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Environmental impact assessment: Retrospect and prospect

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Abstract

The widespread experience of environmental impact assessment (EIA) as an anticipatory environmental management tool has generated a considerable debate over the extent to which it is achieving its purposes. This has been measured in terms of EIA 'effectiveness', especially as discussion has moved away from issues of procedural implementation, to the more substantive goals of EIA and its place within broader decision-making contexts. Empirical studies have revealed the relatively weak degree of influence on planning decisions that is being exerted by EIA, which is increasingly being attributed to its rationalist beginnings. This article seeks to direct this debate towards the founding political purposes of EIA which, it is argued, provide a neglected, yet strong, basis for EIA reform. A number of illustrative suggestions are made as a result of this redirection, to enable EIA to adopt a more determinative role in decision making and to contribute to more sustainable patterns of development planning.

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1. Introduction

Environmental impact assessment (EIA) is the evaluation of the effects likely to arise from a major project (or other action) significantly affecting the environment. It is a systematic process for considering possible impacts prior to a decision being taken on whether or not a proposal should be given approval to proceed. EIA requires, inter alia, the publication of an EIA report describing the

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likely significant impacts in detail. Consultation and public participation are integral to this evaluation. EIA is thus an anticipatory, participatory environmental management tool.

The most immediate purpose of EIA, arising directly from these functions, is to supply decision-makers with an indication of the likely environmental consequences of their actions. This is with the aim of ensuring that development only proceeds in an acceptable manner. (To this end, EIA provides the mechanisms for development proposals to be amended where necessary, and likely adverse impacts ameliorated. Although EIA may lead to the abandonment of certain proposals, its focus is more strongly on the mitigation of any harmful environmental impacts likely to arise.) In addition to these 'proximate aims' (Sadler, 1996), EIA is increasingly being positioned within a broader context of sustainability and its original, substantive aim of contributing to more sustainable forms of development is being rediscovered (Glasson et al., 2005). However, its precise role in this regard remains to be clearly defined (Cashmore et al., 2004).

It is now over 35 years since EIA was first enshrined in legislation in the United States. Since then, EIA has been given legal and institutional force in many other parts of the world, so that it is now practiced in more than 100 countries (Petts, 1999b; Wood, 2003), including many developing and transitional economies (Lee and George, 2000). Although it has been adapted to different contexts and circumstances, its basic intentions and core elements are widely agreed. However, despite the international take-up of EIA, and its legal and procedural integration into many project planning systems, questions have increasingly been raised whether EIA is achieving its purposes. Whilst it is generally accepted that EIA has an important role in certain decisions affecting the environment, its influence appears to have been less than its originators anticipated (Sadler, 1996; Wood, 2003). This has often been attributed to the poor implementation of what is seen as an essentially adequate means of environmental protection, though current attention is focusing on the poor integration of EIA with the decision-making contexts within which it operates (Cashmore et al., 2004). However, relatively little consideration has been given in this regard to EIA's original purposes or to the possible means by which they might be achieved more effectively through the application of the EIA process.

This article therefore seeks to revisit the origins of EIA and to consider its function and degree of influence in the light of its founding purposes. The extent to which EIA has become institutionally embedded in many countries throughout the world makes this an appropriate time to address this issue and to consider whether reform of EIA might contribute to the achievement of its fundamental goals. The article begins by describing the origins and principles of EIA, with particular reference to its legislative beginnings. Secondly, the issue of EIA effectiveness is discussed and the findings of studies into EIA's degree of influence in development planning are reviewed. Finally, possible approaches to improving EIA's performance are considered, particularly with reference to its more substantive purposes which, it is argued, should inform the search for means of increasing EIA's influence in development planning.

2. The origin and founding purposes of EIA

The philosophy and principles of EIA can be traced back to a rationalist approach to decision making that emerged in the 1960s. This requires a technical evaluation to be made which provides the basis for objective decision making (Owens et al., 2004). This 'technical-rational' model has been translated into a whole suite of assessment, or appraisal, tools (Petts, 1999a); EIA has arguably become the most widely recognised and practiced of these. This is partly due to its strong legislative basis, beginning in the United States with the National Environmental Policy Act of 1969 (NEPA).

NEPA was enacted by the US Congress at a time when the serious environmental damage caused by a wide range of human activities was becoming increasingly apparent and the object of growing public concern and political activism, especially in western democracies. As Lynton Caldwell, the principal architect of NEPA, stated, it “became law because of an undeniable groundswell of public demand in the late 1960s for government ‘to do something about the environment’” (Caldwell and Shrader-Frechette, 1993, p146). As he averred, “the United States appears to have been the first nation to respond comprehensively to an insistent (though inchoate) public demand for action to protect the quality of the environment” (Caldwell, 1998, p4).

One of the stated purposes of NEPA is “to promote efforts which will prevent or eliminate damage to the environment and biosphere” (Section 2). This environmental policy goal is coupled with a prescient sustainable development aspiration:

The Congress, recognizing the profound impact of man’s activity on the ... natural environment ...and ... the critical importance of restoring and maintaining environmental quality ... declares that it is the continuing policy of the Federal Government ... to use all practicable means and measures ... to create and maintain conditions under which man and nature can exist in productive harmony, and fulfil the social, economic, and other requirements of present and future generations of Americans.
(Section 101(a))

This policy was intended, *inter alia*, to “fulfil the responsibilities of each generation as trustee of the environment for succeeding generations” (Section 101(b)). However, it was recognised that the policy alone was insufficient: “it was necessary in realizing national environmental policy objectives to lay unequivocal mandatory requirements on the Federal bureaucracies whose inbred attitudes were resistant to the new environmental objectives” (Caldwell, 1998, p6). Accordingly, NEPA requires that “all agencies of the Federal Government shall ... include in every recommendation for major Federal actions significantly affecting the quality of the human environment, a detailed statement on ... the environmental impact of the proposed action” (Section 102(2)(c)). This was the origin of the environmental impact statement (EIS), and the phrase ‘environmental impact assessment’ evolved to describe the process leading up to, and on from, the EIS. The preparation of an EIS was an ‘action-forcing’ measure imposed upon federal agencies to require them to consider the environmental consequences of their decisions. The EIA process was therefore adopted as a practical mechanism for achieving ambitious levels of urgently needed environmental protection.

The surge of environmental concern that lay behind the enactment of NEPA also had wider international ramifications, ultimately leading to the United Nations Conference on the Environment in Stockholm in 1972. Here, the problems of burgeoning development, pollution and destruction of the natural environment that NEPA was intended to address were perceived to be universal. Moreover, the EIA approach of rigorous project-by-project evaluation of significant impacts was seized upon as a means to resolve these environmental problems by many jurisdictions, which saw EIA as a key response to the increasingly large-scale environmental harm being witnessed. For example, member states of the European Communities agreed to mandatory EIA procedures in the mid-1980s (Commission of the European Communities, 1985); many other jurisdictions around the world have also adopted EIA systems (Wood, 2003). The EIA requirements initially put in place have typically been strengthened since their introduction (e.g. European Commission — EC, 1997, 2003), but it is noteworthy that in general, the introduction of EIA outside the USA has not been heralded with the same ambitious

pronouncements as NEPA, and reflects a narrower interpretation of environmental protection than implied in NEPA.

3. EIA effectiveness

3.1. Measuring effectiveness

In tandem with the widespread take-up of EIA, there has been no shortage of studies into (and commentary upon) the extent to which EIA is achieving its purposes. These studies, undertaken by academic and regulatory bodies, have included the examination of individual EIA cases and of elements of EIA procedures; there have also been wide-ranging, comparative reviews of EIA systems. Many of these studies have contented themselves with looking into whether or not EIA is being carried out according to its own procedural requirements. However, increasing attention has been placed upon evaluating EIA according to more substantive criteria and, in particular, upon whether EIA is resulting in the kind of outcomes that are typically sought (Cashmore et al., 2004). This has generally been couched in terms of EIA ‘effectiveness’.

Put simply, the evaluation of EIA effectiveness is intended to determine how much difference EIA is making. Ideally, this question should be addressed with reference to the purposes underlying EIA, such as “restoring and maintaining environmental quality” (NEPA, Section 101 (a)). There are obvious problems, however, in making a comparison of the environmental conditions that might prevail without EIA with those with EIA. Not only is this a very hypothetical comparison to make, but it is difficult to define, in a measurable way, the various aspects of environmental quality that might be improved as a result of EIA. Even more elusive are the concepts of sustainable development and sustainability, which are increasingly being adopted as the fundamental goals of EIA, but remain ill-defined at best (Baker et al., 1997; Mebratu, 1998). These concepts might be valuable aspirational statements of the ultimate purpose of EIA but remain too indeterminate to allow a meaningful consideration to be given to EIA’s effectiveness in this regard. (However, recent advances in sustainability assessment (Gibson et al., 2005) may result in more definable understandings of sustainability which could be applied to future EIA effectiveness studies.)

More helpful in trying to evaluate the performance of EIA is its specific regulatory aim of ensuring that environmental considerations are taken into account in decision making. This is frequently stated to be the purpose of EIA, in legislation, guidance and academic literature (e.g. Department of the Environment, Transport and the Regions, 1999; Glasson et al., 2005; Sadler, 1996). Thus, when a development project or a strategic initiative is proposed, EIA requires the possibility of harmful environmental consequences to be considered and potential effects to be thoroughly analysed; the findings of this study should then be incorporated into the decisions made about the proposal. It is in the realm of decision making about specific projects that the influence of EIA can best be tested; Sadler (1996) refers to the influence that the process has on decision making as the ‘litmus test’ of EIA effectiveness. In other words, we must turn to EIA’s proximate, rather than substantive, aim (Sadler, 1996) to find measurable criteria of effectiveness.

3.2. Direct outcomes

Wood and Jones (1997) examined the effectiveness of EIA in UK planning decisions in the mid-1990s, by studying 40 cases in which environmental statements (ESs) were submitted with planning applications for consideration by local planning authorities. They found that EIA

decided the outcome of the application in only one case (and here the EIA suggested that the development should be permitted, rather than refused). More positively, however, the planning officers concerned generally felt that the ESs helped them to make their recommendations about the planning applications in hand: thus EIA was not determinative, but gave planners added confidence that their consideration of the proposals was well informed. However, at the subsequent committee stage, when final decisions were made about the applications, the ESs played a significant role in only a minority of cases. Overall, other planning considerations had become more important by this stage, such as consultation responses that took place as part of the normal planning process.

It appears that the decision-makers involved in these 40 cases were operating primarily within the parameters of the planning procedures to which they were accustomed and that EIA was generally seen as external to those procedures. The findings of EIA were typically regarded as a useful contributory factor, but EIA was not fully integrated into the institutional patterns of decision making. The only area of decision making where EIA played a consistent role was in the setting of conditions on planning permissions. Here, the mitigation measures recommended in ESs were frequently referred to and used as the basis for some of the conditions set. So EIA was resulting in some modification of projects, though not usually of a major kind: the overall types and scales of development were unaffected (Wood and Jones, 1997).

Although these results are limited in their geographical and institutional scope, they correspond with the findings of other studies of EIA performance in a range of jurisdictions and over a more recent period of time (Barker and Wood, 1999; Christensen et al., 2005; Glasson, 1999; Lee, 1995; Leknes, 2001; Sadler, 1996; ten Heuvelhof and Nauta, 1997; Weston, 1997). In a review of several studies (including that of Wood and Jones (1997)), Cashmore et al. (2004) concluded that the contribution made by EIA, both to consent decisions and to project design, is generally moderate rather than substantial; i.e. that the relatively modest fine tuning of developments is a typical outcome of EIA practice (not least as a result of stakeholder involvement).

Similar conclusions were reached in a wider comparative review of seven EIA systems around the world (Wood, 2003). Each EIA system was tested against a decision-making criterion: "must the findings of the EIA report and the review be a central determinant of the decision on the action?" For this criterion to be met, it had to be demonstrated not only that decisions should be influenced by EIA (this was the case for all seven systems), but also that EIA actually influenced decisions. It can be seen from Table 1 that this criterion was not fully met for any of the systems. There are mechanisms for ensuring that the EIA is considered in all seven jurisdictions, but in practice, it was found that it was not unusual for "decision-makers to circumvent... EIA mechanisms where this is convenient" (ibid. p239). This appeared to be partly a result of regulatory weaknesses. Wood concluded that EIA does exert some influences on development decisions, but that it is common for the findings of EIA to be marginalised in favour of other considerations, such as non-environmental objectives and political factors. He found that, for all seven systems, EIA does bring about modifications to project design, prior to formal applications and/or during formal EIA processes, but that these are generally minor and designed to mitigate the worst effects of development. None of the systems examined was judged to make an adequate use of EIA findings during decision-making processes.

3.3. The Strait-jacket of rationalism

These findings are consistent with current critiques of EIA as an essentially techno-rational approach to decision making. As mentioned in Section 2, the concept of EIA was developed at a

Table 1
The treatment of decision making in EIA systems

Jurisdiction	Criterion met?	Comment
United States	<input checked="" type="checkbox"/>	Consideration of, and explanation of, decision and disclosure of environmental effects mandatory. In practice, EIS often influences decision.
United Kingdom	<input checked="" type="checkbox"/>	Environmental information is a material consideration but not necessarily a central determinant. Practice varies.
The Netherlands	<input checked="" type="checkbox"/>	Explanation of way environmental impacts considered in decision is mandatory. In practice, EIA generally influences decision.
Canada	<input checked="" type="checkbox"/>	Findings of self-directed assessment influence decision: reasons must be given if recommendations of public review report not accepted.
Commonwealth of Australia	<input checked="" type="checkbox"/>	'Assessment report' based on EIA report must be taken into account in determining decision on approval.
New Zealand	<input checked="" type="checkbox"/>	Act makes EIA central to decision but, in practice, EIA is sometimes not given appropriate weight. Practice improving.
South Africa	<input type="checkbox"/>	Environmental authorisation must be based on scoping report or environmental impact report but decision sometimes narrowly based. Refusals very rare.

■ Yes, Partially, No.
Source: Wood, 2003, p358.

time when rationalist thinking prevailed (Weston, 2000), by which decision-makers would give objective consideration to an issue, taking into account possible alternatives, each of which would be assessed on the basis of the technical information available, and would come to a decision that was in the best interests of society as a whole. EIA's key proximate aim of 'providing environmental information' is clearly in harmony with this model. However, this understanding of decision making, and of EIA's place within it, has increasingly been challenged (Owens et al., 2004). Firstly, the assumptions of value-free objectivity in EIA itself can be questioned; a more likely scenario is for there to be "an intricate interweaving of facts and values" (ibid. p1946). Secondly, decision making rarely proceeds in the detached way implied in the rational model, in which impartial use is made of the information presented; decisions reached are likely to depend more upon other underlying interests, reflecting the norms and values of decision-makers who are usually operating within a political arena. It is particularly in the later stages of decision making that the findings of EIA are likely to give way to political considerations (Leknes, 2001). So even if EIA is presenting environmental information satisfactorily – i.e. in these most restrictive of its own terms, is performing well – it is unlikely to succeed in its stated aim of ensuring that environmental considerations are fully incorporated into decision making. Even though it might be said that decision-makers are 'taking account' of the information, it is probable that other perspectives will, in the final analysis, hold greater sway. The likelihood of EIA achieving more far-reaching purposes, such as preventing large-scale environmental degradation, or contributing to sustainable patterns of development, though difficult to ascertain, seems remote.

These conclusions inevitably raise the question of whether or not the immediate aims of EIA, to provide environmental information, and thus to assist better decision making, are an adequate expression of its ultimate purpose as expressed in NEPA. The bold vision of NEPA, in which humanity should co-exist with nature "in productive harmony" (Section 101(a)), is poorly reflected in the largely advisory capacity to which EIA has effectively been relegated in its regulatory forms. The insistence that EIA is a decision-aiding, rather than decision making, tool may be unduly limiting, placing too great a level of trust on decision-makers to act in accordance with the environmental information provided to them. And even though NEPA itself sought no more than "practicable means and measures" (ibid.) to bring about its vision, the essentially procedural nature of EIA may be too constraining. As Benson (2003) argued, it is unusually weak as an environmental management tool, in that it does not impose any particular environmental standards or targets upon decision-makers. Although decision-makers may well apply environmental criteria when considering proposals, there is no obligation on them to give any specified weight to the environmental information provided. It could, of course, be argued that the 'provision of environmental information' function of EIA is as much as is politically acceptable on a widespread scale, and that EIA has only been adopted in so many jurisdictions around the world because of the relatively modest and unchallenging role in which it has been cast. But the disjuncture between NEPA's ambitious undertaking to address the causes of environmental degradation and EIA's marginal influence on the consequences of industrial development remains deeply unsatisfactory from an environmental perspective, and calls for a reassertion of the fundamental goals of EIA.

3.4. Indirect outcomes

Before addressing means by which EIA might be reformed in line with its founding purposes, consideration should be given to the possibility that EIA is being 'effective' in ways other than by directly influencing decisions about individual developments. For if EIA's

record of demonstrably changing the decisions made about projects is not strong, it is possible that it is exerting influence on decision making in more subtle, and possibly long-term, ways. For instance, an international survey of EIA practitioners in the mid-1990s suggested that, quite apart from its immediate influence on proposals, EIA confers other benefits, such as increasing environmental awareness and learning amongst participants (Sadler, 1996). More recent studies also highlight the potential for critical education to take place amongst participants involved in EIA processes (Fitzpatrick, 2006; Fitzpatrick and Sinclair, 2003). This is likely to contribute to greater consideration of environmental concerns in the future, both by proponents, whose plans may become more environmentally acceptable from the outset, and by decision-makers, who may come to demand higher standards of environmental protection.

If EIA does facilitate environmental learning amongst communities and other stakeholders involved in EIA processes, this greater environmental awareness is likely to be brought to bear not only on future development proposals but also in societal debate about the broader direction of development. There is a clear link here with EIA's aspiration of contributing to sustainable patterns of development. Again, the actual extent to which EIA is achieving 'indirect outcomes' of this kind is difficult to ascertain, but several studies suggest that gains are being made in this sense (e.g. Christensen et al., 2005; Jones et al., 1998).

Directing attention to these less tangible outcomes of EIA is a helpful progression from the critique of EIA referred to Section 3.3. For even though EIA has its origins in a rationalist approach to decision making, it does not completely fail to engage with other understandings of decision making. As Bartlett and Kurian (1999) and Lawrence (2000) have demonstrated, various aspects of EIA can be shown to relate to different models of how planning decisions are made. For instance, from an institutionalist perspective, EIA could be seen as a means of bringing about change in the values, rules and priorities that govern the institutions responsible for planning decisions. Rather than being a central factor in individual planning decisions, EIA may be having a more gradual, transformative effect on decision-making authorities. For example, the experience of dealing with applications for EIA development may be the means by which environmental learning ensues, higher environmental standards are set and staff with environmental expertise are recruited (Taylor, 1984). So whether intended or not, EIA is not just operating within the confines of its narrow rationalist beginnings but has a more complex role within decision-making processes, in which environmental perspectives are being brought to bear in a variety of ways and amongst a range of audiences. Moreover, it is itself subject to some of the dynamics currently being observed within development planning, such as more 'communicative' approaches, in which emphasis is placed upon participation and consensus-building, rather than upon expert-led technical solutions (Richardson, 2005).

4. Increasing the effectiveness of EIA

The issue of EIA effectiveness and the limited influence that EIA appears to be having on decision making has inevitably stimulated discussion about the best means of enhancing its effectiveness. The conventional response in this regard has been to place emphasis on strengthening existing EIA practice and procedures. However, more recently, there has been a focus on seeking to address the more fundamental limitations of EIA and adapting it more closely to current understandings of decision-making processes. It is within this context that measures to reassert the founding goals of EIA can be contemplated.

4.1. Strengthening practice and procedures

A number of approaches have been taken to strengthening the implementation of EIA as it is currently understood. Firstly, ‘capacity building’ has been seen for some years as an important strategy for the dissemination and improved practice of EIA. Training activities for practitioners, guidance on good EIA practice, and continuing research have been counted upon as means of establishing EIA and extending its influence. For example, the existence of published guidance on EIA procedures as a whole, or on particular elements of EIA, is clearly beneficial to carrying out EIA to certain standards. Equally, the provision of training for project managers, technical specialists, etc., is likely to increase the standard of practice even in mature EIA systems (Wood, 2003). EIA capacity building may also go hand-in-hand with wider institutional capacity; for instance, in developing countries, EIA has often been introduced as a condition of development assistance programmes where broad frameworks of environmental and social protection are lacking (Lee and George, 2000). In this context, as EIA itself has become established it has contributed to a wider institutional and professional environmental protection capacity.

Along with this perceived need for a stronger foundation for EIA practice, there have been persistent calls to improve the more detailed conduct of EIA. This is based on the assumption that, if EIA is carried out more comprehensively and rigorously, it will fulfil its aims more successfully. For instance, Glasson et al. (2005) have suggested a number of areas where the EIA process could be improved, such as ensuring better public participation and better prediction of cumulative impacts. Lee and George (2000) pointed to similar procedural weaknesses in EIA in developing countries. These suggestions for improvement in process often highlight the gap between regulatory procedures and an idealised, ‘state of the art’, EIA system. The underlying assumption here is that EIA can be made more effective by being conducted more assiduously and being given a stronger regulatory backing. Perhaps the most explicit connection between EIA aims and the EIA process has been made in relation to its post-decision stages; it is precisely the limited degree of leverage being exerted by EIA that has provoked suggestions to include better measures for the ‘follow-up’ of actions after they have been approved (Morrison-Saunders and Arts, 2004).

One of the specific ways by which this latter point has been addressed is to try to establish stronger links between the EIA for a given project and its ongoing environmental management. For instance, conditions for development consents can be made to reflect more closely the commitments made in environmental reports, especially for mitigation and monitoring, etc., which can also be translated into the terms of formal environmental management systems (Slinn et al., in press). Such linkages could help to carry the findings of EIA beyond its immediate remit; however, mechanisms for ensuring their efficacy remain either weak or absent from most regulatory systems (Morrison-Saunders and Arts, 2004).

4.2. Asserting the substantive purpose of EIA

The emphasis in the above recommendations and measures for increasing EIA effectiveness is on the more comprehensive implementation of a relatively standardised EIA system. With the possible exception of adding in mechanisms for better EIA follow-up, the original EIA ‘template’ is left untouched. The essential orthodoxy of EIA is not questioned and little consideration is given to whether it has the ability, even in its normative form, to bring real influence to bear on decision making. However, as greater attention is given to the place of EIA within broader decision-making processes, the possibility of EIA being more closely adapted to those processes presents itself (Bartlett and Kurian, 1999; Culhane et al., 1987; Richardson, 2005). Thus

Cashmore et al. described EIA's "passive integration with decision processes" (2004, p303) as a serious constraint, and advocated research to address the question of how EIA can interface more closely with those processes. They called for less attention to be paid to the issue of EIA's influence in design and consent decisions (which has framed the effectiveness studies referred to Section 3.1), and more to be given to the broader institutional, political, etc., context in which decision making occurs. In this regard, they pointed again towards the role that EIA can play in bringing about institutional change, through such mechanisms as stakeholder involvement in environmental decisions, and saw this as a significant means of contributing to underlying sustainable development goals.

It is probable that integrating EIA more closely with the processes of development planning will give it a stronger influence in those processes. However, this approach is still preoccupied with bringing EIA's findings more effectively into the planning and decision-making arena, rather than with making a more fundamental contribution to development planning. EIA's goals are assumed but are not clearly expressed or determinative. The development of strategic environmental assessment (SEA) can be seen as one initiative to further the integration of the principles of EIA into development planning by enabling the review of the strategic policy-, plan- and programme-making actions that generally set the context for EIA at the project level. Wood (2003, p331) reports the widespread perception that the implementation of SEA has "the potential to streamline and strengthen project EIA and to contribute towards the aims of sustainable development". Despite this, there is still a need to assert the substantive aim of EIA and to promote more strongly what Lawrence (2000) implies is its latent socio-ecological idealism: the transformative power of its environmental imperatives. EIA could be given greater weight by embodying within its frameworks, procedures and techniques the goals that were originally articulated in NEPA.

An opportunity to advance EIA in this sense is presented by the current emphasis within policy-making on sustainable development/sustainability (this is also a recognition of the political context within which EIA inevitably operates). This is particularly so given the shift towards 'environmental sustainability' (Royal Commission on Environmental Pollution — RCEP, 2002) as a reassertion of environmental priorities within the sustainability equation. For example, sustainable development in the UK has been redefined as "respecting the limits of the planet's environment, resources and biodiversity — to improve our environment and ensure that the natural resources needed for life are unimpaired and remain so for future generations" (Her Majesty's Government — HMG, 2005, p16), and 'living within environmental limits' is now one of its twin goals. Contributing to broader sustainability strategies has, as noted in Section 1, frequently been seen as an underlying rationale for EIA, but, although calls have been made for this to be made more explicit, the means by which this might be attained have not been fully explored. There are several avenues that could be explored in this respect; these are discussed below, though remain illustrative in nature.

An initial approach would be to make more explicit use of sustainability concepts in EIA practice. For example, the analysis of the likely effects of proposed developments could be based on the concepts of environmental resources, capacities and limits, rather than on the relatively narrow assessments being made of the effects of proposals on their immediate environment. This could allow wider impacts, for instance on climate change and biodiversity, to be seen more clearly, and would enable the cumulative consequences of development to be tracked (Wood, 2003). Ultimately, clearer limits could be set for proposed developments according to the resilience or regenerative ability of the environments affected (Sadler, 1996).

A particular principle that could be applied in this context is that there should be no net environmental deterioration resulting from any given development. This would take EIA beyond

its conventional role of simply identifying and mitigating significant adverse impacts, towards being a vehicle for ensuring environmental enhancement on a scale that fully offsets negative impacts. For example, [Sadler \(1999\)](#) has called for a natural capital approach to EIA, in which aggregate stocks of natural capital are maintained or increased (and critical natural capital is only destroyed in cases of overriding need). This notion has been applied in certain other contexts, especially in Germany, where the concept of compensation pools (or mitigation banks) has been practiced since 1976. These involve approved locations where developers can conduct environmental enhancement to compensate for negative impacts elsewhere ([Wende et al., 2005](#)). This concept, including measures to achieve net environmental gain, has since gained currency more widely, including within the UK ([Countryside Agency et al., 2005](#)). For example, EIA could result in the use of planning obligations which:

might be used, when appropriate, to offset through substitution, replacement or regeneration the loss of, or damage to, a feature or resource present or nearby, for example, a landscape feature of biodiversity value, open space or right of way. ([Office of the Deputy Prime Minister, 2005](#)).

Although compensation is already recognised as an approach to mitigation within EIA, much more rigorous analysis could be carried out of the extent and type of measures needed to achieve an environmental balance for any given proposal.

Similarly, there is a scope for greater application of the precautionary principle within EIA. Uncertainty is inherent to the predictive approach of EIA. However, even where uncertainties are acknowledged in assessments, it is rare for precautionary measures to be invoked as a result. A reshaping of EIA in line with the principles of environmental sustainability would help to persuade decision-makers to take a more sceptical attitude to development proposals where considerable levels of uncertainty hang over their possible consequences. It is interesting to note that the precautionary principle is starting to be integrated to other regulatory forms of environmental protection. For example, it is included in the European Union integrated pollution prevention and control (IPPC) directive ([EC, 1996](#)). In the UK, the RCEP has recommended that the IPPC licensing procedure, and hence the precautionary principle, should be integrated with EIA and the land use planning regime; i.e. that a single procedure should be used for the implementation of European Union EIA and IPPC requirements, leading to a common environmental statement ([RCEP, 2002, p92](#)).

A more fundamental assertion of EIA's sustainability brief would be to incorporate it explicitly and centrally into legislative frameworks for EIA. In other words, the application of the kind of approaches outlined above should be underpinned by a determining statement of intent. For example, a statutory purpose for EIA, based upon the notion of environmental sustainability, could be established, such as "ensuring that the quality of the environment is safeguarded and wherever appropriate enhanced" ([RCEP, 2002, p108](#)). This would bring to the fore substantive goals for EIA, of the type originally embedded in NEPA, but which were largely lost from sight in the procedural minutiae of NEPA and other subsequent EIA regulatory systems. One of the difficulties with the implementation of EIA in the US is not that overarching principles of environmental protection are absent from NEPA; indeed, six impressive admonitions to Federal Government are listed, such as to "fulfil the responsibilities of each generation as trustee of the environment for succeeding generations" ([Caldwell, 1998, p11](#)). It is rather that there is inadequate linkage to the ensuing EIA requirements, so that there is "no explicit obligation on the agencies to reconcile their decisions with [these] principles (or values)" ([Caldwell, 1998, p12](#)). The establishment of an overriding EIA purpose, to which subsequent regulatory provisions are clearly linked, would enforce the application of sustainability approaches such as those suggested above.

5. Conclusion

Over the last 35 years or so, EIA has become an internationally accepted and established tool for environmental management. During this time, EIA procedures have been strengthened and EIA capacity has been improved in many different contexts, including developed, developing and transitional economies. There is no doubt that, especially in more mature EIA systems, EIA has made a difference to patterns of development through design modifications, institutional learning, and stakeholder involvement. The quality of decisions involving EIA has improved as a result of the increased use of modification or mitigation, the use of more stringent conditions upon permissions and, occasionally, the non-implementation of potentially environmentally damaging proposals which might previously have been approved.

However, there has been growing dissatisfaction over the fact that EIA's influence over development decisions is relatively limited and that it appears to be falling short of its full potential. Even its most immediate aims of ensuring that the likely environmental consequences of developments are properly taken into account and ameliorated where necessary are only being met to a limited degree. The achievement of its substantive aim, contributing to more sustainable patterns of activity, although difficult to assess, appears to be even more elusive. This may be partly because this aim is ill-defined in itself but it also betrays a failure to incorporate into EIA systems any clear rationale for working to such an end.

A range of specific measures has been recommended to strengthen EIA systems and many have been adopted over the years. These have generally focused on introducing or bolstering appropriate procedural requirements, underpinned by capacity building measures related to guidance, training and research. The case for formal mechanisms that ensure 'follow-up' of EIA in relation to individual projects, such as linkage with environmental management systems, has also been made. But these measures remain limited in their effect, and EIA generally continues to bring about only relatively modest adjustments of development proposals.

This disappointing performance has led to increasing questioning about the nature of EIA and a recognition that its fundamentally rationalist approach is out of step with the realities of decision making. This has begun to focus attention on decision-making contexts themselves, and suggests that EIA should be more closely adapted to the processes that it seeks to influence. On a positive note, effectiveness studies also suggest that EIA already relates to decision making in more indirect ways, implying that EIA is yielding more far-reaching benefits than those simply associated with specific project decisions.

The continuing aspiration that EIA should contribute to the wider endeavour of bringing about sustainable development has provided EIA with its most strategic sense of purpose but this has not been translated clearly into EIA frameworks, principles or methodologies. Setting about this task would be a means of re-establishing the founding purposes of EIA and giving it a more determinative position in project planning processes. For example, it is probably time to reconsider the nature of Caldwell's (1998) 'unequivocal mandatory requirement' (Section 2) and give EIA a statutory purpose. Much could be achieved by increasing the weight given to environmental resources and capacities in existing EIA systems. The same end could be achieved by ensuring that EIA was linked to clear 'environmentally sustainable development' objectives. The effectiveness of EIA would be bolstered if a specific aim was to deliver 'no net environmental deterioration' and, if this could not be demonstrated, to require the application of the precautionary principle in decision making. There is no doubt that, if the public and politicians will the ends, EIA can provide a much more effective means of engaging with planning processes and of achieving more sustainable patterns of development.

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