



Understanding why impact assessment fails; a case study of theory and practice from Wafi-Golpu, Papua New Guinea

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ABSTRACT

From an instrumental or management perspective, impact assessment (IA) is a process of identifying impacts, finding solutions and achieving project approval. A recipient community, however, has a completely different perspective. For them the IA is about living with impacts, individually and collectively, perhaps over generations, and contested processes of self-determination, consultation and exclusion. IA practitioners live in a third space, usually bound to the proponent but also aware of responsibilities to communities and eco-systems. Seeking to better understand how IA is practiced and experienced, we explore the proposed Wafi-Golpu mine, located in the Morobe Province of Papua New Guinea. Determinably focused on local effects we situate the proposed mine within the context of the national mining experience and discuss how IA practices see local and/or Indigenous communities. We find that the Wafi-Golpu IA is blind to local ways of being and seeing the world, with an opaque and arbitrary assessment that reflects its technical and Western basis and bias. We finish with observations about the proposed Wafi-Golpu mine and IA that is relevant to the approval process, as well as making a decolonial, Southern contribution to IA theory and practice, extractive industry regulation and mining-affected communities elsewhere.

1. Introduction

This research began with and responds to Communities¹ in Papua New Guinea who asked questions about the likely impacts from mining.² The aim was to share and exchange knowledge with mining-affected Communities, a process involving theory, as well as sharing international, provincial and local experience. After exploring extractive

impacts more broadly, the research for this article explored impact assessment (IA) with Communities who felt excluded from the IA process and had strong concerns about its accuracy and validity.

From an instrumental or management perspective, IA is a process of identifying impacts, finding solutions and achieving project approval. In practice, however, IA has developed into complex, technocratic and time-consuming processes that can frustrate proponents and

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¹ Capital C is respectfully used when referring to specific Communities, or their ownership over something i.e. knowledge.

² While specifically focused on IA, this article builds on four previous and linked articles focused on PNG and mining at Wafi-Golpu. (1) Mudd et al. (2020) explores PNG's mining industry and its impacts on people and place; (2) Roche et al. (2019b) examines extractive outcomes through the concept of human flourishing; (3) Roche et al. (2019a) explore extractive dispossession; and (4) Roche et al. (2021) explores methodologies and shares stories from Communities.

Communities alike. Acknowledging the complex relations between communities and extractive industries, we³ examine the Wafi-Golpu Project Environmental Impact Statement (hereafter WGEIS⁴) using community perspectives that emphasise human flourishing⁵ to make visible what is missing from the IA. Rather than a comprehensive or technical review of the 6800 page WGEIS, however, the focus is on how non-western realities are seen, described, experienced and excluded.

This participatory action research (PAR) based review serves two purposes. The first is to report on a process that wove extractive sector and Indigenous knowledge⁶ together to critique the WGEIS (Wafi-Golpu Joint Venture, 2018), exposing flaws that will have real life consequences for generations. The second purpose is to utilise this local experience and Indigenous knowledge to contribute to IA research and practice; to listen and learn from mining affected communities to inform how we conceptualise and operationalise IA as an international practice.

After a brief description of the methodology (Section 2) and Community (Section 3), the different scales (national, international/sector, local) of IA are explored in three main sections: first, in Section 4., we present a truncated PNG mining history illustrated by examples of community experience; second, in Section 5., we engage in a broader international discussion of IA, discussing ethics, evolving IA practice, community based impact assessment (CBIA⁷) and Indigenous knowledge and IA challenges; and third, in Section 6., we examine the WGEIS, focusing on the development justification, stories of life on the Wafi River, a contested settlement history and risk assessment. The elements are then combined in Section 7., a concluding discussion to identify points of failure that can inform regulators and stakeholders as well as contributing to theory, practice and praxis elsewhere.

2. Methodology and theoretical context

Part of a larger study,⁸ the fieldwork methodology for this paper is extensively discussed in a sister article entitled *Unseen existences: stories of life from Venembeli, Papua New Guinea* (Roche et al., 2021) which details an evolving methodology from earlier research. In brief, we applied a deliberately decolonial and emancipatory participant action research (PAR) approach using *tok stori* (to exchange stories) and *tok stori/tok ples* (to exchange stories from local language) methodologies

³ Authorship and ownership are complicated in this article. With equal but differentiated roles, some separation is required. In this article 'we' refers to the University Team as the article's principal writers. Whereas the Venembeli Community contributors, who provided the local stories from Indigenous knowledge, are described as co-researchers; we use the term co-researcher rather than research participant to describe Venembeli contributors because they were involved in shaping the research, the methodology and even the analysis in our process of repeatedly returning to the community to talk through the research findings. While not completely satisfied with this separation, it was deemed necessary to ensure responsibility for the final text lay with those who wrote it.

⁴ Rather than reference each component separately, when referring to the WGEIS we will cite, in-text, the number/letter of the volume/chapter/appendix and page number as per the WGEIS table of contents. While other assessments of the WGEIS have been reported, none have been released to the public, and so this review, which will be translated and distributed to affected communities, provides a deliberate counterbalance to the technical WGEIS.

⁵ We prefer the complexity and emphasis of human flourishing (Roche et al., 2019b) when it comes to describing impacts on people rather than the potentially meaningless term of mining sustainability (Kirsch, 2009), though we do use it to speak to international conversations (Mudd et al., 2020).

⁶ Although the communities do not readily identify as indigenous (identifying locally - *ples*), as well as Melanesian, Papuan and Papua New Guinean), apart from self-identification they satisfy any criteria for indigeneity; we thus use the term Indigenous knowledge to situate their work in international conversations.

⁷ O'Faircheallaigh (2017) uses the similar term 'community-controlled impact assessment' (CCIA).

⁸ See related articles in footnote 2.

which are exchange-based approaches of listening and speaking with an emphasis on mutuality and relationality (Sanga and Reynolds, 2019; Stead, 2013). But even these decolonial methodologies do not avoid the potential for western epistemologies to dominate the research, a fact further complicated by the disparity in formal, western education levels between university academics, co-authors and local Communities. To overcome this we have used PAR, given primacy too and amplified local voices, and deliberately merged Melanesian, Southern and Northern concepts and methodologies - though we note that the research still needed to engage Western debates to fulfil its action-research agenda. Undoubtedly, more can be done to overcome epistemic bias and to allow a pluriversal debate capable of overcoming ontological bias and processual norms and practices to develop; we regard this work as contributing towards, rather than exemplifying this goal (Allen, 2016; Álvarez and Coolsaet, 2018). Critically for this research, the methodologies challenge the abyssal line⁹ identified by Santos' (2018) and are capable of recognising other ontologies, uncovering values that are often unseen or rendered invisible by those with mono-ontological philosophies. Or, as described by Escobar (2020), methodologies of ontological politics capable of contributing to the creation of pluriversal transitions.¹⁰

Demonstrating agency and research involvement and direction, stories told by members of the Community highlighted deficiencies in the WGEIS, prompting a modification of our research focus to concentrate on what their *tok stori*'s had uncovered. The result is a weaving together of our industry and their local and Indigenous knowledge to provide a case study that identifies challenges to the IA sector and research and critiques related sections of the WGEIS. Given our PNG Community focus, we have used examples from other minesites in PNG (see Fig. 1) to illustrate extractive impact, rather than undertaking a full PNG IA review, though acknowledge it would add further detail to this already complex story.

We chose the Watut Valley as the delineation of focus as many of the communities had been impacted by the Hidden Valley mine and relied on the Watut River or its tributaries for water to cook, wash, play, cool and undertake artisanal gold mining (ASM) (Boylan, 2014; Mudd and Roche, 2014; Mudd et al., 2020). While capacity constraints narrowed this research to Venembeli, previously (2012–2018) the authors have engaged a much wider group of Wafi Communities from the Yanta (Nambonga, Pekumbe, Venembeli), Babauf (Babwaf) and Hengenbau (Hekeng) language groups (see Fig. 2). Based on this long-term engagement, we maintain the research also represents a generalisable and wider reality applicable to other communities in the Wafi-Golpu area, notwithstanding the heterogeneity within and between communities.

Additional information and interviews were sought from the Wafi-Golpu Joint Venture (WGJV)¹¹ and the WGEIS consultants. Yet, despite ongoing communications with WGJV we were unable to resolve issues of access, possibly owing to the sensitivity of the information sought and our action research orientation that elevates community over company interests.¹² We see considerable benefit in future cooperation to better understand community and company perspectives and made an open-ended invitation for WGJV to dual author an analysis of

⁹ Describing how modern Western thinking creates dividing lines (dualisms) and distinctions and then denies the existence and knowledges of those on the other side of the line (Santos, 2007).

¹⁰ Referring to an ontological politics that recognises radical interdependence and is unconfined by binaries (i.e. mono versus plural) that combines work from South and North to create just transitions for human flourishing (Escobar, 2020).

¹¹ In keeping with earlier articles, we use name WGJV for the various mining entities that are involved at the proposed Wafi-Golpu mine. The JV is owned by Newcrest Mining and Harmony Gold.

¹² The first author has engaged with WGJV and parent company Newcrest since 2012 in a role with the Mineral Policy Institute and then also as a PhD researcher from 2015.

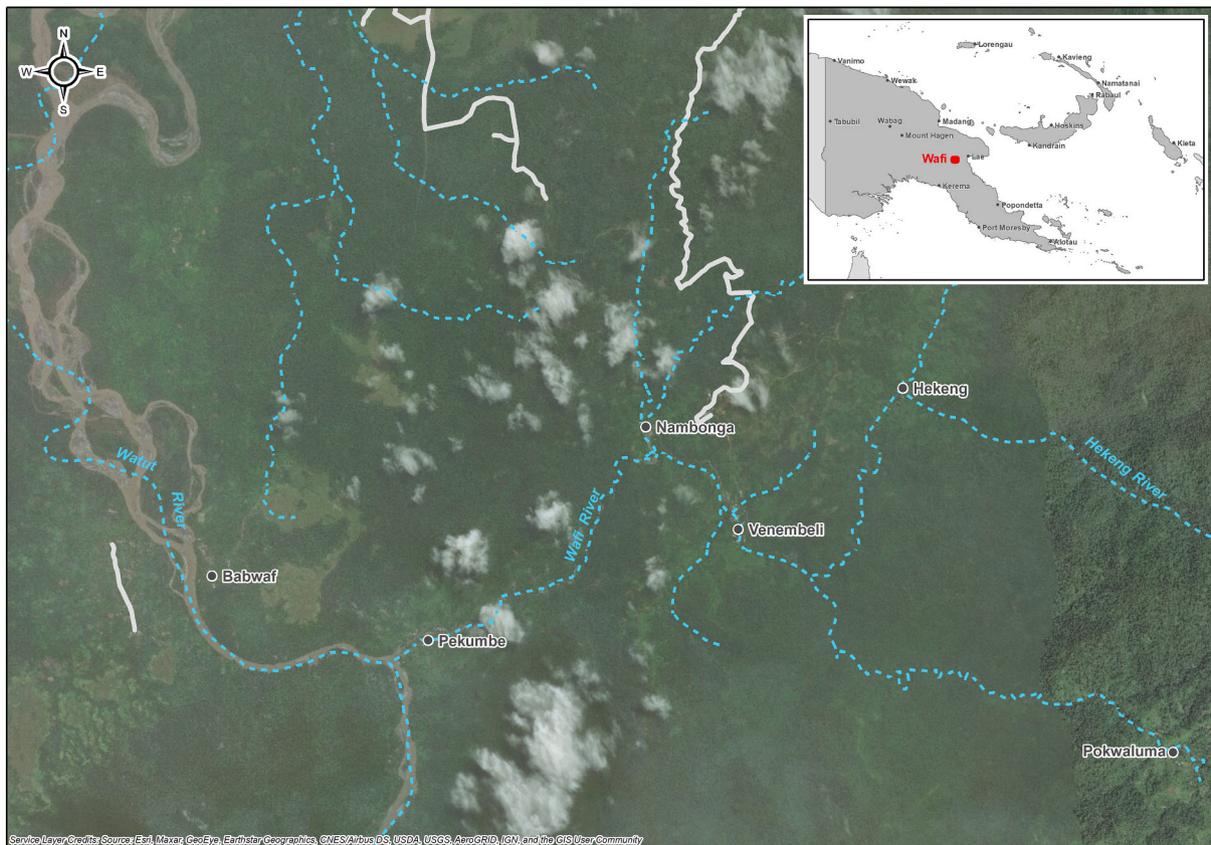


Fig. 2. Wafi Communities.

Chairman of Bougainville Copper Limited (BCL). Momis states that BCL is a “faceless corporation” whose “executives inhabit a fantasy world” unable to see, respect or engage in Melanesian Ways.¹⁴ In the same year Hyndman (1987, p. 28) described “[A] long series of ecocide disasters ...” at Ok Tedi mine and the interruption of subsistence and cash crop production due to the enormous environmental damage at Panguna; both sites have significant and long-lasting social impacts stemming from environmental destruction.

With the forced and violent closure of Panguna and the resultant Bougainville Crisis that caused 16,000–20,000 deaths, Papua New Guinea became an international mining hot spot for all the wrong reasons (Havini and Johns, 2001).¹⁵ While some saw Panguna as a unique conflagration, Clairmonte’s (1992) review identified structural barriers to, and questioned the ability of the industry to contribute to PNG’s development. He describes the situation as “[Y]et another macabre reminder of the extent to which PNG’s economy has been structured in the interests of expatriate big capital in blatant complicity with political interests at home and abroad” (p. 582). Barriers to an effective contribution from the mining industry to human development in PNG remain, with more recent studies identifying a lack of contribution to well-being (Banks, 2014); a disconnect between development rhetoric and practice

¹⁴ The term Melanesian Way term was popularised but deliberately left undefined by Narokobi (1983). It captures the relational way Melanesians wanted to live and develop. The essence of the Melanesian Way is reflected in a spiritual; authentic (not a carbon copy of others) culture with a communal, cosmic vision at one with the interdependence of the animal and plant world. See Ritchie (2020) for a detailed account of Narokobi’s work and the formation of the Melanesian Way.

¹⁵ Estimates on the number of deaths from the crisis vary from 10,000–20,000 (Alley, 2003; Lasslett, 2014) with others identifying combat deaths of between 1000 and 2000 (Adamo, 2017).

and a gap between development aspirations and reality on the islands of Lihir and Simberi (Richardson, 2018; Richardson et al., 2019); and obstacles in accessing health care in pre, operational and post mining phases at Hidden Valley, Lihir and Misima mines (Kuir-Ayius, 2016).

Part of the mining industry’s response to the forced closure of Panguna was the Mining Minerals and Sustainable Development (MMSD) review, which was effectively commissioned by the Global Mining Initiative, the precursor to the International Council on Mines and Metals. The PNG baseline study (Banks, 2001) for the review identified numerous issues and knowledge gaps, the most relevant to our work, being: (1) the lack of studies and understanding of mining’s effect on social and economic change from both immanent and intentional development; (2) poor communication; (3) impact of mine waste; and (4) the lack of effective social assessment and monitoring. Further, Banks describes the application of social assessment and monitoring as irregular, pointing to a lack of interest from corporates and poor government enforcement. These problems remain pervasive, as documented by Pacheco Cueva (2016) at Lihir, where a lack of transparency, political asymmetries between company and communities and a reduced state role all contributing to social conflict; where the company is seen to be more focused on the acquisition of legitimacy rather than the lived experience of social impacts. At the same site, Hemer (2016, 2018) describes gendered fears of violence around the mine site and avoidable conflicts caused by development induced displacement.

Gendered impacts from mining in PNG are inescapable. Byford (2005) describes a lack of women’s participation in decision-making on Misma, despite women there suffering the gendered impacts of mining common at other mine sites in PNG including increased workload due to male absenteeism; family fragmentation; prostitution; rape; single motherhood and domestic violence. Women’s exclusion from extractive decision-making has always been a challenge in PNG, with gendered traditions, conservative Christianity and a masculine mining industry

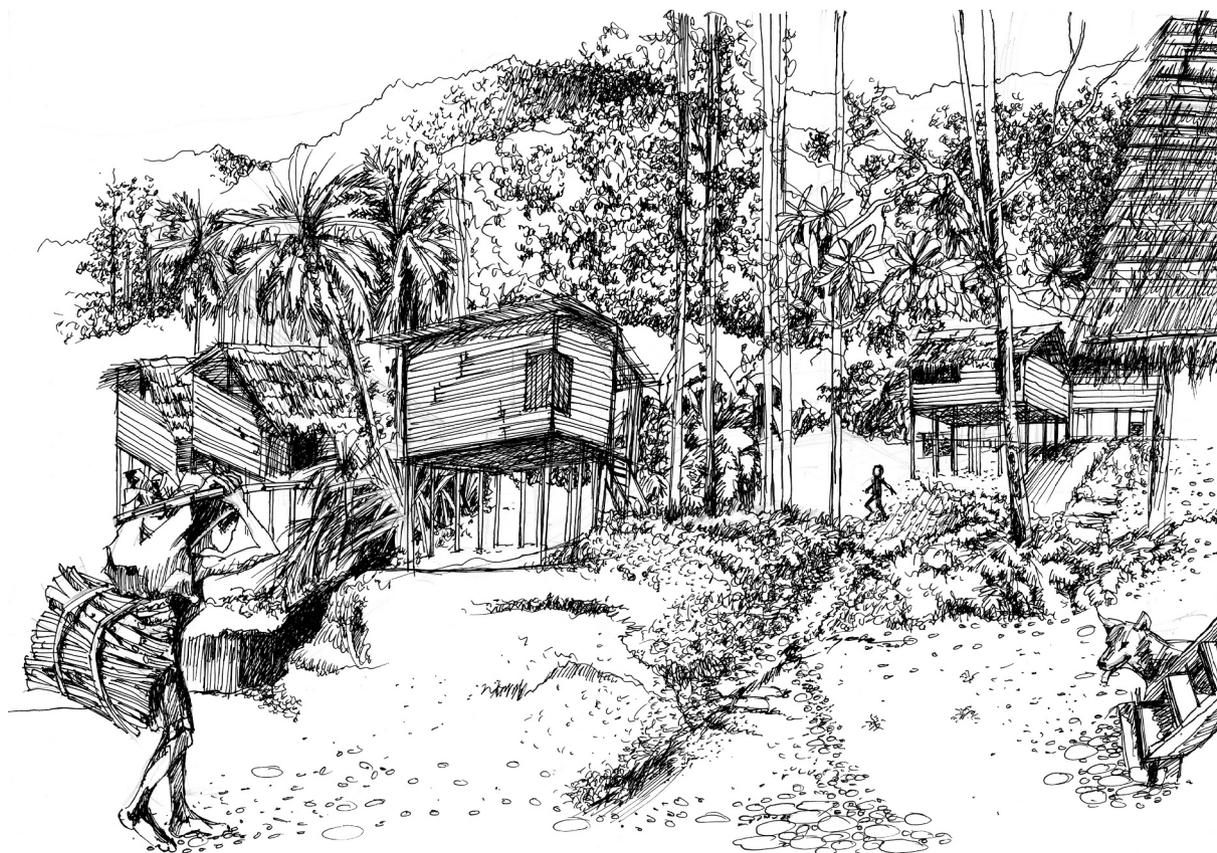


Fig. 3. Venembeli.

combining to deny women a voice as well as disproportionately distributing benefits to men (Burton, 2013; Macintyre, 2002). The intersectionality of mining's gendered impacts continues with Manning (2016) linking the long-term sexual violence at the Porgera mine to structural violence and dispossession. The need for gender-focused reform in Pacific resource exploitation is well established, with Scheyvens and Lagisa (1998) producing a framework to assess women's marginalisation and to reform industry practice. More recently Horowitz has described the silencing of women in the Pacific through retrogradation, which is "...a specific form of cultural violence: an anachronistic narrative that ignores social transformations, reinforces pre-existing forms of oppression, and places the blame squarely with the other culture" (Horowitz, 2017, p. 1423).

Long recognised but poorly understood in development and mining sectors, immanent development represents a significant part of the change, positive and negative, that large-scale mining brings. While intentional development, such as a school or bridge is easy to see, immanent development, which is unplanned, spontaneous, chaotic and potentially conflictual is much harder to predict (Banks et al., 2013; M. Cowen and Shenton, 1996; Maiava and King, 2007). Negative impacts can include the breakdown of social fabric, as described above on Misima by Byford (2005) and for the Reite Community, by Leach (2011, 2014). Living on the edge of the Ramu, the Reite's people's semi-subsistence lifestyles responsible for most of their food, water and housing, was disrupted by their desire to enter the market and sell food to the mining company. While access to market was ostensibly a positive outcome, the result was a fragmentation of culture and the peoples' long-term relationship with their land. There were also unintended consequences at the Ramu mine refinery in Basamuk Bay where the refinery caused gendered effects, changing the masculinity of young men (Kuo, 2019).

5. Impact assessment perspectives

International IA theory and practice can have enormous impacts on how normative IAs are performed. Here we explore IA concepts and practices that can inform our analysis of the WGEIS. In doing so, we recognise the many divisions or specialisations of IA (Morrison-Saunders et al., 2014) and arguments about ontology and Indigenous knowledge (Blaser, 2013; Chandler and Reid, 2018) but leave those debates to elsewhere, while we maintain our more grounded focus. For our more practical orientation we recognise that multiple worlds coexist without arguing for superiority of an ontology or valorisation of a particular knowledge over others and use IA as an all-encompassing and general descriptor of the various IA approaches.

5.1. Ethics and impact assessment

Having explored the ethics of research in our own work, including the adoption and adaptation of methodologies capable of recognising other ontologies that elicited stories about values rather than answers to questions, we came to see that the ethics of IA as central to its application and continued development (D. Lawrence, 2013). This view was further influenced by an informal conversation among Australian scientists, highly educated people with the skills and experience to understand the biophysical world and industries' effect on it, or to write an EIA. The quandary put to them, which centred on IA, was this; 'if every expert, scientist and consultant had done an ethical job but the IA still produced unjust outcomes for local communities, did the unjust outcome mean that in sum, it was an unethical assessment?' Almost unanimously it was agreed that ethically completing a segment of the IA did not absolve you of responsibility in contributing to an unethical outcome. The question of how to resolve this quandary remains unanswered.

Here the normative standards of IA ethics presented by F. Vanclay et al. (2013) are a useful ethical guide, accessible and understandable to practitioners and researchers alike. Their article provides extensive detail and covers, for example, general ethical goals for practising professionals, principles for researchers/practitioners and potential actions for ethical practice. The article also addresses the need for ethical research with indigenous communities but stops short, however, of recognising different worldviews or how to respond to differing or incommensurable values and ontologies in an IA process. The companion article by Baines et al. (2013) extends more valuable advice to IA researchers and practitioners, but again stops short of acknowledging a plurality of worldviews and advises techniques, such as signed consent forms, which demonstrates ethical intent but – as we have found – can conflict with local values and ways of relating (Roche et al., 2019a). While not specifically focused on ethics, Hanna et al. (2016) make a strong case for a more ethnographic approach to IA, including the recognition of Indigenous self-determination and problems with externally designed and science-based approaches. More recently the importance of “...alternate cosmologies and epistemologies” has been recognised, but are still situated within and constrained by a Western conceptualisation of IA, rather than the power sharing equivalency we argue for (F. Vanclay, 2019, p. 129).

We contend that there is a disconnect, or perhaps just a time lag, between these normative ethics and the gradual trend from the original positivist domination of IA to a more post-positivist or constructivist understanding (Bond et al., 2018; Loomis and Dziedzic, 2018). Now a substantial evolution is required if IA ethics are to align with the paradigmatic representations and decolonial perspectives of IA that are capable of addressing ethics with axiological, ontological, epistemological and methodological plurality as well as the spiritual dimensions of well-being (Aledo-Tur and Dominguez-Gomez, 2017; Chuengsatiansup, 2003; Hanna et al., 2016; Held, 2019). Whether IA as it is theorised and practiced today is capable of such a transition remains an open question.

A pluri-ontological ethics is not new, and significant contributions from Plumwood (1993), Connell (2007), Tuhiwai Smith (2012) and Santos (2014) inform our approach. Indeed, we see this work as a challenge to abyssal thinking by supporting in principle, and in action, an ecology of knowledges (Santos, 2007) and a pluriversal politics (Escobar, 2020). Further, while mindful of the propensity of Western constructs and researchers to dominate, we have sought to engage in and support intercultural translations in their didactic (includes: combining individual and collective, oral and written) and diffuse forms (from informal and collective work) (Santos, 2018, pp. 32–33). We believe our own work that pre-empted and paralleled the formal WGEIS suggests a more value-neutral, ethical mode of engagement; a process where power should be contested and shared. Industrial mining needs to adopt this pluralist mining ethic if human flourishing is to be the primary goal, rather than a casualty of extractive development.

5.2. Evolving IA practice

Rather than transverse the history of IA, which has been done by others, we succinctly outline the ontological challenge by narrowing our initial focus to the works of Richard Howitt, who has long discussed the dominance of Eurocentrism in IA. Writing about Australian social impact assessment (SIA) in 1989, Howitt identified how SIAs had two different approaches, one that empowers the state and the proponent, allowing proponent commissioned research to be “...reasonably characterised as post facto justification of predetermined outcomes” (1989, p. 159). The alternate approach is more community orientated, a deliberate focus on, and advocacy for, the community, especially indigenous, interest. An emancipatory approach that privileges self-determination.

In a second, more tangential work Howitt and Suchet-Pearson (2006) address the issue of ontological pluralism in management – making it

strongly applicable to how mining impacts are identified and managed. They describe impacts “[W]here even imaginaries have been deeply colonised by the dominant Eurocentric discourse, it is not just the relationships of power that need to be reshaped, but also concepts, language and images used to describe, analyse and address the processes” (p. 324). This description accurately describes Western technocratic IA and resonates with the experience of mining-affected communities in colonised countries. Then, in *Theoretical Foundations* Howitt (2011, p. 90) brings these concepts together, first by describing IA as a “... technology that reinforces centralised power in states and state agencies and privileges the power of corporate developers” He then describes the failure to see the “...realities of ontological pluralism...” (p. 90) despite the related concepts of well-being, diversity and subsidiarity being included in the *International Principles for Social Impact Assessment* (F. Vanclay, 2003); an irony compounded by the ontological focus of his own chapter being largely neglected in more normative writings on international mining despite being published in the respected IA handbook (F. M. Vanclay & Fonte, 2011). Howitt’s work is reflected elsewhere with the need for pluri-ontological IA processes reinforced by identifying problems rather than people; in seeking technical solutions rather than people orientated ones; in assuming equivalence often through compensation rather than acknowledging incommensurability; and its role as a hegemonic tool for neoliberal capitalism (Bond et al., 2020; Li, 2011). Some IA specialisations, such as health, have recognised the importance of challenging IA’s paradigmatic assumptions, though we are unsure how much this has influenced extractive focused IA practice (Haigh et al., 2012).

Relevant, but unable to be fully explored here, are other non-Western ontologies that after decades or centuries of suppression are re-emerging and challenging the supremacy of western, anthropocentric and individualistic capitalism and its associated IA practices (Kothari et al., 2014). One example from the Ashaninka People in the central Peruvian Amazon illustrates how other ontologies are often tied to alternate conceptualities of wellbeing as shown by Barletti (2016, p. 50) who describes “... wellbeing’s intimate connection with place and place-based consciousness”. As discussed above, the ability to see, respect and include pluri-ontologies in IA and in research generally is providing a new values or ethics-based frame that encompasses different ways of seeing and being, where people are impacted by colonial past, present and future (Aledo-Tur and Dominguez-Gomez, 2017; Held, 2019). The relevance of pluri-ontologies should not be underestimated in understanding the impacts and complexities of intentional, immanent and Indigenous development, nor the role or questionable ethics of external trustees deciding the development futures of communities based on colonial ontologies or corporate objectives (M. P. Cowen and Shenton, 2008; Maiava and King, 2007).

5.3. CBIA and Indigenous Knowledge

Alongside the gradual evolution from positivist IA, has been a growing recognition of the importance of Community engagement and participation in decision-making in achieving just outcomes that are capable of supporting the flourishing of local communities. Howitt (1989, p. 158) describes an early example of more respectful Indigenous engagement for the then proposed Argyle mine in Australia with a dual process of expert and Aboriginal advisory panels in an IA project that “... sought to advocate the interests of local Aboriginal communities, while maintaining wider credibility” (p. 158). Further, O’Faircheallaigh (2017) sees opportunities in CBIA/C CIA to properly identify impacts on communities; influence decision-making; address imbalances of power; and recognise Indigenous knowledge and authority.

A recent CBIA was undertaken by the Sami Community of *Semisjuar Njarg* who together with R. Lawrence and Larsen (2017) assessed impacts in parallel and in response to the proposal to construct an open-pit copper mine that would interrupt traditional Sami lifestyles. Their CBIA process, which was a community response to an EIA that failed to

recognise their concerns, had three distinct ingredients: (1) independent researchers as resources (Lawrence and Larsen); (2) a shared governance process with Community; and (3) fed into an ongoing permitting process. The Community, which "...held fundamentally different views [to the company] on what constituted the legitimate scope of the EIA" (p. 1174), sought a genuine understanding of impact, while the company, like its industry peers, regarded the process as a means of achieving approval. In the end, the incommensurability between Sami and Western perspectives and the ways in which knowledge was constructed and used were pivotal points of disagreement.

Both of these examples respected and incorporated Indigenous Knowledge and mark a progression towards an IA where the focus is on the community, with impact assessment a learning process, rather than a proponent-based assessment endpoint (Johnston et al., 2019; Sánchez and Mitchell, 2017). If implemented, such an approach would represent a seismic shift in IA, where communities have plans of their own and undertake IA to guide their own development future, responding to new development proposals from a position of strength and shared understanding. A critical part of this transition is overcoming the entrenched and disputed power relations that are rooted in colonial relations, dominate community-company interactions and produce poor extractive outcomes (Aledo-Tur and Dominguez-Gomez, 2017). A reality described decades ago by Howitt (1989) and reinforced by researchers encouraging the extractive industries to improve outcomes and make mining more responsible (Bice, 2016; Owen and Kemp, 2017). This evolution can be more easily understood using Larsen's (2018) scalar framework¹⁶ which provides a means of understanding alternate approaches. The framework positions increasing levels of community owned/managed influence in relation to the timing of IA. A critical example would be the scoping study, early on, before the proponent has committed to a project. It is at this stage we see the greatest opportunity to recognise and incorporate disparate views, values and ontologies into IAs. Though even this initial engagement would benefit from more pluralistic regional strategic assessments to understand community values and aspirations alongside resources and vulnerabilities. With co-management or community ownership of IA a means of ensuring greater recognition of plurality throughout the stages of project design and assessment.

5.4. Challenges for impact assessment

Above we have focused on the ethical and ontological challenges, suggesting a continued evolution in practice, with community focused and controlled IA offered as a means of achieving power sharing within pluri-ontological IA. There are, however, specific related challenges that can be usefully identified to guide understanding and practice. Rather than starting with a proposal, our starting point is the goal the human flourishing of Communities, with just and appropriate development. Relying on O'Faircheallaigh (2017), the authors' experience and extensive reading of IA literature, the list of challenges include: (1) dominance and control of IA by project proponents; (2) the exclusion of communities from processes (un/intentional); (3) the prioritisation of economic benefits over impacts; (4) an excessive value placed on management perspectives; (5) focus on approval rather than accurate assessment; (6) narrow scope of IA and ignoring indirect and immanent impacts; (7) unrealistic budgets and timeframes that reduce effective participation; (8) asymmetry of power, knowledge and resources between community and company; (9) relative weighting of identified impacts; (10) IA for approval rather than ongoing management; (11) collusive corruption of agencies and leaders/elites; (12) political licence to operate overriding proper assessment processes; (13) opaque risk

¹⁶ Larsen's (2018) approach is based on self-determination and Larsen's human rights justifications, which are components of our pluri-ontological approach and prioritising of human flourishing.

assessment methodologies; (14) focus on technically solvable management problems and solutions rather than lived impacts (i.e. resettlement rather than displacement); (14) overestimating benefits, underestimating impacts; (15) a lack of clearly implemented IA ethics and standards; (16) a lack of verifiable specificity with unreferenced or unsupported statements with no/limited peer review; and finally (17) assumed ontological commensurability. While unable to further expand on these challenges due to space constraints, we contend they represent generalisable challenges that continue to undermine the function and legitimacy of IA with many evident in the WGEIS. Overcoming these and other challenges is vital if IA is to become "... little more than a feeble attempt at project legitimisation" (Esteves et al., 2012, p. 37).

6. Wafi-Golpu EIS competing realities; the Wafi-Golpu EIS

Costing 30 million Kina (\$12 million AUD), the WGEIS is a formal, technical document of over 6800 pages, with a fifty-two-page executive summary that is also available in *TokPisin* (Ukaha, 2018). We make no attempt here to review the WGEIS in its entirety as the scope of this exercise is beyond this paper. Instead, we focus on areas identified by our *tok stori* with the Venembeli Community and from previous engagements with the Yanta, Hengambu and Babuaf Peoples. These provide illustrative examples of the chasm, and perhaps incommensurability, between community and company values and the different imaginaries and languages used to conceptualise and describe them (Martinez-Alier, 2001, 2014). We have not undertaken an analysis of formal EIS engagement processes as the quantitative data supplied by the proponent (WGEIS 5–1/20), is, like the values that underlie it, incommensurable with the local experience. For example, no copies of the EIS were provided to the Communities, who complained to the authors about externally controlled and secretive research that created resentment and magnified exclusion. Alongside development hegemonies, this practical exclusion, multiplied by asymmetries of power, knowledge, influences and resources meant that there was little opportunity for PNG Communities to adopt strategies that challenge the Western rituals of verification or use the formal spaces of participation to protest or redistribute power (Escobar, 1995; Leifsen et al., 2017; Li, 2015; McKinnon, 2007).

6.1. Proponents justification for Wafi-Golpu

To support its case for approval the WGEIS references (2–4/6) PNGs constitutional goals, Development Strategic Plan 201030 (PNGDSP) and the PNG Vision 2050. This is not an unusual practice and in a positive way recognises that the mine needs to contribute to PNG's development consistent with the goals and plans established by the representative government of the people. Yet, it also provides early evidence of the reliance on motherhood or aspirational statements to signal intent, rather than a critical review or evidence-based practice as would be required in more rigorous, referenced and/or independently peer-reviewed process.

For example, the PNGSDSP, which reflect egalitarian ambitions for a PNG model of development, are presented in one dimension, as if the listing of them would suffice. Missing is an engagement with the complexities of achieving them, their contested origins (Kari, 2005) or the failure of successive governments since independence to implement, or live up to them (Narokobi, 2016). This means the promises of the mine's development contribution are disconnected from reality and based on heroic assumptions that perennial PNG development challenges can be overcome. With no hint of irony, the WGEIS authors purport an ability to deliver on the elusive goals of integral development and equality and participation, albeit with no reference to how an industrial mine would achieve or conflict with, for example, PNGSDP goals such as 'Papua New Guinea Ways', which explicitly calls for: PNG forms of participation; small scale development; respect for culture and traditional ways of life; and the value of traditional villages and communities (Papua New

Guinea Constitution, 1975, p. preamble). Blithely asserting a capacity to deliver on these ambitious goals despite the well-established lack of connection between industrial mining and sustainable human development in PNG (Banks, 2014) suggests a willingness to only examine what aids approval rather than informs assessment processes. The WGEIS uses the same uncritical approach in relating the proposed mine with the PNGDSP and Vision, despite the fact that Plan conflicts with and fails to reflect or embody the ambitions articulated in the preamble to the PNG Constitution (Kaiku, 2020).

6.2. The Wafi River

The Wafi River, which swirls around the village of Venembeli on the hill above, is regarded by the Community as a big river. While far smaller than the Watut River it feeds into, the Wafi is large enough to run freely and to escape the heat of the day. Explored at length in a sister article (Roche et al., 2021) the significance of the River to Community was brought to life through stories and art. We present a brief synopsis here. The first story explores the River as a site of play and formation for children, which for many hours of the day provides a site for unsupervised time to play, to learn skills from, and with friends and to develop friendships that form the basis for future village relations. The second story describes the River as a liminal space, where the usually sharp gendered relations are transformed and young people are freer to mix, play and flirt. As well as providing a place of youthful joy, the River is again the site of formation, where relationships are fostered, marriages arranged and relationships consummated. The third story tells of the importance of the River to women, with one describing it as “*I feel very strong and am filled with happiness when I stay in the River, and I also see this River is like a mother to me*” (p.11). Critically, in addition to a place of happiness, the River also provides a vital source of fish protein, a place to wash, mine gold and perhaps most importantly, a woman’s space where friends meet and laugh on a daily basis. The ability to mine gold is also apparent with women using their earnings to buy food, clothes, medicine, education and housing. This was found to be particularly important for vulnerable women such as single mothers, widows and women whose husbands did not support them adequately. We suspect that our understanding of the Rivers’ importance is just beginning as these stories were only shared after many years of patient fieldwork and the adoption of decolonial and emancipatory methodologies that encouraged the mutual exchange of stories.

To identify whether the importance of the Wafi River might be recognised in the WGEIS we target-read relevant chapters/volumes featuring discussions on rivers and social impact,¹⁷ and performed electronic searches of the term ‘wafi river’. All identified references from our review are presented in the Table 1. There were no additional mentions of consequence in either of the Mine Closure, Cultural, Environmental or Social Management Plans.

It is hard to reconcile the realities presented by these two accounts. The Community stories demonstrate the lived importance of the Wafi River, which performs a multitude of functions essential to the human flourishing of the Venembeli Community. The synopsis above, along with those statements and stories in previous articles also identifies a relationship with the land that transcends utility, providing evidence of values based on other worldviews or ontologies. In contrast, the WGEIS recognises the importance of River as a site of alluvial gold mining but with none of the nuance about its value to mothers and vulnerable women or its role in the formation of relationships and the social reproduction of the Village. The conflict between these two descriptions, these two realities, is real, with unseeing WGEIS descriptions incapable of identifying or understanding impact from a Community perspective.

¹⁷ Note while biological and scientific studies in the WGEIS may find or describe likely social impacts these are then transferred to the relevant social chapters.

Table 1
References to social values of, or impacts on Wafi River in the WGEIS.

Chapter	WGEIS page reference	Description of reference to Wafi River (WR) in text (not in maps/tables)
8. Physical and Biophysical Environment Characterisation	8–6, 8–23, 8–30	Geophysical and study area descriptions
12. Socioeconomic characterisation	12–21	Alluvial gold mining among Tier 1 (closest to mine) villages, more common on WR
	12–25	Existing gardens causing sedimentation of WR, mention of WR as site for washing
13. Cultural Heritage	No mention	
18. Socioeconomic IA	18–23	Expected sedimentation of the Wafi River deemed to be minimal and expected to progressively decline within 18–24 months
	18–24	Residual (no time span given) effect of sedimentation on freshwater assessed as low for the WR
	18–24	Residents of Nambonga, Hekeng, Venembe and Pekumbe may need to find new sites for alluvial gold mining
19. Health Risk A	19–25	Likely timeframe for contaminated water to reach the Nambonga Creek and WR has not been estimated, but reasonable expected to persist for 50 years following mine closure
	19–30	Treatment of contaminated water from seepage and/or crater lake overtopping discharges to the WR System to meet water quality criteria prior to discharge to the environment and until such time that closure objectives are met.
20. Cultural Heritage IA	No mention	
App. T Socioeconomic baseline	p.76, p.78	Alluvial mining methods and frequency in the WR. No outsiders engaged in alluvial mining in the WR, methods of mining, WR catchment details
App. U Cultural Heritage	p.111	Wire bridge as a historical site
App. W Human Risk	p. 63	Environmental, catchment and village descriptions
	p.14, 16, 19	Study scope, details of assessment points similar data to 19–25, contaminant concentration levels, source data table
	p.29, 30, 83, 60, 61, 86, Table D	Details importance of rivers generally for fishing, washing and alluvial mining
	p.41	Poor quality of groundwater feeding ER post mine closure – potential direct and indirect health affects likely to be significant
	p.118	

6.3. Settlement history

The WGEIS ambitiously sets out to record the settlement histories of the potentially affected Communities. Here we address only the settlement history of Venembeli, also spelt Venembe.¹⁸ The WGEIS describes how “[T]he people from Venembe originally came from Parakris in Zenag (Mumeng) and initially settled in the two villages upstream: Pokwana and Zilani. They settled in Venembe within the last 40 years” (12–17). This account of settlement history, which is

¹⁸ Spelt Venembe in the EIS documents, we continue to use the spelling Venembeli as first told to us in the Village without claiming that either is more correct.

incompatible with accounts from the Venembeli Community, is unsupported apart from reference to unpublished and inaccessible social baseline studies.

The Community's account of settlement is complex and recounted by several individuals over multiple visits with similar details providing validation. The settlement path to Venembeli, which was originally a seasonal hunting area from the early 1900s, can be traced from movements from the settlements of Touvil and then to Arkay during WW2, a significant event that enabled more precise dating of settlement patterns. Prior to WW2 and before permanent settlement, the Venembeli site was used for two to three months a year to access fresh hunting grounds. Due to problems with water access in dry seasons and steep hillsides the Community moved from Arkay to Venembeli, which had the bigger Wafi River and more reliable sources of drinking water. By the early 1950s there was a permanent settlement at Venembeli with additional Community and family members moving there in subsequent years. In the 1960s artisanal gold mining was firmly established at Venembeli and since then has been the major source of cash for the Community. While details may vary, we believe the settlement *stori* indicates historic connections to Venembeli with a permanent occupation 20 to 30 years longer than stated in the WGEIS.

This inconsistency between settlement accounts was revealed during fieldwork as we sat and *tok stori* with the Community, which included looking at our digital copy of the EIS. Given that there was no copy of the WGEIS available in the village, this was part of a process of sharing information and knowledge to ensure our co-research had value for the Community. The senior male leaders were angry at the account in the WGEIS and asked us how WGJV could be allowed to write 'such rubbish'.¹⁹ This is not a simple or meaningless error, as by describing the settlement time as after mining exploration, the proponent is establishing a discourse of equivalency with the Community, or even making a claim (as has happened verbally) that the Venembeli Village is only there because of the proposed mine. While unable to determine all the reasons for the different settlement accounts, many of the IA challenges outlined above, along with inappropriate methodologies could all contribute to the dramatic inconsistency between local knowledge and what is presented in the WGEIS.

6.4. Determining risk assessment

There were a number of impacts recognised in areas very important to individual and collective identity, the role of women and human flourishing: impacts that are also important to cultural identity and social cohesion which are an integral part of village-based life. Four of these impacts (underlined), with the proposed *management response* (in italics) and residual risk assessment are paraphrased and presented below (WGEIS table ref. and volume-page in brackets).

1. High initial significance for life of mine was attributed to disruption to existing cultural ties (s72, 18–68) for life of mine (LofM). *The proposed management measure was to respect existing local ties, traditions and sense of place and to be fair and transparent in land access.* The impact deemed to be of unlikely/moderate/moderate residual significance.
2. High initial significance for LofM was attributed to disruption to sense of place (s28, 18–61) due to disturbance or restricted access. *The proposed management measure was to respect existing local ties, traditions and sense of place and to be fair and transparent in land access.* Impact deemed to be of possible/minor/moderate residual significance.
3. High initial significance for life of mine was attributed to a reduction in social cohesion (s73, 18–65) for LofM. *The proposed management measure was to manage compensation obligations and to variously*

establish, engage and facilitate capacity development, build social capital and support local enterprise measures in the Community. Impact deemed to be of possible/minor/moderate residual significance.

4. Very high significance was attributed to an increase in domestic responsibilities for women (s31, 18–62), but inexplicably, this was deemed to be only during construction despite the mine offering ongoing direct and indirect employment and other economic and social disruption. *The proposed management measure was consultation and individual and community capacity development (see 18–51).* Impact deemed to be of likely/moderate/high residual significance.

Despite the potential significance of (1) disruption to cultural ties, (2) disruption to sense of place and (3) a reduction in social cohesion, none of the three risks were deemed to have more than moderate residual significance in the WGEIS risk assessment. The assessed significance of all three risks was decreased from the initial impact due to assumed outcomes from the proposed management responses (shown in italics above) such as respect, transparency, engagement and management of compensation. While linked to management plans, little detail was provided on the rationale for the risk assessment and on how different responses would be designed, implemented and assessed throughout the LofM. Without detail or supporting documentation we are unable to elaborate on or further analyse the risk assessment processes or the adequacy of the related management responses.

Of the four risks above, the only risk deemed to be high was (4) increased work for women to be addressed by WGJV "...implement[ing] proactive measures to promote gender equity" (18–51). It remains unclear how an outside agency (WGJV) can implement measures adequate to the challenge of gender equity in PNG. Also, the risk was assessed for the mine construction only, which seems unrealistic in light of other factors, such as the other three above, liable to trigger extensive social fragmentation due to impacts and outcomes from both intentional and immanent development. Without adequate explanation and evidence-based justification, these risk assessments strike as arbitrary determinations and responses from anonymous or unaccountable authors who, unlike the Community, bear none of the risk of failure.

7. Concluding discussion - combining the elements: Local, national and international

Above we described social impacts from mining in PNG and then explored international IA theory and practice to inform an in-depth look at components of the WGEIS, providing observations and experiences from different scales to better understand how IA is, and might be practised. While each section offers its own insights, here we combine some elements to provide a critique of the WGEIS, further develop our challenge to the abyssal line and make a combined South-North contribution to IA theory and practice (Connell, 2007; Escobar, 2020; Santos, 2018).

7.1. PNG and Wafi-Golpu

PNG's mining experience has been mixed, with positive development contributions overshadowed by a failure to deliver improved wellbeing for the majority of PNG citizens (Banks, 2014). As outlined above, we can see how particular impacts, such as incommensurable conceptions of land and the gendered exclusion from decision-making and benefit-sharing have challenged and marred the extractive industry in PNG from before independence. There are questions of transparency and legitimacy, with the asymmetric power of 'faceless corporations' determining peoples' futures, the direct opposite of power sharing modes seen as the key to reforming industrial mining (Owen and Kemp, 2017). Then, by applying Larsen's (2018) framework, we can characterise the WGEIS community engagement as consultation with limited influence over scoping, evidence generation or significance, with exclusion at each stage a considerable barrier to meaningful community

¹⁹ We are paraphrasing here to be more polite.

involvement, reducing the effectiveness and credibility of the IA. Not a positive finding for PNG's IA system.

Also evident is a desire for development, though these aspirations are confounded by unintentional impacts and the potential for negative immanent development. This is not an isolated case, with mining central to Prime Minister Marape's 'take back PNG' discourse, which is reminiscent of conflicts between *Buen Vivir* and extractivism in Ecuador (Kama, 2019; van Teijlingen and Hogenboom, 2016). Here differences in language and understandings are critical, with misunderstandings and multiple interpretations magnified by the forty years the Wafi Communities have been waiting for development (Martinez-Alier, 2014). Roads, for example, are imagined as an entrée to modernity (Dalakoglou and Harvey, 2012), whereas in practice they are problematic - with a lack of Community access to mine roads, roads as a source of uncontrolled immigration and the fact that the Village access roads are only proposed, not guaranteed in the WGEIS. This fetishization of mining's development potential, aptly described by Bridge (2004, p. 241) as the "...alchemic transition of mere dirt into wealth beyond the dreams of avarice..." further undermines and complicates the plurio-ontological conversations required to understand and mitigate extractive impacts (Kneas, 2017).

In justifying the mine based on its future contributions to the PNGDSP DSD goals and the well-being of PNG, the WGEIS avoids many complexities and the proven inability of industry or state to deliver to date. Also apparent is a comparative disjunct in depth between Community *stori* of the River and the WGEIS assessment, even though we could only present their *stori* in synopsis. If shared and understood more fully, the relationships nurtured and wellbeing provided by the River and the surrounding ecosystem would reinforce the inadequacy of the risk assessment process that fails to properly see or value local ways of being, or to protect vulnerable groups.

But our review was also limited, and by no means a comprehensive assessment of the entire WGEIS. Indeed, our focus was pre-determined by areas of concern raised by participant action research with the Community. So, in deliberately seeking out problem areas in the WGEIS it is possible these results are not indicative of the wider IA process, although there are additional issues raised by Communities that we were unable to address here. We contend our review is an indicative rather than a representative sample, that nevertheless raises significant issues that question the quality and validity of the WGEIS. As an IA, the WGEIS is long and comprehensive - yet flawed; and in failing to provide a credible assessment it fails its own *raison d'être*.

In sum, we can see common social impacts from mining in PNG that are affected by, and raise questions about, international IA theory and practice, which in turn influenced how the WGEIS was conceptualised, designed and conducted. Meaning that many of the challenges are not specific to the proposed Wafi-Golpu mine but are instead relate to IA as a practice and are affected by structural forces and ontological biases. This in part explains, but does not resolve the significant issues of credibility, with untested or unsupported motherhood statements, a lack of transparency and an absence of the local people in the WGEIS. Indeed, rather than multidimensional beings in relationship with each other, the environment and time, the communities described in the WGEIS appear barely two dimensional - merely management problems to be solved with consultation plans and capacity building.

7.2. Reforming IA theory and practice

Our exploration of IA outlined an ethical conundrum, whereby ethical guidelines and normative practices can still result in a combined unethical outcome. We suggest this is in part due to the mono-ontological theories that underpin IA, restricting its focus and ability to see relationships not easily recognised or understood by a modernist Eurocentric perspective as well as IA practices that privilege individualism and reductionist science. Acknowledging that IA has evolved from its positivist beginnings we identify approaches that could inform

impact assessment, allowing IA to move beyond Eurocentrism as the dominant, singular modernity and embrace an ontological messiness, a pluriverse where worlds co-mingle, and impacts cannot be understood from a single vantage point (Aledo-Tur and Dominguez-Gomez, 2017). Importantly, this is not an anti-Western or anti-European sentiment, but a true recognition and valuation of plurality, which includes both Indigenous and Western conceptualisations of the world (Esteva and Escobar, 2019). But to be clear, this new conceptualisation demanded by the South goes far beyond a recognition of cultural difference in development planning and IA. Rather, it is an assertion that the current IA and development processes is but one way of seeing and being in the world and that the decolonising of development and IA requires a sharing of power, including an acknowledgement of and correction to the various asymmetries that dominate extractive relations today (Klein and Morreo, 2019; Owen and Kemp, 2017).

CBIA is offered as an example that involves communities and respects local and Indigenous knowledge, but we further propose a more comprehensive mining ethic that empowers and supports community-controlled IA that deliberately prioritises human flourishing. Such a pluriversal transition would require IA processes to reflect Community development aspirations and plans rather than just responding to a mining proponent or project-focused IA (Escobar, 2020). In terms of reforming current IA, we see much in this assessment of the local that could inform normative IA theory and practice; one idea would be to overcome ethical reductionism within IA to ensure that an overall project assessment is not less ethical than the sum of its parts. Challenges to IA are legion, and we recognise our list identifies deficiencies rather than solutions and instead offer it as a hybrid checklist-cum-reform agenda.

We acknowledge that recognising a plurality of knowledges could be challenging for both the mining sector and IA theory and practice as it sits uncomfortably with their positivist foundations and scientific orientation. Indeed, just as some in industry are still coming to terms with acknowledging cultural difference in ethics and practice, this growing awareness of ontological plurality demands not just respect for difference, but ontological equivalency. In relation to our own work above, we are well aware that the *stori* shared with us over the research project is just a small segment of life, a slither of knowledge shared because it relates to how the team and Community saw the mine. But we also know we have yet to hear or uncover *stori* of local ontologies that were not prompted by this externally imposed development.

It could be argued that a better IA process would be able to identify, describe and manage relationships that are unfamiliar to, and unseen by, the IA investigators. This would suggest that although the WGEIS is flawed and at least partially blind to local values and experience, that a better IA would not be. In short, IA processes are fine, the flaw is in their execution. Part of our response to this self-identified critique, is yes, perhaps that is possible. But we also posit that at a minimum, an acceptance of the possibility of plurality is required to implement methodologies that can see experiences and relationships from outside a singular modernity; even more so if an IA team is dominated by positivists or convinced of the validity of current IA assessment processes and prepared to merely recreate them, pre-satisfied that they are adequate to protect non-Western communities from unseen and multi-generational impacts. It seems fitting that IA, which seeks to reduce impacts and improve outcomes for communities, must hear and learn from the plethora of Southern voices to become capable of truly recognising plurality and to prioritise Community-specific conceptions of human flourishing.

We see rich ground for further work, with additional targeted and epistemic IA critiques that allow the adequacy of IA's approach to be assessed at a deeper, rather than technical level. These could test the need for a pluralist mining ethic and ensure that Southern perspectives continue to inform IA as it is practised today and what it evolves into tomorrow. Preferably, such critiques would be based on trust-building and participative engagement with communities to uncover the stories

that normative IA assessments miss. As described above, many of the challenges are grounded in the theory of IA rather than being project-specific, and we thus see further research required on ethics for individuals as well as composite assessments and mechanisms that ensure that IA processes challenge processual, structural and ontological barriers and constructs, helping to emancipate communities rather than reinforcing asymmetries. Finally, in terms of research-in-action, we see much potential for greater community control of IA for all communities, a process that in addition to identifying impacts recognises that self-determination is, in itself, a key determinant of human flourishing.

Declaration of Competing Interest

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