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Article

The Triple Bottom Line and Progress toward Ecological Sustainable Development: Australia's Coal Mining Industry as a Case Study

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Abstract: A common goal shared by the world is to achieve well-being for the planet—for this generation and generations to come. The world formalized this common goal when it accepted the concept of ecological sustainable development (ESD) at the 1992 Earth Summit in Rio de Janeiro, and through the adoption of the United Nation's Agenda 21. This paper explores the capacity of New South Wales' planning system to deliver on this shared goal. It does this through an evaluation of the triple bottom line (TBL), as an impact assessment framework, in the context of coal mine development proposals. The evaluation is performed against ESD principles, and draws from the experience of the authors in reviewing a recent coalmine expansion application in New South Wales, Australia. During this review the authors encountered opportunities to improve the impact assessment process. The opportunities identified relate to the process of robust and consistent drawing of impact boundaries and selection of scales (geographic and temporal), in which to conduct an impact assessment. The findings are significant, as they offer a path toward greater discussion around, and realization of, opportunities for achieving development in each TBL domain, *i.e.*, social, environmental and economic.

Keywords: triple bottom line; ecological sustainable development; mining; mineral resources; environmental impact assessment; social impact assessment

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1. Introduction

The push for expanded coal mining, in Australia and around the world, heightens the need to clearly articulate and assess the benefits and costs of this activity to society. The impacts of coal mining vary significantly depending on the social (including cultural and political), economic, and natural environments in which they operate. Impacts experienced at a particular mine site will also be greatly determined by how the mine is managed throughout all of its life phases (planning, development, operation, decommissioning, remediation and rehabilitation). Management decisions, around where and how to direct revenue that the mine generates, is a key determinant for what impacts a mine may have. Greater appreciation of the potential impacts of a mine development proposal, both positive and negative, will enable more meaningful evaluation of development proposals, and thus more strategic decision-making for development that will progress society toward ecological sustainable development (ESD).

The need for greater appreciation of the potential impacts that mining may have on society has been recognized recently in New South Wales (NSW), Australia. The NSW Strategic Regional Land Use Policy [1] proposes that a triple bottom line (TBL) cost benefit analysis (CBA) be carried out where coal and gas mining have the potential to adversely affect other high value land uses. This policy originates from a need to protect strategic agricultural land and water resources, and comes at a critical time for ensuring sustainable land use in Australia. This is particularly significant when industries that rely on finite resources threaten the future of industries that provide the bare necessities, *i.e.*, food and water. Research by the authors [2] found that there is a great opportunity to improve the process of identifying and assessing potential impacts of a proposed mine development, and thus an opportunity to achieve greater ESD outcomes.

2. Triple Bottom Line

In the early 1990s, John Elkington [3] developed the TBL as a new accounting framework to measure the performance of businesses. This framework went beyond traditional economic measures, and included environmental and social dimensions, using particular criteria [4]. The TBL was initially intended to be used as a way of ensuring that all three aspects of sustainability were considered when assessing the performance of a business [5]. Today, the TBL accounting framework has gained momentum in all tiers of government and in business, where it is used to compare policy and business options that have potential to impact ESD. ESD is a stated objective of NSW's planning system, and in this context the TBL is seen as a way to achieve this objective by providing a framework to identify a range of potential impacts across the three domains of sustainability.

By conventional measures, the economic performance of a business is determined by the inflow and outflow of resources from that business. Economic criteria can be used to determine how much an organization, or activity, generates in monetary value. Under ESD, environmental performance, in the business context, is concerned with a business' impact (both negative and positive) on the natural environment. Environmental impacts may include, but are not limited to, positive and/or negative impacts on waste, GHG emissions, contamination, air and water quality, and biodiversity. The social impacts of a business, or its activities, may include, but are not limited to, positive and/or negative

impacts on health and social well being, quality of the living environment, material well-being, culture, family, institutions, politics, social cohesiveness, and aesthetics.

Although we may categorize potential impacts into the three TBL/ESD domains, it is important to appreciate the relationships that exist between them, and thus the multi-domain nature of some impacts, such as employment, which clearly encompasses both the economic and social domains. Section 4 explores the benefits of appreciating these interdependent relationships.

2.1. Measuring Environmental, Social and Economic Performance

The inclusion of social and environmental criteria, as performance indicators for business, introduced a significant challenge, one of measurement. Whilst economic criteria may be measured in dollars, social and environmental criteria are not as easily quantifiable. Yet, existing TBL CBA methodologies attempt this. They do this by allocating monetary value to impacts, to determine whether a "net positive benefit" is likely to be delivered by a proposed development [6]. The approach of allocating monetary value to social and environmental impacts has come up against opposition from those who challenge whether it is meaningful or even possible to monetize biodiversity, spiritual, cultural or indigenous values [6]. Esteves and Vanclay [7] argues that the emphasis on empirical indicators is likely to reduce the consideration of social issues, instead of increasing it, when undertaking TBL assessments. The same can be said about environmental issues for the same reason, *i.e.*, the challenge of measuring impacts. Further to this, challenges exist around measuring and monetizing cumulative impacts and irreversible changes in environmental and social quality [8]. This issue is explored in Section 5.

2.2. Evaluating TBL, in the Context of Coal Mine Development Proposals

Evaluation of the TBL as an impact assessment tool, against ESD principles, is drawn from the experience of the authors in reviewing a coalmine expansion application in NSW, Australia [2]. This paper concludes that the TBL framework does not guarantee a robust or consistent assessment of potential impacts, in the context of development proposals, and consequently does not lay solid ground for a meaningful evaluation. In doing so, the paper identifies several issues that are important to address to facilitate the robust and consistent identification and assessment of potential impacts. The paper suggests an investigation of regulatory mechanisms that ensure the use of frameworks that are specifically designed to address several of the issues identified in this paper. While these frameworks exist, the authors argue that they are not yet being applied on a large enough scale to ensure successful ESD outcomes.

3. Ecologically Sustainable Development

Whilst the TBL as defined by Elkington was novel, its underlying concepts are founded in the earlier ideas of ESD, which were first described in the Brundtland Report [9]. The Brundtland Report states that environmental problems are a global concern and that it is in the interest of all nations to develop policies for sustainable development. This reflects a realization that the expansion of economic growth cannot be sustained without concurrent benefits in the three domains: social, environmental and economic.

The concept of ESD has been accepted worldwide, following the 1992 Earth Summit in Rio de Janeiro and the adoption of the United Nation's Agenda 21. However, the mechanisms for achieving ESD remain debated. Australia's National Strategy for Ecologically Sustainable Development [10] defines ESD as:

> *...using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.*

In addition, the following key principles and objectives of ESD are provided [10]:

1. Integration of both long and short term economic, social and environmental considerations;
2. Precautionary principle, where there are threats of serious or irreversible environmental damage;
3. The global dimension of environmental impacts of actions and policies should be recognized and considered;
4. The need to develop a strong, growing and diversified economy that can enhance the capacity for environmental protection should be recognized;
5. The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognized;
6. Conservation of biological diversity and ecological integrity; and
7. Improved valuation, pricing and incentive mechanisms.

The use of TBL, to uphold ESD principles, is discussed in the following sections.

4. TBL and "Trade-off" Outcomes

At present, TBL is commonly used to identify potential impacts in the three TBL/ESD domains and to allocate monetary value to the identified impacts. The purpose of this approach is to determine whether the proposed development is likely to deliver a "net positive impact". A "net positive impact" is currently calculated through a financial reconciliation across all domains. A criticism of this approach is that while it may ensure economic development, it does not always ensure environmental or social development [11]. Further, it only considers present value, and thus does not ensure long-term economic development. A consequence of this balancing approach is lost opportunity for development in the environmental and social domains, as well as potential losses in terms of long-term economic progress.

4.1. Avoiding "Trade-offs"

If development involves a moving forward, a form of progress and improvement, then to achieve ESD, the net impact in *each* domain must be positive. As Fraser [12] argues, TBL is effectively being used to allow the economy to characterize and manage the environment. An example of the short-term nature of this characterization is illustrated in the Director-General requirements that accompanied the coal mine expansion application that the authors reviewed. In this case, the Director-General specifically required that the Offsets Strategy "ensure" that the project "maintains or improves" the biodiversity values of the region. On the surface, the meanings of these terms are as follows: "ensure"

indicates certainty, and "maintain or improve" requires that biodiversity values are kept at least constant. From this perspective, the Director-General's requirements are consistent with ESD principles. However, as was the case in the application the authors reviewed, the language commonly used in EIAs, is focused on *reducing* negative impacts, *i.e.*, minimizing damage, as opposed to maintaining or improving biodiversity values. A similar experience is occurring in the context of SIAs. Esteves and Vanclay [7] identifies that most practical applications of SIA are focused on *mitigating negative* impacts, as opposed to creating *positive* impacts. This proposition is supported by an empirical analysis of large-scale mining developments by Esteves [13].

The approach of *avoiding, mitigating and compensating* is not consistent with ESD; it indicates that not only is development not occurring, but also that damage may in fact result. A TBL assessment that is consistent with State and Commonwealth law is one that assesses it on the basis that it upholds ESD, *i.e.*, the proposed project must achieve development in all three sustainability domains. The language of mitigation and compensation makes very clear a trade-off approach. With foresight, one can appreciate that the cumulative impacts of development projects, that practice a trade-off approach, may result in mass-scale deterioration of some ESD domains at the expense of the others.

ESD is "not a factor to be balanced against other considerations; ESD is the balance" [14]. Properly applied, ESD recognises that ecological integrity and environmental sustainability are fundamental to social and economic wellbeing, particularly when considering the needs of both present and future generations [15]. To experience sustained success in any of the ESD domains, Esteves and Vanclay [7] argues that investment is required across each domain, including the six capitals: human, business, infrastructure, natural, public institutional, and knowledge. The trade-off approach does not recognize this. Thus, we are experiencing lost opportunities to achieve development in the environmental and social domains, as well as potential losses in terms of long-term economic progress. This issue is reflected in the Social Development Needs Analysis (SDNA) approach to identifying locally relevant social impacts of developments [7].

4.2. Frameworks to Facilitate ESD Outcomes

4.2.1. Social Development Needs Analysis (SDNA)

Social Development Needs Analysis (SDNA) was developed on the premise that both the business proposing the development, and the communities likely to be affected by the development, would experience greater outcomes by closer alignment of interests [7]. At present, SDNA is not widely applied in the context of development proposals. A consequence of the absence of uptake of SDNA, or a similar approach, are projects that propose strategies to *minimize* and *offset* damage in these domains, with activities that *may* be considered *compensatory* for the *harm* caused, rather than projects that *maintain* or *improve* the state of each ESD domain. As communities become more aware of the significant short and long-term impacts of mining, both negative and positive, fear of the industry increases. At the same time, corporate social responsibility (CSR) is gaining increased profile, causing increased expectations of the industry [16].

4.2.2. Corporate Social Responsibility (CSR) and Social License to Operate (SLO)

CSR is a form of corporate self-regulation that recognizes the role that corporations play in society. It is a concept that appreciates the potential impact that businesses may have on sustainable development (positive and negative). It also reflects the idea that corporations have responsibilities to society beyond short-term profits for shareholders [16]. CSR initiatives, such as corporate and sector sustainability reporting and investing in community capacity-building, provide benefits to both society and business. The business case for CSR can be summarized into four key categories: (1) cost and risk reduction, (2) competitive advantage, (3) building reputation and legitimacy, and (4) synergistic value creation [16]. CSR initiatives, in the mining context, can thus be linked with initiatives to gain a "social license to operate" (SLO), *i.e.*, the approval and broad acceptance of society to conduct mining activities. Prno describes CSR as the most utilized market-orientated tool for obtaining a SLO in the mining sector [16]. Obtaining a SLO is a significant challenge facing the mining industry today, and it is one that will only become greater, as the trend of growing societal demand is set to increase into the foreseeable future. However, whist a challenge, SLO is also a framework that, when overlapped with other frameworks such as SDNA, presents an opportunity to increase the engagement of community and business around the full scope of benefits that mining may bring to society.

4.2.3. Involving the Community in Impact Assessments and Decision-Making

SDNA was developed to assist both communities and business to experience greater benefits, rather than the present approach of "less harm". The approach works by facilitating equitable and strategic thinking. It demonstrates an appreciation of Labonne's [17] advice for effectively working with society, which includes involving the affected community in identifying its development needs and aspirations. Every community exhibits unique social, economic and cultural attributes, and operates in unique natural environments. A consequence of this reality is that the impacts from changes in the economic, social and natural environment, brought about by a project, will be different for each community. Thus, the importance of involving the affected community in impact assessments and investment decisions becomes clear. SDNA provides a framework for identifying an extensive range of potential social impacts and calls for involvement of the affected community in prioritising impacts that they consider most important. As described by Esteves and Vanclay [7] on page 137:

> *SDNA…attempts to address, on behalf of a company, the following question: what are the priority social issues that should be addressed in order for us to contribute to a sustainable development of the community and create value for our business?*

Whilst industry-wide application of SDNA, or a similar approach, would help to enable ESD, several other actions are also important, such as having systems in place to ensure that outcomes of community participation influence development decisions.

4.3. Under What Circumstances may Mining Achieve ESD?

The United Nations Millennium Development Goals (MDGs) [18] are based on fundamental values including freedom, equality, respect for nature, and shared responsibility. If structures are in place to

ensure robust identification and assessment of impacts, which are relevant to affected communities, then mining may contribute to development in a way that upholds ESD and MDGs.

Ways in which mining developments may contribute to ESD and MDGs, include investment in:

- Community programs that build capacity and resilience across the community;
- Services and infrastructure that achieve healthy communities (physically, socially and mentally);
- Participatory capacity-building activities that enable and encourage community members to make informed choices, and contributions, toward the future of their community; and
- Supporting programs that ensure holistic and long-term planning for a community, such as diversified economic opportunities.

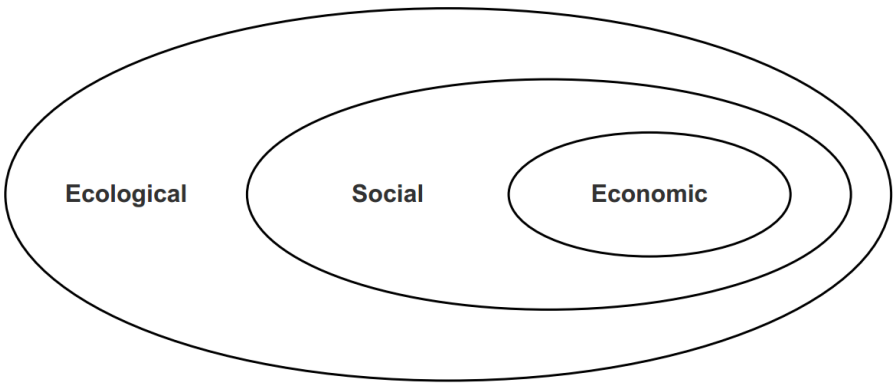
Each way in which a mining development may contribute to ESD involves meaningful and deliberate community participation, and this requires significant and sustained resources throughout each phase of a mining development (planning, construction, operation, decommissioning, remediation and rehabilitation). Esteves and Vanclay [7], on page 140 succinctly explains that:

> *...greater sustainability and reduced liability will occur where companies partner with local government on community projects, aligning their social investment programs with the strategic social and economic priorities of a legitimate democratic local planning process.*

4.4. A Model of TBL that is Consistent with ESD

As put by Fraser [12], the economy is a subset of the society that we live within, which is a subset of the environment, and the environment is bound by physical limits, as shown in Figure 1. Such a model would envisage the economy as a constraint imposed on our activity by the environmental and the social aspirations we have, rather than accepting a society and environment that is the result of the economy we strive for [12]. Applying this model, the UK government has viewed the goals of sustainability to be essentially twofold: environmental and social. Efforts to achieve a sustainable economy is not so much a goal in and of itself, but should rather be seen as a means to an end, *i.e.*, one that enables society to live within its environmental limits and to build a strong, healthy and just society [19].

Figure 1. Depiction of Triple Bottom Line [18].



While the TBL provides a framework for ensuring that impact assessments span across the three sustainability domains, it does not ensure that the interdependent relationships between these domains

are recognized. Industry-wide uptake of mechanisms and guidance that demonstrate an appreciation of these relationships would assist progress toward ESD. As a start, there is a demonstrated need for mechanisms and guidance around several scoping issues when conducting impact assessments. These include the application of scales, in terms of spatial and temporal, the nature of impacts considered, and direct *versus* indirect impacts.

5. Application of Consistent Scales

TBL is currently being applied in a way that uses inconsistent spatial and temporal scales. For example, benefits may be measured at one scale, while costs at another, and/or the impacts in one domain may be assessed at a different scale to the impacts in another. Thus, there is a demonstrated need for mechanisms that ensure that the impacts identified during impact assessments are comprehensive within a clearly articulated boundary. Inconsistent use of scales may also arise during comparative investigations of the proposed development with alternatives or the no project scenario [2], as discussed below.

5.1. Spatial Scales

Generally, impact assessments may consider the distribution of benefits and costs across three main levels of impact:

- The company and its shareholders;
- The local community and geographic region;
- The state or national level.

However, the analysis of the positive and negative impacts of the proposed development is not always consistently applied across these levels. For example, the economic benefits of a mining project are often motivated as being for the state or national good. That is, the project boundary, for the economic domain, is set at the country-wide level. However, impacts in the environmental and social domains are not commonly considered at this same level, unless listed species are involved. This inconsistency is particularly significant when national and global impacts threaten ESD, such as contributions to GHG emissions, deterioration of the natural environment, and damage of other industries.

Australian courts have found that, on application of the intergenerational equity principle, through the Environment Protection and Biodiversity Conservation Act 1999 [20], governments are responsible for assessing the indirect impacts of the expansion of the coal industry, on the basis of its significant cumulative impact on GHG concentrations and consequently its contribution to climate change [21]. In Taralga Landscape Gaurdians Inc v Minister for Planning and RES Southern Cross Pty Ltd. [22], Judge Preston explained that intergeneration equity should be a key consideration of planning decisions:

> *The principles of sustainable development are central to any decision-making process concerning the development of new energy resources. One of the key principles underlying the notion of sustainable development is the concept of intergenerational equity* [23].

The case for including environmental national and global impacts also raises the common issue of inconsistent temporal scales applied during impact assessments, and the nature of impacts considered. The issue of including indirect impacts is expanded upon in Section 5.3.

5.2. Time Scales and the Nature of Impacts

While positive national economic impacts are often included, negative national economic impacts, such as long-term damage to Australia's economic diversity, are rarely acknowledged. A significant long-term impact of mining, in the absence of appropriate policy and industry mechanisms to ensure otherwise, is to drive the value of the local currency up, as international entities buy the local currency for the purpose of buying local minerals. The flow on effect of this is to make it more and more difficult for all other industries, especially manufacturing, to survive, as it becomes cheaper to import goods than to support local business [24,25].

To enable robust and reliable evaluation of a projects foreseeable impact, time frames for measuring short, medium and long-term impact need to be identified and used consistently. In the case that the authors reviewed there was general acknowledgement that coal reserves will deplete over time. However, this was not taken into account in the economic assessment. This is not to say that mining projects cannot provide long-term economic impact but it highlights the lack of consistency being applied in impact assessments. Long-term economic benefit may be achievable for a mining development if long-term strategic thinking is utilized. With such thinking opportunities may arise for sufficient investment in environmental and social development, such as environmental conservation programs, diversified skills development, and growth of sustainable industries including health, education and agriculture.

Another significant time-scale issue, that is common to impact assessments of mining developments, is the way in which value is attributed to alternative land uses. In the case that the authors reviewed, agricultural land values were grossly undervalued. The opportunity cost of not being able to use the subject land for agricultural purposes, as well as depleting the quality of this land for future agricultural purposes, are critical impacts to include in impact assessments, in ways that reflect the true opportunity cost. Land use opportunity cost is a particular important field of impact, and is one that will only grow in significance, as agricultural land decreases and demand for food increases. It is also important to appreciate that the agriculture industry is one that can and must be sustained for societal progress, especially in a world where food security is an increasingly significant issue.

5.3. Direct versus *Indirect Impacts*

There is a tendency for EIAs, in the context of coal mine developments, to include benefits that flow from the coal generated energy from coal fired power station, in the form of electricity, whilst at the same time not taking account of associated impacts of the generated power, most importantly the associated GHG's [2]. The total lifecycle impact of the proposed products and services flowing from the coal mining activities, including the GHG emissions of the electricity production, are generally treated in EIAs as being outside the proposed project boundary, despite legal precedent requiring otherwise. The question of where the boundary should be drawn in consideration of the impact of coal mining has both a legal and an ethical dimension. The legal question is addressed in a number of recent Australian cases, which are discussed below and cited in McGrath [26].

It is common practice that the direct GHG emissions (Scope 1) from mining operations and local transportation of the coal are included in impact calculations, and that associated emissions from

burning the coal are excluded. The justification for excluding emissions associated with the burning of the product coal is that the proposed development is for the mining of coal, as opposed to the burning of coal, and that the emissions from the burning of coal are not subject to the control or influence of proposed mine [27]. This justification is thus based on a view that the mine development operates in isolation from the system in which it exists. In addition this approach is justified on the basis that the National Greenhouse and Energy Reporting Act [28] does not require reporting of Scope 3 emissions (those outside of the operational boundary), and that to include them would lead to double counting. However, the purpose of an EIA is not to create a national emissions database and track the country's GHG budget, making this justification irrelevant.

The case *Minister for the Environment and Heritage vs. Queensland Conservation Council Inc* (2004) [29] outlined that any EIA and associated planning decision should take into account adverse environmental impacts, including downstream or "indirect" impacts [26]. *Gray v Minister for Planning* (2006) [30] addresses the relationship between coal mining activities and the combustion of coal [31]. It provides the legal precedent for the inclusion of emissions from the combustion and transport of coal. In her ruling, Justice Pain cited the need to consider ESD principles, such as intergenerational equity and the precautionary principles, when assessing a similar coal mine. Specifically, the precautionary principle required that the mine's cumulative effects, including downstream emissions, be assessed, and that the potential climate impacts should be assessed despite any scientific uncertainty about their extent. It appears that legal precedent for inclusion of the product impacts, as well as the downstream production impacts, is not affecting EIAs in practice. The implication of this experience is that current impact assessments may be grossly underestimating the adverse environmental and social impacts of proposed coal mine projects.

From an ethical perspective, consideration of the impact of coal mining in an EIA, in isolation from the impact of its product, is highly questionable. This argument would have the producer (the proponent) only supplying demand that would otherwise be met by alternative suppliers. Recasting this argument with a number of other products that have damaging consequences in use, rather than in their production, is illustrative, for example, weapons manufacture and tobacco. The potential effects from climate change are certainly as damaging [32]. For example the World Health Organisation estimates that already 150,000 deaths are occurring annually due to climate change [33], while Myers [34] estimates that by 2050 there will be 250 million displaced people due to climate change. Long-term threats are far more damaging, with threats of irreversible ecological damage. It is thus consistent with ESD principles to include, in an impact assessment, the impact that a proposed mine may have on prolonging the use of coal as a major energy source in Australia, and consequently its impact on delaying a transition to a clean energy future, need to be considered.

5.4. Using the TBL as an Impact Assessment Tool

TBL assessment methodologies are best used to determine which option, from a set of options, best meets a project's objectives; where these objectives incorporate financial, ecological and social elements. These objectives should be clearly aligned with widely accepted societal objectives and principles for ESD. The challenge in developing a TBL report is therefore in choosing a set of indicators that, when

put together, provides an adequate picture of the whole. In such a situation the TBL assessment process may be used as a broad indicator of the options' relative progress towards ESD [35].

It is incorrect to assume that a well-designed TBL assessment process will identify a good option that pursues ESD, as it is possible that none of the options in the option analysis will achieve an ESD outcome. Rather, a TBL assessment may highlight one option as being the best of several very bad alternatives [35]. This is often the case with new mining options, where the comparison of costs and benefits have been limited to alternative ways of operating the proposed mine, whilst non-coal sources of energy are not considered or compared to the mining, transportation and use of coal.

6. Conclusions

Evaluating common applications of the TBL framework, in the context of coal development proposals, makes apparent a number of opportunities to improve the capacity of the NSW planning system to achieve ESD. Firstly, there are opportunities to shift away from the trade-off approach and language of "mitigation" and "harm reduction" to "maintain", "improve" and "progress". TBL, as it is currently applied does not ensure the pursuit of *maintaining* or *improving* social or ecological processes, on which life depends, nor does it guarantee progress, *i.e.*, an increase in the total quality of life, now and in the future. Secondly, there are significant opportunities to transition away from considering potential impacts in the three TBL domains on an equal weighting, to one that appreciates the interdependent relationships between the domains. Finally, there exist significant opportunities for industry-wide adoption of mechanisms and guidance that assist industry in setting consistent boundaries for conducting impact assessments, that demonstrate the full life-cycle impact of an activity, and for involving community in the impact identification and assessment process.

The current application of the TBL framework does not guarantee a robust or reliable identification and assessment of potential impacts. Consequently, there exists a large evidence base of development proposals that do not enable satisfactory evaluations by decision-makers, in the context of a legislative framework with an ultimate and stated objective to achieve ESD. These findings are significant, as they may generate discussion and action around improving the capacity of the industry to conduct robust and reliable impact assessments, and thus may lead to greater opportunities for achieving development in all three TBL/ESD domains. Given the seriousness of what is at stake if we do not ensure ESD, the authors call for immediate investigation into regulatory mechanisms that may ensure industry-wide uptake of frameworks that are designed to ensure that development projects progress society toward ESD.

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