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Cumulative impact assessment, Indigenous Peoples and the extractive sector: literature review and potential methods

SE Holcombe *The University of Queensland, Australia*

Abstract

In the context of Indigenous Australia, cumulative impact assessment (CIA) is a nascent field both in terms of state and territory regulation and in practice. Likewise, relative to the science of environmental and social impact assessment (ESIA), this nomenclature of CIA is recent, and its application to Indigenous interests even more so. This paper briefly reviews the available literature – internationally and within Australia – on CIA, Indigenous peoples and the extractives sector. In the Australian context, the limited CIA literature reveals a focus on the impacts to Indigenous tangible cultural heritage. The issue of cumulative impacts to Indigenous cultural landscapes is especially heightened in mining regions, and came to the attention of the wider public in relation to the Juukan Gorge site destruction in May 2020 in the Pilbara mining region. The subsequent parliamentary inquiry and 172 submissions served to focus attention on the cumulative impacts of the industry across both space and time for the impacted Indigenous customary landholders.

This paper condenses the findings from a specific component of a larger project entitled 'Towards a Framework for Regional Cumulative Impact Assessment', under the auspices of the Cooperative Research Centre for Transformations in Mining Economies (CRC TiME). As the focus is on application and informing industry and regulators, this focus on Indigenous CIA also reviewed current Australian practice and methods, finding that there has not been a specific methodology developed for Indigenous CIA in relation to the extractives sector. There are, however, a range of methodologies that are more useful and relevant than others, as they begin to address Indigenous-specific interests. A fundamental element in developing an effective Indigenous CIA method is to ensure that it is able to identify what the specific interests are in terms of 'values' and 'significance'. This can only be done in collaboration with the Indigenous groups and knowledge holders, and requires qualitative and quantitative methods. The question of the relationship between mine closure and cumulative impacts for affected Indigenous groups will also be briefly explored, with the caveat that there are few examples of large-scale mines relinquished back to the Indigenous estate – indeed, none that this author is aware of. Nevertheless, many of the conceptual and practical aspects of CIA are heightened in closure – with additional risks and opportunities. This consideration of closure and the interface with Indigenous CIA in this paper builds upon the CRC TiME research.

Keywords: *cumulative impacts, Indigenous Australians, cultural heritage, extractive industries, global literature review, methodologies, mine closure*

1 Introduction

Cumulative impact assessment (CIA) as it relates to Indigenous Australians is an emerging, yet dynamic, area. This paper reviews the available English language literature (with the bulk of the research to mid-2021) – internationally and within Australia – on CIA, Indigenous peoples and the extractives sector. The internet search has specifically been for literature with these three foci. However, relative to the science of environmental and social impact assessment (ESIA), this nomenclature of CIA is more recent, and its application to Indigenous interests even more so. This paper condenses the findings from a specific Indigenous-focused component of a larger project entitled 'Towards a Framework for Regional Cumulative Impact Assessment', under the auspices of the Cooperative Research Centre for Transformations in Mining Economies (CRC TiME). More detail can be sought from that larger report (Sinclair et al. 2022).

CIA has developed as a distinct area of assessment concerned with two particular contexts where specific forms of assessment are required. Drawing on Banks (2013), these contexts are:

- Where a proposed project's effects are likely to attenuate the effects of other trends and processes in the broader impact area.
- Contexts in which there are multiple projects proposed across a region or area that will have effects that are not captured by individual project ESIAs.

Drawing on elements of the Franks et al. (2013) definition when this term 'cumulative impacts' is used in this paper, it is referring to:

> *"Successive, incremental and combined impacts of mining – as these negatively impact Indigenous society, economy and the environment – resulting from the aggregation and interaction of impacts on a receptor and it may be the product of past, present and future activities.* (p. 8)*"*

Of note, in the original Franks et al. (2013) definition, cumulative impacts could also be positive. However, as the literature reveals, in the Indigenous context, cumulative impacts are overwhelmingly understood in negative terms and through the lens of mitigation, and the structural, legislative and regulatory constraints and limitations that Indigenous groups operate within.

As an evolving practice, there is inconsistent and unsystematic attention to cumulative impacts in conventional approaches to ESIA. While it has been observed that CIA remains a weakness within most impact assessment regimes, this is particularly the case in the licensing of mining projects on Indigenous lands globally (Larsen et al. 2018), and notably in relation to mine closure. In the Australian context, many of the largest mines are on, or adjacent to, the formally recognised Indigenous estate – as native title or state-based land rights. This estate comprises just over 50% of the continent. Beyond this, across Australia, Indigenous peoples still hold customary forms of attachment to land, even where these rights and interests may not be formally recognised.

In Australia, there has not been a specific methodology developed for Indigenous CIA in relation to the resources sector. There are, however, a range of methodologies that are more useful and relevant than others, as they begin to address Indigenous-specific interests. These methods include community and participatory social impact assessment (SIA), as well as land management tools and resources that Indigenous groups have established to care for their Country. A fundamental element in developing an effective Indigenous CIA method is to ensure that it is able to identify what these specific interests are, including valued environmental and social components (VECs). This can only be done in collaboration with the Indigenous groups and knowledge holders, and requires qualitative and quantitative methods.

In the Australian context, there are three key stages to engaging with Indigenous groups in relation to mining on their lands. These are:

1. In the initial ESIA for the proposed project.
2. In the negotiation of benefit-sharing agreements or Indigenous Land Use Agreements (ILUAs).
3. In the ongoing cultural heritage assessment surveys, often as part of cultural heritage management plans (CHMPs) for individual projects.

This initial ESIA is typically undertaken by the proponent as a compliance measure and, as a result, from an instrumental or management perspective, it is a process of identifying impacts, finding solutions and achieving project approval (per Roche et al. 2021). It is hardly surprising that the expectations of Indigenous groups will differ from the proponents, as they will be focusing on individual and collective impacts, and often from an intergenerational perspective that is rarely accounted for (see Holcombe 2021; Roche et al. 2021).

In an analysis of 50 ILUAs from across Australia's major mining regions, O'Faircheallaigh & Lawrence (2019) found that many agreements failed to address mine closure in any substantive way. Indeed, 30 of the 50 agreements make no reference at all to closure, except in relation to the termination of financial benefits

if and when production is suspended or a project is closed (O'Faircheallaigh & Lawrence 2019, p. 76). As a result, agreements tend not to provide leverage in managing cumulative impacts on closure. And there has been little research focus to date on how mine closure impacts the Indigenous landowners. The limited research that does exist suggests that if negative cumulative impacts are not addressed during life-of-mine, they are amplified on closure (Holcombe et al. 2022).

If Indigenous groups don't have an agreement or ILUA with a company, they will still be engaging with the potential or active project via a state-based Aboriginal cultural heritage regulatory regime. All states and territories have regulatory protections in place for Indigenous cultural heritage. These legislations, however, vary significantly in terms of strength of protection and exactly what types of heritage is afforded protection, and so on. The experience within Australia indicates that it is often within the cultural heritage management stage that cumulative impacts may be considered, and this is overwhelmingly at the 'front end' of the project.

With several major mines now in closure, including the Ranger uranium mine (Northern Territory) and Argyle diamond mine (Western Australia [WA]), there are some emerging examples of 'cultural closure criteria' and the establishment of 'cultural reconnection committees' (Brady et al. 2021; Holcombe et al. 2022). Both these mines were established in the context of disputation between the Indigenous customary landowners and the company (and the state). Ranger and Argyle are also high-profile mines, where the Indigenous groups have the support of strong representative bodies or Aboriginal organisations, so in these cases there are opportunities to address intergenerational cumulative impacts. However, there is no research that this author is aware of as to whether the closure of these mines is specifically articulated by the traditional owners as an opportunity to address cumulative impacts.

In light of the very limited Australian literature on the topic, it is clear that the gap in CIA literature is illustrative of a gap in practice. When the focus is on CIA and the ongoing impacts of mining on Indigenous peoples and their Country, it is overwhelmingly in terms of their cultural heritage. If there are considerations of cumulative impacts on cultural heritage, the way in which this heritage is defined has been a significant limitation. Cultural heritage is commonly defined in terms of moveable or tangible cultural heritage as codifed and/or interpreted as such in much Aboriginal cultural heritage legislation. An essential element in any Indigenous-focused CIA methodology will entail broadening the definition of VECs and ways in which the 'significance' of a site or place is established. This includes accommodating a more encompassing understanding of Indigenous culture – beyond the tangible 'stones and bones' – to also include intangible cultural heritage (customary practices and cultural knowledge), and also to integrate culture and environment as an eco-cultural landscape. Thus, while we need to expand our understanding of 'cultural heritage', we also need to expand our understanding of what Indigenous peoples can contribute to CIA and to subsequent closure planning and implementation. Such a process will be outlined in general terms in Section 6.

2 Review methodology

This literature review has been targeted at applied research materials where the authors specifically reflected on their roles in CIA as a legislative or regulatory requirement, or they have reviewed the practice of Indigenous CIA in a particular jurisdiction. As such, the online search words were variously a combination of the following terms: cumulative impacts, cumulative impact assessment, cumulative effects assessment, social impact, Indigenous peoples, First Nations, cultural heritage, mining region, resources sector.

Of secondary interest were collaborative and participatory SIA methodologies focusing on Indigenous peoples and development on their lands. This material is very useful for establishing methods and frameworks for engaging Indigenous peoples in CIA. Likewise, other materials in this applied category of land management planning on Indigenous lands were also drawn upon. These materials, such as Healthy Country Plans, are especially useful in gaining a perspective on Indigenous priorities and approaches to Caring for Country and land management planning. Closure planning documents that specifically address Indigenous interests are both uncommon and not readily available, given the confidentiality of most ILUAs and other benefit-sharing agreements (O'Faircheallaigh & Lawrence 2019).

Such a targeted approach – via a focus on the language of CIA – necessarily excludes the extensive amount of longitudinal ethnographic research undertaken globally and in Australia on the transformative impacts of the extractives industry on Indigenous peoples' livelihoods and cultures (see Bainton & Skrzypec 2021). Such ethnographic research, based on localised fieldwork, tends to take a holistic approach to the impacts of the industry on Indigenous peoples and their life worlds. This social science method does not often use the terms CIA or cumulative effects assessment (CEA) and so was not captured in the literature review search. However, this body of research (by social anthropologists, human geographers and political scientists) routinely engages with the impacts and effects of industry at multiple levels, integrates the social, political and environmental domains, and reflects on the intersections of historical legacies, such as colonisation and the extractive industries (see Altman & Martin 2009; Chaloping-March 2017; Ferguson 1999; Keeling & Sandlos 2015). Such an approach necessarily considers the ways in which multiple impacts converge, new issues arise and where locally understood thresholds may be crossed.

For the purposes of this review, it is the method of longitudinal ethnographic research that is of note for the development of an Indigenous CIA. Such a method provides insights that most survey-based, time-limited and compliance-based approaches to SIA cannot capture. Though the new language of CIA and CEA is an important step in recognising the need to mitigate the multiple and intersecting local, regional and global (i.e. climate change) effects of the extractive industries, and other development, it is important that any method does not simply take an additive approach (i.e. as a list of impacts to mitigate) that extends from a baseline established at the outset of a particular project. This is important in colonial contexts in particular, as the legacies of dispossession and intergenerational trauma also often inform Indigenous peoples' perspective of any particular project, and thus their understanding of cumulative impacts.

3 Overview of the literature and its geographic focus

Most of the research located focuses on the qualitative and quantitative methods to incorporate Indigenous ecological knowledge (IEK) into environmental impact assessment (EIA) and/or SIA. Other related research focuses on engagement, governance and integration practices within and across these fields of IEK, EIA and SIA.

Of note, articles focusing on the specific nexus between CIA (as a field of SIA), Indigenous peoples and the resource sector were few. In Australia, only two research articles with this specific focus were located. However, it is an emerging field internationally, with a recent report from Canada focusing specifically on SIA methods for predicting cumulative effects involving extractive industries and Indigenous people (Da Silva et al. 2020). Other international research articles focusing on this nexus were from Brazil (Athayde et al. 2019), Sweden (Larsen et al. 2018; Osterlin & Raitio 2020; Raitio et al. 2020) and Canada (Atlin & Gibson 2017; Lawe et al. 2005).

An important point that Da Silva et al. (2020) make in relation to consultation and decision-making in environmental impact statement (EIS) processes is that the lack of Indigenous voices in decision-making is clearly evident in the literature (p. 7).

3.1 Australian literature: CIA through the lens of cultural heritage management

The two Australian articles (Godwin 2011; Sutton et al. 2013) that specifically focus on the intersection of CIA practice, Indigenous interests and the mining industry do so via a cultural heritage management (CHM) lens. Both articles, by archaeologists, draw case material from mining regions on the east coast. Godwin (2011) draws on applied research in the coal and coal seam gas regions in Queensland, while Sutton et al. (2013) is based on collaborative research in the Hunter Valley coal-mining region.

Though Godwin (2011) indicates that the terms of reference (ToR) for EIS related to projects demand that "consideration be given to the cumulative impacts of [mining] development on Aboriginal cultural heritage" (p. 88). These ToR mirror those that are issued to ecologists and air-quality specialists, with a heavy emphasis on 'quantifiable data'. This focus on a natural science model for CIA encourages archaeologists to 'disaggregate' complex sites in order to assess heritage values and adverse impacts of specific tangible

components (i.e. a stone tool workshop), rather than assess landscape-level values and thus also include intangible elements of a place.

Godwin (2011) argues that in addition to this lack of specific guidance and methods for assessing the potential cumulative impacts on cultural heritage, the data necessary for determining the effects of cumulative impacts on cultural heritage does not exist. And, likewise, nor do the fundamentals necessary for determining the CIA on cultural heritage, which entails determining the datum, determining an acceptable threshold, and determining when the threshold has been exceeded. He argues that alternative approaches to CIA are the continuing application of qualitative processes such as significance assessment, the social licence to operate (SLO) and the limits of acceptable change (see Stankey et al. 1984).

However, it is worth noting that the SLO concept has limitations, as demonstrated by the use of ILUAs in mining regions, which contributed to the Juukan Gorge destruction (see also Kemp & Owen 2013). Nevertheless, Godwin maintains that these qualitative approaches provide a more robust framework for determining CIA in relation to CHM. One of the key reasons for this is demonstrated in the Queensland context, where there is no definitive dataset (such as cultural maps or a site register) readily at hand for consultation either by a development proponent or by the state itself. Likewise, the CHMPs that need to be developed prior to approvals are in no way a thorough cultural inventory. Indeed, this is the case across Australia.

The Sutton et al. (2013) article found that one of the key issues in the assessment of cultural heritage under the EIS regime in New South Wales is the lack of consideration of cumulative impacts of mining, and the relationship of these prolonged cumulative impacts on social and psychological health and community wellbeing. They reference Godwin's (2011) statement that reliably quantifying such impacts is impossible, but strongly articulate that it is crucial to attempt an assessment, especially in such intense mining regions as the Hunter Valley (at the time of writing, there were 24 open cut and 10 underground coal mines and others awaiting project approval). The authors draw on the concept of 'solastalgia', which emerged from this region, to assist in promoting dialogue with CHM on this issue.

The solastalgia concept (Albrecht 2005) describes the feeling of powerlessness and distress experienced by Hunter Valley residents who were watching environmental destruction and transformation of landscapes around their homes in this coal-mining region. As environmental psychologist, Albrecht (2005) states, solastalgia is the "'lived experience' of the loss of the present as manifest in a feeling of dislocation; of being undermined by forces that destroy the potential for solace to be derived from the present" (p. 45). The potential for rehabilitation and closure activities to mitigate these feelings is a hopeful one, as Svobodova et al. (2012) have found in their study of surface coal-mining reclamation in the Czech Republic where residents of these areas were empowered to take part in the design of new landscapes. In the Hunter Valley context, as some of these mines are approaching closure and have approval to leave 'final voids', "the debate is as much about hydrology and geology as it is about absence, loss, and ruin", according to Dahlgren (2022, p. 538).

Albrecht (2005) also argues that solastalgia is experienced at a potentially deeper level by Indigenous people due to their strong spiritual and emotional connections to Country, with distress manifest from the ongoing destruction and transformation of the landscape since colonisation. One could anticipate that actively engaging with impacted Indigenous groups in deliberations on post-mining land use, including in rehabilitation and reclamation, and their subsequent employment in doing so, could go some way to healing this distress. However, without regulatory or legal drivers, and no standards or guidelines for the inclusion of Indigenous rights and interest holders (Bond & Kelly 2021), currently only ILUAs and voluntary company initiatives offer a path forward.

The interrelationship between Indigenous wellbeing, cultural heritage and the environment is not a new one and there is a body of literature illustrating these connections (see, for instance, Bawaka Country et al. 2013; Rose 1996). However, an awareness of these intrinsic interconnections does not form part of the EIA process (Roche et al. 2021), and is likewise very rarely accounted for in closure processes. Sutton et al. (2013) describe the emotional distress they witnessed by Indigenous custodians as a feeling of disempowerment during the

EIS process. This is in relation to the determination of project approvals and a perception of a lack of adequate SIA: "that the mine will always go ahead no matter what" (p. 8). In this context, cumulative impacts are also felt by Indigenous groups as exasperation, cynicism and ceasing to engage with CHM in EIS processes.

In terms of tangible archaeological sites, Sutton et al. (2013) indicate that the site registration and heritage assessment process is still coming to grips with how to define, describe and assess cumulative impacts and its relationship to rarity, representativeness and significance. For instance, sites that may have originally been assessed by an archaeologist as common (and therefore of lower scientific value) may become rare through increased attrition due to development. This article also discusses the use of 'offset strategies', such as Cultural Heritage Offset Areas, Conservation Areas and Heritage Management Zones, specifically for their Aboriginal and/or scientific values. These strategies will be discussed in the Methods section.

3.2 Canadian literature: CIA and Indigenous peoples

Lawe et al. (2005) found that while stakeholder input in EIAs had generally improved in Canada, there was still inadequate First Nations involvement in designing monitoring programs and a lack of integration of scientific and traditional knowledge (Lawe et al. 2005). In a more recent analysis, mining proposal assessment regimes in Canada were reviewed, with the recommendation that mining proposals be planned, reviewed, and approved with host communities so they result in more sustainable regional futures. This would require a shift in focus from mitigating significant adverse effects to having positive contributions to sustainability as well as having more effective regional planning through understanding the cumulative regional effects of multiple mining projects (per Atlin & Gibson 2017).

3.3 Swedish literature: CIA and Indigenous Peoples

In Sweden, there is a focus on the pressure that the extractive industries are placing on the Sami livelihood of reindeer herding. An extensive socio-legal analysis of the mining permitting process found that the narrow scope and weak status of CIA in Swedish EIA legislation and practice and the weak recognition of Sami reindeer herding as a 'property right' during the permit review process was not able to balance competing land uses. This has become an urgent issue for Sami herders, as the accumulated area of land designated for mining in their territories has already more than doubled between 2010 and 2017, and the number of mineral exploration permits issued per year has increased from less than 10 between 2002 and 2004 to 40–60 permits per year between 2014 and 2016 (Raitio et al. 2020).

Voluntary corporate actions to improve the CIA of mining companies on Sami lands have only led to cosmetic improvements in the actual CIA outcomes. Instead, a stronger regulatory role of government and recognition of the right of Indigenous communities to lead or co-manage impact assessments on their own lands is needed (Larsen et al. 2018).

4 Gaps in the literature and in practice

A recent Canadian paper (Proverbs et al. 2020) observed that a gap in CIA literature includes methods to evaluate impacts on cultural landscapes. This language of 'cultural landscapes' is becoming recognised by some cultural heritage practitioners as a more encompassing term to incorporate intangible and tangible landscape features. This gap in CIA addressing cultural landscapes is also apparent in the two Australian papers just discussed, as they only focused on tangible archaeological sites.

Gaps in practice include, for instance, the WA government 'Cumulative Environmental Impacts of Development in the Pilbara Region' (2014) report, under the WA *Environmental Protection Act 1986*. This report does not mention Indigenous interests, though they have significant native title interests in the region, nor does the BHP Billiton Iron Ore strategic CIA report (BHP Billiton Iron Ore 2015) for this same region. The report notes that "this CIA is a first of its kind for the Pilbara and represents a significant contribution by BHP Billiton Iron Ore to provide an analysis of the potential effects of iron ore mining development in the Pilbara …" (p. ii). They list five species from the region that are 'vulnerable' or 'endangered', and it could also reasonably be expected that these species, which include the olive python, the greater bilby, and the

northern quoll, would also have great significance for native title groups. Yet, there appears to have been no consideration of Indigenous interests in this CIA report.

Gaps in practice also apply to the standard approach to SIA, as this is often incorporated into a state's EIS regulatory process. Before a methodology for CIA can be developed that integrates Indigenous interests and values, it is useful to consider the ways in which standard SIA does not adequately address these interests. Though most SIA methods claim to be inclusive, the prevailing practices tend to reflect the dominant interest groups' methods and cultural practices, and rarely Indigenous interests and concerns and, as previously noted, are generally compliance driven by the proponents. In industrialised countries, such as Australia, the standard approach to SIA is to document the existing socio-economic conditions within which a proposed development is to occur, assess its likely impacts and identify strategies to minimise and mitigate these negative effects (O'Faircheallaigh 2011). This baseline is then used to evaluate ongoing impacts from the project. Though the limitations of this method for the Australian Indigenous context were pointed out over three decades ago (see Ross 1990), mainstream SIA methods still tend to be applied to this group. This is notably problematic in regions with high levels of social vulnerability, which includes remote and regional Indigenous Australia.

Indeed, Ross found that the Indigenous communities in the Kimberley region preferred a long-term cumulative view to assessment of any single impact, such as the Argyle mine, and laid emphasis on the early contact period. This work was undertaken as a 'community social impact assessment' as part of the broader East Kimberley Impact Assessment Project (in WA). This finding suggests that if SIAs are led and directed by Indigenous interests, they will inevitably include cumulative impacts. In this East Kimberley SIA, various historical impacts were included: the Halls Creek gold rush of 1886; the eight recorded massacres within 100 km of the Warmun community; the pastoral phase and land dispossession; up to the intensive mineral exploration of the late 1970s (see Ross 1990).

5 What are cumulative impacts for Indigenous peoples?

Though for Indigenous peoples there will of course be many of the same elements of cumulative impacts as for the mainstream population who also reside in the impacted region (such as the impact of dust, noise and aesthetic amenity), additional impacts are also felt for this group. Such additional cumulative impacts may include:

- Loss of access to sites of spiritual significance and/or destruction of sites.
- Loss of access to cultural places, including customary harvest places (light pollution can affect feeding and breeding patterns; vegetation clearing leads to the destruction of roosts, removal of water courses and destruction of water catchments).
- Loss of cultural integrity of cultural places through the destruction of Country in close proximity.
- Loss through indirect impacts, such as increased dust, vibration, noise.

Compounding the historical effects of loss of control over development decisions on Country can lead to feelings of powerlessness and lack of wellbeing (see also the Wintawari Guruma Aboriginal Corporation Submission to the Parliamentary Inquiry into the Destruction of the 46,000-year-old caves at Juukan Gorge, Parliament of Australia 2020).

Though these are all possible individual impacts, the ways in which these impacts intersect with each other, compound the effects and are transformative are crucial considerations in CIA. *CIA is more than the sum of the individual impacts* and it is in the way in which they intersect and interact that the effects are most acutely felt. For example, if there are restrictions on accessing Country, this leads to multiple intersecting impacts including the ability to practice cultural activities, such as customary harvest and ceremonial/spiritual activity, which in turn leads to loss of connection to Country and thwarts intergenerational knowledge transfer. Likewise, customary harvest can also play an important role in supplementing nutritional needs and

supporting a healthy diet, assists in augmenting food supplies during off-pay weeks and provides wellbeing and mental health benefits.

In particular, the destruction of significant sacred sites can have social and cultural impacts that are ongoing for years after the incident. Lewis & Scambary (2016) mapped this social fall-out from the destruction of a significant site in the Bootu Creek region in Northern Territory and others, including the women's Barramundi Dreaming site that was destroyed to build the Argyle mine in WA. The cumulative social and cultural impacts included:

- The perceived complicity of some traditional owners in the destruction of the site, which is in turn the cause for continuing tension and ill-feeling within the Aboriginal community.
- More broadly, and perhaps more insidiously, the site damage can reinforce a sense of powerlessness and alienation within the community.
- At the individual level, site damage is generative of emotional distress and grief and is often associated with physical illness and death, with the grief being likened to the death of a close relative, or serious physical injury.
- At the collective level, site damage incidents constitute social rupture and imbalance, that may result in temporary or permanent cessation of ceremonial activity related to the site.
- At both the individual and collective level, site damage often results in shame – a powerful social force of humiliation, where custodians lose face for failing to protect their sites, regardless of cause, blame or ability to prevent damage (Lewis & Scambary 2016, p. 244).

To sum up, destruction, or threats of destruction, of places of significance is a threat to Indigenous peoples' abilities to order their social and cultural relationships (Lewis & Scambary 2016, p. 242). Mine closure that leads to remediation and rehabilitation in close consultation with Indigenous landowners can offer an opportunity to reset past negative relationships and heal social and environmental wounds. However, in order to do this, remediation has to be recognised as more than a scientific technical challenge – it also has to encompass "concepts of social justice, repair, mediation, reconciliation and care" (Beckett & Keeling 2019, p. 217).

6 Methods, tools and approaches for integrated and regional CIA

For Indigenous peoples, cumulative impacts are inherently regional scale and integrated. Methods to evaluate impacts on cultural landscapes is a significant gap in CIA literature (Kirkfeldt et al. 2017; Proverbs et al. 2020). The term 'cultural landscapes' incorporates Indigenous intangible and tangible landscape features that are important for subsistence harvesting and wellbeing or that are culturally important for land management and political, spiritual, religious or educational reasons.

There are several tools, methods and approaches from Indigenous cultural heritage and land management practice that can both benefit, and benefit from, integration with broader CIA research and practice.

6.1 Defining values and significance

An essential element in establishing an Indigenous CIA method is to develop the parameters around how values and significance are defined for each element of the datum. Ensuring that Indigenous knowledge holders are engaged in determining these valued components and establishing 'significance' is essential in CIA. Nevertheless, some values (such as water quality and fauna distribution) are more amenable to objectification than others and there will be a mixture of objective and subjective values that may also overlap. Environmental values (as defined by ecologists) will also have social values, and some social values – such as economic wellbeing – will have objective indicators.

The concept of VECs is widely used in CIA as a framework that allocates indicators to the values in order to monitor the condition of the values over time (International Finance Corporation 2013). In terms of

Indigenous CIA, how these VECs are chosen and who chooses them will be a key element in a participatory methodology. Such a method will ensure that the VECs are valid for the potentially impacted Indigenous customary landholders.

6.2 Culture in Indigenous values

A CIA that is relevant for Indigenous peoples will have to actively ensure that what comprises 'culture' is not limited, or reduced, to the physical or tangible aspects of culture that are often defined by archaeologists in CHM. A more inclusive approach would ensure that 'culture' is not bracketed, or somehow seen as optional, from environmental and economic CIA. For Indigenous peoples, this concept bundles the economic and environmental factors together with the social to make 'the cultural'. Applying the concept of Indigenous landscapes or cultural landscapes is also more appropriate. This concept is a more useful and evocative means to understand the interconnection between people and place (Rose 1996). A landscape-level approach considers not only the interconnections between spiritual sites – as Dreaming ancestors travelled between places that they created – but also the relational values a person's or group's customary estate holds for them. This attaches rights and responsibilities to care for Country to particular areas or regions in a reciprocal human–nature relationship and is a necessary consideration in any regional CIA. This set of interrelationships has clear implications for mine closure, as closure provides an opportunity for the affiliated Indigenous groups to reclaim these landscapes and regenerate connections. The obvious caveats are that appropriate resourcing and training (for water monitoring, for instance) needs to be established, with the financial liabilities ethically managed.

6.3 'Country' as a value

'Country' is an Aboriginal English term, which refers to more than just a geographical area and instead can be seen as a "shorthand for all of the values, places, resources, stories and cultural obligations associated with a geographical area" (Smyth 1994, as cited in Russell et al. 2020, p. 4). 'Country' evokes the landscape as sentient and requiring constant renewal for its health. Such renewal can be seen, for instance, in cultural burns (cool burns) and increase ceremonies (to support a healthy population of particular plant and animal species). Russell et al. (2020) developed what they refer to as a "Connection as Country" framework in an effort to understand the relational human–country ontology and the multidirectional ways that people connect to human and non-human realms through Country. They promote this framework as a "valuable early step in making relational values visible to promote inclusion in environmental management and decision-making". The Connection as Country framework encompasses four domains of relational value (to the environment), which are:

- Spirituality.
- Reciprocal kinship.
- Knowledge and education.
- Cultural subsistence.

6.4 Establishing cultural indicators

The concept of "cultural keystone species" (per Garibaldi 2009) provides a useful mechanism to incorporate the social, ecological and spiritual values that Country holds for Indigenous peoples into CIA. This concept derives from the scientific concept of ecological keystone species and offers a bridge between IEK and environmental science. It has been used in mine land reclamation in Canada and the concept has been explored in relation to the closure of the Ranger uranium mine in the Northern Territory (Smith 2009). Cultural keystone species are "culturally salient species that shape the cultural identity of people in a major way, as reflected in the fundamental roles these species have in diet, material and/or spiritual practices" (Garibaldi & Turner 2004, p. 5). Examples of cultural keystone species in the area of the Ranger mine, surrounded by Kakadu National Park, include barramundi – freshwater and saltwater fish used for food and

an important totemic species for many clan groups – and the sand palm – used extensively for medicine, dyes, fibre and food (Smith 2009).

Though the cultural keystone species concept is not widely used in Australia and not at all in CIA, it offers a meaningful tether for communities with landscapes in transition. Furthermore, since it is derived from the scientific concept of 'ecological keystone species', it provides a shared language, or communication bridge, between Indigenous land management practitioners and environmental scientists. Utilising this concept will provide a meaningful methodology to draw out locally valued species in customary terms and begin the conversation to quantify culturally valued criteria, as has been done in developing 'cultural closure criteria' in relation to closure at Ranger (Brady et al. 2021; Smith 2009).

6.5 Cultural mapping

Cultural mapping is a tool for Indigenous CIA that is particularly useful for well-documented cultural landscapes. This technique can include spatial overlay analysis to quantify and map the potential overlap between environmental disturbance and cultural features (Proverbs et al. 2020). However, any such mapping needs to be well resourced and highly collaborative, with knowledge governance protocols built into the method.

Proverbs et al. (2020) used spatial overlay analysis to quantify and map the Gwich'in cultural landscape in the Gwich'in region in Canada. The methods they used included:

1. Cultural feature density for:
    a. Historic harvesting trails.
    b. Named places (sacred and location names).
    c. Traditional land use areas.
    d. Archaeological sites.
2. Cumulative environmental disturbance.
3. Potential overlap between disturbances and cultural features species.

The Gwich'in have a Social and Cultural Institute and a Place Names Atlas, as they use this technique to document their cultural landscapes. Proverbs et al. (2020) also note that demarcating cultural locations on a map may fail to fully represent the knowledge, relationships and collective memories associated with tangible and intangible cultural features. Importantly, not all features can be made publicly available (such as sacred sites or harvesting locations), hence the need for knowledge protocols. Cultural mapping exercises have been undertaken in some areas in the Northern Territory, notably in areas of Aboriginal land and sea, where there are fishing, tourism and other commercial or development pressures. Appropriate resourcing is required to undertake such a cultural mapping exercise, ideally as the baseline prior to development.

Nonetheless, a "cultural landscape is not some static entity that can be catalogued and inventoried once and for all; it is continually evolving and expanding" (Godwin 2011, p. 9). Any cultural mapping method for establishing baseline datum should encompass both physical and tangible sites that can be mapped as well as qualitative features that may shift over time.

The concept of cultural mapping is becoming popularised: (i) Google Earth Outreach has collaborated with Winyama, an Indigenous business focusing on digital mapping and geospatial capacity building; (ii) Google supported and attended an Indigenous Mapping Workshop in 2019 where a set of icons representing a broad range of Indigenous experience, including subsistence harvesting, cultural and sacred sites, burial places, among others, were developed to assist Aboriginal and Torres Strait Islander communities to map cultural and natural resources.

6.6 Healthy Country Plans

Healthy Country Plans are widely used in Australia in relation to managing Indigenous Protected Areas and more broadly in regions where there are established Indigenous ranger groups. The plans are based on an adaptation of the open standards for the practice of conservation. Many of these land management plans are available online and are an invaluable resource for determining the local and regional priorities of Indigenous groups for managing their land and culture. Groups in mining regions, such as the Pilbara, have also developed these plans. Any region with an established ranger program will have a Healthy Country Plan.

For example, according to the Yinhawangka Healthy Country Plan (in the Pilbara region of WA), it was developed to:

1. Identify areas of special cultural/environmental interest.
2. Assess the current health of their Country.
3. Determine the current and future management requirements of their Country.

Of note, they also state that "all traditional and cultural knowledge in this plan is the cultural and intellectual property of Yinhawangka Traditional Owners …", so no other information will be quoted. In broad terms, the range of issues that are covered by this and other plans can be overviewed. They tend to include:

- Healthy Country assets (including trends and targets for action).
- Threats to Country and culture (including measuring and understanding threats).
- Projects and monitoring (including how progress is measured).

Clearly, these resources are valuable tools and directly useful in the development of any regional CIA that seeks to also address Indigenous interests.

It is also of note that these plans closely articulate the relationship between healthy country and healthy people. This interrelationship has been understood for decades (Kingsley et al. 2009). The establishment of over 120 ranger groups across the country is an indicator of the popularity of this Indigenous land management work (Barnes et al. 2020). Because Indigenous land management has been successful in providing meaningful employment, there has been concerted research on their success factors. The benefits of the ranger work (for practitioners and their communities) include that the programs are culturally based and Indigenous led; directed by Indigenous governance and co-governance arrangements; provide livelihoods that generate multiple benefits, including social, spiritual and physical health; and support intergenerational knowledge transfer (Garnett et al. 2009; Mackie & Meacheam 2016). Any Indigenous CIA would seek to tap into and build on these benefits and expertise.

From an industry perspective, employing Indigenous ranger groups in mine closure (and ideally during operation) has several benefits. According to Barnes et al. (2020), they include addressing local employment and contracting commitments as well as industry social and environmental performance standards. Likewise, integrating traditional ecological knowledge into the mine's science-based systems contributes to Indigenous land management and regional biodiversity. Establishing clearer pathways to relinquishment is also encouaged through improved landowner relationships and trust (Barnes et al. 2020, p. iv), while from an Indigenous perspective, increasing Indigenous participants' technical skills, self-confidence and ability to engage in the wider economy are part of including options for direct industry employment onsite. While gaining regular access to land and meaningful work to 'look after Country', maintaining or reactivating connection to Country and passing on traditional ecological knowledge to younger generations is a strongly positive potential outcome. Other positives for Indigenous land mangement workers at the interface with progressive rehabiliation and closure include acquiring knowledge, methods, and technologies transferrable to the management of the Indigenous land estate, and options for developing career pathways across a greater diversity of Indigenous land management work, including access to long-term commercial monitoring opportunities (Barnes et al. 2020, p. iv).

6.7 Community-based monitoring programs

Ensuring Indigenous customary landowners have a significant role in establishing the VECs and the subsequent indicators for a regional CIA is appropriate. Establishing a community-based monitoring program was raised in several papers (Lawe et al. 2005; Parlee et al. 2012). One important element of such a system (which has been implemented in British Columbia, Canada, for over two decades) is to build local capacity to collect, deliver, and use ecological information to facilitate sustainable decision-making. It has been noted that, ultimately, the use of this approach to monitoring will begin to reflect the value base of all area residents. This will in turn increase trust in the data in overall management decisions.

Such an approach is also a key aspect of adaptive management, as those who live in a region notice new potential resource impacts more quickly than scientists and others who live elsewhere.

6.8 Cultural offsets

The concept of cultural offsets and conservation areas have been developed as an attempt to mitigate cumulative impacts, including "compound emotional stress and the destruction of sites and landscapes … and intergenerational equity" (Sutton et al. 2013, p. 10). In the 'Why Cultural Heritage Matters' guide, it states that cultural offsets, like biodiversity and environmental offsets, should exceed the life of the operation and be designed to continue into the future without operational support (Rio Tinto 2012). However, the guide also states that cultural offsetting is a difficult area to navigate, as it is very hard to compare or substitute one type of heritage value for another similar or different type of value. Monetary compensation can also be negotiated to compensate for site destruction, though this form of offset is clearly not aligned with an intergenerational equity purpose.

The Sutton et al. (2013) paper from the Hunter Valley mining region also indicates that the practice of rescinding or partially rescinding land-based offset packages (upon which project approvals have been issued) by coal-mining companies has been a disturbing trend in this region over the last decade. This suggests that there is a trust deficit between Indigenous groups and industry, which will impact closure planning in this region.

The Cultural Heritage Matters Guide (2012) provides examples of cultural offsets, including:

- Documenting local oral histories, genealogies or other significant intangible heritage.
- The documentation or research (interpretation/publication) of significant tangible cultural heritage places.
- Establishing museums or cultural centres.
- The conservation or preservation of other culturally significant landscapes or features outside the operation area.
- Initiation and continuation of cultural programs that focus on local cultural programs.

Social and cultural offsets also have the potential to create divisions and conflict within affected groups. The destruction of one site for the protection of another may seem 'balanced' but, when different subgroups have responsibility for particular sites, this amounts to picking winners within a community or landholding group.

6.9 Distribution of risks

Any CIA that includes Indigenous interests would start from the understanding that the Indigenous customary landholders generally bear the brunt of environmental and social risk. A paper from the United States developed what the authors refer to as an "equity assessment to evaluate impacts to trust resources, watersheds and eco-cultural landscapes" (Harris & Harper 1999, p. 1). They identified three major steps in assessing what they refer to as the "inequitable distribution of risks":

1. Knowing what is relevant to the community.
2. Knowing how to measure relevant impacts.
3. Knowing how to aggregate different kinds of risks into a meaningful whole.

Kemp et al. (2016) have also found that the mining industry's use of the term 'social risk' does not clearly differentiate between *risk to people* and *risk to the project*. This lack of clarity invites questions about what is viewed as constituting *a risk*, and who or what is considered to be *at risk* in the context of mining (Kemp et al. 2016). Indigenous customary landowners also bear the brunt of environmental and social risk in mine closure. If rehabilitation and mine closure practices are inadequate, the Indigenous population has more to lose than other groups – especially when these mines are on or adjacent to their Indigenous estates. As O'Faircheallaigh and Lawrence (2019) state, "the current regime provides little opportunity for input by native title holders or Aboriginal communities and fails dismally to ensure effective rehabilitation or remediation of mine sites" (p. 66).

7 Conclusion

A suite of qualitative and quantitative methods will need to be developed in collaboration with affected Indigenous groups and multidisciplinary experts to effectively undertake a CIA that incorporates Indigenous customary landowners' values and priorities. The literature clearly articulates that community participation is even more important when dealing with Indigenous knowledge, land and peoples. While there is no doubt that mine closure is a potential opportunity for Indigenous landowners to reclaim and regenerate the land, this is also commonly a period where there are less resources, less company focus and commitment, and largely ineffective environmental laws and policies (O'Faircheallaigh & Lawrence 2019; Richardson 2015). Ideally, an approach to mitigating cumulative social and environmental impacts on Indigenous customary landowners is implemented during the life-of-mine, including skilling up and drawing on the expertise of local Indigenous rangers or land managers.

A stronger regulatory role of government has been found as essential in all of the literature on CIA. The current project-by-project approach to engaging with CIA evident in the literature is inadequate to the task of a strategic regional approach to planning. The very limited material on engaging with the rights and interests of Indigenous groups to lead or co-manage impact assessments on their lands indicates a lack of recognition of said rights and interests. Yet there is a raft of readily available resources, including Healthy Country Plans and cultural mapping technologies that can be harnessed for CIA. There is also an emerging raft of Indigenous land management expertise in the growth of ranger groups caring for Country. These groups are currently engaging with a range of introduced threats and have developed mitigation strategies that, in many instances, align with CIA methods.

The parliamentary inquiry into the destruction of the Juukan Gorge in the Pilbara region focused concerted attention on the impacts from the resources industry on cultural heritage, and many of the submissions focused on cumulative impacts. However, expanding what is meant by 'cultural heritage' is fundamental – not only within the remit of CHM but also more broadly. A landscape-level approach to managing cultural heritage is now increasingly recognised as good practice, while the values embodied in the concept of 'Country' are also being made more explicit through Healthy Country Plans. And frameworks such as 'Connection as Country' are also assisting in making relational values visible to promote inclusion in environmental management and decision-making.

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