






ADVANCES IN MINING RESTORATION

POLICY ARTICLE

Indigenous environmental justice through coproduction of mining restoration supply chains in Australia

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Mining activities often cause displacement and disruption of Indigenous socio-cultural relations to land, water, biodiversity, and sacred entities. Due to the high disturbance and degradation that occurs as a result of mining on Indigenous lands, mine restoration and closure (MR&C) must mobilize the political agency of Indigenous Australians and provide enduring benefits beyond the life-of-mine. Here, we demonstrate that Indigenous engagements with mining restoration supply chains in Australia can only succeed if institutionalized socio-environmental inequalities are recognized and dismantled. Through environmental justice lenses, we examine critical mine restoration injustices and how Indigenous Australian participation can energize environmental self-determination. We analyze emerging restoration supply chains through the native seed collection and production activities as opportunities for nurturing transformative local collaborations, Indigenous entrepreneurship, and political participation. Our analysis shows the potential for community practices to coproduce MR&C through enduring partnerships, Indigenous-led organizations, and plural knowledge systems. Indigenous Australian leadership in coordinating investments, collaborations, techniques, and business operations is critical to transforming MR&C into democratic and equitable plans and actions on Indigenous lands where mining operates. When aligned with progressive institutional changes, restoration interventions can potentially strengthen environmental self-determination for Indigenous Australian political control over the customary use and stewardship of their lands.

Key words: environmental justice, Indigenous knowledge, Indigenous participation, mine restoration and closure

Implications for Practice

- The critical foundation of mine restoration and closure plans on Indigenous lands should rely on current principles of environmental self-determination to dismantle injustices and inequalities rooted in inappropriate colonial frameworks.
- Institutional changes are needed to transform top-down restoration arrangements into plural forms of coproducing knowledge, collaborations, and organizational systems for equitable restoration supply chains.
- Indigenous-led organizations should have opportunities to reconfigure participation in restoration decisions to enhance local engagements and influence business models that endure long after the mine is closed.

Introduction

Mining and petroleum extractive activities have caused extensive and profound destruction of Indigenous lands worldwide, manifesting social and environmental inequalities underpinned by the uneven distribution of benefits and environmental degradation (Lilley 2017). In this context, Indigenous peoples face multiple injustices, including displacement and violation of

fundamental human rights, which has often resulted in strong opposition to mining (Schlosberg & Carruthers 2010; Ulloa 2017). In Australia, extractive industries—mining, oil, and gas—have been an integral component of the domestic economy, with significant wealth generated through exports of coal, iron ore, minerals, and natural gas (Downes et al. 2014). While the mining industry represents Australia's largest export revenue (ABS 2021), Aboriginal and Torres Strait Islanders (henceforward referred to as Indigenous Australians) have not shared in this bounty equitably, with social and economic disadvantage exacerbated where mining activity is the greatest (Lawrence 2005; O'Faircheallaigh & Lawrence 2019).

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Among the last environmental injustices in mine restoration and closure (MR&C) is the call to enforce adequate reparation for ongoing ecological, cultural, and social impacts, often long after mines close on Indigenous lands (hereafter referred to as Country). In Australia, current legal systems and Indigenous Land Use Agreements (ILUAs) emphasize developmental interventions to reduce structural socioeconomic inequalities (Langton 2013, 2015). However, most MR&C plans lack participatory mechanisms to effectively involve the often-invisible Indigenous rights and necessities for equitable reparation on the ground (Unger et al. 2020). Political engagement with Indigenous perspectives is vital to building relevant relations that include plural cultural values in mine site restoration processes (Bond & Kelly 2020).

Emerging examples from across the globe already demonstrate the promising role of Indigenous and traditional communities in coproducing restoration supply chains from the bottom up as progressive socio-environmental interventions (Schmidt et al. 2019). In Australia, the unprecedented national demand to restore hundreds of thousands of hectares of mined lands (Merritt & Dixon 2011) presents potential opportunities for community participation in supplying products and services and structuring local restoration supply chains. A shortage of native plant material remains a significant bottleneck for Australia's restoration programs (Gibson-Roy et al. 2021), and linking plant material demands to Indigenous Australian groups is an opportunity to reshape MR&C operations. As a result, Indigenous-led organizations aligned with restoration demands can include and value Indigenous knowledge, generate socioeconomic opportunities, and trigger local participation in political decision-making processes (Urzedo et al. 2022).

This policy article examines critical MR&C environmental injustices and discusses community practices to reconceptualize Indigenous Australian participation in the coproduction of equitable restoration supply chains in Australia. We analyzed information from published reports and literature to identify the main historical events and political instruments related to mine site restoration in Australia. By focusing on native seed supply systems, we showcase emerging Indigenous Australian initiatives in Western Australia and western Cape York, Queensland. Our analysis focuses on including Indigenous environmental justice perspectives in mining restoration supply chains in Australia while acknowledging that Indigenous involvement is an emerging and evolving socio-political process with potentially far-reaching implications for mining practices, plans, and policies.

Undermining Rights: Indigenous Development Contestation in Mining Activities

The Australian government has historically excluded, ignored, or forcibly removed Indigenous Australian peoples from any role in land management and political decision-making processes (Foley & Anderson 2006). European settlers justified land appropriation based on the legal fiction of *terra nullius* (land belonging to no one) and deprivation of political and economic rights of Indigenous Australians (Banner 2005). At least in principle, initial reconciliation occurred in the late 1960s when Indigenous Australians gained formal Australian citizen

status. The Australian government's initial attempt at recognizing Indigenous land rights included The Aboriginal Lands Trust Act 1966 (South Australia) and The Aboriginal Land Rights Act 1976 (Northern Territory). Indigenous Australians fought for formal recognition and enforcement of their rights to reaccess, reconnect, and once again manage Country over which they had stewardship for millennia, especially when resource extraction projects were negotiated or implemented on these lands (Trigger 2000). Nevertheless, Commonwealth and state governments refused to adopt a national legal position in Indigenous natural resources management and lands rights (Howitt 2001).

Legal recognition of land sovereignty by Indigenous Australians has only progressed in the last three decades following the High Court of Australia's 1992 *Mabo* decision rejecting the doctrine of *terra nullius* (HCA 1992), followed by the introduction of the Commonwealth Native Title Act (Cth 1993). This Act recognizes that Aboriginal and Torres Strait Islander peoples have interests and rights to land and waters. Combining this legal mechanism with other instruments (e.g. ILUAs), the government implemented a set of safeguards to protect the interests of Indigenous Australians in mining activities throughout Australia. Notably, and relevant to Indigenous land holders where mines operate, the social license to operate and close a mine site have emerged as crucial elements to facilitate consultations with local communities and encourage business development (Robinson et al. 2020). Government and industry expect these agreement-making approaches to tackle a long history of inequality, create an equitable, ethical distribution of benefits, and reduce environmental and social risks (Langton 2015).

Two decades after the *Mabo* decision, almost two-thirds of mineral extraction operations overlapped or abutted Indigenous Country, resulting in more than 1,300 ILUAs and Mine Participation Agreements (Australia 2021). Emerging partnerships between mining companies and Indigenous Australians, in some cases, have built trust and respect for Aboriginal and Torres Strait Islander cultures and delivered economic returns for local communities (Langton 2015). Social responsibility programs frequently concentrate on professionalization, employment, and business creation for Indigenous Australian communities, rather than focusing on transforming social and environmental injustices rooted in colonial legacies (Lawrence 2005). A national assessment of 45 Indigenous Australian-industry agreements revealed that such partnerships were poorly developed and failed to adequately compensate for the immediate and long-term impacts of mining on Country (O'Faircheallaigh 2015). Hence, mining in Australia continues to be built upon socio-environmental inequalities, leading to the undermining of Indigenous values and social justice (O'Faircheallaigh & Lawrence 2019).

Indigenous Australian Engagements with Mine Site Restoration Supply Chains

When mining ceases on Country, Indigenous Australians expect to reaccess, live on, reinvigorate customary pursuits, and regain cultural relations from restored and healthy environments (Barnes et al. 2020). MR&C plans would hypothetically tackle these concerns. By enforcing post-closure commitments and

approval conditions, MR&C plans focus on effective decommissioning and land rehabilitation processes for safe post-mining subsequent land use (Australia 2016). However, such post-mining land use rarely, if ever, effectively, and transparently engages with Indigenous management and land stewardship (Bond & Kelly 2020). More recently, the MR&C debate in Australia has gradually shifted from a scientific emphasis on the biophysical conditions of soils and vegetation to a critical understanding of cumulative impacts and the possible benefits to be derived from post-mined land through the recognition of Indigenous knowledge and customary practices (Unger et al. 2020).

Mine closure activities have been criticized as being too focused at the end of the mineral extraction phase often overlooking Indigenous Australian engagements and participation. According to a national assessment of nearly 30 MR&C plans, most operations have underexplored any form of Indigenous Australian engagements or benefits arising from closure and rehabilitation activities (Bond & Kelly 2020). Existing examples

of participation in mine closure rely typically on commitments to create consultation processes and committees or workgroups for plan developments (e.g. Cultural Heritage Management Reconciliation Action Plans). Consultation is often seen as the end of a process rather than a pathway to meaningful practical involvement for Indigenous Australians. These unsuccessful ways of engaging with Indigenous Australian communities fail to dismantle structural injustices which in themselves are constructs of current legal and regulatory frameworks, nonparticipatory planning and symptomatic of insufficient financing allocated to mine site restoration (O’Faircheallaigh & Lawrence 2019).

We consider long-lasting negative environmental impacts and risks of poorly restored sites a recurrent pattern of the uneven distribution of benefits and risks in mine site restoration that require urgent and necessary debate about Australia’s environmental justice issues. Indigenous environmental justice seeks the critical role of Indigenous ontologies and capabilities in transforming rights-based approaches to include environmental

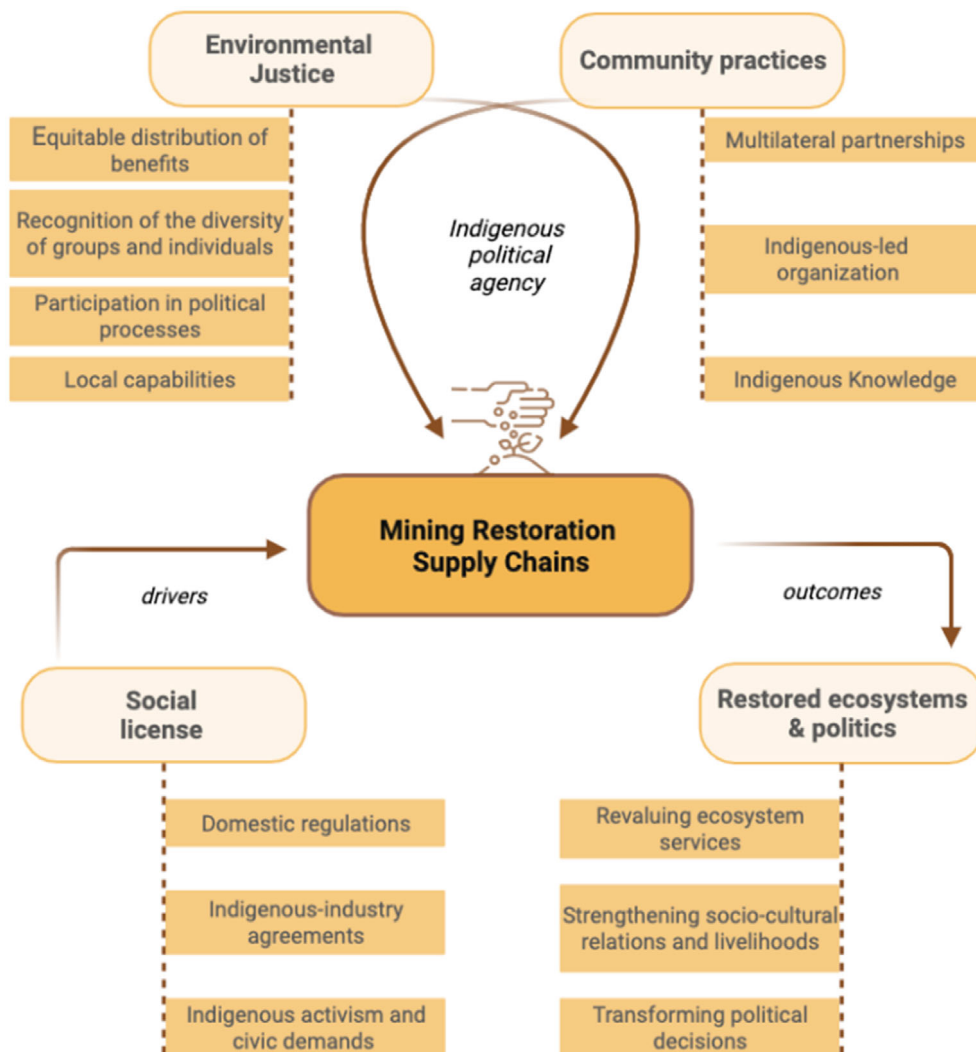


Figure 1. Coproducing equitable mine restoration supply chains for nurturing Indigenous political agency underpinned by multilateral partnerships, Indigenous-led organization, and Indigenous knowledge.

self-determination (Ulloa 2017). These environmental justice values applied to MR&C highlight commonly unrecognized Indigenous dimensions in restoration practices, such as Indigenous knowledge and relations with sacred and culturally significant entities and sites (Bond & Kelly 2020). Indigenous environmental justice emphasizes the importance of Indigenous political agency in determining the capabilities necessary for experiencing and reproducing cultural practices, cosmologies, and relations with nature (Schlosberg & Carruthers 2010).

For translating these justice debates into the coproduction of restoration supply chains, we discuss three critical community practices: (1) establishing multilateral partnerships; (2) mobilizing Indigenous-led organizations; and (3) pluralizing knowledge practices (Fig. 1). We draw attention to case studies (Box 1) to describe Indigenous Australian engagements with the native seed supply chain, a key component of mine land restoration, and how it can support regional capabilities through regional socioeconomic opportunities and ownership by Indigenous Australians. The following section analyses diverse forms of Indigenous Australian participation in partnerships, local organization, and knowledge-making processes to remake regulatory and technical frameworks more closely to procurement practices.

Establishing Multilateral Partnerships

Equitable restoration supply chains rely on the cooperation between multiple stakeholders (Urzedo et al. 2022). By articulating various groups and their situated experiences and needs, localized networks unfold as participatory platforms for collaborations that can reshape restoration plans and actions (Schmidt et al. 2019). Collaborative negotiations should nurture Indigenous political organizations to achieve legal recognition of self-determination across domestic and international levels (Langton 2015). When meaningful engagements between the state, mining industry, and Indigenous Australian groups are articulated, essential financial, technical, and political resources trigger Indigenous political agency (O’Faircheallaigh 2021). At the same time, Australian restoration networks are still poorly articulated and not in the position to stimulate an inclusive sector aligned with democratic and participatory engagements with Indigenous Australians (Gibson-Roy et al. 2021).

Promoting Indigenous participation in MR&C goes beyond the direct interactions with government bodies and the mining



Figure 2. Implementation of an Indigenous Australians-owned native seed farm in Morawa, Western Australia (Photo by S. Pedrini).

industry. Scientists, civil society, and nongovernmental organizations offer ample prospects to enhance cooperation for the coproduction of restoration supply chains centered on Indigenous leadership (Barnes et al. 2020). Among the different challenges, building trust is fundamental to recognizing and including diverse roles and expectations of various stakeholders to establish partnerships and local leadership in Indigenous-led supply chains (Jarvis et al. 2022). The native seed farm in Morawa (Western Australia) is one example of how regional partnerships between several stakeholders support the coproduction of restoration supply chains (Fig. 2). This Indigenous-led seed farming initiative was implemented in 2018 through the cooperation between an Aboriginal Corporation (MEEDAC), environmental nongovernmental organizations, scientists, and the private sector. This cooperative approach aims to boost the seed availability of 20 key native species usually absent in mining restoration seed mixes due to regional difficulties in wild seed collection. These different organizations have supported the interconnections between legal, scientific, and participatory approaches to elaborate plans and mobilize resources to assist Indigenous Australians.

Transforming these social relations into contractual and formal MR&C procedures should hold the mining industry accountable for environmental justice (O’Faircheallaigh & Lawrence 2019). Indigenous communities require realistic expectations and timelines to manage socio-political concerns and assess the values and benefits of the restoration actions (Urzedo et al. 2022). For

Box 1. Indigenous-led native seed supply initiatives to mining restoration supply chains in Australia.

The Gelganyem Seed Project was established in 2019 by Gelganyem Ltd charitable trust to meet the requirements of the closure of the Argyle diamond mine in the Kimberley region of Western Australia by creating a supply contract for native seed collection and storage. A team of local Aboriginal staff were hired to conduct seed collection works and coordinate a community seed collection program, whereby traditional owners from outstations and communities within a 200-km radius of the mine had the opportunity to supply native seeds. The Gelganyem Seed Project model was blueprinted from a community seed collection program running for over a decade at another Rio Tinto site on western Cape York in Queensland. The Rio Tinto Weipa bauxite mine procures an understory seed program that runs between the communities of Aurukun, Napranum, and Mapoon. More recently, a collaboration between multiple organizations with the Midwest Employment and Economic Development Aboriginal Corporation (MEEDAC) has established the first Aboriginal-owned and managed native seed farm to meet regional mined land restoration demands in the Midwest region of Western Australia (Fig. 2).

instance, when developing Indigenous-industry contracts for seed supply, different parties must incorporate adaptability, flexibility, and continuous revisions of agreement outcomes (Schmidt et al. 2019). The Gelganyem Seed Project (Box 1) was initially awarded for 18 months to achieve very ambitious seed collection targets basing such expectation on a similar seed procurement initiative in western Cape York. However, this model took over a decade of development and growth to establish, highlighting the need for early engagement with Indigenous Australians in the mining cycle. Hence, partnerships between community seed suppliers and mining companies need to be adaptively managed over several years. These conditions are essential to respect context-specific issues, promote active political representation of diverse Indigenous Australian groups and develop contracts that activate restoration supply chains.

Mobilizing Indigenous-Led Organizations

Australia's emerging native seed supply chain aligns an increasing demand for restoration products and services with regional socio-economic priorities (Gibson-Roy et al. 2021). Recent examples of Indigenous Australian groups working on mining restoration supply chains revealed significant socioeconomic outcomes through employment and contracting commitments (Barnes et al. 2020). However, the coproduction of community-led organizations is challenged by diverse interests in coordinating and organizing supply chain operations (Urzedo et al. 2022). Commonly, dominant socio-cultural worldviews lead to power asymmetries and exclusion of Indigenous groups in shaping administrative and management operations. For instance, Indigenous Australian groups have a recurring role in harvesting bush products but lack political leadership and influence further along supply chains (Jarvis et al. 2022).

Indigenous Australians' influence in business arrangements must be placed in each step of the supply chain, from community mobilization to delivery logistics, removal of current obstacles and equitable socioeconomic inclusion (Langton 2015). Indigenous participation in the breadth of technological, management, and political roles required is underpinned by incorporating Indigenous perspectives into conceptual, productive, and cultural operations (de Sousa Santos 2015). Identifying clear roles, rights, and responsibilities facilitates the formulation of organizational decision-making processes, respecting differences and needs. In the Kimberley region, the Gelganyem Seed Project assisted non-Indigenous managers with cultural awareness and capabilities to navigate effective cross-cultural communication to codesign supply chain arrangements with local groups and begin development of a regionally significant enterprise.

Indigenous businesses also question how products and services are measured, valued, and quantified by restoration markets to reconfigure benefit-sharing instruments (Schmidt et al. 2019). Western perspectives frequently emphasize financial interests and gains, which underrecognized multiple forms of valuing Indigenous relations and cultural connections within nature (Whyte 2017). Restoration projects often quantify the native seed value by adopting standardized market prices formulated through national commercial systems (Pedrini et al. 2022).

For example, the Rio Tinto Weipa bauxite mine operates a seed program by purchasing seeds via a pay-by-weight system in Cape York with different seed collection groups drawn from local Indigenous groups working across 60 native plant species. Including diverse socio-cultural dimensions associated with restoration practices require revaluing products and services through more robust and holistic instruments aligned with procurement contexts and relevant local cobenefits, such as cultural services.

Pluralizing Knowledge-Making Systems

Coproducing restoration supply chains with Indigenous Australians interconnects multiple knowledge practices to unfold cultural relations and values in mine site restoration. Indigenous knowledge and capabilities are diverse and covers monitoring, recording, communicating, and learning about entangled relations between humans, biodiverse landscapes, and diverse sacred entities (Whyte 2017). Indigenous knowledge of Country, including the cultural and customary use of diverse species and connections with culturally significant entities provide great value in configuring Indigenous Australian-led supply chains (Jarvis et al. 2022). From Indigenous perspectives, tangible and nontangible connections with the land as a dynamic caring relation honor their ancestors, entities, and histories (Ulloa 2017).

Indigenous-led practices for coproducing knowledge combine several mutual learning processes to include diverse ways of connecting, experiencing, and managing environments (Robinson et al. 2022). Through plural knowledge-making practices, negotiations between heterogeneous knowledge systems identify the differences and bring together similar interests to build alliances (de Sousa Santos 2015). The Gelganyem Seed Project, for instance, operates community seed workshops to strengthen participatory practices to codesign seed supply activities. The Gelganyem program implemented intercultural seed collection planning activities to identify culturally significant and local relevant plant species by incorporating Indigenous knowledge and scientific approaches with the dialogue yet to be fully matured with the mine owner. These learning processes support Indigenous Australian groups to set their relations, views, and aspirations to manage supply chain operations as a political process.

Conclusions

There is still a considerable lack of inclusion of Aboriginal and Torres Strait Islander values to influence and participate in the coproduction of mine site restoration in Australia (Unger et al. 2020). This policy article presented how current MR&C approaches reinforce ongoing Indigenous displacement and limited access to their lands as complex issues that emphasize historical disadvantages and structural inequalities (O'Faircheallaigh & Lawrence 2019; Bond & Kelly 2020). Activating participatory restoration supply chains to eliminate injustices requires the transformation of the power inequalities to flourish Indigenous Australian rights to self-determination (Ulloa 2017). To overcome typical top-down MR&C instruments, we demonstrated the

importance of mobilizing efforts to activate community participation in structuring restoration supply chains by establishing multi-lateral partnerships, mobilizing Indigenous-led organizations, and supporting plural knowledge-making systems.

Building genuine relations focused on active Indigenous Australian political agency entails transforming MR&C plans and regulations to include Indigenous knowledge, local organization systems, and a cultural safety net (Langton 2015). Partnerships should support the configuration of diverse networks to shift MR&C plans from a technical and commercial logic to a participatory planning approach underpinned by solid ethical Indigenous leadership. Placing Indigenous capabilities and political positions at the core of restoration operations support the coproduction of Indigenous-led organizations aligned with engagements across decision-making processes (Barnes et al. 2020). Indigenous knowledge assists innovative formulations through plural knowledge practices which honor their histories, entities, and ancestors (Whyte 2017). These Indigenous practices can result in alternative mechanisms for reshaping social and political MR&C plans and activities to “Close the Gap” on social disadvantage reinvigorate Indigenous stewardship and trigger environmental self-determination on Country.

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