



## Towards sustainability assessment follow-up



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### ABSTRACT

This paper conceptualises what sustainability assessment follow-up might entail for three models of sustainability assessment: EIA-driven integrated assessment, objectives-led integrated assessment and the contribution to sustainability model. The first two are characterised by proponent monitoring and evaluation of individual impacts and indicators while the latter takes a holistic view based around focused sustainability criteria relevant to the context. The implications of three sustainability challenges on follow-up are also examined: contested time horizons and value changes, trade-offs, and interdisciplinarity. We conclude that in order to meet these challenges some form of adaptive follow-up is necessary and that the contribution to sustainability approach is the best approach.

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## 1. Introduction

The theory and practice of impact assessment for sustainability, also known as sustainability assessment, is now well established. Bond et al. (2012) demonstrated exponential growth in the publication of papers with the phrase 'sustainability assessment' in their title over the last decade, finding around 150 such papers published in the year 2011 alone. So far though, the emphasis in the literature on sustainability assessment has been on the pre-approval decision phases of new development proposals, and specifically how sustainability concepts and principles are reflected in the development and assessment of these proposals. In this paper we turn our attention to the post-approval stages and consider how the sustainability outcomes of implemented proposals might be monitored and managed, through processes that have come to be known collectively as 'follow-up' (Arts and Morrison-Saunders, 2004).

Our aim is to consider how the theory and practice of impact assessment follow-up might apply to sustainability assessment, and therefore to shed some light on what might be termed sustainability assessment follow-up. Being a conceptual paper, our methodology is based predominantly on literature review and personal reflection, although where possible we draw upon examples from practice in published sources.

We commence by engaging with previously established conceptual models of sustainability assessment and consider how we believe follow-up might usefully be accomplished for each of these. We then address some challenges associated with sustainability and therefore sustainability assessment follow-up, which we consider are over and above those that could apply to any form of impact assessment follow-up (see Wallgren et al., 2011 for a consideration of some typical follow-up issues which are not specific to sustainability). We note that an early attempt at conceptualising follow-up for sustainability assurance (Arts and Morrison-Saunders, 2004) touched on some of these challenges (and some others); here though, we derive our focus specifically from the recent sustainability assessment literature. In the final section, our conclusions point to possible ways forward for research and practice with sustainability assessment follow-up.

## 2. The two core concepts: sustainability assessment and follow-up

In this section we briefly review the two core concepts with which we are concerned in this paper, namely sustainability assessment and follow-up, and we identify and critically review the conceptual frameworks that form the basis of our analysis.

### 2.1. Sustainability assessment

In recognition of the diversity and evolving nature of sustainability assessment practice, we define sustainability assessment broadly as any process that has as its aim to direct decision-making towards

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sustainability (Bond and Morrison-Saunders, 2011, derived from Hacking and Guthrie, 2008). Given assertions that all forms of impact assessment inherently have as their goal to contribute to sustainable development (e.g., Cashmore et al., 2007; Feldmann et al., 2001), this potentially makes it difficult to demarcate between what is sustainability assessment and what is not for the purpose of our exploration of follow-up. To clarify, we define a sustainability assessment process as explicitly incorporating a clear articulation of the concept of sustainability, at the minimum including environmental, social and economic dimensions. For example, we would therefore consider that many forms of strategic environmental assessment (SEA), such as that conducted under the European Union Directive (European Parliament and the Council of the European Union, 2001) are forms of sustainability assessment, while biophysically-oriented environmental impact assessment (EIA) or social impact assessment (SIA), to give just a couple of examples, are not, even though they may certainly contribute positively to some dimensions of the sustainability agenda.

We also recognise that sustainability, or sustainable development (we use the terms interchangeably), is a normative and ambiguous concept (Bond and Morrison-Saunders, 2011; Bond et al., 2013). Nevertheless, broadly different conceptualisations of sustainability have been distinguished in the impact assessment literature and we draw upon previously published models of sustainability assessment that reflect these different conceptualisations. Specifically we draw upon the models posed by Pope et al. (2004) nearly ten years ago to structure our reflections. Drawing upon a review of literature at the time, three conceptual models of sustainability assessment were described:

- EIA-driven integrated assessment, which aims to minimise negative environmental, social and economic (ESE) impacts within acceptable limits;
- Objectives-led integrated assessment, which aims to maximise positive ESE outcomes; and
- Assessment for sustainability, which aims to determine whether or not a proposal is sustainable.

We find these models to be a useful starting point for distinguishing different approaches to follow-up for sustainability, though recognising that thinking has evolved, particularly with respect to the third model. The first two models assume a simplistic and reductionist 'triple bottom line' or ESE (environmental, social and economic) understanding of sustainability which can readily be identified in practice, while the third, as posed in the original paper embodied a more integrated and holistic conceptualisation with no practical examples at the time of conceptualisation (in Pope et al., 2004). The challenge of determining what might be and what might not be sustainable was acknowledged.

We suggest that the more recent conceptualisation of sustainability assessment as a process of evaluating the 'contribution to sustainability' of a proposal, as has been applied in some Canadian practice (e.g., Joint Review Panel for the Mackenzie Gas Project, 2009) and which is aligned with the work of Gibson (2006), reflects a more practical and realistic alternative to the assessment for sustainability model. While both models take as their starting point an integrated, holistic understanding of sustainability that recognises that human welfare is intrinsically dependent on natural capital and do not take a reductionist, triple bottom line approach (Gibson et al., 2005), the difference is that the contribution to sustainability model asks not whether a proposal is or isn't sustainable, but whether it is sustainable *enough*. Thus the conceptual models to be assessed in this paper are:

- EIA-driven integrated assessment;
- Objectives-led integrated assessment; and
- Contribution to sustainability.

EIA-driven integrated assessment arguably remains the dominant form of sustainability assessment in practice, and can be utilised at both project and plan levels. Objectives-led integrated assessment is typified by the English sustainability appraisal approach applied to

land use plans, while the contribution to sustainability model is typified by certain examples of project assessment from Canadian practice.

What each means in practice for follow-up must be defined for each decision context, as will be illustrated later.

## 2.2. Impact assessment follow-up

It is not our intention to duplicate or repeat the already well-established practices and literature on impact assessment follow-up (see, for example, Arts, 2004; Marshall et al., 2005). We recognise that impact assessment follow-up has been conceptually framed at three separate tiers (see, for example, Arts and Morrison-Saunders, 2004) at the development activity level, impact assessment system level and impact assessment concept level. Notwithstanding that an effective follow-up framework requires all three tiers (see also Sadler, 2004), our focus in this paper is principally on sustainability follow-up at the development activity level. Such development could range from projects through to plans and other strategic-level activities. We adopt the definition of follow-up employed in the International Association for Impact Assessment best practice guidance (Marshall et al., 2005; Morrison-Saunders et al., 2007) comprising monitoring, analysis/interpretation, management and communication of post-approval decision development activity.

## 3. Follow-up for sustainability assessment

In this section we consider how the follow-up activities appropriate to the level of development activities might be conducted in the context of each of the three models of sustainability assessment presented in Section 2.1. To do this, we elaborate a little on each model, providing examples to highlight their distinguishing features that are of relevance to follow-up activities. We consider both the 'what' of follow-up in each case (what exactly is being monitored, analysed/interpreted, managed and communicated) and the 'who' (where responsibilities lie and which stakeholders might be involved). Descriptions of the models will refer to illustrative examples drawn from practice across the world. We acknowledge that objectives-led integrated assessment and the contribution to sustainability model in particular have some contextual differences due to their application to plans and projects respectively and we have taken this into account in our descriptions that follow.

### 3.1. EIA-driven integrated assessment

The *EIA-driven integrated assessment* model of sustainability assessment is an extension of traditional project-based environmental impact assessment, and aims to minimise the negative environmental, social and economic impacts of development and ensure that they remain within acceptable limits. It is applied in jurisdictions in which the definition of environment in the relevant EIA legislation is sufficiently broad to encompass the three dimensions of sustainability, for example South Africa (Morrison-Saunders and Retief, 2012), or when a biophysically-oriented EIA process has been supplemented by social and economic impact assessment as in the case of the Gorgon Gas Development in Western Australia (Pope et al., 2005). The approach is often also applied to evaluating a range of available alternatives, for example sites for industrial facilities, to identify the most acceptable from a sustainability perspective (Morrison-Saunders and Pope, 2013a,b).

The process of EIA-driven integrated assessment is fundamentally baseline-driven, whereby impacts are compared with the status quo prior to the development (Pope et al., 2004). Ideally, acceptable limits for impacts in relation to the baseline would be defined for each relevant environmental, social and economic factor in legally-binding approval conditions that focus on outcomes rather than on the outputs of processes designed to deliver the outcomes. Follow-up activities for this model of sustainability assessment

should therefore focus on monitoring and evaluating the actual environmental, social and economic impacts of the development activity to ensure that they do not exceed the acceptable limits as defined by experts within regulatory agencies and typically articulated in approval conditions. When such limits are exceeded (or at risk of being exceeded), appropriate adaptive management action should be initiated, the results communicated and the new actions subject to ongoing follow-up. Typically follow-up would be undertaken by the proponent in the form of compliance audits, which would then be reported to the regulator and perhaps made available to the public.

An example of well-established practice in this approach, albeit limited to the biophysical environmental dimension only, can be found in Western Australia (Box 1). Due to the broad definition of 'environment' (to also include social and economic aspects) adopted in the South African context examples of outcome based conditions explicitly established for social and economic outcomes do exist. They typically include outcomes defined in relation to levels of employment, use of local labour, access to resources as well as skill development and capacity building.

Complementary to this compliance audit approach to follow-up would be the use of Environmental Management Plans (EMPs), perhaps embedded in an Environmental Management System (EMS) as a strategy to ensure that environmental goals and outcomes identified through impact assessment are translated into actions through the allocation of specific responsibilities in the operational stage of a development (e.g., Goodwin and Wright, 2008; Marshall, 2002; Perdicoulis et al., 2012; World Bank, 1999). In such cases, EIA approval conditions can be set for any type of impact, and appropriate stakeholders identified for carrying out appropriate actions. Extrapolating this well-established approach to environmental management to encompass a broader sustainability mandate would require a corresponding broadening of focus towards 'sustainability management plans' and the emerging practice of sustainability management systems (Scanlon and Pope, 2012).

The strength of sustainability follow-up established on the basis of the minimising ESE impact approach is that it is consistent with established EIA thinking and applications. The individual ESE impacts can be monitored and reported on separately, and in doing so, different stakeholders can assume responsibility for their area of expertise; for example proponents can engage environmental or social impact specialists for monitoring and reporting, and different government agencies might sign-off on the work carried out. However, although this approach is relatively straight-forward in application to biophysical environmental outcomes, it is potentially much more complex when applied to social and economic outcomes where acceptability limits are arguably far more difficult to establish and where impacts are more likely to be caused by many activities in addition to the development that is the subject of the assessment, introducing challenges of causality. In addition to the South African examples of measurable social and socio-economic outcomes mentioned earlier, we note that Glasson and Cozens (2011) demonstrate how some relatively intangible social impacts arising from development, such as crime, can be accounted for in the post-approval stages of impact assessment.

From a sustainability perspective, an important weakness is that the focus on negative impacts on a series of factors serves to reinforce not only a disaggregated and reductionist conceptualisation of sustainability but acceptance of a 'death by a thousand cuts' outcome where some negative impacts are considered acceptable and natural capital is systematically eroded. Furthermore, cumulative impacts of more than one development are not adequately managed under this model of proponent responsibility, although an extension of the EIA follow-up example provided by Au and Hui (2004) from Hong Kong in which an Environmental Project Office is established to coordinate follow-up of cumulative environmental impacts from multiple EIA projects could be envisaged.

### 3.2. Objectives-led integrated assessment

The *objectives-led integrated assessment* model of sustainability assessment is often associated with established methods for strategic environmental assessment (SEA) whereby positive objectives for each relevant environmental, social and economic factor are ideally established early in the planning process to guide the selection of the development strategy that best achieves the stated objectives<sup>1</sup> (Thérivel et al., 2009). An application of this model is sustainability appraisal as was practised in England until recently and described in guidance developed by the Office of the Deputy Prime Minister (2005).<sup>2</sup> This guidance (now obsolete) included follow-up monitoring expectations focusing on monitoring progress against the achievement of the objectives and the delivery of positive environmental, social and economic outcomes from the development (see Box 2).

The main strength of the objectives-led approach compared with the previous model with its focus on minimising impacts is that sustainability should be uniquely defined for each plan or development area, ideally with community and stakeholder involvement, and therefore it should be more likely that following up on progress against the objectives in the framework would contribute to positive outcomes from the development. The English process called for sustainability to be articulated for each context in the form of a unique sustainability framework, although it is noted that this was not always the case in practice as local authorities tended to base their frameworks on those already prepared at regional level. The use of common consultants, or national-level stakeholders, across different local or regional assessments also leads to strong similarities between frameworks (Bond et al., 2011). A second potential strength of monitoring against objectives instead of the baseline is that this facilitates the management of cumulative impacts from a range of activities within the plan area although once again it is not clear that this opportunity was consistently realised in practice.

The main weakness of this approach experienced in English practice was that the frameworks tended to become unwieldy with far too many factors and associated objectives typically identified (see, for example, Bond and Morrison-Saunders, 2011) with the result that robust data could not realistically be collected for all indicators. More generally, and similarly for the previous model, a framework of disparate ESE objectives does not adequately reflect the linkages and inter-relations between the factors. Responsibility for follow-up in this case would usually rest with the authority responsible for the plan, but there are clear opportunities for engagement of the community and other stakeholders in evaluating the extent to which the various objectives have been met, particularly given the essentially qualitative nature of such evaluations and therefore the value of diverse opinions and priorities. Indeed, communities often ask for this opportunity (see Bond et al., 2011).

### 3.3. Contribution to sustainability

The *contribution to sustainability* model of sustainability assessment not only aims at delivering positive outcomes (which is also true of the objectives-led integrated assessment model) but also takes a holistic view of sustainability that does not revert to separate ESE or triple bottom line categories and tests whether a proposal makes a sufficient

<sup>1</sup> Although it is noted that the EU SEA Directive describes a baseline-led approach, sustainability appraisal in England until recently did take an objectives-led approach.

<sup>2</sup> Note: this document and the processes described in it have since been superseded with direct support now provided by the Planning Advisory Service [http://www.pas.gov.uk/web/pas-test-site/search/-/journal\\_content/56/332612/15258/ARTICLE](http://www.pas.gov.uk/web/pas-test-site/search/-/journal_content/56/332612/15258/ARTICLE) [accessed 26 November 2013]; this change was in response to the objectives-driven approach leading to Court challenges where the appraisal had not also complied with the SEA Directive, which is baseline-led.

## Box 1

Follow-up to minimise impacts in Western Australia.

In Western Australia, approval conditions established by the Environment Minister during EIA are legally binding on the proponent and s47 of the *Environmental Protection Act 1986 (EPAct)* requires proponents to provide 'reports and information about (a) the implementation of the proposal... and (b) compliance with the implementation conditions...'. The Environmental Protection Authority (EPA), an independent body established by the *EPAct* to conduct EIAs, has a strong preference for outcome-based conditions to be employed wherever possible (*Environmental Protection Authority (EPA), 2009*). As stated in s16 of the *EIA Administrative Procedures 2012*,<sup>3</sup> the aim of specifying environmental outcomes in approval conditions 'is to regulate "what" to achieve, not "how" to achieve it', thereby enabling adaptive management. Such outcomes will normally be expressed as levels of acceptable impact (e.g. areas of habitat to be cleared, water quality standards to meet, permissible levels of groundwater drawdown etc.). Thus compliance with the approval conditions provides a measure of acceptable environmental performance. Compliance audit procedures are well established with detailed guidance provided to proponents (e.g. *EPA, 2012a,b,c*) on how to monitor and report on their activities.

contribution to be acceptable. Canadian practice across several case studies, including the Voisey's Bay Nickel Mine, White's Point Quarry and MacKenzie Gas Project (*Gibson, 2011; Gibson et al., 2005*) demonstrates how sustainability is defined uniquely for each case by an assessment Panel, based upon the characteristics of the receiving environment and the needs of the local communities. The key difference from the objectives-led model is the tightness of the scoping leading to just a few focused sustainability criteria; for example fewer than 10 rather than the 30 or more objectives typical of sustainability appraisal in England leading to a proliferation of indicators –between 60 and 233 in a sample of nine analysed by *Bond and Morrison-Saunders (2011)*. These criteria highlight the big, cross-cutting sustainability issues, and as such, the approach is arguably less reductionist and more holistic. The MacKenzie Gas Project assessment discussed in *Box 3* illustrates how a tight focus lead to just five key issues defining sustainability for that decision in that specific context.

Follow-up in this case should therefore also be considerably more focused than in the previous examples, monitoring the contribution against the key sustainability issues identified in order to determine whether a positive contribution has been achieved. This focus on what is really important for sustainability in a given context is a strength of this approach and of the associated follow-up process. However, the complexity of the issues underpinning the conceptualisation of sustainability in each case requires careful design of the monitoring programme and the preparation of appropriate guidance for the evaluation process, as measuring contributions to these may be even more subjectively open to interpretation than monitoring data sets obtained for the previous two models. We return to this matter later when considering the trade-off challenge in sustainability follow-up.

This approach, with its focus on the sustainability issues relevant to a particular location and community, requires a collaborative approach to delivering the contribution to sustainability, involving Government, the

## Box 2

Follow-up to maximise positive outcomes in England.

In the context of land use planning in England (prior to recent court challenges), SEA was integrated with 'sustainability appraisal' (which pre-dated the EU SEA Directive), and the combined assessment report arising from the pre-approval decision phase was prepared at the same time as the spatial plans to which they applied (*ODPM, 2005*). This combined an objectives-led approach required by sustainability appraisal under English planning law, with a baseline-led approach required by the SEA Directive. In summary, the process involved the following steps:

- setting the context and objectives, establishing the baseline and deciding on the scope;
- developing and refining options and assessing effects;
- preparing the sustainability appraisal report;
- consultation on both the regional spatial strategy and sustainability appraisal reports resulting in modification as appropriate;
- decision-making and publication of the revised spatial plan
- implementation, monitoring and review of the spatial plan.

The overall intention was that the objectives reflected positive advances with respect to the issues and indicators examined. Appendix 14 of the OPDM guidance addressed monitoring needs and expectations based around the objectives, targets and indicators developed during the sustainability appraisal process along with features of the baseline that would indicate the effects of the plan (*ODPM, 2005, p145*), the likely significant effects and the mitigation measures proposed. The guidelines stated that monitoring 'needs to consider both beneficial and adverse effects' (*ODPM, 2005, p146*) and take into consideration 'secondary, cumulative and synergistic effects of the individual measures in the plan'.

developer and potentially other parties as well. The *Joint Review Panel for the Mackenzie Gas Project (2009)* did indeed strongly emphasise the need for significant government action in addition to proponent-led mitigation, and a large number of its recommendations were specifically for various government agencies to enact (*Gibson, 2011*). This notion of shared responsibility makes this model significantly different from the other two, especially when this model of assessment is applied at the project level where traditional EIA practice would typically have the developer responsible for any monitoring (*Marshall et al., 2005*). It also suggests the potential for more collaborative approaches for the delivery of positive sustainability outcomes (see for example *Kania and Kramer, 2011*), which in turn potentially makes the issue of causality of impacts less relevant and therefore less problematic.

Some form of independent auditing of the follow-up of the actions allocated to Government and the conditions applied to the proponent of the development is also likely to be required. An example of how this might be approached is provided by *Ross (2004)* who reports on the workings of the Independent Environmental Monitoring Agency established in the approval of the Ekati Diamond Mine, Canada including their watchdog role in reporting on both activities of the mining proponent and government agencies. The need to hold Government to account may be a weakness of this process, as in the McKenzie case where a lack of appetite by Canadian government agencies to become involved in the first instance resulted in rejection of many of the recommendations of the Joint Review Panel (*Gibson, 2011*). The qualitative and subjective nature of the sustainability issues suggests an opportunity for community and stakeholder involvement in the follow-up process in an explicitly engaging manner. Indeed *Hunsberger et al.*

<sup>3</sup> Environmental Protection Act 1986 EIA (Part IV Divisions 1 and 2) Administrative Procedures 2012 *Government Gazette, Western Australia* 7 December 2012, No. 223: 5939–5959, Available at: [http://edit.epa.wa.gov.au/EPADocLib/Environmental Impact Assessment Administrative Procedures 2012.pdf](http://edit.epa.wa.gov.au/EPADocLib/Environmental%20Assessment%20Administrative%20Procedures%202012.pdf) [accessed 26 November 2013].



Box 3

Follow-up for sustainability and net contribution in the Mackenzie Gas Project, Canada.

The five key sustainability issues that provided the focus of the Panel's assessment of the Mackenzie Gas Project were (Joint Review Panel for the Mackenzie Gas Project, 2009, p589):

- Cumulative Impacts on the Biophysical Environment:
- Cumulative Impacts on the Human Environment:
- Equity Impacts: (fair distribution of benefits and risks);
- Legacy and Bridging: (use of the project and other positive impacts arising as a bridge to more sustainable livelihoods for people in the regions where the pipeline infrastructure would be established);
- Cumulative Impacts Management and Preparedness: (capacities of the government and proponent for managing the risks and opportunities).

Chapter 18 of the Panel's report was devoted to monitoring and follow-up. It outlined the principles and requirements for a follow-up programme for the project encompassing impact monitoring, adaptive management and for cumulative impacts management and monitoring. The chapter included 22 specific recommendations, many directed at government as well as the proponent.

(2005) argued that citizen-based approaches to follow-up would offer several benefits including:

- better tracking of cumulative effects of multiple development activities;
- assessing changes in local quality of life;
- responding to detected changes with adaptive design and management strategies; and
- producing locally meaningful results.

**Table 1**  
Comparative summary of follow-up in sustainability assessment.

Sustainability assessment model	Decision context	Follow-up		Strengths	Weaknesses
		What	Who		
EIA-driven integrated assessment	Applied at project and plan level in practice; baseline led; ESE focused.	ESE outcomes as a result of the development	Proponent with oversight by regulators	Established practice, particularly with respect to biophysical outcomes	Does not address cumulative impacts; reductionist; permits 'death by a thousand cuts'
Objective-led integrated assessment	Applied at plan level in practice; comprehensive objectives led ESE framework established	Progress against ESE objectives uniquely defined for the plan area	Authority responsible for plan/development with potential for community and stakeholder involvement	More likely to demonstrate positive sustainability outcomes; potential to evaluate cumulative impacts	Difficult to demonstrate causality; reductionist; difficulty of gathering robust monitoring data
Contribution to sustainability	Applied at project level in practice; limited number of holistic sustainability principles established	Progress against focused sustainability issues uniquely defined for the context	Shared responsibility of proponent and Government; independent third party to areas of monitor government responsibility; opportunities for community and stakeholder involvement	Focused on unique issues affecting sustainability in a specific context from a holistic perspective; shared responsibility for outcomes means causality less of an issue	Complexity of issues underpinning focused conceptualisation of sustainability; difficulty of holding Government to account.

3.4. Comparative summary of follow-up in sustainability assessment

Table 1 summarises the discussion in the preceding sections to highlight the characteristics of follow-up in the three models of sustainability assessment.

4. Challenges in follow-up for sustainability assessment

We now turn our attention to some of the challenges arising from the integration of sustainability concepts into impact assessment that may have consequences for how follow-up might be conceptualised and undertaken. We do not discuss here the pervasive challenges that apply to all, or most, impact assessment follow-up processes, and while we have attempted to identify challenges unique to sustainability assessment we acknowledge that our list is unlikely to be comprehensive. However, we are confident that we have, based on the frequency of their appearance in the academic literature, identified the key challenges. In summary, these are:

- Contested time horizons and value changes (Arts and Morrison-Saunders, 2004; Bond and Morrison-Saunders, 2011; Bond et al., 2012, 2013)
- Trade-offs (Gibson, 2013; Morrison-Saunders and Pope, 2013a,b); and
- Interdisciplinarity (Ballard and Hall, 1984; Bond et al., 2010).

4.1. Contested time horizons and value changes

Inter-generational equity has been a core sustainability principle since its articulation in the Brundtland Report (WCED, 1987). This principle implies long time-frames, at least two generations or 50–60 years, and therefore sustainability assessment follow-up should also account for broader time horizons than is the case for traditional forms of impact assessment where the focus is typically on the life of the project or plan (or potentially a policy or programme). The development of a follow-up strategy for a sustainability assessment is complicated by the fact that the actual impacts of the development and the expectations with respect to these impacts are likely to evolve and change over long time periods, and so follow-up activities will similarly need to evolve and change.

The evolution of impacts and expectations implies a need for an adaptive approach to sustainability assessment follow-up, but a more sophisticated version than adaptive management as typically employed in EIA. The example provided earlier of specification of outcomes in Western Australian practice facilitating adaptive management has a different implication when value-changes are taken into account; the desired outcomes are likely to change over the timescales envisaged for follow-up activities, and this suggests that 'adaptive follow-up' is

necessary to accommodate the changing sustainability outlook. This is a significant challenge as it suggests that follow-up actions themselves should, like the projects and/or plans they are designed to enable, time expire and be subject to renegotiation with relevant stakeholders. This implies an ongoing role for the community and other stakeholders beyond the ex ante impact assessment, where the importance of broad engagement is increasingly recognised (e.g. Hunsberger et al., 2005; Sinclair and Diduck, 2001; Sinclair et al., 2008), throughout the life of the development and beyond, including ex post follow-up activities.

In the examples of practice discussed earlier with respect to the EIA-driven and objectives-led integrated assessment models of sustainability assessment, we found no evidence of this kind of adaptive, collaborative approach to follow-up. Indeed the concept is incompatible with these forms of practice, where sustainability is defined by clearly defined thresholds or objectives that are often articulated in approval conditions. We suggest here that this adaptive and long-term approach to sustainability assessment follow-up can only meaningfully be applied to the *contribution to sustainability* model, where sustainability is defined in terms of issues against which a contribution is sought. What this contribution should look like in practice, and where the target should be set, should be subject to ongoing re-evaluation in collaboration with stakeholders, and follow-up processes should be reframed accordingly. We also note that contributions to sustainability, as called for in this model, take time to manifest, further emphasising the need for long-term follow-up strategies. This point is demonstrated by Gibson (2013), in his report of the actual outcomes of development projects several decades after their original assessment.

#### 4.2. Trade-offs

We have argued previously that the evaluation and management of trade-offs is an essential and defining characteristic of sustainability assessment (Morrison-Saunders and Pope, 2013a). We therefore argue here that monitoring and managing trade-offs should be an essential element of sustainability assessment follow-up. Understanding and evaluating trade-offs in sustainability assessment cannot be achieved through an objective analysis of monitoring results, but will require judgments to be made and the perspectives of different stakeholders to be taken into consideration. We recognise that the consideration of trade-offs in sustainability assessment is highly context-specific, both with respect to the type of proposal as well as the values of decision makers. For example, whether people uphold weak or strong conceptualisations of sustainability (e.g. Williams and Millington, 2004) will directly determine the kinds of trade-offs they are prepared to accept (Morrison-Saunders and Pope, 2013a). Using the MacKenzie Gas Project from Box 3 as an example, understanding matters of equity with respect to the distribution of project benefits and costs or the legacy and bridging outcomes during a follow-up study would require social research involving individuals and groups.

Also, we suggest that the reductionist nature of follow-up for both EIA-driven and objectives-led integrated assessment approaches with their focus upon separate ESE impacts means that little or no consideration of trade-offs typically occurs. In contrast, the notion of follow-up within the contribution to sustainability model implicitly demands some engagement with what 'sustainability' means in a particular context (e.g. changing over time and with intergenerational change) and this likely would in essence include analysis or consideration of trade-offs. Retief et al. (2013) identified that difficulties with dealing with trade-offs stemmed from the lack of consensual values, and that finding solutions to dealing with difficult trade-off decisions requires recognition and understanding of the role of values. König et al. (2013) develop a framework for competing values in interdisciplinary research (they categorise eight competing value frames) which suggests that any trade-off decisions are unlikely to be accepted unless a broad range of stakeholders are involved spanning the different values. Similarly, Gregory et al. (2012) advocate that multiple framings

in the context of trade-off decisions are advisable, and thus, this will need to translate into adaptive follow-up. This points to the need for the greater number of stakeholders and the deeper level of engagement associated with follow-up for contribution to sustainability.

#### 4.3. Interdisciplinarity

Interdisciplinarity is a core principle of good impact assessment practice (International Association for Impact Assessment and Institute of Environmental Assessment, 1999) and featured in the text of the world's first EIA legislation, the *National Environmental Policy Act* (NEPA) 1969 (Senate and House of Representatives of the United States of America, 1969) in Section 102 where federal agencies are asked to:

*"utilize a systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on man's environment"*.

Despite this foundation, interdisciplinarity continues to be a recognised challenge in impact assessment, and we note that it is frequently confused with multidisciplinary. As noted by Bond et al. (2010), p7):

*"Multidisciplinarity involves the same research subject being examined through several disciplinary lenses, but with no interchanging of methods among them. Multidisciplinarity presumes that each expert works on some research subject by his/her own knowledge corpus"*.

Interdisciplinarity, on the other hand, can be defined as involving the transfer of methods from one discipline to another, at the practical or epistemic level (Bond et al., 2010). As such, it requires experts from very different disciplines to work together and to understand the linkages between their areas of focus (Morrison-Saunders et al., in press). This is a key to integrating evidence on a diverse range of impacts in any sustainability assessment process.

In the EIA-driven integrated assessment, normal practice is for individual experts to prepare separate assessments on their own areas of expertise. Likewise in the objectives-led integrated assessment, it is usual for experts representing the specific objectives identified to separately prepare assessments, without cross-linkages. Only the contribution to sustainability approach implies the need for an interdisciplinary approach given that the few, focused sustainability principles embody a range of inter-related issues.

By extension, follow-up for the contribution to sustainability model also requires an interdisciplinary approach, and can form the basis of adaptive management as described in Section 4.1. EIA-driven integrated assessment and objectives-led integrated assessment are not currently interdisciplinary; in order to rise to this interdisciplinary challenges, they would need to embrace different patterns of working, perhaps using analytic-deliberative approaches to engender cross-discipline engagement and understanding (see, for example Burgess et al., 2007; Chilvers, 2007; Bond et al., 2011), although these are known to be resource intensive.

### 5. Towards sustainability assessment follow-up

In this paper we have attempted to define and outline some of the key features that might characterise sustainability assessment follow-up, relative to traditional and well established EIA follow-up expectations and practice, framed in relation to three sustainability conceptual models and some key sustainability challenges. In summary some of the key defining characteristics might be:

- The EIA-driven and objectives-led integrated assessment approaches would be characterised by separate consideration of ESE impacts, with emphasis on follow-up being undertaken by the proponent or central agency responsible for a plan.

- The contribution to sustainability approach evokes an integrated, interdisciplinary and adaptive follow-up approach that would accommodate active stakeholder involvement, long time frames to promote intergenerational equity and consideration of trade-offs. It would be less of a compliance exercise and more of an attempt to understand and collaboratively manage the impacts of development to promote sustainability outcomes.

What we realised in the process of mapping out possible sustainability assessment follow-up scenarios was that two of the sustainability conceptions (EIA-driven and objectives-led integrated assessment) do not support intergenerational equity without changes to existing practice and the use of more resource-intensive methods (for example, analytic-deliberative approaches). While both these approaches might have considerable appeal and traction because of their proximity to existing follow-up practices associated with EIA and SEA, and they meet our previously indicated minimum requirement for being considered a type of sustainability assessment (i.e. because they do consider ESE impacts), they fail to adequately account for vital aspects of sustainability such as intergenerational equity and explicit treatment of trade-offs. We therefore argue for the uptake of the contribution to sustainability model of sustainability assessment as we have characterised it here, as the only approach through which these specific sustainability challenges can be adequately addressed through both the assessment process and subsequent follow-up.

We have also identified a potential mismatch in current literature between the increasingly participatory ex-ante assessment processes, and the top-down, expert driven ex-post stage where assumptions are made that desired sustainability outcomes are established at the time of the approval decision and thereafter remain largely unchanged. Given the intergenerational mandate of the sustainability concept and the likely evolution of both impacts and expectations associated with them, this approach is clearly invalid from a sustainability perspective. Other challenges specific to sustainability assessment follow-up include the time that is likely to elapse before sustainability impacts clearly manifest; the necessity of engaging with temporally diverse stakeholders; the subjective aspects of determining and accounting for trade-offs; and the practical difficulties associated with Governments, developers and other stakeholders working collaboratively in a model of shared responsibility to manage the delivery of sustainability outcomes. Perhaps these challenges ultimately relegate sustainability assessment follow-up to remaining an academic exercise. We hope, however, that in our attempt to conceptualise the characteristics of sustainability assessment follow-up, and our call for increased uptake of the contribution to sustainability model of practice, we have at least commenced a conversation that will lead to improved sustainability assessment practice and the delivery of positive sustainability outcomes from development.

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