



Conceptualising sustainability assessment

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Abstract

Sustainability assessment is being increasingly viewed as an important tool to aid in the shift towards sustainability. However, this is a new and evolving concept and there remain very few examples of effective sustainability assessment processes implemented anywhere in the world.

Sustainability assessment is often described as a process by which the implications of an initiative on sustainability are evaluated, where the initiative can be a proposed or existing policy, plan, programme, project, piece of legislation, or a current practice or activity. However, this generic definition covers a broad range of different processes, many of which have been described in the literature as ‘sustainability assessment’.

This article seeks to provide some clarification by reflecting on the different approaches described in the literature as being forms of sustainability assessment, and evaluating them in terms of their potential contributions to sustainability. Many of these are actually examples of ‘integrated assessment’, derived from environmental impact assessment (EIA) and strategic environmental assessment (SEA), but which have been extended to incorporate social and economic considerations as well as environmental ones, reflecting a ‘triple bottom line’ (TBL) approach to sustainability. These integrated assessment processes typically either seek to minimise ‘unsustainability’, or to achieve TBL objectives. Both aims may, or may not, result in sustainable practice.

We present an alternative conception of sustainability assessment, with the more ambitious aim of seeking to determine whether or not an initiative is actually sustainable. We term such processes ‘assessment for sustainability’.

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‘Assessment for sustainability’ firstly requires that the concept of sustainability be well-defined. The article compares TBL approaches and principles-based approaches to developing such sustainability criteria, concluding that the latter are more appropriate, since they avoid many of the inherent limitations of the triple-bottom-line as a conception of sustainability.

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1. Introduction

The pervasive growth of interest over the last 15 years in the idea of ‘sustainability’ or ‘sustainable development’² has brought with it challenges to the way in which impact assessment has been traditionally conceived.

Designed originally in the late 1960s and early 1970s to focus on the environmental impacts of proposed projects, impact assessment has recently been reassessed by scholars to take account of the sustainable development agenda (IAIA, 2002; Sadler, 1999; Partidário, 2003; Gibson, 2001; Verheem, 2002). There has been a consequent call for the development of ‘sustainability assessment’ procedures that would contribute to the shift towards a more sustainable society.

Available definitions of sustainability assessment include:

- “Sustainability assessment is...a tool that can help decision-makers and policy-makers decide what actions they should take and should not take in an attempt to make society more sustainable” (Devuyst, 2001, p. 9); or
- The aim of sustainability assessment is to ensure that “plans and activities make an optimal contribution to sustainable development” (Verheem, 2002).

However, as this article seeks to demonstrate, these definitions are sufficiently generic to describe a broad range of different processes, many of which have indeed been called ‘sustainability assessment’ or some similar term in the literature.

The purpose of this article is to clarify what the term ‘sustainability assessment’ should mean if it is to fulfil its potential as a tool for promoting sustainability. We believe that such clarification is an essential prerequisite for meaningful discussions on the development of sustainability assessment processes around the world. This article is meant to be reflective. It considers the philosophies that underscore the various approaches advocated for sustainability

² For the purposes of this article, the terms ‘sustainable development’ and ‘sustainability’ will be considered to be synonymous.

assessment. Its intention is not to define an ‘ideal’ sustainability assessment process. This will be an important task for future research.

Our work is also driven by a concern that moves currently being taken internationally towards sustainability assessment are not being informed by proper critical debate. There appears to be a view that any move towards sustainability assessment will axiomatically be a ‘good thing’. Like [Scrase and Sheate \(2003\)](#), who write about integrated assessment, we do not believe that all sustainability assessment approaches can be assumed to be ‘good for the environment’, or indeed will encourage sustainable development. As we will show, it is possible for some concepts of sustainability assessment to overly promote the prevailing economic agenda and thereby undermine 30 years worth of hard-won environmental policy gains.

The article begins by reviewing and categorising sustainability assessment approaches, as they have been described in the literature. These sections of the article also evaluate these conceptions, asking how likely they are to contribute to sustainable development. In the final section of the article we present an alternative conception of sustainability assessment (that we call ‘assessment for sustainability’) which we believe addresses the limitations presented by existing approaches.

2. Defining sustainability assessment

The concept of sustainability, or sustainable development, is clearly the basis of sustainability assessment. Sustainable development was first described by the Brundtland Commission in 1987: as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” ([WCED, 1987](#)).

Since the Brundtland Commission, many alternative definitions of sustainability have been proposed and diverse interpretations of the concept made. Many of these are based upon the ‘three-pillar’ or ‘triple bottom line’ (TBL) concept. Whereas the Brundtland Commission presented a two-pillar model reflecting environment and development concerns, the three-pillar TBL model separates development issues into social and economic factors, emphasising that “material gains are not sufficient measures or preservers of human well-being” ([Gibson, 2001, p. 7](#)). For the purposes of this article, the TBL can be considered an interpretation of sustainability that places equal importance on environmental, social and economic considerations in decision-making.

The theory of sustainability assessment as currently expressed in the literature has largely evolved from work undertaken by practitioners of environmental impact assessment (EIA), and more recently strategic environmental assessment (SEA), which in turn has been influenced by policy analysis techniques ([Sheate et al., 2001, 2003](#)). The fact that much sustainability assessment thinking has been substantially developed by EIA and SEA practitioners is understandable, given

that sustainability assessment is often considered to be the ‘next generation’ of environmental assessment (Sadler, 1999).

The literature reflects a widely held belief that environmental assessment processes such as EIA and SEA can, and do, make valuable contributions towards sustainability. Gibson (2001, p. 1) points out that “environmental assessment processes...are among the most promising venues for application of sustainability-based criteria. They are anticipatory and forward looking, integrative, often flexible, and generally intended to force attention to otherwise neglected considerations”, although he also recognises that “environmental assessments are not the only vehicles for specifying sustainability principles, objectives and criteria” (Gibson, 2001, p. 19).

Marsden (2002) highlights the two schools of thought around the relationship between environmental assessment processes and sustainability. In some cases it is suggested that this contribution arises directly from the integration of environmental considerations into decision-making (see for example Sheate et al., 2003, p. 5; Wood, 2002), while others suggest that EIA and SEA provide a sound basis that can be extended to include broader sustainability concerns (Gibson, 2001; Verheem, 2002).

The two views of the potential contribution of environmental assessment to sustainability often correspond to two different conceptions of sustainability. It is important to note at this point that sustainability is a difficult concept to define in a way that is meaningful and sufficiently practical to allow it to be operationalised. It has been suggested that the difficulty arises because sustainability is a concept like ‘love’, ‘hope’ or ‘freedom’, and as such tend to remain ‘fuzzy’ until applied in a specific context (Government of Western Australia, 2002). This situation is not aided by the fact that many alternative theoretical formulations and applications of sustainability have been developed, which are founded upon common concerns and principles, but which have different emphases (Gibson, 2001).

This article does not attempt to provide a detailed analysis of alternative conceptions of sustainability, but does seek to highlight where appropriate how these alternative views are embedded in the various documented approaches to ‘sustainability assessment’.

For example, the suggestion that EIA itself contributes to sustainability reflects the view that “environmental impacts are at the core of sustainability concerns” (Sadler, 1999) and that “integrating the environment into strategic decision-making is an essential pre-requisite for moving towards sustainable development” (Sheate et al., 2001, p. 5). This is consistent with a ‘deep green’ ecological sustainability model that can be represented as three concentric circles, the outer representing ecology, the middle representing society and the inner representing the economy (Gibson, 2001). This view of sustainability emphasises that the source and sink functions provided by natural resources are finite, and that sustainability therefore means finding a way to live within the limits of natural systems (Sadler, 1999).

On the other hand, the suggestion is often made that environmental assessment could contribute to sustainability by extending its scope to include social and economic considerations along with environmental ones (Devuyst, 1999; Sadler, 1999; Marsden and Dovers, 2002). This reflects the ‘three-pillar’ or TBL model of sustainability, which is often conceptualised as three intersecting circles representing the environment, society and the economy (Gibson, 2001). This form of extension of environmental assessment results in a form of TBL integrated assessment (Twigger-Ross, 2003).

In the next two sections of this article we examine the nature of proposals for sustainability assessment approaches which embody the concept of TBL integration, as they have evolved from project-level environmental assessment processes, and from strategic environmental assessment thinking.

3. The conceptual origins of sustainability assessment

In the literature, sustainability assessment is generally viewed as a tool in the ‘family’ of impact assessment processes, closely related to EIA applied to projects and SEA applied to policies, plans and programmes (PPPs) (Devuyst, 2001, p. 9). When considering the concept of sustainability assessment and reviewing the literature available on the subject, we believe that it is useful to consider its conceptual origins by examining the more traditional forms of these assessment tools in more detail.

As a tool typically applied to project proposals, the limitations of EIA are well understood and documented. The most common concerns relate to the late stage in decision-making processes at which EIA is applied, and limited success at evaluating alternatives (Steinemann, 2001). Consequently, SEA has evolved rapidly over the past decade as a series of tools for addressing the environmental implications of decisions made at much higher levels (Dalal-Clayton and Sadler, 2002; Dovers, 2002; Thérivel and Partidário, 1996; Partidário, 1999).

Within the broad definition of SEA as environmental assessment of PPPs there has been considerable debate as to how it should be approached (Sheate et al., 2003; Brown and Thérivel, 2000; Verheem and Tonk, 2000) and as a result “there are several definitions of SEA stemming from the many ideas over its role and purpose” (Sheate et al., 2001, p. 6).

Therefore, based upon the work of several authors, we believe that it is important at this point to distinguish between two forms; ‘EIA-driven’, and ‘objectives-led’ SEA (Partidário, 1999; Eggenberger and Partidário, 2000; Sheate et al., 2001, 2003).

‘EIA-driven SEA’ is essentially project-level EIA process applied to a PPP, or “EIA writ large” (Sheate et al., 2003). As such, it is typically a reactive, ex-post process that aims to evaluate the environmental impacts of a policy, plan or programme for which decision-making is well advanced or complete against a baseline, to evaluate the acceptability of the impacts and to identify potential

modifications to improve the environmental outcomes (Sheate et al., 2001, 2003; Sippe, 1999; Devuyst, 1999). Like project-level EIA itself, there is limited scope for consideration of alternatives in this model of SEA. Partidário (2003) suggests that an EIA-driven approach is reflected in some early definitions and SEA legislation, including the US *National Environmental Policy Act* (1969).

The literature also describes a range of SEA processes that can be considered to be ‘objectives-led’. For the purposes of this article, the term ‘objectives-led’ will be used to refer to SEA in which the potential impacts of a proposal are assessed against a series of aspirational environmental objectives, rather than against a baseline (Sheate et al., 2001, 2003; Smith and Sheate, 2001; Twigger-Ross, 2003).

‘Objectives-led SEA’ aims to be a proactive, ex-ante process and as such it has been seen as part of the process of developing PPPs, rather than evaluating them after the fact. Unlike EIA-driven SEA, it promotes comprehensive analysis of alternatives. Clearly, a well-defined set of environmental objectives is an important prerequisite for this form of SEA. Objectives, or goals, describe the purpose of a policy, plan or programme, and in this discussion the two terms will be considered synonymous. Reflecting the principles of ‘tiering’, also known as ‘vertical integration’ or the ‘trickledown effect’ (Thérivel and Partidário, 1996; Noble, 2002), these objectives must be consistent and compatible with those applied at higher and lower levels of decision-making. Ideally, environmental assessments conducted at higher levels of the planning hierarchy would establish appropriate objectives for decision-making processes at the lower levels, although it is recognised that processes are rarely so streamlined in practice (Jones, 2003; Nootboom, 2000; Lee, 2002; Noble, 2002).

Extension of environmental assessment processes to include the three pillars of the triple-bottom-line could conceivably occur within all three of the environmental assessment processes described thus far: EIA, EIA-driven SEA and objectives-led SEA. For the purposes of the rest of this article, we will categorise and discuss contemporary approaches to sustainability assessment as being either ‘EIA-driven integrated assessment’, or ‘objectives-led integrated assessment’. Although the latter is derived from objectives-led SEA, an objectives-led integrated assessment approach could equally be applied to project-level proposals.

Both of these approaches can be considered to be examples of ‘sustainability appraisal’, as defined by Sheate et al. (2001); ‘integrated sustainability appraisal’ as discussed by Eggenberger and Partidário (2000) or ‘integrated impact assessment’ (Sheate et al., 2003). Similarly, Lee (2002) uses the term ‘sustainability assessment’ to describe a special form of integrated assessment, which takes into consideration economic, environmental and social impacts; a definition which applies equally to EIA-driven and objectives-led integrated assessment.

As with sustainability, the term ‘integration’ can be understood in different ways. Scrase and Sheate (2003) define 14 meanings of the term ‘integration’,

with at least three³ being directly related to the concerns of impact assessment. The integration of environmental, social and economic considerations is an example of what *Scrase and Sheate (2003)* call ‘integration among assessment tools’, and what *Lee (2002)* calls ‘horizontal integration’.

The term ‘integration’ in this sense implies that integrated assessment should be more than the sum of separate environmental, social and economic assessments. *Eggenberger and Partidário (2000)* remind us that “the principle that the sum of the parts does not equal the whole is widely acknowledged” and suggest that “integrating in fact means that a new entity is created where new relationships are established, bearing on individual entities that have specific characteristics and specific dynamics but in combination act in a different way”.

The aim of integrated assessment is articulated by *Post et al. (1997)*:

It aspires to describe—from the perspective of an identified problem or proposed project—the relations between the human communities concerned, their economic organization and their actual resource base. It qualifies, quantifies, and, as far as possible, values the effects of proposed and alternative interventions on the three (economic, social and natural) subsystems and their intersystem relations. It attempts to identify beneficial interventions and to fully expose unavoidable trade-offs.

Therefore, both EIA-driven and objectives-led integrated assessment should not only consider the environmental, social and economic implications of proposals, but should also examine the interrelations between these three pillars of the TBL. In the case of EIA-driven integrated assessment, this means that potential interlinkages between TBL impacts must be identified, while objectives-led integrated assessment also requires the identification of interlinkages between TBL objectives.

In what follows, we provide a more detailed definition of these two contemporary approaches to sustainability assessment. We discuss their origins, aims, contribution to sustainability, and limitations.

4. Existing approaches to sustainability assessment

4.1. EIA-driven integrated assessment

EIA-driven integrated assessment has its origins in the 30 years of international experience with traditional, project-level EIA.

Like traditional EIA, it is defined by its reactivity, and tends to be ‘applied’ after a proposal has already been conceptualised. It aims to identify social and

³ “Integration of environmental concerns into governance”, “vertically integrated planning and management”, and “integration among assessment tools”.

economic impacts of a proposal (in addition to traditional environmental impacts), and to compare these impacts with baseline conditions. It is then possible to determine whether or not the impacts are ‘acceptable’.

George (2001) describes the application of EIA-driven integrated assessment to international trade agreements, noting that “the prime aim of such an appraisal, often referred to as a sustainability impact assessment (SIA), is to identify mitigation measures through which adverse impacts might be minimised or avoided”.

In terms of contribution to sustainability, EIA-driven integrated assessment reflects the ‘three-pillar’ or TBL model, which was conceptualised earlier as three intersecting circles representing the environment, society and the economy (Gibson, 2001). This approach to sustainability assessment aims to ensure that impacts are not unacceptably negative overall, meaning that the guiding acceptability criterion for a proposal is that it does not lead to a less sustainable outcome. This approach can be thought of as ‘direction to target’, where the exact position of a sustainable state for that particular proposal is unknown (Fig. 1).

It is possible to foresee benefits from this way of thinking about sustainability assessment. In theory it can allow for a more transparent examination of the social and economic implications of proposals. Clearly in traditional EIA these aspects tend not to be examined in parallel. On the other hand, the literature and practical experience point to significant procedural and substantive limitations to this conception of sustainability assessment.

In relation to administrative procedure, jurisdictions which do assess the social and economic, as well as environmental impacts of proposals tend to conduct three separate assessment processes, and therefore inconsistencies in the methods and paradigms of different sectoral assessments may inhibit implementation of more integrated approaches (Lee, 2002).

To be truly integrated, the interrelations between the three ‘pillars’ of impacts must be considered (George, 2001), since it has been recognised that “the combined impacts, positive and negative, of the sets of measures as a whole, are likely to be more than the simple sum of the impacts of their constituent measures because of synergistic effects” (Lee and Kirkpatrick, 2001).

If the respective impact assessment processes are not integrated effectively, then this form of ‘integrated’ assessment is reduced to three separate impact assessments, each generating data relating to the potential environmental, social and

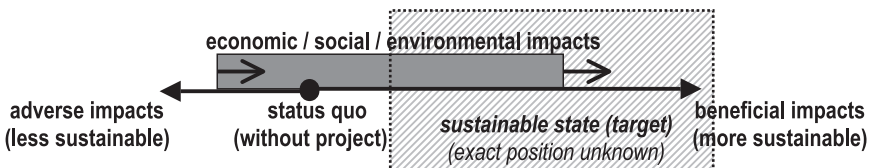


Fig. 1. EIA-driven integrated assessment approach to sustainability assessment (minimise adverse impacts).

economic impacts of the proposal or initiative. The three sets of data must then be ‘integrated’ in some way after it has been collected in order to reach a decision as to whether or not the proposal or initiative is acceptable within a sustainability context.

This raises a substantive limitation, which is related to ‘trade-offs’ between the TBL categories. Gibson (2001) suggests some trade-offs may be inevitable in EIA-driven integrated assessment, and the risk of environmental standards being traded off against socio-economic factors in such a process has been discussed extensively in the literature (Sheate et al., 2003; Jenkins et al., 2003; Gibson, 2001; Lee, 2002).

Fuller (2002) summarises these concerns by suggesting that “where trade-offs between the economy and the environment are seen as legitimate in the pursuit of sustainability, sustainability assessment could be regarded as a means for economic requirements to override those of the environment or the social context”. This concept of sustainability assessment can be seen to overly promote the prevailing economic agenda and thereby undermine 30 years worth of hard-won environmental policy gains.

This is a valid concern since there appears to be a perception, particularly from some industry quarters, that EIA-driven integrated assessment processes actually increase the chances of project proposals being approved, in spite of clear environmental detriment. In the jurisdiction that we work in—Western Australia—we have seen recent evidence of this. In relation to perceived delays in a Government approval process associated with extending an iron ore mine, the Managing Director of a mining company stated:

It is a very stressful time. This is absolutely crucial to us, but as I’ve said all along I believe at the end of the day the Government will look at this with its triple bottom line approach of social and economic considerations as well as environmental considerations and make a sensible decision (Weir, 2003a).

In this case the Government did approve this mine extension, despite the EIA process having concluded that this action was likely to result in the destruction of rare flora (Weir, 2003b).

Another recent case saw the Western Australian Government’s two main environmental advice bodies⁴ recommend that an offshore gas processing plant be refused approval on a sensitive island nature reserve. The Government undertook an EIA-driven integrated assessment for this project proposal, and approved the development when environmental impacts were clearly negative (Environmental Protection Authority, 2003).

⁴ Western Australian Environmental Protection Authority and the Conservation Commission of Western Australia.

Despite this outcome, the example highlighted one of the potential strengths of EIA-driven integrated assessment when compared with conventional EIA, this being that the economic and social implications of a proposal may be made transparent to both government decision makers and the public. This is particularly true in a jurisdiction such as Western Australia where legislation prohibits consideration of economic and social factors in the EIA process.

Earlier we said that this approach to sustainability assessment aims to ensure that impacts are not unacceptably negative overall. This is akin to a ‘weak’ conception of sustainability, which states that a proposal can be considered to be overall positive as long as net assets are not degraded (Neumayer, 2003). Arguably this means that a proposal may have positive outcomes in one of the categories, but negative outcomes in the other two. As long as the overall (‘net’) outcome is still positive, then negative impacts in two of the categories would be acceptable.

Although Sadler points out that the likelihood of win–lose scenarios can be reduced by the incorporation of minimum acceptability thresholds into the TBL model and requiring that any initiative at least meets these minimum thresholds, he also agrees that “beyond these boundaries, one set of criteria are either unduly promoted or unduly discounted against the others” (Sadler, 1999).

4.2. Objectives-led integrated assessment

Objectives-led integrated assessment reflects a desire to achieve a particular vision or outcome defined by integrated environmental, social and economic objectives. It assesses the extent to which the implementation of a proposal contributes to this vision, in contrast with EIA-driven integrated assessment, which aims to ensure that triple bottom line impacts of a proposal are acceptable compared with baseline conditions.

Objectives-led integrated assessment has its origins in objectives-led SEA. The tools and techniques used to undertake this kind of sustainability assessment have been borrowed from policy analysis/appraisal (Sheate et al., 2001, 2003).

An objectives-led approach reflects a concept of sustainability as a goal, or series of goals, to which society is aspiring. As Gibson (2001, p. 1) notes:

Adopting contributions to sustainability as a key objective and test in environmental assessment clearly implies that minimization of negative effects is not enough. Assessment requirements must encourage positive steps—towards greater community and ecological sustainability, towards a future that is more viable, pleasant and secure.

In our view, this means that it is a proactive approach, and has a ‘direction to target’ characteristic, although as for EIA driven integrated assessment, the position of the sustainable state is unknown (Fig. 2).

Just as objectives-led SEA requires defined environmental objectives, objectives-led integrated assessment requires clearly defined environmental, social and economic objectives against which the assessment can be conducted.

We suggest that an objectives-led approach is more likely to result in ‘win–win win’ outcomes between the three pillars of sustainability, and is therefore less likely to generate conflicts and trade-offs. This would require agreement on a broad set of objectives reflecting the needs of all stakeholders at the commencement of the process. According to Gibson (2001, p. 20):

For practical (environmental) assessment purposes, especially at the project level, it is usually desirable and often crucial to specify the relevant sustainability principles, objectives and criteria as fully and credibly as possible before proponents begin thinking about their purposes and options.

Since the objectives define the required outcomes of the proposal under development, specifying objectives at the commencement of the process places the onus of identifying and maximising ‘win–win–wins’ on those responsible for developing the proposal rather than those who may be conducting a reactive impact assessment once the proposal has been largely developed. The former is much better placed to do this, since they are involved at an earlier stage of the decision-making process. There may be additional incentives if sustainability criteria have been applied that restrict a ‘business as usual’ approach.

An example of objectives-led integrated assessment is the UK Department of the Environment, Transport and the Regions (DETR) process requiring that regional plans be subject to ‘sustainability appraisal’ defined as:

a systematic and iterative process undertaken during the preparation of a plan or strategy, which identifies and reports on the extent to which the implementation of the plan or strategy would achieve the environmental, economic and social objectives by which sustainable development can be defined, in order that the performance of the strategy and policies is improved (Smith and Sheate, 2001; George, 2001).

Given the prevalent view that sustainability is about positive change rather than simply minimising the negative, objectives-led integrated assessment clearly has more potential to contribute to sustainability than EIA-driven integrated

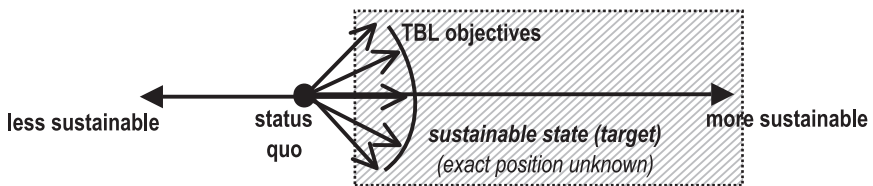


Fig. 2. Objectives-led integrated assessment approach to sustainability assessment (maximize objectives).

assessment. As Gibson points out: “In most jurisdictions, the essential immediate effect of a shift to sustainability-based criteria is an expansion of central concern from avoidance of significant adverse effects to expectation of positive contribution to the achievement of sustainability objectives, however vaguely specified” (Gibson, 2001, p. 19).

However, an objectives-led approach to sustainability assessment has its own challenges and limitations. Issues of tiering and its practical limitations apply to objectives-led integrated assessment as they do to objectives-led SEA. Furthermore, the objectives must be consistent and compatible with each other, which in itself represents a challenging task since it is not uncommon for strategic objectives to be conflicting (George, 2001; Thériver, 1996).

Finally, the most important remaining question is whether the chosen triple-bottom-line objectives really reflect ‘sustainability’. In his analysis of the UK DETR process, George (2001) recognises the important role of environmental, social and economic objectives within the decision-making process, but suggests that such objectives, which typically concern issues such as jobs, economic growth, housing, transport, services, etc., relate to development that is not necessarily sustainable and therefore should guide the planning process rather than the sustainability assessment process.

4.3. Towards a new conception of sustainability assessment

Our analysis so far has pointed to the possible benefits, and the main limitations of the current approaches to sustainability assessment. We have indicated that we believe EIA-driven integrated assessment approaches allow decision-makers to ask: Are the TBL impacts acceptable? The focus in these approaches is on minimising negative TBL impacts. We have also argued that objectives-led integrated assessment goes further to ask the question: Does this proposal make a positive contribution to TBL goals?

Both of these conceptions of sustainability assessment can be described as ‘direction to target’ approaches. While these kinds of assessment have their place, it could be argued that they do not go far enough to make a significant contribution to sustainability. Fuller (2002) and Sadler (1999) discuss the need to measure ‘distance from target’ as well as ‘direction to target’. George (2001)⁵ goes even further by stating that proposals should not be assessed for their contribution to sustainability, but to determine whether or not they are, in themselves, sustainable.

In general, both approaches avoid attempting to define a condition of sustainability that a proposal should be required to meet. Even the earlier-

⁵ Much of our argument has been influenced by the work of Clive George and the distinctions he has drawn between different models of “sustainability assessment” (George 2001).

mentioned UK DETR process—which does require assessment against “objectives by which sustainable development can be defined”—does not actually require that these objectives be achieved, requiring only that “the extent to which” the objectives of sustainable development would be met is identified (George, 2001).

In the next section of this article, we present an outline of a new possible conception of sustainability assessment that we believe goes some way towards overcoming the concerns we have discussed above.

5. Assessment for sustainability

In our view, and based upon the work of George (1999, 2001), Sadler (1999) and Gibson (2001), there is room for a new conception, where sustainability assessment can be defined as a process to determine whether or not a particular proposal, initiative or activity is, or is not, sustainable, and therefore effectively becomes a yes/no question. Instead of asking: Are we heading in the right direction? The alternative process allows us to ask: Are we there?

Based upon this discussion, it is suggested that the term ‘sustainability assessment’ should be reserved exclusively for those processes that have the aim of determining whether or not an initiative is sustainable. However, to avoid confusion between terms, this article will use the term ‘assessment for sustainability’ to distinguish it from other related forms of assessment that do not share this specific aim.

Table 1 compares the three conceptions of sustainability assessment that we have discussed in this article.

The notion of ‘assessing for sustainability’ implies that sustainability is a societal state, or perhaps more realistically a series of societal states, with particular characteristics or conditions, defined by sustainability criteria.

Assessment for sustainability could potentially be applied in a range of different circumstances, although there are no real-world applications that can currently be pointed to. It could be conducted in a reactive sense as an alternative to conventional EIA or SEA. In this conception it would be applied at the conclusion of decision-making, perhaps by regulators, to determine whether a proposal is sustainable. In another conception it could be applied proactively during the decision-making process to assess the sustainability of the various options proposed to meet a series of sustainability criteria. The point of difference between assessment for sustainability and the other assessment processes discussed is not how or when the assessment process is applied but rather the intent of the process, which is to determine whether or not a proposal is actually sustainable.

Assessment for sustainability could also be applied effectively to existing practices and activities, which is perhaps one of its most important applications.

Table 1
Comparison of three conceptualisations of sustainability assessment

	EIA-driven integrated assessment	Objectives-led integrated assessment	Assessment for sustainability
Origins	Ex-post, project-based EIA.	Ex-ante, objectives-led strategic environmental assessment.	Recently defined in theory, but not yet evident in practice.
Aims	To identify the environment, social and economic impacts of a proposal after a proposal has been designed, and compare these impacts with baseline conditions to determine whether or not they are acceptable.	To determine the extent to which a proposal contributes to defined environmental, social, and economic goals, before a proposal has been designed and to determine the 'best' available option in terms of meeting these goals.	To determine whether or not an initiative is actually sustainable.
Contribution to sustainability	Reflects a 'three-pillar' or TBL approach. Aims to ensure that impacts are not unacceptably negative in any of the three pillar-categories.	Reflects vision of sustainability as a series of societal goals and measures contribution to goals. Asks whether things can get better, rather than just whether they can be prevented from getting worse.	Allows society to define what is meant by 'sustainability', and then to compare initiatives against this definition.
Treatment of impacts	Minimise negative TBL outcomes.	Maximise positive TBL outcomes.	Starts not from a 'trade-off' perspective between impacts, but from the idea that 'sustainability' may be more than the sum of parts.
Relation to 'target'	Direction to target.	Direction to target.	Distance from target.
Limitations	Most likely to result in 'weak sustainability' and trade-offs between categories.	Do TBL objectives really reflect sustainability?	Deciding upon a clear concept of what is meant by 'sustainability', and defining criteria

Current impact assessment procedures only apply to new development proposals and often only to the (relatively) few proposals likely to have a significant effect on the environment. For example, in Western Australia, EIA is only applied for some 30–40 proposals each year. Ongoing land-use activities, such as natural resource management (fishing, agriculture, forestry, etc.) or urban life (e.g. use of private

motor cars) are not subject to assessment processes. Assessment for sustainability could be applied equally to existing and proposed land-uses or other human activities.

It has been suggested that to be effective and an instrument for change, assessment processes, including assessment for sustainability, must be applied:

- within a structured framework (Jenkins et al., 2003);
- to proposed new initiatives at all levels of decision-making (Noble, 2002);
- to existing practices across all sectors (Jenkins et al., 2003);
- to the prevailing policy and legislative paradigm (Dovers, 2002);
- to any decision with the potential to impact on patterns of production and consumption; governance and settlement (Dovers, 2002); and
- by all sectors of society (Devuyst, 2001).

One of the main implications for this conception of sustainability assessment is that it necessarily requires a clear vision of what sustainability means. Further, this vision needs to be translated into context specific sustainability criteria. Sustainability criteria should effectively separate sustainable outcomes from unsustainable ones for the purposes of the assessment process, which would then ask whether or not these criteria have been met.

6. Determining ‘assessment for sustainability’ criteria

In our view there are two overarching approaches to the development of assessment for sustainability criteria. One generates criteria by assuming that simultaneous achievement of a series of environmental, social, and economic goals or objectives defines a state of sustainability. This is effectively a ‘bottom up’ approach in which objectives are defined in relation to baseline conditions. One problem with this kind of approach is knowing how to judge when extension has reached far enough to achieve the goal of sustainability. Quoting George (2001) again from his discussion of the UK DETR process:

The extent to which an appraisal will achieve its aim depends critically upon the extent to which the chosen objectives do indeed define sustainable development. It is insufficient for them to be a combined set of environmental, economic and social objectives. They must be objectives ‘by which sustainable development can be defined’.

The alternative approach to the development of assessment for sustainability criteria, and the one that we favour, assumes a ‘top–down’ generation of criteria. It begins with the concept of sustainability as a state to which society aspires, and then moves on to define this state in terms of sustainability criteria.

The UK DETR process is an example of a process which seeks to define a condition of sustainability in terms of TBL objectives. The practical difficulties of

developing a consistent and compatible set of environmental, social and economic objectives that truly define sustainability have already been discussed. In addition to the inherent difficulties of a ‘bottom up’ approach, we also suggest that the problems arise from the TBL conception of sustainability.

Firstly, as has already been discussed, the separation of the concept of sustainability into the three pillars of the TBL tends to emphasise potentially competing interests rather than the linkages and interdependencies between them, making the task of integration extremely difficult and promoting trade-offs, often at the expense of the environment (Sheate et al., 2003; Jenkins et al., 2003; Gibson, 2001; Lee, 2002).

Furthermore, the TBL can be considered a reductionist approach to sustainability, and that dividing the holistic concept of sustainability into three pillars as a starting point invariably runs the risk of the sum of the parts being less than the whole. This is particularly true if the interrelations between the three pillars are not adequately understood and described, and therefore sustainability is reduced to a consideration of separate environmental, social and economic factors, the sum of which is less than the whole, that is, sustainability. Gibson (2001, p. 17) expresses this concern by pointing out that there are sustainability-related discourses that are: “not always incorporated in pillar-based sustainability literature and practice”.

In addition, Gibson (2001, pp. 7) points out that the three pillars of the TBL, although recognised to be interconnected and interdependent, still: “reflect more or less conventional modern disciplinary categories” whereas sustainability should be: “necessarily an attack on conventional thinking and practice” (Gibson, 2001, pp. 6).

As an alternative to the TBL, Gibson (2001) promotes the use of a principles-based approach to sustainability assessment, in which sustainability criteria are derived from sustainability principles rather than TBL goals. He argues that a principles-based approach emphasises interconnections and interdependencies between the pillar areas rather than promoting conflicts and trade-offs. Therefore, a principles-based approach could avoid some of the inherent limitations of the TBL approach to sustainability.

In presenting his model, Gibson (2001, p. 8) states that:

We have therefore chosen here to propose a slightly different approach—one that avoids constructing the edifice of sustainability criteria on the conventional pillars... The alternative, which is perhaps only superficially different from the pillar approach, is to begin not with categories based on the usual areas of concern (ecological, social, etc.) but with a list of the key changes needed in human arrangements and activities if we are to move towards long term viability and well-being.

Similarly, in presenting the approach he calls ‘environmental sustainability assurance’ Sadler (1999) discusses the establishment of: “‘benchmark principles’

which are robust enough to evaluate the ‘sustainability contours’ of development proposals and choices”.

George (1999, 2001) also reaches the conclusion that a principles-based approach to developing sustainability criteria is the more appropriate, after recognising the limitations of the TBL approach in the UK. He recommends an approach to sustainability assessment based upon fundamental principles of sustainability as defined by the Rio Declaration and Agenda 21, as does Sadler (1999). In developing his sustainability criteria, George effectively operationalises the Rio sustainability principles. He demonstrates assessment for sustainability by applying his criteria theoretically to six UK project proposals previously assessed by other means (George, 1999).

The use of the Rio Declaration principles is also supported by the International Association for Impact Assessment (IAIA) in its performance criteria for SEA where it is suggested that the ultimate objective of sustainability assessment should be to determine how proposals can best contribute “to the overall sustainable development strategy as laid down in Rio 1992 and defined in the specific policies or values of a country” (IAIA, 2002). However, the IAIA’s emphasis on ‘contribution’ to sustainability implies a concept more akin to an objectives-led approach rather than the assessment for sustainability idea using the Rio principles advocated by George (2001) and Sadler (1999).

The principles used to define sustainability will clearly depend upon the prevailing conception of sustainability in the context in which the assessment is conducted. As we have discussed throughout this article, sustainability is not a simple concept to define and there are a large number of different interpretations. Alternative sets of sustainability principles include the Natural Step System Conditions (The Natural Step, 2001; Sadler, 1999) and the principles developed by Gibson (2001) and by the Government of Western Australia in their State Sustainability Strategy (Government of Western Australia, 2003).

In order to provide an example of principle-based criteria, Table 2 presents the sustainability principles that have been developed for Western Australia and the criteria for sustainability assessment that have been derived from the principles (Government of Western Australia, 2003, p. 40). The Western Australian sustainability principles are conceptually similar to those developed by Gibson (2001) and contrast with the Rio-based approaches of George (1999, 2001) and Sadler (1999).

Clearly the criteria listed in Table 2 are generic and insufficiently defined to form the basis of an assessment for sustainability process. The next stage in the process of defining criteria for the purposes of assessment would be to operationalise the criteria in Table 2 specifically for the assessment at hand. This is substantial and complex task, and well beyond the scope of this article which seeks only to explore conceptual models of sustainability assessment processes. The operationalisation of sustainability principles must be the subject of further

Table 2
Western Australian sustainability principles and criteria

Principles	Criteria
Long-term economic health. Sustainability recognises the needs of current and future generations for long-term economic health, innovation, diversity and productivity of the earth.	Provides both short and long-term economic gain.
Equity and human rights. Sustainability recognises that an environment needs to be created where all people can express their full potential and lead productive lives and that significant gaps in sufficiency, safety and opportunity endanger the earth.	Increases access, equity and human rights in the provision of material security and effective choices.
Biodiversity and ecological integrity. Sustainability recognises that all life has intrinsic value and is interconnected and that biodiversity and ecological integrity are part of the irreplaceable life support systems upon which the earth depends.	Improves biodiversity and ecological integrity and builds life support systems.
Settlement efficiency and quality of life. Sustainability recognises that settlements need to reduce their ecological footprint (i.e. less material and energy demands and reduction in waste) while they simultaneously improve their quality of life (health, housing, employment, community...).	Reduces ecological footprint while improving quality of life.
Community, regions, 'sense of place' and heritage. Sustainability recognises the significance and diversity of community and regions for the management of the earth, and the critical importance of 'sense of place' and heritage (buildings, townscapes, landscapes and culture) in any plans for the future.	Builds up community and regions, 'sense of place' and heritage protection.
Net benefit from development. Sustainability means that all development, and particularly development involving extraction of non-renewable resources, should strive to provide net environmental, social and economic benefit for future generations.	Provides conservation benefits and net social-economic benefit.
Common good from planning. Sustainability recognises that planning for the common good requires equitable distribution of public resources (like air, water and open space) so that ecosystem functions are maintained and a shared resource is available to all.	Increases 'common good' resources.

Table 2 (continued)

Principles	Criteria
Precaution. Sustainability requires caution, avoiding poorly understood risks of serious or irreversible damage to environmental, economic or social capital, designing for surprise and managing for adaptation.	Ensures there are acceptable levels of risk with adaptation processes for the worst case scenarios.
Hope, vision, symbolic and iterative change. Sustainability recognises that applying these principles as part of a broad strategic vision for the earth can generate hope in the future, and thus it will involve symbolic change that is part of many successive steps over generations.	Brings change and a sense of hope for the future as it is linked to a broader strategic vision.

Source: Government of Western Australia, 2003, p.40.

research if we are to successfully develop and implement assessment for sustainability processes in the future.

7. Summary and conclusions

This article has reviewed the evolving concept of ‘sustainability assessment’ by firstly considering its origins as a member of the family of environmental assessment processes that includes EIA and SEA, where a distinction was made between EIA-driven, and objectives-led processes.

The potential for these processes to contribute to sustainability was then discussed. Typically, this has involved the expansion of the scope of environmental assessment processes to include social and economic considerations as well as environmental issues, reflecting the TBL or ‘three-pillar’ approach to sustainability and resulting in forms of integrated assessment. Examples of EIA-driven and objectives-led integrated assessment were provided, and the risks and challenges of these approaches discussed. In particular, the practical difficulty of integrating environmental, social and economic considerations in a way that fully recognises interactions and interlinkages, and that maximises ‘win–win–wins’ and minimises trade-offs was acknowledged.

These forms of integrated assessment were then reviewed for their contributions to sustainability. It was argued that EIA-driven integrated assessment tends to focus on minimising negative impacts and reducing unsustainable practices, but fails to address the concept of sustainability as a societal goal. Objectives-led integrated assessment was found to be far more compatible with the concept of sustainability, since it assesses the contribution of a proposal to aspirational objectives, rather than against baseline conditions.

However, it was pointed out that most applications of integrated assessment processes in practice, even objective-led processes that attempt to define sustain-

ability in terms of TBL objectives, tend to limit themselves to measuring whether or not a proposal represents a positive or negative contribution to sustainability. In other words, they consider ‘direction to target’, where the target is a sustainable society. It has been pointed out that while this may be useful, it may not be sufficient to drive the kind of change required in the pursuit of this goal and that processes are needed that actually assess whether an initiative is, or is not, sustainable. For the purposes of this article, such processes have been termed assessment for sustainability approaches.

Assessment for sustainability requires a clear definition of sustainability and corresponding criteria against which the assessment can be conducted. While sustainability criteria could theoretically be developed through a TBL interpretation of sustainability, this approach has practical challenges and conceptual limitations. Several writers have therefore recommended principles-based criteria for sustainability that avoid the problems of the TBL approach.

Furthermore, assessment for sustainability does not replace all applications of EIA-driven impact assessment or objectives-led processes of decision-making. Rather, it is an additional tool that can be effectively applied within a decision-making framework to ensure that decisions are in fact sustainable. It can also be used retrospectively as a stand-alone process to evaluate existing practices for sustainability. It can and should be applied broadly, to both proposed and existing practices, and to all levels of decision-making.

The major conclusions drawn are therefore:

- Sustainability assessment should assess whether or not an initiative is sustainable, and not simply assess ‘direction to target’. For the purposes of this paper, such processes have been termed assessment for sustainability.
- Assessment for sustainability requires a clear concept of sustainability as a societal goal, defined by criteria against which the assessment is conducted and which effectively separate sustainable outcomes from unsustainable ones.
- While a TBL view of sustainability could theoretically be used as a starting point to develop these criteria, in practice this is unlikely to be successful, and principles-based approaches are recommended.

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References

- Brown A, Théritel R. Principles to guide the development of strategic environmental assessment methodology. *Impact Assess Proj Apprais* 2000;18(1):183–9.

- Dalal-Clayton B, Sadler B. Strategic environmental assessment: a rapidly evolving approach. <http://www.nssd.net/References/KeyDocs/IIED02.pdf> 2002 [Accessed 3 February 2003].
- Devuyst D. Sustainability assessment: the application of a methodological framework. *J Environ Assess Policy Manag* 1999;14(1):459–87.
- Devuyst D. Introduction to sustainability assessment at the local level. In: Devuyst D, editor. *How green is the city? Sustainability assessment and the management of urban environments*. New York: Columbia University Press; 2001. pp. 1–41.
- Dovers S. Too deep a SEA? Strategic environmental assessment in the era of sustainability. In: Marsden S, Dovers S, editors. *Strategic environmental assessment in Australasia*. Leichhardt (NSW): Federation Press; 2002. pp. 24–46.
- Eggenberger M, Partidário M. Development of a framework to assist the integration of environmental social and economic issues in spatial planning. *Impact Assess Proj Apprais* 2000;18(1):201–7.
- Environmental Protection Authority. Environmental Advice on the Principle of Locating a Gas Processing Complex on the Barrow Island Nature Reserve: Gorgon Venture. Bulletin 1101; 2003.
- Fuller K. IA for sustainable development report: IAIA output report WS07. Proceedings of the 22nd Annual Conference of the International Association for Impact Assessment; 2002.
- George C. Testing for sustainable development through assessment. *Environ Impact Assess Rev* 1999;19(1):175–200.
- George C. Sustainability appraisal for sustainable development: integrating everything from jobs to climate change. *Impact Assess Proj Apprais* 2001;19(1):95–106.
- Gibson R. Specification of sustainability-based environmental assessment decision criteria and implications for determining “significance” in environmental assessment. <http://www.sustreport.org/downloads/SustainabilityEA.doc> 2001 [Accessed 12 August 2003].
- Government of Western Australia. Focus on the future: the Western Australian state sustainability strategy consultation draft. Perth (Western Australia): Department of the Premier and Cabinet; 2002.
- Government of Western Australia. Hope for the future: the western Australian state sustainability strategy. Western Australia: Department of the Premier and Cabinet Perth; 2003.
- International Association for Impact Assessment. Strategic environmental assessment performance criteria. <http://www.iaia.org/Publications/sp1.pdf> 2002 [Accessed 3 Feb 2003, IAIA].
- Jenkins B, Annandale D, Morrison-Saunders A. Evolution of a sustainability assessment strategy for Western Australia. *Environ Plan Law J* 2003;201(1):56–65.
- Jones C. Tiering in environmental assessment—can it be delivered? Paper presented at the 23rd Annual Meeting of the International Association for Impact Assessment. Marrakech, Morocco. 14–20 June 2003.
- Lee N. Integrated Approaches to Impact Assessment: Substance or Make-Believe? In Institute of Environmental Management and Assessment 2002. “Environmental Assessment Yearbook 2002. The EA agenda for Johannesburg and beyond”. IEMA Centre University of Manchester; 2002.
- Lee N, Kirkpatrick C. Methodologies for sustainability impact assessments of proposals for new trade agreements. *J Environ Assess Policy Manag* 2001;3(1):395–412.
- Marsden S. Strategic environmental assessment and fisheries management in Australia: how effective is the commonwealth legal framework? In: Marsden S, Dovers S, editors. *Strategic environmental assessment in Australasia*. Leichhardt (NSW): Federation Press; 2002.
- Marsden S, Dovers S. Conclusions: prospects for SEA. In: Marsden S, Dovers S, editors. *Strategic environmental assessment in Australasia*. Leichhardt (NSW): Federation Press; 2002.
- Neumayer E. Weak versus strong sustainability: exploring the limits of two opposing paradigms. Edward Elgar, Cheltenham; 2003.
- Noble B. The Canadian experience with SEA and sustainability. *Environ Impact Assess Rev* 2002;22(1):3–16.
- Nooteboom S. Environmental assessments of strategic decisions and project decisions: interactions and benefits. *Impact Assess Proj Apprais* 2000;182(1):151–60.
- Partidário M. Strategic environmental assessment—principles and potential. In: Petts J, editor. *Handbook of environmental impact assessment*, vol. 1. Oxford: Blackwell; 1999. pp. 60–73.

- Partidário M. Strategic environmental assessment: Current practices future demands and capacity-building needs. Course Notes. IAIA'03 Marrakech, Morocco; 2003.
- Post R, Kolhoff A, Velthuysen B. Towards integration of assessments with reference to integrated water in third world countries. *Impact Assess Proj Apprais* 1997;16(1):50.
- Sadler B. A framework for environmental sustainability assessment and assurance. In: Petts J, editor. *Handbook of environmental impact assessment*, vol. 1. Oxford: Blackwell; 1999. pp. 12–32.
- Scruse I, Sheate W. Integration and integrated approaches to assessment: what do they mean for the environment? *Journal Environ. Policy Plan.* 2003;4(1):275–94.
- Sheate W, Dagg S, Richardson J, Aschemann R, Palerm J, Steen U. Vol. 1 Main Report European Commission Contract No. B4-3040/99/136634/MAR/B4 Imperial College Consultants ICON. Available online. URL, <http://europa.eu.int/comm/environment/cia/sea-support.htm#int> 2001. [Accessed 26 July 2003].
- Sheate W, Dagg S, Richardson J, Aschemann R, Palerm J, Steen U. Integrating the environment into strategic decision-making: conceptualizing policy SEA. *Eur Environ* 2003;13(1):1–18.
- Sippe R. Criteria and standards for assessing significant impact. In: Petts J, editor. *Handbook of environmental impact assessment*, vol. 1. Oxford: Blackwell; 1999. pp. 74–92.
- Smith S, Sheate W. Sustainability appraisal of English regional plans: incorporating the requirements of the EU strategic environmental assessment directive. *Impact Assess Proj Apprais* 2001;19(1):263–76.
- Steinemann A. Improving alternatives for environmental impact assessment. *EIA Rev* 2001;21(1):3–21.
- The Natural Step. Sustainability made easy: guide for logical living. The Natural Step Environmental Institute Australia, Melbourne, Australia; 2001.
- Thérivel R. SEA methodology in practice. In: Thérivel R, Partidário M, editors. *The practice of strategic environmental assessment*. UK: Earthscan; 1996.
- Thérivel R, Partidário M. Introduction. In: Thérivel R, Partidário M, editors. *The practice of strategic environmental assessment*. UK: Earthscan; 1996.
- Twigger-Ross, C. Emerging approaches to integrated assessment. Paper presented at the 23rd Annual Meeting of the International Association for Impact Assessment. Marrakech, Morocco. June 2003.
- Verheem R. Recommendations for Sustainability Assessment in the Netherlands. In Commission for EIA. *Environmental Impact Assessment in the Netherlands. Views from the Commission for EIA in 2002*. The Netherlands; 2002.
- Verheem R, Tonk J. Strategic environmental assessment: one concept multiple forms. *Impact Assess Proj Apprais* 2000;18(1):177–82.
- Weir M. Portman heads into red. *West Aust.* 2003a [March 10].
- Weir M. Portman gets the go-ahead: shares up as EPA is overruled. *West Aust.* 2003b [April 2].
- Wood C. Environmental Impact Assessment-Process Practice and Performance. In Institute of Environmental Management and Assessment 2002. *Environmental Assessment Yearbook 2002*. The EA agenda for Johannesburg and beyond. IEMA Centre University of Manchester; 2002.
- World Commission on Environment and Development. *Our Common Future*. Oxford (UK): Oxford Univ. Press; 1987.