges and to contribute to generating ECV. For example, the literature suggests that the failure by industry to recruit talented and committed people with an interest in remote regions means that industry capacity to lead effective community engagement is diminishing over time (Stuart 2005). A lack of attention to the community/social dimensions of planning in values and priorities of corporate leaders, management systems (Epps 2003) and professional recruitment (e.g. see Hissey 2005, Stuart 2005) is also noted.

6. Intersection between RESILIENCE and REMOTE COMMUNITIES

Given the focus of this section, we often use the term ‘remote’ even though the literature uses other more specific or nuanced terms that were included in our search parameters (Table 1), for example, deserts, drylands, rangelands, arid and semi-arid areas as well as other associated terms such as savanna. These kinds of biophysically defined areas are often sparsely populated and remote from major urban areas. However, not all remote areas are in these kinds of environments. We keep the original term or include it in brackets where it is important for context or where use of the term ‘remote’ instead of the original term risks misrepresenting content.

6.1 What is particular about the interaction between RESILIENCE and REMOTE COMMUNITIES

People in remote communities face great uncertainties in relation to their livelihoods because of inherent temporal and spatial variability of the biophysical system, mainly driven by rainfall, as well as variability generated by the social system as a result of sparse, mobile populations and variable distant signals from policy and markets (Stafford Smith et al. 2008, McAllister et al. 2009). These inherent characteristics result in remote social-ecological systems having either multiple equilibria (Anderies et al. 2002, Retzer 2006, Leuteritz & Eklund 2008, Richardson et al. 2010) or else a wide ‘basin’ of resilience characterised by a capacity to function through cycles of drought and wetter periods (Mortimore 1988, Colloff & Baldwin 2010). Social parameters are suggested as the dominant drivers of change in these systems (Leuteritz & Eklund 2008). Remote systems subject to climatic variability can be relatively resilient if institutions are appropriate and effective (Mortimore 1988, Vetter 2009, Dougill et al. 2010). For example, rainfall variability leads to human mobility that reduces soil degradation compared to sedentary use (Janssen 2010). However, institutional changes that affect customary strategies for natural resource management may lead to land degradation (Mortimore 1988, Enfors & Gordon 2007).

As well as the routine variability of climate systems, remote communities face extremes of climate change. Climate change is likely to increase temperature and disturb hydrological cycles, resulting in lower and more erratic rainfall, reduced water supply and potential conflicts in water allocation (Archer et al. 2008, Thomas 2008a).

A resilient remote settlement in Australia can be defined as one that is viable over the long term even though inputs vary over time (Stafford Smith et al. 2008). Viability judgements by distant policy makers may be underpinned by inappropriate mental models and insufficient understanding of the motivations of communities and their potential to self-organise and provide services (Stafford Smith et al. 2008).

The introduction of technologies such as modern systems of water supply in remote regions can increase resilience of communities in the short term by ensuring safety and reliability. However, these technologies can also cause 1) technology-induced environmental distancing whereby people lose awareness of resource variability and the intimate knowledge and sensitivity they need to adapt their behaviour; and 2) a transition from cultural to convenience values of water that may result in reduced resilience in the long term and acute vulnerability to disruptions in supply (Alessa et al. 2010). The decoupling of livelihoods from local natural resources that accompanies changes from subsistence to cash economies reduces awareness of environmental degradation and erodes local ecological knowledge. This may represent a system transition because re-establishing that knowledge is difficult (Turner et al. 2007).

The transition of values is reinforced by a shift from continuous to discontinuous transmission of traditional knowledge which is occurring in many remote communities (e.g. Alessa et al. 2008). This is particularly pertinent in that resilience literature widely attributes application of traditional knowledge as important to adaptive capacity and positive resilience. Traditional knowledge has been less disrupted in remote communities than elsewhere. The role of identity and a positive attitude to remote lifestyle (Dean & Stain 2007) and political re-conceptualisation of marginalisation as a collective struggle (Wexler et al. 2009) are also noted as important to resilience in young people.

6.2 Necessary considerations for developing ECV

Resilience of communities and the social-ecological system was presented as a solution to the multiple endogenous and exogenous stressors faced by remote or marginalised communities. Following from this, resilience could be interpreted as important to realisation of ECV by a remote community. Eighteen of the 20 articles analysed took a normative view of resilience, considering resilience to be a good thing. The exceptions considered how authoritarian resilience is maintained through censorship of media and courts in ways that legitimise authority (Stockmann & Gallagher 2011) and recognised that resilience can restrict flexibility and adaption (Stafford Smith et al. 2008).

The literature considered that resilience in remote communities could be enhanced by:

- social strategies that mimic desert biophysical responses to resource scarcity, in order to diversify access to resources across space and time (McAllister et al. 2009)
- reducing technology-induced environmental distancing or decoupling of the social and ecological dimensions of the social-ecological system (Alessa et al. 2010)
- enhancing community mobility in order to improve access to livelihood options (Spielmann et al. 2011)
- introducing water efficient varieties of crops and adopting promising new renewable technologies (Thomas 2008a)
- recognising and paying for environmental services and introducing institutional and policy measures that enhance social-ecological resilience (Thomas 2008a)
- simplifying costly and complex bureaucratic networks and building effective bridging networks for effective approaches to cultural and natural resource management (Woodward 2008)
- assisting demand-driven and innovative local service provision as this would promote local control, responsibility and long-term viability of remote settlements (Stafford Smith et al. 2008)
- learning from archaeological findings that indicate residents of past remote communities had self-organising social-ecological systems that supported internal circulation of resources (Spielmann et al. 2011)
- recognising and working with customary practices and institutions that have social links, are environmentally sound, and incorporate the flexibility needed for management in risk-prone environments (Barrow 1990).

7. Intersection of SUSTAINABILITY and REMOTE COMMUNITIES

As in the previous section, we often use the term ‘remote’ in this section even though the literature uses other more specific or nuanced terms that were included in our search parameters (Table 1), for example, deserts, drylands, rangelands, savannas, arid and semi-arid areas. We keep the original term or include it in brackets where it is important for context or where use of the term ‘remote’ instead of the original term risks misrepresenting content.

7.1 What is particular about the interaction between SUSTAINABILITY and REMOTE COMMUNITIES?

Often planning for sustainable development is done by people elsewhere, in core areas away from remote peripheries, and there is too little attention to local forms of expertise, aims and priorities (McDowell 2004). Complex interacting factors particular to remote communities require a systems approach to sustainability and distinctive indicators (Mitchell & Woodmansee 2002, Davies et al. 2008b, Thomas 2008b, Fox et al. 2009, Cowie et al. 2011). Sets of criteria and indicators developed for monitoring sustainability in other environments may be adaptable to remote areas [rangelands], as has been established for forest system indicators developed through the Montreal process in the 1990s (Mitchell & Woodmansee 2002, Shields & Bartlett 2002). However, one common omission is indicators that can elucidate the intersectoral linkages (Shields & Bartlett 2002). These are important to sustainability of remote areas because such areas often have multiple integrated values.

7.1.1 Values

Remoteness impacts in complex ways on remote people’s general quality of life, concerns, aspirations and priorities. In one study from a Scottish island (McDowell 2004), positive feelings stemming from attachment to place and a sense of community were offset by negative feelings about impacts of cost of living, poor service provision, transport difficulties, isolation and concern for the future of young people. Such a combination of feelings and issues is also familiar to people living in remote Australia.

Small remote settlements develop diverse distinctive ways of operating, capacities and aspirations that need to be respected by higher organisational levels if governance structures are to be sustainable (Sanders & Holcombe 2008).

Contests over whether rural communities are sustainable involve a clash of values: ‘life values’ (individual and collective needs for good quality of life, including the strong place-attachment that is typical in desert regions of Australia) versus ‘money values’ (economic activity directed at increasing financial wealth). Life goods and social capital (education, social inclusion, job opportunities, networking) in rural communities are enabled, protected and determined where there is a strong civil commons (i.e. regulatory systems for clean air, water, etc; universal education; environmental open space; public art; architecture, etc) (Sumner 2005). This argument suggests that a universal standard of provision of ‘civil commons’ in rural communities, through public funding, is the key determinant of rural community sustainability. However, the converse is often argued or implied in Australian remote contexts: that communities are unviable or unsustainable if they do not contribute economically and are hence not entitled to scarce public funding to build and maintain civil commons. When a broader view is taken of the definition of ‘costs’ of remote living as analysed for the Northern Territory, it is apparent that remote Aboriginal and Torres Strait

Islander people have a smaller ecological footprint than other Aboriginal and Torres Strait Islander people, mainly due to higher local (bush) food consumption (Wood & Garnett 2009).

In the case where remote desert people become urbanised, recreational camping can provide one of few tangible links to their heritage and their forebears' way of life. Yet it has considerable negative impact on the natural environment through garbage and human waste and off-road vehicle use, as in Kuwait (Mahgoub 2007).

7.1.2 Economic activities

Enhancement of existing livelihoods or promotion of alternatives is important to improve the welfare of remote arid and semi-arid populations. Small-scale innovations based on production of food, fuel and construction materials can have potential, as well as challenges, for environmental sustainability (Ngugi & Nyariki 2005). One challenge is the efficient use of water resources, which is critical to economic development in arid regions (Hambright et al. 2000, Jacobs & Holway 2004).

One livelihood activity in remote Aboriginal and Torres Strait Islander communities is wildlife harvest, a cultural and customary economic activity that also interacts with state-supported economic activity and with markets, presenting additional complexities for sustainable harvest (Kwan et al. 2006).

Other activities, such as tourism planning and management in the remote regions that cover much of northern Australia, need to be informed by region-specific data on tourist experiences and environmental impacts given that remote regions are data poor and their tourism characteristics are distinctive. For example, the natural environment or wilderness experience is paramount for tourists to the Kimberley region (Larson & Herr 2008), suggesting that if communities see tourism as part of their long-term sustainable future, then planning for tourism and monitoring of tourist experiences need to be fully integrated into their local planning.

7.1.3 Ecosystem management

For production to be sustainable in remote [dryland] regions, it needs to be based on natural climate and vegetation cycles. Sustainable land management is important to promoting resilience in these dynamic environments (Cowie et al. 2011), and resilience needs to be fostered by preservation and redundancy.

7.1.4 Services

More efficiency in government service delivery would help improve services to remote Aboriginal and Torres Strait Islander people while maintaining their low ecological footprint, since government service provision makes a relatively high contribution to that footprint (Wood & Garnett 2009). One area where this is suggested to be possible is housing: Aboriginal and Torres Strait Islander home ownership is especially low in remote areas, which is considered to constrain standard of living and Aboriginal and Torres Strait Islander people's sense of security and control. The experience on Bathurst Island, NT, of building 14 houses for purchase by community members shows that good design of home purchase arrangements can overcome Aboriginal and Torres Strait Islander people's common expectation that government will provide for their housing at no cost. In this example, good design of the houses and the building program achieved high quality (guaranteed for 25 years), relatively low-priced, energy-efficient and low carbon-footprint houses that met local social and cultural needs (Burroughs 2010).

A challenge in the area of service provision is the poor access to and high costs of improving telecommunications in remote regions. This means it cannot readily serve the lynchpin role for sustainable social and economic development that it serves in other areas (Bandias & Vemuri 2005). Another

challenge is in the high cost of importing energy to remote regions, which makes development of alternative renewable energy sources very important for regional sustainability (McDowell 2004, Mala et al. 2008). Energy options need to be evaluated in the context of community livelihoods, including their effect on people's opportunities and choices for income-generating activities, and their sustainability, including affordability, flexibility and local technological capability for maintenance and management (Mala et al. 2008).

Health care professionals have a key role in the social capital and social sustainability of remote communities and service delivery design overlooks that role when reducing staff in order to cut financial outlays (Farmer et al. 2003). Sustaining specialist health services in remote communities is particularly difficult (Gruen et al. 2002).

7.2 What does this literature say about Enduring Community Value (ECV)

The literature talks about factors that impact on sustainable development or on transitions to enhanced sustainability. We interpret these as being related to the 'enduring' aspects of ECV.

7.2.1 Dimensions of ECV

Literature on sustainability and remote communities draws attention to some characteristics of sustainability that are likely to be important to place-based communities seeking ECV. These include sustainable land management, which offers an effective unifying theme in remote areas, spanning carbon stocks and flows, biodiversity protection and livelihoods, land degradation and desertification (Thomas 2008b, Cowie et al. 2011). The ecological values of remote regions, which underpin potential alternative diversified economies such as through tourism, are argued as being sufficiently important that they should command considerably more policy and planning attention (Tynkkynen 2007). On the social side, health care professionals are considered to be important for sustainability and maintaining the stocks of social capital in remote communities (Farmer et al. 2003). In Aboriginal and Torres Strait Islander remote communities, attention to the maintenance needs and life cycle of housing is important to sustainability (Burroughs 2010).

7.2.2 Necessary conditions indicated for developing ECV

The literature on sustainability and remote communities indicates a number of conditions that are likely to be important for developing ECV. These are:

- Remote local groups need to forge effective relationships with organisations at higher institutional levels if they are to have the capacity and support that they need to implement their aspirations. In turn, higher level organisations need to respect and work with the capacities of people in the local groups (Sanders & Holcombe 2008).
- A 'common language' is needed to support close interactions between policy makers, managers, users and scientists, as Hambright et al. (2000) found for water management. In addition, a transition to sustainable development needs high quality data, planning and research support; a clear policy framework, whether that relies on incentives and facilitation or regulations and coercion; and a recognition that an effective approach needs to grow and evolve over many years guided by a long-term goal and shorter-term plans that are updated (Jacobs & Holway 2004).
- In remote areas, where agriculture is often marginal, sustainable development requires improved productivity through payments for environmental services, together with better crop and weather

insurances; plus diversification to alternative livelihoods that are not primarily dependent on land productivity (Thomas 2008b).

- Monitoring and reporting programs need to have an enforcement capability (Mitchell & Woodmansee 2002).
- Education, research and outreach about sustainability (Mitchell & Woodmansee 2002) need to use pedagogies that will awaken environmental knowledge among learners by using observation and engagement with the environment, particularly in remote areas where mainstream educational models are not likely to be appropriate to local conditions (Gille 2008).
- Achieving sustainability in the delivery of services requires appropriate timeframes and local readiness, flexibility to take account of dynamic local conditions, a high level of community engagement, congruence with national policy, effective communication between participating organisations, project champions, effective use of monitoring and evaluation data, and adequate and ongoing funding (Wakerman et al. 2005).
- A focus on optimising for a particular production strategy is flawed in remote regions, since over-optimisation is a risk to resilience. Diversity, that is, maintenance of multi-functional landscapes and economic strategies, and functional redundancies, where more than one entity undertakes a role or process, are considered to be required if remote regions are to sustain their strengths (Cowie et al. 2011).

7.2.3 Supporting factors for developing ECV

The literature on sustainability and remote communities indicates some supporting factors that are likely to be important for developing ECV. These are:

- The sustainable livelihoods approach promotes a systemic understanding of factors that will promote sustainability in remote Aboriginal livelihoods and regional social-ecological systems (Davies et al. 2008b). This could be applied as a tool to support dialogue towards a common understanding among stakeholders about conceptions of ECV. However, it is important to take into account complex interactions between ecological, social and economic conditions, capitals and processes and how these are interpreted at different spatial and temporal scales. This is particularly the case in remote regions where variability across space and time indicates there is no ideal state or equilibrium, and transitions between states can be rapid (Fox et al. 2009).
- The universal service obligation (USO) that required Telstra to cross-subsidise service provision in remote areas should be replaced with a government subsidy that pays part of the cost of telecommunication services. This would assist in maintaining a competitive telecommunications environment, which the existing USO does not take into account. It would also facilitate the sustainable social and economic development of remote communities (Bandias & Vemuri 2005).
- Specialist services (e.g. in health) can be effectively delivered to remote places by outreach strategies (remote visits). However, poorly planned and conducted outreach will not be sustainable and will draw resources away from primary health care, which is already underserved (Gruen et al. 2002).
- The opening up of major markets and the windfall profits from market booms have been important in supporting transitions to sustainability in some remote regions (in this case agriculture regions in Kenya) (Zaal & Oostendorp 2002).

7.2.4 Constraints on developing ECV

The literature on sustainability and remote communities indicates a number of constraints that will impact on development of ECV. These are:

- Lack of local power in planning and decisions about resource use, which has precluded the development of economic activities that could provide alternatives to resource exploitation in ecologically rich regions (in this case in north-western Russia). This is a manifestation of the ‘resource curse’, where the abundance of natural resources (oil, forestry) inhibits investments in human capital (Tynkkynen 2007).
- Discounting future returns from livestock grazing (i.e. assessing present value only) results in unsustainable land use, land degradation and reduced opportunity for regeneration of degraded land (Wang & Hacker 1997). An inference that might be drawn from that research for mining operations is that discounting the future value of a place (i.e. assessing its value only for mineral exploitation) could result in the non-mining values of the place being degraded. This might present follow-on risks to mining through impacts on a company’s SLO.
- Effective measures to integrate environmental and social costs and benefits, including local perceptions of these, in a way that allows them to be integrated into policy, are lacking (Mitchell & Woodmansee 2002).

7.2.5 System components and interactions that impact on realisation of ECV

A number of system components and interactions that can be expected to impact on various stakeholders in relation to realisation of ECV are identifiable in the literature on sustainability and remote communities. These are:

- Objectives of the three international conventions on climate change, biodiversity and desertification are important to sustainability. These need to underpin approaches to ECV. Sustainable land management can impact on all three conventions by practices that conserve moisture, maintain or enhance species diversity, reduce cultivation, replace annual with perennial species and use native species. These practices also enhance productivity and nutrient and water use efficiency, all of which are important to sustaining value from the land (Thomas 2008b, Cowie et al. 2011)
- Interactions between cultural or customary economies, state-supported economic activity and markets which are particular to Indigenous communities in developed countries because the state sector is typically weaker in developing countries (Kwan et al. 2006). This situation indicates that realisation of ECV has specific dimensions in Australia and possibly other developed countries compared to the developing world. The extent of state support in Australia could mean that local communities seeking sustainable livelihood strategies have better prospects of overcoming the variable and marginal productivity (for wildlife, livestock, agriculture and tourism) that often characterises remote areas. For example, a local community can switch from production/harvesting to state-supported incomes, which may allow a resource to recover. Alternatively, they can use state-supported incomes to adopt new technologies that promote production/harvest efficiency and may promote over-exploitation. Assured state support could potentially reduce local commitment to the long-term transformational strategies that are likely to be necessary for ECV.
- Capacity for sustainability, which is a system property related to property rights, land-use policy, use of best management practices, access to capital, social capital and sense of place (Mitchell & Woodmansee 2002)

- Place attachment and social capital modes characteristic of desert Aboriginal communities (Sanders & Holcombe 2008)
- The low ecological footprint of remote Aboriginal and Torres Strait Islander people (Wood & Garnett 2009), which challenges the argument that remote settlements are too costly to be sustainable by showing that such judgements depend on how costs are calculated. However, improving quality of life in these settlements while retaining low ecological footprint is a significant challenge.

8. Intersection of SUSTAINABILITY and RESILIENCE

8.1 What is particular about the interaction between SUSTAINABILITY and RESILIENCE

Different types of interactions and links between sustainability or sustainable development and resilience are identified in the literature. These include interactions of sustainability and resilience (1) in response to perturbations at different scales; and (2) in terms of conceptual relationships and measurements.

8.1.1 Interactions between sustainability and resilience in response to perturbations at different scales

Global environmental changes such as climate change are considered as major threats to sustainability. Communities and social-ecological systems will have differentiated vulnerability to climate change and other global perturbations. Vulnerability is considered as a function of exposure to climate change elements, the sensitivity of the systems to change (that is, their resistance), and the resilience of the systems (that is, the amount of perturbation the systems can absorb without qualitative change) (Turner et al. 2003). Here resilience is considered equivalent to adaptive capacity in that it reduces the vulnerability of a system to perturbations. Hence resilience is a system property that is essential for sustainability (Darnhofer et al. 2010).

A shift from a conception of ‘engineering resilience’ to one of ‘systems resilience to perturbations’ is recommended for industries, including mining companies, in order to enhance system-wide sustainability (Flint 2010). Engineering resilience is geared to anticipate and resist disruption. However, engineering resilience often makes systems vulnerable to unforeseen factors. In contrast, designing and developing systems resilience requires attention to flexibility and adaptive capacity to absorb perturbations. This shift in the conception of resilience is important because failure of industrial plants due to unforeseen factors could have significant impact on the efforts and concerns of both shareholders and stakeholders to progress sustainability (Flint 2010).

Local household-level responses to perturbations impact on community-wide or regional-level resilience and sustainability. This local to regional link is mediated through human–environment interactions. The degree of either resonance or disconnection between local and regional-level interests can influence the trajectory of the system’s development, either towards sustainable futures or alternatively towards less resilient futures. Reducing this potential disconnect requires that attention be paid to the roles of individual and household motivations and capacities to respond to perturbations, and to information exchange between the different scales (Eakin & Wehbe 2009).

At an individual level, resilience is an adaptive response to adversity or a speedy and thorough rebounding of emotions from stressful events (Zautra 2009, Zautra et al. 2010). Resilience is important for sustainability: it is a measure of how well people sustain health and psychological wellbeing in a dynamic

environment characterised by ongoing challenges that threaten to disrupt the engagements that give people's lives meaning and purpose (Zautra 2009).

8.1.2 Interactions between sustainability and resilience in terms of conceptual relationships and measurement

Conceptual relationships and measurement between sustainability and resilience are affected by different interpretations of the two terms. While there is a relatively broad agreement on the meaning of sustainability (and sustainable development), resilience has a number of interpretations that widely differ in scope. These range from narrow descriptive technical definitions that focus on the capacity of a system to buffer perturbations, to definitions that include learning, adaptation and transformation.

A clear conceptual relationship, amenable to measurement, is drawn between sustainability and the descriptive definition of resilience. In this definition, resilience comprises a capacity to buffer disturbance without any qualitative change to the system (Maler 2008). It is considered to be a necessary condition for sustainability because it is an insurance against crossing system thresholds. This insurance is essential for sustainability as sustainability is often defined, that is, bequeathing a stock of wealth to the next generation that will enable the next generation to reach at least the same welfare as the current generation is enjoying (Maler 2008). This definition requires that the value of the asset base available to the relevant population does not decline over time.

A resilience perspective implies that you cannot assume a steady state in assessing the asset base (Agliardi 2011) since the asset base is affected by dynamic processes and feedbacks. The composition of the asset base is also critically important. The asset base should have the critical properties of diversity and redundancy that are necessary for a social-ecological system to be resilient, that is, to absorb disturbances and still maintain functionality (Perrings 2006).

A measure of the resilience of a system can be included as part of measures of the sustainability of that system. This could be achieved by including the buffering capacity of the stock of assets as part of the set of indicators of man-made and natural assets that form a framework for assessing sustainability or sustainable development. Key characteristics that are important to the buffering capacity of assets are the diversity of assets and distance of system of interest from thresholds (Maler 2008).

8.2 What does this literature say about Enduring Community Value (ECV)

Little of the literature reviewed talked directly to ECV, but almost all the literature related the concepts of sustainability and/or sustainable development to the concept of resilience and highlighted that both are essential for continuity and persistence of systems. We interpret that both concepts are also essential for ECV.

8.2.1 Dimensions of ECV

Dimensions important for ECV are those that are raised for sustainable development and resilience. Sustainable development requires attention to environmental, economic, social and cultural dimensions (Flint 2010) as well as equity and sustainability principles for bequeathing resources (Maler 2008).

Community resilience is said to have multiple dimensions, including community resources and their development and engagement, active agents, collective action, strategic action, equity and impact (Magis 2010). The validity and reliability of these dimensions to the construct of community resilience are not yet tested.

8.2.2 Drivers

Different internal and external drivers of sustainability and resilience that will have direct bearing on ECV are identified in the literature. Major external drivers that will have differential local impact include climate change and its current and projected impacts (Eakin & Wehbe 2009), which will tend to entrench current inequalities (Allouche 2011); and changes to values and other social dimensions that influence corporate environmental and social responsibilities (Fiksel 2003). Another external driver is the globalisation of communication, transport, trade and ownership of companies. These factors all act to reduce the heterogeneity and independence of institutions and operations. As a consequence they transport and increase the risk of perturbations and the global reach of the impact of those perturbations (Perrings 2006).

Diversity and thresholds are the major drivers internal to a system that are important for resilience and sustainability (Perrings 2006). At an individual and local level, self-interest, motivation and the values and beliefs about human–environment relations drive people’s efforts to realise resilience and sustainability (Eakin & Wehbe 2009). Hence they also drive efforts to realise ECV.

8.2.3 Necessary conditions indicated for developing ECV

Processes that facilitate or are necessary for ECV due to their contribution to sustainability and resilience are:

- Developing benefit distribution mechanisms that address local-scale inequalities driven by imbalanced power relations, including gender dimensions (Allouche 2011)
- Fostering positive individual emotion, strong community connections and shared values and purposes (Zautra 2009, Magis 2010, Zautra et al. 2010)
- Managing the disconnect between individual or family livelihood aspirations and community or regional aspirations, because such disconnects can be a source of vulnerability for ECV (Eakin & Wehbe 2009)
- Establishing effective governance of information, motivation and capacity exchanges between the local and regional scales in order to mediate interactions between the social and environmental components of a system (Eakin & Wehbe 2009)
- Investing financial capital from mining into other forms of capital that enhance the buffering capacity of assets (Maler 2008)
- Identifying critical capitals from different cultural perspectives, and particularly that of place-based communities (Brand 2009)
- Enhancing traditions, knowledge, institutions and activities that maintain a sustainable relationship between the social and ecological components of a system and that help the social-ecological system to be resilient to shocks (Folke et al. 2002, Trosper 2002). This literature indicates that, while engaging with mining activities and opportunities is important, it is also important that people do not abandon existing practices that assist resilience and sustainability. Social change in place-attached communities driven by new economic opportunities can weaken internal cohesion and also perpetuate mistrust of external institutions (Barrera-Bassols & Zinck 2003). Place-based communities should negotiate with mining companies to develop shared governing principles that promote resilience and sustainability (Trosper 2002)
- Adopting explicit and transparent governance principles supported by strong norms that are binding and that provide incentives to parties to exercise sustainable resource use (Trosper 2002)

- Maintaining and building positive resilience to non-mining related perturbations in order to develop a strong bargaining position in negotiations and agreements about ECV (Zautra 2009, Zautra et al. 2010)
- Participatory development of heuristics for resilience thinking and surrogates for resilience in mine settings, for use by mining corporations, government and communities to guide their interactions. These would need to take into account time dimensions (change over time in response to stresses and shocks), space dimensions (place-characteristics and policy contexts) and human dimensions (what the community makes of the mine opportunity and what community values and preferences are for the future). Drawing from factors identified as contributing to resilience in farm settings (Darnhofer et al. 2010), resilience in a community-mine setting is likely to be contributed by:
 - a big picture view of threats and opportunities
 - far-reaching and accurate information systems
 - trust in the information provided and viable options for change
 - considering a complete set of choices, beyond people's current experience
 - using all forms of knowledge
 - flexible planning structures and processes
 - strong infrastructure for learning and support
 - a strong sense of purpose, place and belonging
 - confidence and optimism among individuals
 - willingness to admit mistakes and to squarely confront change when needed
 - strong leadership within the local community
 - equitable and rapid access to resources when needed to effect change.

9. Conceptual framework for ECV

Achieving ECV from mining in remote regions requires an integrated approach between social, environmental and economic components of social-ecological systems. The need for a systems approach is highlighted by our analysis of literature on sustainability and remote communities. This highlights that the particular context of remote communities needs to be considered in assessments of sustainability but often is not. Approaches to sustainability tend not to account well for the multiple integrated values and intersectoral linkages that characterise remote areas and the frequent tensions between endogenous and external institutions.

Rather than focusing on component parts of a social-ecological system (such as minerals production, local engagement in the mine labour force, education or natural resource condition), systems approaches seek to understand the relationships between components. Change in one component will affect other components in either positive or negative ways. Systems research approaches, developed through tools such as scenario planning and modelling, can help to account for non-linear dynamics that arise in these situations and that are highlighted in literature on resilience and sustainability as critical determinants of outcomes from human endeavour. These approaches offer important potential for insight into how changes in policy and practice in single sectors such as mining can promote positive and lasting changes in human wellbeing as are envisaged by the notion of ECV.

9.1 Adapting the Sustainable Livelihoods Framework

An existing framework, the Sustainable Livelihoods Framework (SLF, see Box 1 and Figure 2), provides the basis for a conceptual framework and systems model for ECV. The SLF has currency through its frequent use in international development as a planning and evaluation tool or a heuristic to guide policy, research and practice (Scoones 1998, Batterbury & Forsyth 1999, Hussein 2002, Armitage 2007, Davies et al. 2008a). The five capitals used in the SLF to characterise livelihood resources have been applied in Australia to explore adaptive capacity in the agricultural and natural resource management sectors (Brown et al. 2010) and in value chains in Western Australian mining regions (Loechel et al. 2010, 2011). However, the SLF does not appear to have been applied to interactions between mining and remote communities or to considerations of realising ECV from mining. Enhanced attention to risks, institutions and to interactions and feedbacks between processes operating at different scales is important to effective application of the SLF in this context.

Conventional applications of the SLF tend to assume that policy interventions will result in a steady state of enhanced livelihoods (Armitage 2007). They do not always account for shocks and uncertainties that arise at different scales, such as the opening or closure of a mine. Nor do they account well for the feedbacks within livelihood systems, such as how people's aspirations for livelihood outcomes and their compliance with institutions may change with changes to their asset base and to livelihood strategies. The fit between the SLF and processes involved in realising ECV is enhanced by conceptualising the dynamics of a livelihood system as being impacted by processes operating at multiple scales, from local to global. This references the concept of 'panarchy' – rapidly unfolding or slowly changing processes that take place and interact at many scales (Holling 2001). Global drivers, such as climate change, that present risks to remote communities and mining companies but are unable to be substantially mitigated by either party's actions, highlight the importance of institutions that manage risk by fostering adaptive capacity within livelihood systems. These issues are considered further below in relation to the literature analysed in earlier sections of this report and the deliberations of the project workshop.

Box 1: Sustainable Livelihood Framework and capital transformation

The Sustainable Livelihood Framework (SLF) is an aid for conceptualising the process of improving the sustainability and resilience of livelihoods, particularly as that process is experienced by individuals and communities. The SLF (Figure 2) provides a conceptual model of dynamic processes involved in people making a living. Livelihoods refer to the strategies employed by individuals, families or communities to make a living. The SLF illustrates that people have access to and use assets or *capital*, which encompass tangible and intangible entities in various domains: natural, physical, financial, human or social (see Figure 3). Cultural and political capital are also sometimes specifically identified. People use capital to implement strategies (activities) that generate livelihood outcomes, or in other words, progress their aspirations. Livelihood outcomes can be conceived of in material terms, such as income, food and shelter (Scoones 1998) and also include higher order conceptions of what is important for a 'good life'. Here the SLF interfaces with capability: people's ability to lead lives they have reason to value (Sen 1999).

For sustainability, achievement of aspirations should involve building, or at least maintaining, the total stock of *capital*. Transformations between different kinds of capital may occur in the process (Figure 3). In the framework, *institutions* are the norms, rules and policies that influence people's access to *capital* and determine what livelihood *strategies* are available to them. If effective, *institutions* will help people to manage the *risks* to capital that they face and the adverse impacts of these *risks* on their *capital*. Resilient and sustainable livelihoods are strategies that cope with shocks and stresses, maintain or enhance capitals despite uncertainty, and provide opportunities for future generations to maintain equivalent or enhanced livelihoods (Armitage 2007).

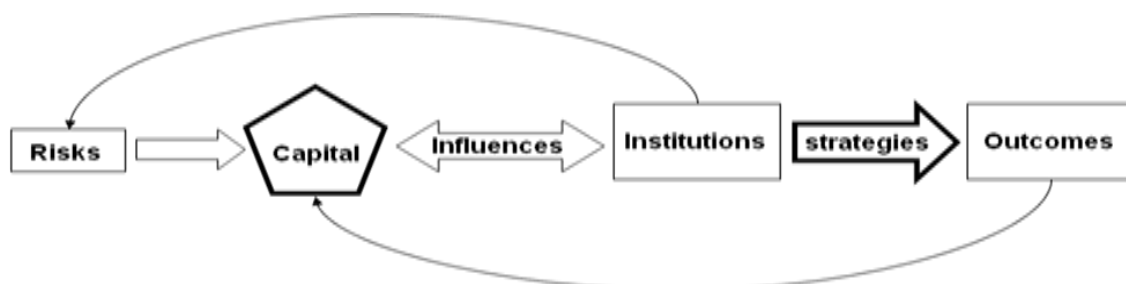


Figure 2: Generic conceptualisation of the Sustainable Livelihood Framework (SLF) indicating dynamic interactions

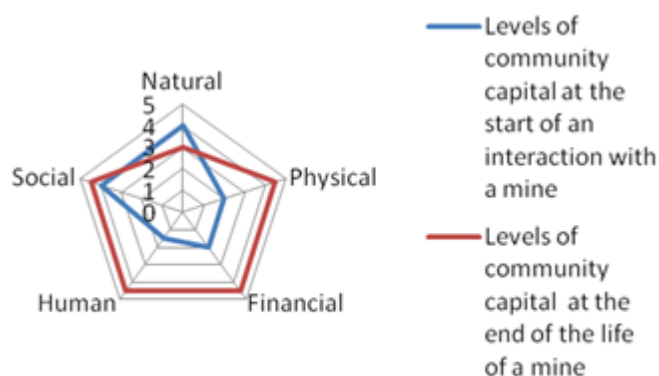


Figure 3: Representation of one possible set of levels of various capitals of a community at the start of an interaction with a mine and at end of the life of a mine

Depletion of natural capital during the life of the mine reflects the removal of minerals in the course of mine operations and any associated impacts on other natural capital. Increase in other capitals reflects transformation of this natural capital, via financial capital, to other forms of capital.

9.2 Capital transformation

Literature on mining and sustainability highlights that sustainability, in the mining context, requires transformation of capitals (assets) during the life of a mine into forms of value that are distributed equitably, and that will endure beyond the life of a mine, including for future generations. This is a critical process for ECV. Literature on sustainability and resilience highlights that diversity and redundancy in the asset base are also required in order that a social-ecological system has capacity to absorb disturbances and still maintain functionality, or to transform to a healthier state.

The process of transforming assets for ECV can be conceptualised using the SLF (Box 1). Individuals and communities apply capitals that exist at the start of the mine, together with any financial flows and other opportunities that they have as a consequence of the mine, into strategies that generate outcomes. These outcomes should include a stronger total pool of assets than existed before the mine. The balance between asset classes may be changed in the process. Literature on sustainability and resilience indicates that where social systems are undesirably resilient (characterised by poverty or vulnerability traps), mining may trigger system transformations by inputting knowledge, skills and financial resources (human and financial capital) mobilised at higher scales through globalised corporations, to the benefit of local communities. Literature on mining and sustainability explains that mining will always draw down some natural capital since minerals are extracted, transported away from the local community, and transformed through processing and manufacturing. However, with good environmental design and management, there may be no impact or minimal impact from mining on natural capital that is critical to maintaining the flow of ecosystem services in the mining locality and region.

Literature on mining and remote communities draws further attention to scale considerations for value transformation. Residents of remote mining towns and FIFO workers may seek a transformation, through employment and enterprise, of the financial capital generated by mining, into human capital (skills) and physical capital (notably houses) that will sustain their lives in other places after their period of mine employment, and that will sustain their descendants through inheritance. In such situations, the community of interest for ECV is constituted at a broader scale than the mine locality. However, local and regional scales assume relatively greater importance in the case of communities that have a strong prior attachment to the place where a mine is developed, such as Aboriginal and Torres Strait Islander and pastoral communities in remote regions. Such people are relatively more likely than mining town residents to want to realise ECV through enhanced human, social and physical capital within the remote region. Maintenance of critical natural and cultural capitals in the remote region is also likely to be relatively more important to these people than it is to those people who move to remote regions for mining work.

9.3 Aspirations

Different people have different aspirations for what they see as desirable for their lives in the future, their descendants and their communities. They will therefore seek different things from the opportunity provided by a mine. Some people frame their aspirations solely from their own individual point of view, expressing what they want to achieve or realise for themselves and their immediate family, rather than for communities that they are part of. Literature on mining and remote communities highlights that residents of remote towns that are established because of a mine are likely to have a stronger focus on individual

goals relative to collective goals than do people who were already living in an area before mining commenced. Residents of place-based communities may have a relatively stronger interest in the future of the remote community and in working towards collective aspirations. However, even in remote communities with strong place-attachment, individual residents and families will almost certainly also have aspirations that are not fully congruent with collective aspirations.

The concept of ECV puts the focus on collective aspirations. However, maintaining the coherence and collective capacity of a community requires that individuals, as well as the community as a whole, have opportunity to realise their aspirations. Thus the concept of ECV necessarily encompasses realisation of individual aspirations as well as community aspirations. Literature on sustainability and resilience indicates that substantial misalignment or disconnections between the set of aspirations for the community's future that are held in common by its members and the personal aspirations of individual members present vulnerabilities for realising ECV.

Literature on mining and remote communities and on sustainability and resilience draws attention to the importance of communities articulating a vision or set of visions for the future of the community that is shared across diverse community members. To illustrate the potential diversity of such visions, Table 4 indicates five scenarios or sets of aspirations that a remote community might have for their lives after the term of a mine. These are hypothetical scenarios, selected to present reasonably stark contrasts with each other.

Table 4: Hypothetical scenarios for a remote community's life after mining in their vicinity

Scenario name	Long-term aspiration of community members	Community strategies during life of mine
Enhanced status quo	Enhanced livelihoods in existing sectors: pastoralism, tourism, customary hunting and gathering, arts and various social and government services.	Little direct engagement with the mine. Protect and rehabilitate natural, social and cultural capital that is critical to existing livelihood sectors. Build human and physical capital for existing livelihood sectors. Co-design of mine infrastructure so that it has legacy value for community services and existing livelihood sectors.
Self-organised remote community	Self-sufficiency in the remote area through locally based employment and enterprise; children may leave for education but come back, settle and raise families.	Employment by mining corporation and contractors that builds skills for self-reliance (e.g. health and safety services, road works, infrastructure and equipment maintenance). Develop enterprises that serve mine but also have ongoing local and visitor market potential (e.g. vehicle maintenance). Develop off-site investments that will provide ongoing income stream post-mine. Co-design of some mine infrastructure for legacy use, ensuring low ongoing input costs.
Green economy	Low ecological footprint remote community with high quality community services; economy built on payment for environmental services and export of skills in green technologies.	Engagement through production of ecosystem services benefits for sale to mining corporation (and others) to achieve a low ecological footprint mine. Rehabilitation and management of land for carbon farming. Up-skilling in green technologies and IT; application of skills in water treatment and conservation, renewable energies, on-site uses of overburden/processing waste. Co-design of mine infrastructure as durable eco-village with fast IT services.
Suburban dream	City living with employment in urbanised sectors; visits to remote area for holidays and cultural renewal.	Direct engagement with mine where it promotes financial capital accumulation by individuals (e.g. via employment). Purchase houses/businesses in suburbs; education and up-skilling in urban settings for employment and enterprise management in urban sectors that have strong demand. Co-design of mine infrastructure for ease of removal, rehabilitation after mining.
Leisure city	Proprietors of an attractive modern urban centre, transport and service hub; service economy e.g. in retail, leisure industry including, e.g. gambling; production of high end items for elite markets.	Engagement focused on learning about globalised corporate culture. Up-skilling in business and property management. Develop joint venture partnerships. Co-design of mine infrastructure to future city blueprint plan (e.g. high quality roads, airport, parks/greenbelts, landscape modification for water harvesting and storage; big renewable energy plant).

9.4 Planning to realise aspirations

Planning is critical to realising aspirations. The need for very good planning, starting from the time that a mine is first proposed, is a strong theme in the literature on mining and sustainability. That literature also indicates that this kind of planning rarely takes place. Establishing a vision or set of aspirations is critical to a community developing the shared value and purpose that is necessary for promoting alignment between individual and collective aspirations and that drives resilience, as indicated by literature on resilience and sustainability. The literature also indicates the importance of adaptive governance and management. Planning needs to encompass iterative processes of action, reflection and evaluation that promote learning, as well as periodically revisiting and refining strategies. Larger-scale dynamics that will potentially impact on a community and its plans, and the prospect of a community conception of ECV shifting during the life of a mine, also need to be accommodated.

Strategic planning can help to identify strategies that will be necessary during a mine's life to realise ECV, such as are indicated in the right hand column of Table 4. However, ECV will not be achieved by any single sector planning or acting in isolation. Collaborative planning is essential in order to achieve alignment between the aspirations of communities, mining corporations, government and other prospective partners. Extensive and ongoing processes of inclusive dialogue are critical for parties to come to a shared understanding of available information and gaps in information; accept information as accurate, meaningful or relevant; and agree to act on it (Innes & Booher 2010).

Box 2: Overarching questions to guide community-based planning for ECV

- How long is the planned life of the mine?
- What is the community's vision for life at the end of the planned life of the mine?
- What is the risk that the mine will be closed before the end of its planned life?
 - Is the mineral deposit low grade?
 - Has the deposit been explored previously but not mined?
 - Are current commodity prices relatively high?
 - If Yes to the above questions, what adjusted timeframe is prudent for planning to realise ECV from the mine? (i.e. downward adjustment of anticipated time period before the end of the mine's life)
- What skills and capacities will the community need by the end of the mine's life to realise the community's vision for ECV?
 - Individual skills and capacities (human capital)
 - Collective skills and capacities (human and social capital)
- What are the critical elements of natural, cultural and social capital that the community will need at the end of the mine's life to realise the community's vision for ECV?
- What infrastructure (physical capital) will the community need at the end of the mine's life to realise the community's vision for ECV?
- What opportunities might arise as a result of the mine to maintain or develop these capitals by the end of the mine's life?
 - What other opportunities need to be available?
 - How can the mine, government or other parties assist in realising these opportunities?
 - What are the incentives for the mine, government and other parties to develop these opportunities? How will these other parties benefit?
- What risks and uncertainties exist that are beyond the capacity of the community, mine, government or other potential partners to manage? How can the community take account of these risks in its planning?

Participatory scenario planning (e.g. Duinker & Greig 2007) is one tool that has application at community level and in partnership forums to develop and test scenarios such as those sketched out in Table 4. The literature on resilience and sustainability highlights that scenario planning can be effective in challenging conventional steady-state thinking about the future. It can foster awareness that the future will not be shaped by a continuation of current trends but impacted by new and often unforeseen factors that may have rapid and dramatic impact on established ways of operating. Models that are set up as games (Guizol & Purnomo 2005, Brown et al. 2007, Maxim et al. 2010) have potential application for engaging community members and partners with scenarios, thereby developing shared understanding and commitment to action. The scenarios presented in Table 4 are potentially a tool to aid in communicating about the range of potential futures options and to encourage deliberation about information needs, decisions and collective action for developing ECV from mining. Creation of artworks or interactive platforms about these scenarios is a potentially valuable method for engaging remote community members.

Box 2 above indicates a set of overarching questions to guide community-based planning for ECV that are indicated by our analysis of literature and the conceptual framework adapted here from the SLF and further explored below. Inevitably these questions will need to be addressed iteratively as exploration and planning for a mine progresses.

9.5 Risks

Literature on mining and sustainability (particularly Laurence 2011) highlights that substantial risks for a community realising ECV over the planned life of a mine are presented by mines that are opened to exploit low-grade deposits at a time when commodity prices are high, and by mines that have not robustly addressed safety and environmental issues. These factors are strongly correlated with early closure of mines. Change of corporate ownership may also cause significant disruptions to community strategies for ECV due to changed personnel and corporate policy frameworks. These situations draw attention to different frames of reference that remote communities and mining corporations have on establishing the diversity that is important for them to be resilient. From a corporate perspective, resilience is likely to be enhanced where a corporation owns a diverse set of mining operations and is prepared to shift investments in and out of particular operations as markets and political circumstances change. However, resilience for the corporation presents substantial risks of any individual mine downsizing or closing, with consequent impact on the plans of place-based communities for realising ECV. Thus, as indicated by literature on mining and resilience, resilience for one entity may come at the expense of other entities.

The risk of mines closing before their planned term also highlights critical temporalities that planning for ECV needs to take into account. Communities with a collective vision for life at the end of a mine that has a high risk of early closure will need to develop strategies that promote the likelihood of some degree of enduring value being achieved even if the mine closes early. The ‘leisure city’ scenario (Table 4) is a clear example of a collective vision that does not have that flexibility given that it would require substantial investment in infrastructure that could not be readily put to alternative uses.

Literature on mining and resilience, and on resilience and sustainability, indicates that communities with a diverse mix of assets that makes them resilient to shocks and stresses that are unrelated to mining are likely to be in a stronger position to realise ECV through mining. Remote communities face significant shocks and stressors as a result of factors such as their typically extreme and variable climates, and policy that is not sufficiently flexible to deal with their distinctive circumstances, as indicated by literature on resilience and remote communities. Literature on resilience and sustainability indicates that, in such circumstances, resilience may be associated with strong local knowledge and identity, and linked to high attachment to

place. However, resilience is not necessarily a positive attribute in remote communities as it can also be associated with entrenched disadvantage.

The literature on mining and remote communities indicates that although mining may bring enhanced economic opportunities to remote communities, it also presents substantial risks that community dependency will be exacerbated. Factors that contribute to this risk include low initial human capital (skills and knowledge) appropriate to realise the new economic opportunities provided by mining; weak endogenous governing institutions; rent-seeking behaviours of remote community members; and a lack of effective established government–community partnerships. Literature on sustainability and resilience indicates a risk that, as a result of such factors, transformations of remote social-ecological systems that are effected through mining may accelerate decoupling of system components and weaken adaptive capacity. These trends may be impossible or very difficult to reverse.

The asset transformations that a community leverages from mining in its vicinity should seek to generate a diverse mix of capitals – including diverse skills, bodies of knowledge and relationships – in order to expand the livelihood strategies available to community members after the life of a mine. A strategy for resilience would leverage from the economic stimulus that a mine provides to a region to enhance existing industry sectors, or develop new sectors that are producing goods and services that will be in demand after closure of the mine. However, such strategies confront the reality that remote communities are remote because they produce relatively few goods and services that are in demand by major markets. Unless the aspiration for a community for ECV encompasses community members moving to a different place, as in the ‘suburban dream’ scenario (Table 4), an important focus needs to be on import substitution for local markets, but with recognition that local markets are likely to weaken after mining concludes. Another appropriate focus, indicated by literature on sustainability and remote communities, is on goods and services that do not require transport to markets, notably maintaining land in good condition to generate ecosystem services (Millennium Ecosystem Assessment 2003, Barrett 2009) that are important to sustainability and social-ecological resilience. This direction is encapsulated in the ‘green economy’ scenario (Table 4).

Employment in a mine or in mine construction is typically portrayed as a strategy that can assist place-based communities to share in the wealth of a mine, with the further advantage that it is often available early in the life cycle of a mine, as indicated by the literature on mining and remote communities. However, too strong a focus on mine employment may not foster the diversity in capitals that is needed for a community to be resilient to the shock of mine closure. Further, mine employment can attract talented individuals to pursue individual aspirations at the same time as they are critically needed to develop and implement community-wide strategies for realising ECV. This situation exacerbates the risk of remote communities becoming dependent not only on the financial capital of a mine, but also on the organisational capacity of the mining corporation. Literature on mining and sustainability includes some examples of community benefit structures that appear to have avoided these risks. In one example, corporations invested in improved health services for local communities rather than in promoting mine employment (Duniway et al. 2010). In another example, corporations contributed financially to strengthening the local institutions that are important to sustaining natural resource management-based livelihoods (Sinha et al. 2007). Investments of this nature may be far more effective at building ECV than mine employment. As indicated in Table 4, such strategies are particularly appropriate to ‘enhanced status quo’ and ‘self-organised remote community’ scenarios for ECV.

9.6 Institutions

Institutions have a key role in realisation of ECV. People craft institutions in order to manage risk. As indicated by the SLF, institutions also determine the strategies available to individuals and communities to transform assets. Effective institutions are needed to bridge the extreme scale difference between the perspectives, networks and aspirations of place-attached remote communities and those of, often globalised, mining corporations. Information, new ideas and expanded support networks are important for remote communities seeking to address entrenched disadvantage, as indicated by the literature on resilience and remote communities.

Partnerships are important for bridging differences in scale and knowledge asymmetries. They develop bridging and linking social capital (Woolcock & Narayan 2000), representing the cross-scale relationships that literature on sustainability and resilience indicates as important for community capacity to adapt and transform in the face of shocks and stressors. Literature on mining and remote communities indicates that corporate–community partnerships will assist communities to realise ECV given attention to building and maintaining relationships; consistent and supportive corporate policy; clear communication about expectations; good governance, including transparency and accountability; engagement of corporations with local culturally based institutions and knowledge; and a flexible approach within the corporation to community concerns. However, the literature on sustainability and remote communities highlights that effective partnership for economic development in remote communities is hampered by the prevalent weak government presence in remote regions. Multi-party agreements about how a mine will be developed in order to promote ECV are important to help ensure that corporate investments in building community assets are synergistic with those of government, rather than substitutions.

Governments have a significant responsibility for developing appropriate and effective institutions to promote ECV from mining. This responsibility stems from the very reason that people make governments: to develop institutions (that is rules, norms and shared strategies) in order to achieve outcomes that groups of people are unable to achieve through self-organised collective action alone. Thus, the challenges of realising ECV in remote regions should never be considered as challenges for mining corporations and communities alone, but also for governments. One example, from literature on mining and sustainability, that illustrates the key role of government involved an empowered local Aboriginal and Torres Strait Islander community and an innovative environmental impact assessment (EIA) process. Elements of the mine proposal were tested during the EIA process against a criterion that the mine should make a positive contribution to local sustainability (Gibson 2006). This contrasts with criteria aimed at minimising adverse impact, such as are more typical in government EIA processes. Institutional innovation of this nature requires leadership from government. Communities and mining corporations that, as indicated by some of the literature on mining and sustainability, pride themselves on exceeding legislative requirements for environmental assessment can lend valuable support. However, government has a critical role in ensuring that institutions such as EIA effectively support achievement of ECV.

There is a tension, indicated in literature on mining and remote communities, between the need to commence strategies for realising ECV at the time that a mine is planned, and the inability or unwillingness of mining companies to contribute financially to ECV strategies until after a mine is in profit, which may be several years after start-up. This is indicative of significant failure of existing institutions to provide robustly for ECV. Government has a key potential role in guaranteeing credit to corporations and communities to enable the considerable effort required to realise ECV to commence at a very early stage in mine planning.

One foundational institutional dimension relevant to ECV is the legal and policy framework for property rights and mining. This establishes the action arena within which remote communities might access a flow of financial resources from mining. Many remote Australian Aboriginal and Torres Strait Islander groups have a right, established by land rights and native title legislation, to negotiate about mining exploration and mining. They can and do negotiate directly with mining companies and conclude long-term benefit-sharing agreements (see Langton & Longbottom 2012). This process allows these groups to invest the financial capital that accrues to the community during the life of a mine directly into strategies that are planned to realise ECV at the end of the mine life. The impact of different institutional settings on the ways that these revenues are invested, and the outcomes from investment, has had little attention. Research in this politically charged area potentially offers insight into wider debates about the regional and national impacts of mining revenues (O'Faircheallaigh 2011).

Our analysis supports O'Faircheallaigh's (2011) assessment that there is little in the literature on appropriate institutional forms for management of revenue flows to Aboriginal people and Torres Strait Islander from mining. Nevertheless, guidance can be found in emergent literature on Aboriginal and Torres Strait Islander governance (Appendix 6 in Green et al. 2009, Smith & Hunt 2011) and more established traditions of institutional analysis and design for small-scale self-governing institutions (Ostrom 1999) and for adaptive governance in social-ecological systems (Folke et al. 2005, Ostrom & Cox 2010). We indicate, in Box 3, some minimal sets of institutions that would be needed to guide the capital transformations required for a community to convert financial flows from a mine in order to progress their vision for ECV.

Box 3: Minimal sets of institutions to guide capital transformations for realising ECV

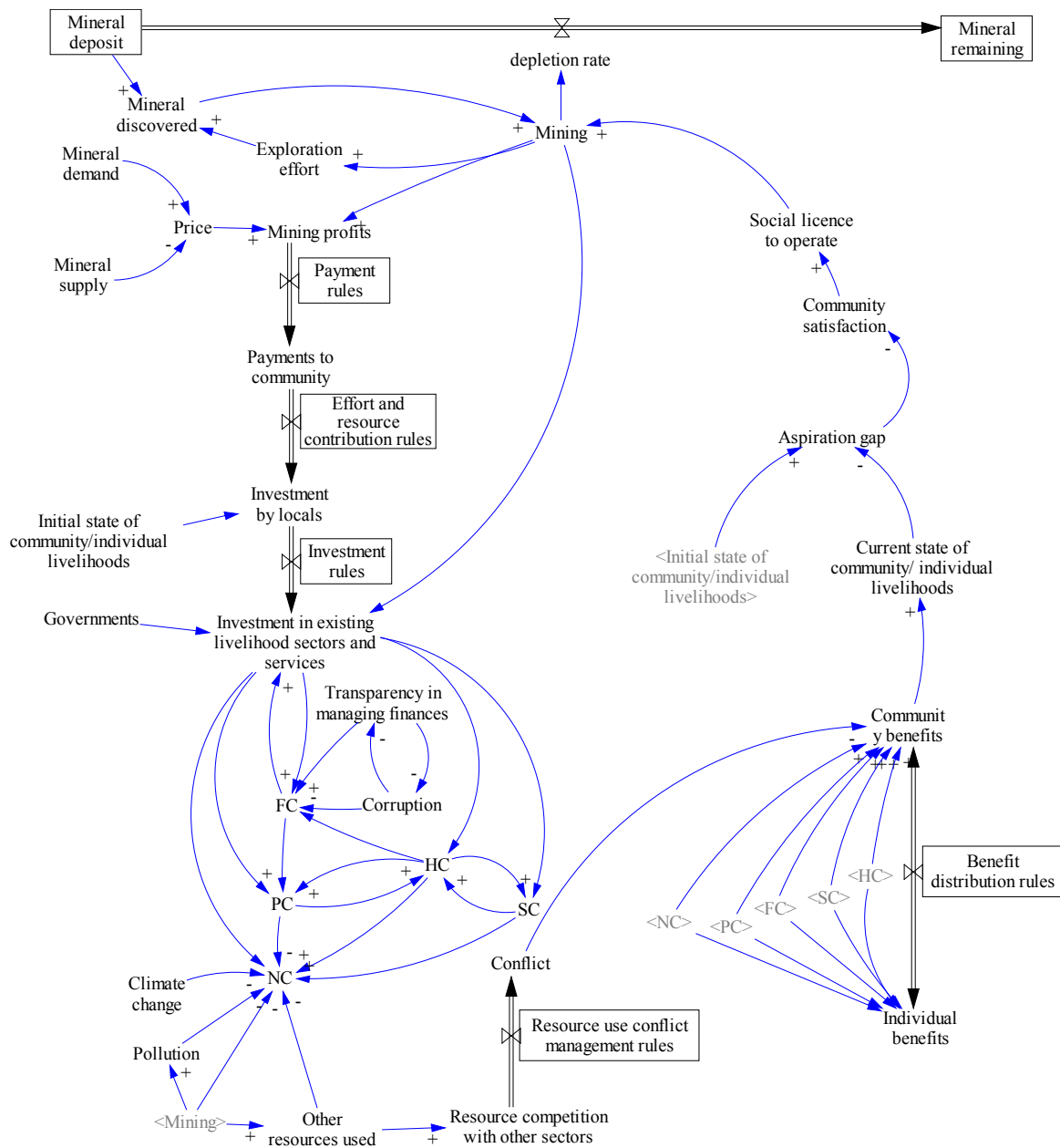
A community that receives a flow of financial benefits from a mine and that aspires to realise ECV would need to craft a number of sets of institutions to manage incoming financial resources in order to achieve capital transformations appropriate to their vision for ECV. At a minimum these institutions would include Payment Rules, Effort and Resource Contribution Rules, Resource Use Conflict Management Rules and Benefit Distribution Rules. Some sets of institutions would be developed and governed by the community alone, while others would need to also involve and bind government and/or the mining company in order to effectively manage risk. The relationship between these sets of institutions and capital transformations for ECV is indicated in the causal loop diagram shown in Figure 4.

Payment Rules would be established by an agreement between the community and the mining company, setting out the quantum and timing of financial flows.

Effort and Resource Contribution Rules would establish what community members contribute individually to progress the community vision, such as contributions of knowledge and other existing assets, and commitments to develop new knowledge and skills. These rules aim to manage the risk of rent-seeking behaviours by community members and guard against imbalance among community members between the benefit they receive through the Payment Rules and the effort they put into progressing the community's vision of ECV.

Investment Rules would set out how financial flows and existing community assets would be invested to realise growth in various asset classes and to manage risk of corruption. These rules would govern development of capitals essential for the community vision, such as by establishing opportunities for skills development and establishing who in the community has access to those opportunities. Governments and mining companies would be important partners to Investment Rules, committing resources and/or establishing new opportunities to support the necessary capital transformations. In order to achieve these commitments, governments and mining companies would also need to be partners in the development of Investment Rules.

The community would need to develop **Benefit Distribution Rules** to govern the balance between individual and community benefits from assets/capitals developed through these strategies, and thereby manage risks to community cohesion.



There is a substantial contrast between the bargaining power that some Aboriginal and Torres Strait Islander land owners have when a mine is proposed near their community, as outlined above, and the situation of other people in remote regions whose rights to a flow of financial resources from a mine are generally limited to compensation for damage to property or disturbance. Although mining corporations may well offer financial contributions to community development, as well as other benefits, as part of their CSR policies, most people must enter into difficult negotiations with governments in order to seek access to an agreed share of mining revenues to support development of ECV. Financial flows to Aboriginal and Torres Strait Islander rights holders may be important for addressing Aboriginal and Torres Strait Islander disadvantage and promoting equity. Nevertheless, the institutional asymmetries between the situation of those Aboriginal and Torres Strait Islander people who have a right to negotiate about mining and other remote people can be expected to impact substantially on the prospect of communities that have mixed Aboriginal and Torres Strait Islander and non-Aboriginal and Torres Strait Islander populations achieving a coherent vision for ECV and realising it.

9.7 Conclusion

The sustainable livelihoods framework (SLF) is adaptable to provide a conceptual framework for realising ECV. It is, however, critical that the SLF is conceived as a conceptual model of dynamic multi-scalar system with feedbacks and cross-scale interactions rather than as a linear pathway to enhanced human wellbeing. Considerable attention must be placed on identifying risk and crafting effective institutions to manage risk. Scenario planning provides a potential entrée to collaborative planning that could engage mining companies and governments as well as remote communities affected by a planned mine, in order to articulate aspirations for ECV. Participatory systems modelling provides tools that may assist parties to visualise and appreciate interconnections between decisions and actions in various components of the social-ecological system that will impact on realisation of ECV. Planning and action to realise ECV needs to start very early in the mine proposal stage. Institutional innovation is required to ensure that necessary resources are available at that time.

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