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## **Towards Impact Assessment Follow-up for Sustainability**

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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 approach. The former 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 some form of adaptive follow-up is necessary in order to meet these challenges, and that the contribution to sustainability approach is best suited to meet these challenges.

**Keywords:** *EIA follow-up, sustainability assessment, integrated assessment, strategic environmental assessment, trade-offs*

### **Highlights**

- We explore sustainability follow-up for three different sustainability models
- Long-time frames require adaptive follow-up and are a key follow-up challenge
- Other key challenges include interdisciplinarity, and trade-offs
- Sustainability follow-up should be a direction of travel and not an outcome
- Only the follow-up for contribution to sustainability model addresses sustainability challenges sufficiently

# **Towards Impact Assessment Follow-up for Sustainability**

## **1. Introduction**

The theory and practice of impact assessment for sustainability, also known as sustainability assessment, is now well established. Bond, Morrison-Saunders et al. (2012) plotted 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.

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 are relevant to any form of impact assessment follow-up (see Wallgren, Nilsson 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 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 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., Feldmann, Vanderhaegen et al. 2001, Cashmore, Bond et al. 2007), 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, is a normative and ambiguous concept (Bond and Morrison-Saunders 2011, Bond, Morrison-Saunders 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, Annandale 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, Annandale 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, Hassan 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.

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 and Morrison-Saunders 2004, Marshall, Arts 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, Arts et al. 2005, Morrison-Saunders, Marshall 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, with EIA-driven practice being widely applied at both project and plan-level, objectives-led integrated assessment being typified by the English sustainability appraisal approach applied to land use plans, and the contribution to sustainability model being typified by the Canadian approach applied primarily to large projects. As such, the latter two models in particular have some contextual differences in their application to plans and projects respectively which we have taken 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 (EIA), and aims to minimise the negative environmental, social and economic (ESE) impacts of development and ensure they remain within acceptable limits. The process is fundamentally baseline-driven, whereby impacts are compared with the status quo prior to the development (Pope, Annandale 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.

#### **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>1</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., Environmental Protection Authority (EPA) 2012, Environmental Protection Authority (EPA) 2012, Environmental Protection Authority (EPA) 2012) on how to monitor and report on their activities.

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<sup>1</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%20Impact%20Assessment%20Administrative%20Procedures%202012.pdf>

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. 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 skills development and capacity building.

Complementary to this compliance audit approach to follow-up would be the use of environmental management plans (EMP) as a strategy to ensure that environmental goals and outcomes identified through EIA are transferred into actions through the allocation of specific responsibilities in the operational stage of a development (e.g., World Bank 1999, Marshall 2002, Goodwin and Wright 2008). In such cases, EIA approval conditions can be set for any type of impact, and appropriate stakeholders identified for carrying out appropriate actions. Ideally the EMPs would be translated directly into Environmental Management Systems to ensure compliance (Perdicoúlis, Durning et al. 2012). Extrapolating this from an environmental emphasis which is well established in practice, for sustainability follow-up would require an appropriate 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 impacts 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 (e.g. proponents can hire environmental or social impact specialists for monitoring and report, 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 measureable social and socio-economic mentioned earlier, we note that Glasson and Cozens (2011) demonstrates 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 negative impacts are considered acceptable and natural capital is 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>2</sup> (Thérivel, Christian et al. 2009). An application of this model is sustainability appraisal as was previously practised in England and described in guidance developed by the (Office of the Deputy Prime Minister 2005)<sup>3</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 this model compared with the previous model with its focus on minimising impacts is that sustainability should be uniquely defined for each plan area through the SEA framework, 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. (This did not necessarily transpire in England in practice, however, as local authorities tended to base their frameworks on those already prepared at regional level, and the use of common consultants, or stakeholders, across different assessments also lead to strong similarities between frameworks – Bond, Dockerty et al. 2011). Another strength

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<sup>2</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>3</sup> Note: this document and the processes described in it have since been superseded by a requirement to conduct sustainability appraisal in line with guidance provided on the Planning Advisory website (<http://www.local.gov.uk/web/pas-test-site/77-chapter-4-sustainability-appraisal>); 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.



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.

The main weakness of this approach as evidenced 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, similarly for the previous model, a framework of disparate environmental, social and economic 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, Dockerty et al. 2011).

### **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'.

### **3.3 Contribution to sustainability model**

The *contribution to sustainability* model of sustainability assessment aims not only at delivering positive outcomes (which is also true of the objectives-led

integrated assessment model) but takes a holistic view of sustainability that does not revert to separate environmental, social and economic, or triple bottom line categories. The sustainability assessment does not merely require the development to make things better in terms of this localised interpretation of sustainability, but asks whether the contribution is sufficient to justify the development. Canadian practice across several case studies, including the Voisey's Bay Nickel Mine, White's Point Quarry and MacKenzie Gas Project (Gibson, Hassan et al. 2005, Gibson 2011) demonstrate 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 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.

**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 (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 program 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.

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 model makes it clear that the responsibility for ensuring a contribution to sustainability is made falls not only on the developer but on Government and other parties as well – this is significantly different from the other models, especially when this model of assessment is applied at the project level where the developer would normally be expected to assume responsibility for any monitoring (Marshall, Arts et al. 2005). The need for government implementation of sustainability-related mitigation actions has long been acknowledged and accounted for in Canadian EIA practice. For example, the Joint Review Panel for the Mackenzie Gas Project (2009) strongly emphasised 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. There is thus less focus on the developer's activities and more focus on sharing responsibility to deliver positive sustainability outcomes, making the issue of causality of impacts less relevant.

This in turn implies that responsibility for follow-up should be shared as was indeed the case in the MacKenzie case as discussed in Box 3. 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 including their watchdog role in reporting on both the 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, Gibson et al. (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.

Thus, this shared responsibility in sustainability assessment follow-up should of itself enhance the overall contribution to sustainability that might be realised for any given development activity.

### 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.

Sustainability assessment model	Decision context	Follow-up			
		What	Who	Strengths	Weaknesses
<b>EIA-driven integrated assessment</b>	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'
<b>Objective-led integrated assessment</b>	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; evaluates cumulative impacts	Difficult to demonstrate causality; reductionist; difficulty of gathering robust monitoring data; difficulty of holding plan-making authority to account
<b>Contribution to sustainability</b>	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 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.

**Table 1: Comparative summary of follow-up in 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. In selecting particular challenges, we have been careful to ignore the pervasive challenges that apply to all, or most, impact assessment follow-up processes. Whilst 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, Morrison-Saunders et al. 2012, Bond, Morrison-Saunders et al. 2013)

- Trade-offs (Gibson 2013, Morrison-Saunders and Pope 2013); and
- Interdisciplinarity (Ballard and Hall 1984, Bond, Viegas et al. 2010).

#### **4.1 Contested time horizons and value changes**

Since the sustainability principle of inter-generational equity implies long time-frames, at least two generations or 50-60 years, 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 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. As a tangible example of evolving impacts, improved technologies could make more effective mitigation possible.

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. Such adaptive follow up is not generally considered which, we would argue, is counter to the move for more participation *ex-ante*; why should this participation cease *ex-post*?

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 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 constantly re-evaluated 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 reporting 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, and in turn that this requires some form of follow-up (Morrison-Saunders and Pope 2013). 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 will directly determine the kinds of trade-offs they are prepared to accept. 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 the 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 inter-generational change) and this likely would in essence include analysis or consideration of trade-offs. Retief, Morrison-Saunders 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, Diehl 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, Failing 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 and transdisciplinarity. Interdisciplinarity can be defined as involving the transfer of methods from one discipline to another, at the practical or epistemic level (Bond, Viegas 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, Pope et al. accepted). This is key to integrating evidence on a diverse range of impacts in any sustainability assessment process.

In the EIA-driven integrated assessment, the norm 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 (there are some exceptions, with Bond, Dockerty et al. (2011) undertaking an analytic-deliberative approach to engender cross-discipline engagement and understanding). Only the contribution to sustainability approach implies that an interdisciplinary approach has to be taken given that the restricted ranges of sustainability principles necessarily integrates sustainability issues (see Box 3).

For follow-up, the implications are that the contribution to sustainability approach should also involve interdisciplinary work, and can be used as the basis for 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 (see, for example Burgess, Stirling et al. 2007, Chilvers 2007), although these are known to be resource intensive.

## **5. Towards follow-up for sustainability**

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, intergenerational equity and consideration of trade-offs. It would be less a compliance exercise and more an attempt to understand holistic operations and outcomes of impact assessment.

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 inter-generational equity and explicit treatment of trade-offs. Our preference is for using the contribution to sustainability approach for adaptive follow-up.

We have 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; the inter-generational nature of sustainability planning precludes this from being a valid exercise. Moreover there are implications with needing to wait until sufficient time has lapsed before direction towards sustainability can be gauged sufficiently, engagement with temporally diverse stakeholders, and the subjective aspects of determining and accounting for trade-offs. Perhaps this relegates it to ultimately being an academic exercise (i.e. it is hard to imagine governments prioritising such activity). However it would be very useful for understanding the 'difference' that impact assessment makes in terms of understanding the benefits of impact assessment.

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