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Environmental impact assessment and the precautionary principle: legislating caution in environmental protection

Abstract
A noteworthy feature of international environmental discourse since the late-1980s has been the shift toward anticipatory policies. Precaution is the leading policy approach that has emerged to guide environmental decision-makers confronted with inadequate information. The "precautionary principle" has found expression in Australia in the 1992 Intergovernmental Agreement on the Environment, various Commonwealth environmental management strategies and a number of pieces of Commonwealth and State legislation. It also has been accepted tentatively by the courts as a factor which should be taken into account in appropriate circumstances. However, existing Australian environmental management approaches fail to advance precaution in a substantive manner. Most hope for the advancement of precaution has rested on its potential to be a mandatory consideration by ministerial authorities when exercising planning powers. However, courts have cast doubt on the legal status of the principle because of the typically weak formulations of it in legislation and policy documents. In this article, a method is suggested by which the principle could be integrated systematically in environmental planning so that it could be given effect in environmental management practice. The writer proposes that environmental impact assessment (EIA) Australia's foremost environmental protection regime should be modified to give effect to the precautionary principle. A three-step method by which this could be achieved is presented. First, the EIA trigger of environmental 'significance' must be broadened; second, uncertainties must be assessed; and third, environmental uncertainty must have greater influence in decision-making.

Keywords
principle, legislating, caution, protection, impact, environmental, assessment, precautionary

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Environmental Impact Assessment and the Precautionary Principle: Legislating Caution in Environmental Protection

*Warwick Gullett**

A noteworthy feature of international environmental discourse since the late-1980s has been the shift toward anticipatory policies. Precaution is the leading policy approach that has emerged to guide environmental decision-makers confronted with inadequate information. The "precautionary principle" has found expression in Australia in the 1992 Intergovernmental Agreement on the Environment, various Commonwealth environmental management strategies and a number of pieces of Commonwealth and State legislation. It also has been accepted tentatively by the courts as a factor which should be taken into account in appropriate circumstances. However, existing Australian environmental management approaches fail to advance precaution in a substantive manner. Most hope for the advancement of precaution has rested on its potential to be a mandatory consideration by ministerial authorities when exercising planning powers. However, courts have cast doubt on the legal status of the principle because of the typically weak formulations of it in legislation and policy documents. In this article, a method is suggested by which the principle could be integrated systematically in environmental planning so that it could be given effect in environmental management practice. The writer proposes that environmental impact assessment (EIA) - Australia's foremost environmental protection regime - should be modified to give effect to the precautionary principle. A three-step method by which this could be achieved is presented. First, the EIA trigger of environmental 'significance' must be broadened; second, uncertainties must be assessed; and third, environmental uncertainty must have greater influence in decision-making.

Introduction

Recent international practice in environmental impact assessment (EIA) has seen a shift in emphasis from its forecasting and decision-making structure to its role within the broader environmental management context (Wood 1995, 1997). The theoretical context in which EIA has been conducted in Australia since the early-1990s has been defined largely - but weakly - by the official goal of ecologically sustainable development (ESD). The 1987 World Commission on Environment and Development report *Our Common Future*, also known as the Brundtland Report, was the first significant document to identify the importance of EIA as a tool by which environment and development objectives could be integrated to achieve "sustainable development". The Report noted the increasing number of countries that require EIAs for major projects and recommended that:

> "A broader environmental assessment should be applied not only to products and projects, but also to policies and programmes, especially major macroeconomic, finance, and sectoral policies that induce significant impacts on the environment" (World Commission on Environment and Development 1987: 222).

In Australia, some of the connections between EIA and the ESD concept were identified in the 1991 Australian and New Zealand Environment and Conservation Council (ANZECC) report *A National Approach to Environmental Impact Assessment in Australia*. In particular, the report noted that EIA can assist in achieving ESD by promoting "caution in dealing with environmental risk and irreversibility" (ANZECC 1991: 4). The 1992 Intergovernmental Agreement on the Environment (IGAE) was the first national policy formally to detail and adopt the concept of ESD. It provides some guidance for the incorporation of ESD principles in EIA and sets out nationally accepted principles of environmental policy, including the precautionary principle. Essential approaches for achieving ESD were outlined in the *National Strategy for Ecologically Sustainable Development* (Commonwealth of Australia 1992), released later in 1992. These include the consideration of national implications of local activities and taking long-term rather than short-term views in environmental decision-making. Some 70 of the recommendations contained within the nine ESD sectoral reports relate to EIA (Environment Protection Agency 1994a: 4).

The Precautionary Principle

Under clause 3.5.1 of the IGAE, the Commonwealth, States and Territories and the Australian Local Government Association agreed that:

> "Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty

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should not be used as a reason for postponing measures to prevent environmental degradation."

This is the traditional formulation of the principle - closely resembling that contained in the 1992 Rio Declaration on Environment and Development - which embodies the notion that we should act cautiously when confronted with uncertain environmental risks. However, the IGAE expands upon this core requirement thus:

> "In the application of the precautionary principle, public and private decisions should be guided by:
>
> (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and
>
> (ii) an assessment of the risk-weighted consequences of various options."

The principle is a relatively new - but commonsense - approach to guide decision-makers confronted with scientific uncertainty in environmental matters. Although it has been widely adopted (most notably by the 179 countries which signed the Rio Declaration), and the gist of the principle is generally understood (that we should proceed cautiously where there is reason to believe harm may result from a proposed activity), there remains considerable doubt and disagreement about its actual content. This is largely due to the numerous formulations of the principle and the often ambiguous manner in which it is phrased. Yet the principle is now entrenched in environmental planning - if only as a guiding principle - and continues to be incorporated in international legal instruments, national environmental strategies and domestic legislation. In fact, there is much support for the contention that the principle has crystallised into a norm of customary international law (Sands 1995; McIntyre and Mosedale 1997). In Australia, it has been judicially considered in a handful of cases, most notably in a series of decisions of the New South Wales Land and Environment Court, and, most recently, by the Federal Court of Australia in the *Friends of Hinchinbrook* (1997) case (discussed below) (Gullett 1997; Lyster 1997). Although the principle is legally recognised, due to its weak incorporation in statutes and policy documents, courts have been unable to hold that it is a "relevant consideration" even where its use is most appropriate. The principle awaits a sufficient legislative mandate to ensure that it is applied in appropriate circumstances.

EIA and Ecologically Sustainable Development

In 1993, in response to the reports discussed above, the Commonwealth Environment Protection Agency (EPA) commenced a comprehensive review of the Commonwealth EIA process. Public comment was sought on the direction and scope of the review. The three most common recommendations in the submissions received were to integrate the goals and principles of ESD in EIA, extend the powers of the Environment Minister, and to ensure the protection of the environment. The review recognised the inability of the present EIA process to enable the Commonwealth government to give full effect to its responsibilities under the IGAE. It canvassed numerous reform proposals relating to jurisdictional, triggering and procedural elements of the EIA process. However, the primary recommendation was for EIA to support the application of ESD principles (Environment Protection Agency 1994b: 1.14).

There is consensus among environmental planners and resource managers that EIA must reflect ESD principles more closely. However, little has been done in a formal capacity to effect this goal. It is evident that "EIA is a major tool for promoting sustainability; however promoting the practicable steps that should be taken when applying the process to that end are not necessarily clear" (Department of the Environment, Sport and Territories 1997: 5). The question then is: how can these practical steps be taken? A method for integrating the precautionary principle, a key component of ESD, in EIA is now presented. This paper focuses on the Commonwealth process established by the *Environment Protection (Impact of Proposals) Act* 1974 (Cth) [EPIPA]. However, the following framework is applicable to all legislative EIA processes, including those established under the following statutes:

- *Land (Planning and Environment) Act* 1991 (ACT)
- *Environmental Planning and Assessment Act* 1979 (NSW)
- *Environmental Assessment Act* 1982 (NT)
- *Local Government (Planning and Environment) Act* 1990 (Qld)
- *Development Act* 1993 (SA)
- *Environmental Management and Pollution Control Act* 1994 (Tas)
- *Environment Effects Act* 1978 (Vic)
- *Environment Protection Act* 1986 (WA)

EIA and the Precautionary Principle

It has been argued elsewhere that the precautionary principle is more than a nebulous idea; it is conceptually clear and it has a minimum content which can be given practical application (Gullett 1997; Moffet 1997; Deville and Harding 1997; Tickner 1998). However, to date, the Australian approach for advancing precaution in environmental management has been repeatedly to espouse the principle as a guide for environmental decision-making. It is the writer's contention that a key way to give effect to the principle so that it influences decisions and environmental management practice is to integrate it legislatively in EIA regimes. This, as will be shown, would be achieved most effectively by incorporating the principle in substantive provisions of

legislation rather than merely including it in preambular statements.[1]

The principle and EIA are complementary. They are both means of informing decision-making and influencing environmental outcomes. Also, EIAs themselves are precautionary in a minimal sense because they are predicated on addressing uncertainty about future environmental effects (Cameron 1993: 36; see Stedman and Hill 1992; Ebbesson 1996: 253; Lawrence 1997). However, the two differ conceptually: EIA is a procedure prior to decision-making and the principle is a policy, or potentially a rule, to inform or govern decision-making.

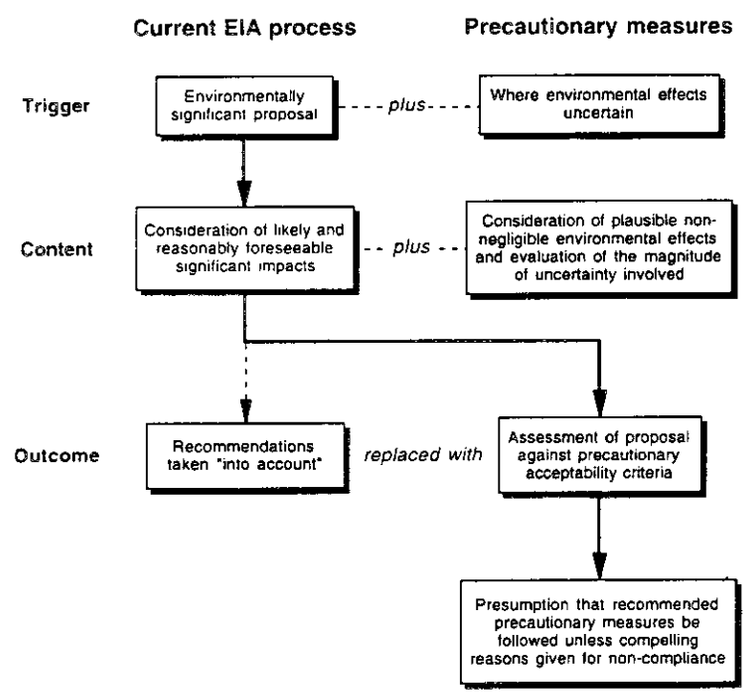
Integrating the Principle in the EIA Process

Giving full effect to the principle could not be achieved simply by appending precautionary considerations to existing EIA processes. More wide-ranging reform options also need to be adopted. In particular, EIAs need to be conducted more widely to encompass strategic impact assessment and to embody cumulative impact assessments in order that they reflect two key notions inherent in the principle - awareness that the causes of environmental harm are numerous and interrelated, and that these causes may be spatially and or temporally distant from their effects (see Harvey 1992, 1998; Wright 1994; Brown and McDonald 1995; Deville and Harding 1995; Court, Wright and Guthrie 1996; Marsden 1997). The landmark New Zealand *Resource Management Act* 1991 could be used as a guide. The Act provides for broad assessments integrated in the planning system with the explicit objective of sustainable management (Section 5(1); Montz and Dixon 1993; Dixon and Fookes 1995). Leaving aside the applicability of EIAs for policies (see Bailey and Renton 1997), plans and programs, effective integration of the principle in current project-specific EIA would require three principal reforms to existing processes. They would need to ensure that:

1. EIAs are conducted where there is uncertainty regarding environmental impacts;
2. there is adequate assessment of environmental uncertainties; and
3. environmental uncertainties are given appropriate weight in final decisions.

The methodology proposed for integrating the principle in EIA is illustrated in Figure 1.

Figure 1. Measures required to integrate the precautionary principle in EIA



Step 1: Threshold for operation of EIA

The first step to integrate the principle in EIA would be to amend the project screening criteria to ensure that EIAs are not limited to activities which *will* affect the environment "to a significant extent" (section 5 EPIPA). The EIA process must also be triggered where there is uncertainty regarding environmental impacts[2]. There has been much dissatisfaction both in Australia and overseas with the subjectivity and uncertainty inherent in the popular EIA threshold of 'significant' environmental impact. Although the parameters of

1. Most legislative inclusions of the principle are stated in permissive terms and or are contained in general object provisions. However, see the proposed Massachusetts Precautionary Principle Act (1997) which states that state agencies "shall" apply the principle "when there are grounds for concern that a procedure or development may contribute to the degradation of the air, land and water of the Commonwealth" (House Bill 3140, s 1) (Tickner, 1998).

2. It is to be noted that the Administrative Procedures issued under the EPIPA allow for the application of the EIS process where the responsible Minister is satisfied that this is desirable "in order to achieve the object of the Act" (cl 1.2.1(b)). This provides grounds to argue that in some circumstances significant uncertainty as to the impacts of an activity could trigger the process (Mossop 1997: 200).

environmental uncertainty are similarly elusive, this difficulty is not insurmountable and guidelines could be prepared to render this threshold operable. In a 1996 report, the ANZECC stated that initiating a formal EIA process may be justified if there is "a high level of uncertainty or a large number of unknowns" (ANZECC 1996: 2). In a draft discussion paper entitled *ESD in EIA*, the NSW Department of Urban Affairs and Planning recommended that a full assessment of an activity should be undertaken if there is insufficient information available to predict whether there is likely to be significant environmental effects (Department of Urban Affairs and Planning 1995: 21). It is suggested that legislative force should be given to a lower, although similar, threshold in all Australian jurisdictions: EIAs should be required where there is insufficient information available to predict whether non-negligible environmental harm may occur. This lower evidentiary standard would reflect the principle in so far as it would shift attention from the acceptability of the 'significance' of the environmental impacts of a proposal to the acceptability of the level of scientific uncertainty which attaches to the predictions of the impacts. Uncertainty as to whether a project warrants an EIA would be reduced if a list of 'designated developments' is adopted to trigger the process. This has been done, for example, in the NSW and ACT processes and in Europe via the European Union Directive on EIA.

Step 2: Content of EIA

The second step to integrate the principle in EIA would be to ensure that there is assessment of the environmental uncertainties involved in a proposal. There must be a genuine attempt to anticipate and evaluate the level of scientific uncertainty. Table 1 lists examples of uncertainty in EIAs (see also De Jongh 1988; Glasson, Therival and Chadwick 1994: 122-4; Lawrence 1997: 87-8). Lawrence notes that uncertainty in EIA also relates to value judgments in decision areas and sums-up rather well the notion that a broader approach to scientific inquiry is required:

> "A scientific, positivist approach will not be generally appropriate for the trans-scientific, messy problems often encountered in EIA. A less analytical, more holistic, approach will be required. A new scientific paradigm, which incorporates concepts such as complexity, nonlinearity and emergence, is more appropriate" (Lawrence 1997: 88).

Uncertainty involves more than the presence or absence of 'objective' scientific knowledge; to a large degree it is socially and politically constructed. It involves approaches to information affected by, among other things, taboo, distortion, irrelevance and confusion (see Smithson 1989; Wynne 1992; Dovers and Gullett 1998). Awareness of this phenomenon in EIAs, in addition to more rigorous scientific inquiry tailored to measuring areas of uncertainty at each stage of an EIA, would enable much more comprehensive assessments of environmental impacts - in particular, cumulative impacts - than are currently undertaken. Determining *how* to assess uncertainty is the current challenge.[3]

EIA content requirements in legislation and subordinate legislation typically provide poor guidance regarding the type of impacts which needs to be assessed. The *level* of assessment required invariably is absent or incomprehensive. The 1994 revisions to the regulations issued under the *Environmental Planning and Assessment Act* 1979 (NSW) provide a welcome and much needed amplification of content requirements in that State. They provide that an environmental impact statement (EIS) "must" include an analysis of the "likely impact on the environment" of the development or activity, having regard to the nature and extent of the proposal and any associated building or work and rehabilitation measures to be undertaken (New South Wales Parliament: 1994). These requirements are amplified in s 82 to include, among other things, consideration of long-term and cumulative environmental effects (but apparently only in relation to the locality rather than distant effects). There is, however, no specific provision for consideration of uncertainty. This is odd, considering that the regulations also require that proposed developments be justified having regard to the principles of ESD, which, of course, include the precautionary principle. A shortcoming here is that although an EIS must include ESD, a decision to approve a proposal can be made without regard to ESD principles because the decision is made under Parts 4 and 5 of the Act which do not mention ESD (Stein and Mahony 1997). Notwithstanding the important inclusion of more distant environmental effects, the focus here remains on "likely" impacts. Further, the scoping phase of EIAs tends to consist of relatively informal consultative processes between government agencies and proponents. This affords proponents the opportunity to influence determinations of what impacts should be assessed and the level of assessment necessary. This has contributed to the content of EIAs varying considerably both between and within jurisdictions.

In Victoria, the guidelines issued under the *Environment Effects Act* 1978 go further than their NSW equivalent and state that an environment effects statement (EES) "should" include:

> "predictions of significant environmental impacts of the proposal...and their consequences, direct and indirect, short and long term and cumulative, *with an estimation of the amount of uncertainty involved*" (emphasis added) (Department of Planning and Development 1995: 7).

3. There are a number of approaches to informing policy and decisions in the face of uncertainty, including modified forms of risk assessment (see Walker 1991; Dovers and Handmer 1995; Dovers, Norton and Handmer 1996).

However, this provision for the estimation of uncertainty - the only such provision in Australian jurisdictions - does not indicate the extent to which uncertainty must be examined. In the normal course, this would be determined by a Consultative Committee, established to guide the scope and preparation of assessments. However, in practice, proponents are afforded much flexibility in their interpretation of the guidelines. For example, the Victorian Point Lillias EES, which examined the proposed relocation of the port and chemical storage facility at Coode Island in Melbourne to Point Lillias near Geelong, met the uncertainty requirement perfunctorily. In relation to the most controversial aspect of the proposal - the nature and understanding of its effect on the Orange-bellied Parrot (a species listed in the highest order of concern under the *Endangered Species Protection Act* 1992 (Cth)) - only four concessions concerning uncertainty were made. There were short statements about unknown population trends, uncertainty concerning the area of the species's habitat potentially affected and other factors playing a role in the response of the species, and poor understanding relating to habitat preferences. The EES noted, however, that data relied on made "no pretence about presenting a complete picture. This would require vastly more knowledge of at least species abundance and key functional aspects of the ecosystems" (Department of Planning and Development 1996: 7B: 85). Thus, despite the requirement that uncertainty should be covered in the EES, this was done in a poor manner, and, due to the unenforceable nature of the guidelines, with no opportunity for redress. Although an Independent Panel was established to review the EES, the adequacy of review was undermined by the abbreviated period given to the panel to complete its report and by the fact that its primary recommendation - that the proposal should not be approved in the absence of a more detailed assessment - was not accepted by the responsible Minister (Department of Infrastructure 1996).

In June 1996, ANZECC published a report entitled *Guidelines and Criteria for Determining the Need for and Level of Environment Impact Assessment in Australia*. The document provides a framework to guide

Table 1. Examples of uncertainty in EIA

(adapted from Department of Urban Affairs and Planning 1995: 12)

Pre-development:	Impact identification and prediction:	Impact mitigation and rehabilitation:	Decision making:	Monitoring:
Knowledge of pre-proposal environment, proposed technology, community values and needs may be: • incorrect • partially correct • non-existent Existing situation may therefore be misunderstood and all later stages may be jeopardised	Impact prediction may be: • [undermined because] impacts may be ignored, missed, overestimated or underestimated [or] not fully understood • [inaccurate] because of incorrect or poorly designed modelling or predictive techniques • based on incorrect knowledge of pre-proposal situation • flawed because of lack of data, incorrect data or the use of poor quality data	Method may be: • unproven • inappropriate • only partially valid (although these do not preclude the mitigation or rehabilitation from being partially successful) Application of method can be unsuccessful due to: • failure of method (unproven, inappropriate, incorrectly applied) • lack of appropriate training, maintenance or management • lack of feedback loop from monitoring • other factors eg. fire may follow revegetation	Decision made based on • biased or partially accurate information • insufficient information to understand the full costs and benefits of the proposal	Monitoring may be unsuccessful for various reasons: • inappropriate method • inadequate data (temporally or spatially) • lack of commitment • lack of funding Lack of a feedback loop may lead to continued unsustainable practices

decisions regarding whether a potentially significant proposal requires an EIA and the level of assessment necessary. It calls for statements in EIAs on the level of confidence with which predictions of impacts are made (see Table 2). The document is a crucial - although partial - step forward for ensuring that EIA practitioners are more critical of scientific evidence and are mindful of the assumptions which inhere in scientific methods and interpretations. These two concepts go to the core of the precautionary principle.

During the EPA review of the EIA process, completed in 1994, it was recommended that the Commonwealth Government adopt the process the US *National Environmental Policy Act* 1969 (NEPA) utilises for dealing with incomplete information and scientific uncertainty (Environment Protection Agency 1994c: 109). Requirements for the content of EISs are stated rather briefly in NEPA but are amplified by regulations issued by the Council on Environmental Quality (CEQ), established by NEPA to oversee the implementation of the Act. Like the Commonwealth Administrative Procedures, the Victorian Guidelines and the NSW Regulations, the CEQ regulations are not binding on the courts, although the United States Supreme Court has ruled that they should be given "substantial deference" (Fitzgerald 1996: 441). The CEQ regulations provide, among other things, that where there is incomplete or unavailable scientific evidence, this should be disclosed. Where the cost of obtaining such information is exorbitant, the relevance of the information must be stated. In particular, there is a requirement that impacts which have been ascribed a low probability of occurrence but which entail possible catastrophic consequences must be considered if they are "within the rule of reason" (that is, they have some scientific support and are not based on pure conjecture) (Code of Federal Regulations 40: §§1502.22, 1508.27). The CEQ has stated that agencies cannot ignore "uncertain, but probable" effects of their decisions (Fitzgerald 1996: 464). Further, the United States Court of Appeals ruled in the *Sierra Club* (1985) case that indirect effects of a project that are reasonably foreseeable must be assessed comprehensively. However, Breyer J held (at 878) that in preparing an EIS, an agency need not consider impacts which are "highly speculative or indefinite."

To enable EIA to embody the precautionary principle it would be necessary to adopt some of the NEPA requirements. It would be imperative to require

Table 2. Checklist for EIAs: confidence of prediction of impacts

(Australian and New Zealand Environment and Conservation Council 1996: 9)

(1) What level of knowledge do we have on the resilience of a given significant ecosystem? Cover —
- — adequacy of baseline date;
- — level of certainty attached to any management or rehabilitation program; and
- — relevance of comparable situations.

(2) Is the proposal design and technology sufficiently detailed and understood to enable impacts to be established? Cover —
- — previous experience with design;
- — relevant models;
- — degree of accuracy desired; and
- — degree of accuracy achievable.

(3) Is the level and nature of change on the natural and human environment sufficiently understood to allow the impacts of the proposal to be predicted and managed. Cover —
- — adequacy of baseline data.

(4) Is it practicable to monitor predicted effects? Cover —
- — frequency and duration of monitoring;
- — feedback loops; environmental management plans; and
- — community involvement.

(5) Are present community values on land use and resource use likely to change? Cover —
- — sources of values; and
- — degree of stress and change likely in the community.

proponents to obtain all available scientific evidence of possible environmental harm of proposals. If insufficient scientific information is available (where there is reason to assume there may be non-negligible environmental harm), that would be reason alone to use the principle to refuse project approval or to require precautionary action for certain aspects of the proposal. A constant source of criticism of EIAs is that the quality of scientific analysis they contain is often poor. To give effect to the essence of the principle - that there be a shift in the 'burden of proof'[4] - proponents should be required to establish that the uncertainties which attach to the predicted environmental effects of proposals are within predetermined precautionary 'acceptability' criteria or 'margin-of-safety' standards. This burden would be more onerous to discharge where there is conflicting scientific evidence and may call for a sliding scale of required proof according to the predicted likelihood and severity of harm. It may be necessary - at minimum - to require a developer or potential polluter to establish that no safer way to conduct the activity is possible (Tickner 1998). This could coincide with measures to ensure that EIAs place greater attention on the existence of alternatives. The focus of scientific analysis in EIAs would change from the significance of harm to the limits of scientific knowledge (Bates 1994). This change would act as an incentive for proponents to submit sound proposals in the first place. Articulation of acceptability criteria is beyond the scope of this discussion, but attention is drawn to Table 3, based on a discussion paper prepared by the NSW Department of Urban Affairs and Planning, as a useful early espousal of such criteria, and Table 4, prepared by Tickner to guide weight of evidence analysis and the amount of proof needed for precautionary action (see also Deville and Harding 1997).

Although the NSW Department of Urban Affairs and Planning (1995: 11) has expressed the concern that the level of uncertainty associated with the predictive process in some NSW EISs has been disregarded or concealed, few commentators would argue that proponents consciously suppress damaging scientific evidence when preparing EIAs. It has been suggested that what is more likely is that proponents fail to seek

Table 3. Factors to consider in deciding the acceptability of a proposal based on the precautionary principle

(Department of Urban Affairs and Planning 1995: 24)

In making decisions about the proposal —

- Have worst cases outcomes been considered in the estimates of environmental benefits and costs? Err on the side of caution when predicting outcomes.
- Have risks to social or ecological integrity been identified? Have the scope and scale of risks been assessed? Are all risks considered acceptable?
- Has a risk averse approach been adopted? Has a safety margin been applied and best available technology used? Can performance bonds or other incentive mechanisms be applied?
- Is there scientific uncertainty about the outcomes? Peer review of scientific data should be undertaken. If certainty is low, are the potential impacts likely to be serious or irreversible? If so, strong consideration should be given to other options.
- Is there information uncertainties about outcomes? Where gaps appear, determine their legitimacy. (Does information exist and applicant has ignored or not known about it, or is it really a gap in human knowledge?) Where knowledge does not exist has the worst-case scenario been considered?
- Is there certainty that a representative range of community values have been considered? Is there certainty that sectors of the community will not be adversely affected at the advantage of others? Has a cautious approach been taken when considering the needs of future generations?
- Have valuation methods been appropriately used in weighing up the costs and benefits? Has scarcity been appropriately factored into valuation and assessment of resources proposals? Have appropriate factors been considered when considering compensation for non-sustainable use of renewable or resource rents and royalties for the use of non-renewable resources?
- Can consent conditions provide for early-warning of environmental degradation?

4. The principle is generally understood as shifting the burden of proof from environmentalists (that of proving that a development would cause significant harm) to developers (to prove that it would not cause such harm) (see Gullett 1997: 59).

out information. Walker (1994: 291) has lamented that an EIA cannot offer a "dispassionate assessment" of a proposal. A difficulty arises here in ensuring that EIAs adequately cover uncertainty at each relevant stage of the process. Time limits for preparing assessments may need to be relaxed to ensure that adequate information is obtained. This would be politically unpalatable due to persistent industry pressure for speedier project approval processes. Yet, depending on the jurisdiction, this may be a necessary trade-off to ensure that rigorous EIAs are prepared. Also, an opening-up of review processes would be required. Wood (1995) has noted that independent EIA review, although contributing to increased cost and delay, has produced good results in Canada and The Netherlands. A sound approach would be to have expert independent panels - perhaps modelled on those in Victoria or Canada - to review EIAs and summarise the magnitude of uncertainty involved and to provide recommendations with respect to whether projects should proceed, or under what circumstances they would be acceptable. This conclusion would then be forwarded to the responsible minister for the final decision following the procedure outlined below.

Step 3: Substantive influence on decision-making

The numerous calls in policy documents and academic literature for ESD principles to be incorporated in EIA have tended to focus on reforming EIA procedure and have tended to neglect substantive outcomes of the process. It is essential that ESD principles govern, or at least heavily influence, decision-making related to the approvals process for major developments. In relation to the matter at hand, once uncertainty is explicitly taken into account in environmental assessments, the next step would be to ensure that proper consideration is given to it in final decision-making. Simply addressing uncertainty in an EIA will not necessarily lead to it determining the final decision. A legal rule needs to be

Table 4. Proposed criteria for precautionary decision-making

(Tickner 1998)

Causal inference criteria

- Strength of evidence (experimental and observational)
- Amount and consistency of evidence across a wide range of circumstances
- Temporality of effect
- Coherence with existing knowledge
- Plausibility of effect
- Have all evidence and all plausible hypotheses been considered?
- Power of study(ies) to detect an effect
- Is the evidence statistically significant or of public health significance?
- Is there some presumption of causal relatedness based on previous experience which would lower the evidentiary standard? (i.e., is there evidence from any other similar case that would lead one to believe that a similar impact could be considered in the present case?)
- What is the adverse effect being studied and is it the correct one?

Decision-stakes criteria

- Spatial scale of cause and effect: local-national-regional-international-global
- Magnitude of possible impacts (on both humans and natural systems)
- Temporal scale of potential impacts
  - timing (near, medium, long-term)
  - longevity (short, medium, long)
- Reversibility (easily quickly reversed or expensive/irreversible)
- Mensurability of factors and processes (well-known/ignorant)
- Degree of complexity and connectivity
- Is the action robust to uncertainties (error friendly)?
- Do alternatives or measures exist to reduce or eliminate potential harm (ease of prevention)?
- What is the trade-off between further study and potential impacts?

formulated requiring the prohibition of an activity or the implementation of other appropriate precautionary measures where the threshold for application of the principle is met. This would be the case unless there is sufficient evidence that the level of uncertainty (where outcomes cannot be given probability distributions) involved, not merely risk (the amalgam of the probability of an outcome and the seriousness of its consequences) is acceptable (see Farrier 1995: 351). To improve environmental management, EIA recommendations should be highly persuasive. This would alter their character from being merely a procedural step more to an approvals process - although this approach is not without its critics (Buckingham 1996). A potential problem is that, if the EIA process were to become an approvals process, there would be more attempts by proponents and governments to avoid the process (Environment Protection Agency 1994c: 108). This would mean that the initial discretion relating to whether a proposal requires an EIA would need to be narrowed and coupled with a stricter interpretation of triggering elements (see Buckley 1991; Whitehouse 1993).

Confining final decision-making discretion on this basis would improve the integrity of the process by ensuring that decisions which conflict with precautionary recommendations are based on pre-determined relevant considerations. This should take the form of a legislative presumption that the responsible Minister adopts the expert recommendations contained in independent reviews of EIAs. To ensure that ministerial discretion would not be usurped, this presumption would be displaced if compelling reasons are given as to why, in the instant case, precautionary recommendations should not be followed. This could be achieved in a manner similar to the 'bounded' decision-making established in Canada under the innovative *Canadian Environmental Assessment Act* 1995 (CEAA). The Act fetters the discretion of the responsible authority (section 37(1)(b)) thus:

> "[W]here, taking into account the implementation of any mitigation measures that the responsible authority considers appropriate, the project is likely to cause significant adverse environmental effects that cannot be justified in the circumstances, the responsible authority *shall not* exercise any power or perform any duty or function conferred on it or under any Act of Parliament that would permit the project to be carried out in whole or in part" (emphasis added).

The important aspect of this provision is that the project cannot proceed once it is established that the project is 'likely' to cause significant adverse environmental effects, unless the effects can be justified in the circumstances. Such a conclusion can be overturned only by Cabinet Order-in-Council. Previously, the responsible authority had complete discretion regarding whether to accept or implement environmental assessment recommendations (Sadler 1995: 121). However, the proposal submitted here goes further than the CEAA in so far as a similar provision in Australian EIA Acts could read:

> "Where, taking into account the implementation of any mitigation [eg precautionary] measures that the Minister considers appropriate, the project is likely to cause significant [or non-negligible] adverse environmental effects or there is a non-negligible level of uncertainty as to whether such effects may result, the Minister shall not exercise any power or perform any duty or function conferred on the Minister or under any Act of Parliament that would permit the project to be carried out in whole or in part, unless the Minister provides compelling reasons why this is inappropriate in the circumstances."

A separate provision would be needed to elucidate the "compelling reasons" exception. It would list other exigencies which, in particular circumstances, could outweigh the uncertainty which attaches to a proposal. This could include significant economic effects and any adverse environmental effects that may occur if the project does not proceed. However, the Minister must demonstrate that he or she has taken into consideration overarching ESD principles. Judicial review must be made available to ensure the adequacy of reasons and to ensure that there is not merely *pro forma* compliance with other procedural requirements[5]. The ability of the public to challenge a decision is essential because the appropriate precautionary approach may conflict with vested interests of the proponent or the government of the day. The important point is that, once the threshold for project denial is reached, the onus is placed on the proponent, and in turn, the Minister, to justify the project against precautionary criteria.

Although by allowing argument against the application of the principle this procedure would in some cases enable precautionary recommendations to be avoided, the principle has never been considered to have mandatory application in all situations. The approach outlined here would ensure that uncertainty is expressly taken into account and that the necessary balancing act of environmental, economic and social issues is undertaken not simply by considering available scientific evidence but also by being critical of such evidence and taking into account the absence of scientific data - amounting to a fundamental re-evaluation of how costs and benefits are estimated. It would require (where appropriate) precautionary measures to be taken unless there is sufficient evidence

5. Judicial review would not usurp ministerial discretion because the nature of judicial review is to ensure sound decision-making — not to implement policy. See Raff (1996: 132) for a discussion on the beneficial nature of objector participation in the planning process. In the United States, it has been held that an agency preparing an EIS must consider in "good faith" the environmental consequences of its activities and must not make arbitrary decisions. This involves taking a "hard look" at the adverse environmental impacts (Holland 1985: 761; Raff 1997: 216).

to conclude that the benefits of proceeding with a development proposal outweigh the uncertainty involved. This would be a utilitarian incorporation of the principle allowing environmental trade-offs for other expected benefits in appropriate situations. This approach would make EIA more ethical and far-sighted and would facilitate the substantive behavioural change necessary to achieve sustainability. EIA would become a truly precautionary process. The need for the approach presented above is demonstrated in the appendix by the shortcomings in the approvals process for the Port Hinchinbrook resort development in Queensland which spurned the most recent Australian judicial consideration of the principle.

Conclusion

EIA is arguably the most obvious vehicle for giving effect to the principle. However, the necessary procedural reform of the EIA process suggested above cannot be allowed to overshadow the *purpose* of EIA - that matters affecting the environment are fully examined and taken into account in development decision-making so that activities avoid or minimise anticipated adverse environmental effects. It is vital that parliament prescribes that the principle is given greater weight in decision-making, for example, by giving it presumptive application. In addition to advancing precaution in both a practical and normative sense, EIA would be given a more concrete conceptual foundation.

As we embrace ESD principles we need to take a more holistic perspective and recognise the interlinked nature of environmental processes and human activities. EIA is a tool which assists us in determining the future implications of our activities and the precautionary principle enables us to consider carefully whether we proceed with potentially risky endeavours in the face of uncertainty. The Federal and State governments have the opportunity to draw on the wealth of literature on ESD and EIA generated in the last five years and undertake a revision of EIA processes and enshrine the principle in EIA legislation.

Postscript

At the time of writing (early-1998), the Commonwealth government released its consultation paper on the reform of Commonwealth environment legislation, a large-scale review conducted over a period of two years (Department of the Environment 1998). Of relevance to the matters discussed above, the Commonwealth government has proposed a new Environmental Protection Act to replace the existing *Environment Protection (Impact of Proposals) Act* 1974.

The review presented the Commonwealth government with an excellent opportunity to entrench sustainability concepts in its fresh legislation by mandating application of principles of sustainable development in appropriate circumstances. However, as far as the broad underpinnings of sustainable development go, the proposal goes no further than expressly recognising the precautionary principle and the principle of intergenerational equity in the proposed Act. There is no indication of exactly how these principles will be taken into account in designing case-by-case EIAs or final decision-making. The proposal does not provide a mechanism to ensure that these principles are considered and accorded appropriate weight in decisions made under the Act. The proposed Act will "enable", rather than mandate, consideration of "any relevant cumulative and regional impacts of a proposal" (Department of the Environment 1998: 14).

The proposal foreshadows that the trigger for a Commonwealth EIA will be where there "may" be a "significant" impact on a matter of "national environmental significance". This last criterion is expanded upon but it appears that an activity, the environmental effects of which may cross a State border (for example, by cumulative or other more distant effects), but otherwise does not meet the test of "national environmental significance", will not trigger the process. In fact, the review reflects the 1990s trend of the previous Labor and current Coalition Commonwealth governments of minimising the ambit of federal involvement in environmental matters by increasing the role played by the States, in this case, by confining matters which trigger the Commonwealth process and promoting State EIA accreditation. At present, there is little reason to be optimistic about greater reliance being placed on the precautionary principle at the Commonwealth level in the short-term.

Appendix: Port Hinchinbrook Resort Development

Port Hinchinbrook, located in the Hinchinbrook Channel in north Queensland adjacent to two World Heritage areas, is one of the most controversial developments in Australia in recent years. Although - remarkable in itself - no Commonwealth EIA or equivalent Queensland process was ever conducted, in June 1994, the then Federal Environment Minister, Senator Faulkner, commissioned a report into the impact of the development on surrounding World Heritage areas. The "Valentine Report" concluded that there was an inadequate level of baseline data on which to consider properly the development proposal and that there was "a great deal of uncertainty" about the impacts of the proposal. It recommended that considerable further study be undertaken "to clarify the extent and significance of the impacts should the proposal proceed" (Valentine 1994: 3). However, the report was able to conclude that the development was bound to lead to "intractable" environmental problems.

The present Environment Minister, Senator Hill, formally approved the development on 22 August 1996 by issuing consent orders under the *World Heritage*

Properties Conservation Act 1983 (Cth) *(World Heritage Act)*. In granting approval, Senator Hill relied upon a review of the Valentine Report commissioned by his department which satisfied him that the development could be carried out "in a manner which is consistent with the protection, conservation and presentation of the World Heritage values of the area and without causing any significant damage to the immediate environment" (Department of the Environment, Sport and Territories 1996). However, the support which the review gave to Senator Hill's decision was tenuous and, in some aspects, absent. Fifteen possible impacts on World Heritage values had been documented and the report concluded that in relation to some impacts there was insufficient evidence to predict their effects.

A legal challenge to the validity of the Minister's consent orders was instituted in December 1996 by the Friends of Hinchinbrook Society (1997) in the Federal Court of Australia (Flemming 1997; Lyster 1997). Of relevance to the matter at hand, the applicant contended that in exercising his powers to grant consent orders, the Minister failed to apply the "precautionary principle" and thus failed to take into account a relevant consideration. With respect to the principle, Sackville J noted (at 100) that it, as adopted by the IGAE, is not a relevant consideration which the Minister is bound to take into account in exercising the powers conferred by the *World Heritage Act*. His Honour noted that:

> "[i]t may be that the 'commonsense principle'...is one to which the Minister must have regard. But this would flow from the proper construction of the relevant legislation and of its scope and purpose, rather than the adoption by representatives of Australian governments of policies and objectives relevant to a national strategy on the environment."

In Sackville J's opinion, to the extent that the Minister was required to take account of the need to exercise caution with regard to scientific uncertainty, he did so. The Minister had before him a "good deal of material suggesting a 'cautious' approach to the exercise of power." Although the Minister did not expressly refer to the principle in his reasons to grant the consent orders, "he took steps to put in place arrangements designed to address the matters of concern identified in the scientific reports" (at 101).

The case, which concerns only the lawful exercise of Ministerial authority with respect to the *World Heritage Act*, demonstrates the inability of the existing development approvals process to require the Minister to give appropriate weight to precautionary considerations when considering to approve development projects.[6] The need to reduce less important political considerations in the decision-making process is underscored in this case due to the considerable political machinations surrounding the proposal which involved different Federal governments and provoked State/Federal tensions. If the EIA process advocated here had been used, the assessment would have contained a much fuller examination of the environmental uncertainties involved than the less formal assessments which were prepared. The level of uncertainty identified most likely would have put an onus on the Minister to address the relevance of the precautionary principle to the proposal and to justify why certain precautionary measures (principally, denying project approval or significant project modifications) would not be taken. In the event that he could not do so adequately, more precautionary measures would need to be taken, possibly involving refusing project approval, or at minimum, delaying the decision to enable more information to be obtained. This would have been a clearer and more systematic process by which the principle would have been given express consideration and appropriate weight in a situation in which this clearly needed to be done.

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6. See Lyster (1997) for argument that *Friends of Hinchinbrook* was wrongly decided on the point that the precautionary principle is not a relevant consideration for the decision-maker upon a proper interpretation of the nature, scope and objects of the *World Heritage Act*, or alternatively, as a specifically relevant policy instrument. Lyster also contends that, in a judicial review, a decision-maker would not be held to have been acting *ultra vires* if he or she took the principle into account as a relevant consideration (see also Pearson 1996: 50).

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