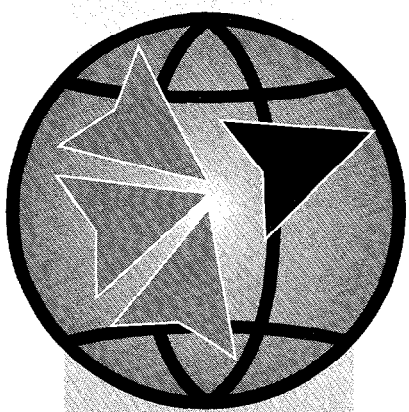
ENVIRONMENTAL ASSESSMENT: TOWARD IMPROVED EFFECTIVENESS

International Study of the Effectiveness of Environmental Assessment



INTERIM REPORT AND DISCUSSION PAPER

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Acknowledgements

This report has drawn extensively on background materials in press or under preparation for the effectiveness study. In preparing the report, considerable support and assistance was extended by participating organisations and individuals. Their advice and input is gratefully acknowledged. Except where original sources are cited, however, the interpretations made here do not necessarily correspond with the views of the institutions and individuals listed herein. As noted, the report outlines broad options for change that are open to review and revision.

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PREFACE: THREE STARTING PROPOSITIONS

The environment matters more that ever before. Human activities are altering natural cycles and systems on an unprecedented scale. For the first time, the side effects of development are estimated to be on par with biophysical processes as an agent of ecological change. Most indications are that exponential population and economic growth, which drive these effects, will continue for the immediately foreseeable future. Whether this course of development is or can be made sustainable are the fundamental questions that confront world society.

Risks and impacts are more significant than ever before. During the past quarter century, from the Club of Rome study to the Brundtland Commission report, the tenor of the policy debate about limits to growth and options for circumventing them has changed markedly. But the underlying trends in resource use and pollution flows have not. They remain unforgiving. At the edge of the 20th Century, we live in a greenhouse world of ozone windows and vanishing species and of widening inequality between North and South that is potentially destabilising. Many reputable scientists consider that the impact of human activities on the biosphere is reaching critical thresholds, with the consequent threat of ecological breakdown and social conflict.

Environmental assessment is more important than ever before. It is a key tool for analyzing the impacts and risks of development proposals and activities. This approach, in turn, provides a basis for designing policies and projects that take account of environmental consequences. However, environmental assessment also needs to be strengthened and extended to deal with new realities and challenges, including the large-scale changes in the integrity of natural systems noted above. This is a point of departure for the present study of the effectiveness of environmental assessment, which deals with the currency of practice -- methods, processes and procedures -- and how these can be upgraded.

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1.0 INTRODUCTION

"Identify and develop methods and procedures...which will insure that present unquantified environmental values may be given appropriate consideration in decision making..."
Section 102(b), US *National Environmental Policy Act* (NEPA) 1969.

"Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment..."
Principle *17, Rio Declaration on Environment and Development, 1992.*

Environmental assessment (EA) stands at a milestone and a cross-road of process development. NEPA and the Rio Declaration are the institutional benchmarks that symbolise the progress made over the last 25 years in the use of EA and the challenges to contemporary practice. During the intervening years, from 1969 to 1992, EA was adopted world-wide, its scope of application broadened significantly, and impressive advances occurred in methods and procedures. Yet, EA is also widely recognised as falling short of realising its full potential for contributing to informed decision making. The pros and cons of EA practice, well documented in the professional literature, take on added force and urgency in relation to the sustainability principles and protocols established at the Earth summit.

In response to these concerns, a review and comparison of the effectiveness of EA is being undertaken by a consortium of countries and international organisations. The aim is to gain a better understanding of how well EA systems, processes and components work in practice. A collaborative approach, primarily based on exchanging and pooling case experience with EA, is taken to data gathering and analysis. Key considerations include benchmarking progress, identifying success and shortfalls of current practice, evaluating its relevance to decision making, and building on strengths and accomplishments to improve the capability of EA as a sustainability tool. Study objectives and methods are summarised in Box 1.1 and the main research themes are outlined in Annex 1.

Broadly stated, the effectiveness study can be divided into three interrelated streams of work. These deal with:

i) core processes and practices -- namely project-level EIA, strategic environmental assessment (SEA), and EIA plus SEA for sustainability assurance (see Box 1.2 for definitions);

ii) capacity building -- including research, training and cooperative activities for advancing core processes and practice with particular reference to requirements of developing countries; and

iii) related trends and issues -- covering overall developments in EA theory, practice and professional activity that bear upon and influence effectiveness and performance.

This interim report is concerned with the core processes of EA, which are the focus of the **program** of activities undertaken by the Steering Committee of the effectiveness study. When combined together, project **EIA,** SEA and environmental sustainability concepts and approaches constitute a "second or next generation" process. The building blocks of this framework are in place already in the countries and international organisations participating in this study. However, their integration is still incomplete and a number of elements of current practice also need to be strengthened. These aspects are the focus of discussion in this interim report, together with certain additional proposals for advancing the application of EA as a sustainability tool.

The discussion is organised into four main parts:

i) background review of EA effectiveness;
ii) requirements for strengthening project **EIA;**
iii) status and challenges of SEA, and
iv) proposed rules for ESA

Box 1.1: Effectiveness Study Design

Objectives	Modes of Approach
- to review current issues, emerging trends and future directions in EA	- literature review, surveys, workshops and consultation - background studies, challenge statements, resource papers for IAIA'96
- to examine relevance of EA to decision making	- country status reports, audits of cases and successes - response to questionnaire by members of IAIA and other networks
- to document what works well in existing approaches	- case studies of best practice, pilot and demonstration projects, database of case studies and other materials
- to recommend measures for improving EA	- interim and final reports on EA core processes and competencies

Box 1.2 Initial Definition of Terms

Environmental assessment (EA) is a generic approach to development planning and management. It encompasses both project-level environmental impact assessment (EIA), concerned primarily with analyzing and mitigating the adverse effects of development proposals, and strategic environmental assessment (SEA) of policies, plans and programs. Both EA and EIA are also understood to include other forms of impact assessment; for example, social impact assessment (SIA), risk analysis, technology assessment and environmental health impact assessment (EHIA). Environmental assessment for sustainability assurance explicitly addresses the maintenance of the "source and sink" functions performed by natural systems; it is referred to here as environmental sustainability assessment (ESA for short).

2.0 BACKGROUND: ENVIRONMENTAL ASSESSMENT IN PERSPECTIVE

Environmental assessment is part of the standard "tool kit" for policy analysis. It is usually applied as part of a systematic approach to identifying, evaluating and managing the effects of development proposals, ensuring that environmental, social and related impacts are avoided or mitigated. Numerous studies have described the anatomy of EA systems, processes and components. These aspects will be taken largely as understood here. A brief introduction is given to:

i) the evolution and characteristics of EA;
ii) concepts and dimensions of effectiveness; and
iii) the status of current practice.

2.1 Trends **and Lineaments of Assessment**

During the past 25 years, EA has undergone a remarkable expansion, from a novel instrument to a widely used approach for development planning and management. The architects of NEPA, when specifying the environmental impact statement as the action-forcing mechanism for implementing legislation, clearly intended to redirect federal policy making and administration. What they likely did not foresee was the extent to which EA would become widely used by other countries, culminating two decades later in the Rio Declaration which calls for the universal adoption of EA. Based on its acceptance and use, environmental assessment can be judged as a highly successful policy mechanism.

The evolution of EA is characterised by continued innovation in law, procedure and methodology. Several phases in process development can be identified (see Box 2.1). For most countries, the major trends listed in Box 2.1 will not necessarily correspond with the approximate dates given for their onset. The sequence is likely to apply only to countries that made an early start with EA, for example, USA (1969), Australia (1973), Canada (1973), New Zealand (1973) and France (1976). However, it is the overall process and direction of progress in EA that is important, and particularly notable are recent international developments (see Box 2.2).

As indicated, EA evolved from a relatively limited process of impact analysis and mitigation toward a more integrative, multi-purpose, inter-disciplinary approach to development planning and decision making (as described in the founding language of NEPA). Four trends have been instrumental in this transition:

i) including a greater range of factors in EA, e.g. social, risk and health issues;
ii) extending the temporal and spatial frameworks for impact analysis, e.g. to include cumulative and regional scale effects;
iii) addressing development issues at the policy, plan and/or program levels; and
iv) incorporating sustainability perspectives and principles into EA practice.

In broad outline, EA has become a distinctive form of policy analysis. The technical, predictive approach, rooted in the rational-scientific tradition of the component natural and social sciences, remains a cornerstone of procedure and practice. No longer, however, is EA only an impact science it is also trans-science and policy science, i.e., concerned with facts and values and their incorporation into decision making. As an impact science, EA is increasingly applied with reference to holistic, long term ecosystem perspectives and to sustainability frameworks, i.e., in which the interactions among environment, equity and economic considerations are explicitly considered.

From the standpoint of the above "sciences", the issues typically addressed in EA have three basic or fundamental characteristics. These are:

i) uncertainty about the consequences of a proposed_ action;
ii) conflict of interests and values over outcomes; and
iii) divided policy mandates and institutional roles and responsibilities.

By their nature, these characteristics bear significantly upon what realistically EA can achieve in practice and so represent important background considerations in reviewing its effectiveness.

Box 2.1 Major Trends in EA

The evolution of EA can be divided into four main phases:

i) initial development (early 1970s) -- introduction of basic principles, institutional arrangements and analytical techniques for conducting EA;
ii) expanding scope (later '70s, early '80s) -- progressive inclusion of social, risk, health and related factors, improved opportunities for public participation, greater focus on impact management;
iii) process redirection (mid-late '80s) -- increasing efforts to address cumulative effects, to integrate project-level EIA with policy, planning and regulatory frameworks, and to establish monitoring, audit and other follow-up procedures;
iv) toward a sustainability paradigm (to date) -- development of strategic environmental assessment (SEA), new requirements for EIA established by international conventions (e.g. biodiversity), introduction of consensus-based dispute settlement procedures.

Box 2.2 International Developments in EA in the 1990s

In the last five years, significant international developments in EA include:

i) major reforms were made or are pending to well established EA systems (e.g. Australia, New Zealand, Canada);
ii) the European Community Directive on EIA (1985) was widely implemented and has driven domestic reform in UK and other member states;
iii) the World Bank and other development assistance agencies established EA policies and procedures and introduced the process into many developing countries;
iv) the Espoo Convention (UN Economic Commission for Europe (UN ECE) Convention on EIA in a Transboundary Context, 1991) identified principles and provisions for EA of projects and activities with transboundary effects; and
v) additional requirements were placed on EA by the UN Conventions on Climate Change and Biological Diversity (1992).

2.2 Dimensions and Concepts of Effectiveness

Put simply, the effectiveness study is about evaluating practice to improve performance (and vice-versa). This is something that EA practitioners do all the time in one way or another, though often informally. As well, there are examples of systematic appraisals of EA performance at both the macro (system-wide) and micro (process-application) levels. Usually, these have taken place in countries with substantial experience in EA, often they form part of the review and reform of national systems or aim to improve processes and procedures. There is now increasing interest in the frameworks and methods for evaluating the effectiveness of assessment and in applying these to broader, comparative reviews of national and international experience. In that regard, aspects of critical interest include the relative strengths and weaknesses of EA systems and processes, the results achieved and the extent to which these meet established objectives and / or widely agreed principles.

Overall, EA effectiveness can be judged by how successful the process is in performing the purpose(s) it was established to serve. The framework of evaluation can be drawn broadly or narrowly. At a minimum, EA is applied to identify, evaluate and mitigate the adverse effects of individual projects and proposals. This definition establishes what may be termed a basic test of EA performance. In more advanced form, EA is applied as a mechanism for sustainability planning, ensuring that development proposals and activities are consistent with the regenerative and assimilative capacities of natural systems. This perspective establishes what may be termed an advanced test of EAs overall performance. Under both frameworks, subsequent questions relate to the enabling conditions and operational components which facilitate or impede successful performance.

These aspects of performance are difficult to measure in any satisfactory way using established research methodology. EA processes involve a complex sequence of activities, which is influenced by the play of real world events. So many variables intervene between specified objectives and the actual results and impact outcomes (themselves difficult to determine and monitor) that only a proximate or contingent determination can be made of effects and relationships. More positively, however, research and practice point toward the basis for a discriminating approach to EA performance. Box 2.3 summarises the key steps of effectiveness review. These are described below and elaborated in a draft workbook on comprehensive evaluation.

A surrogate indicator of the overall effectiveness of environmental assessment is its impact on decision making (broadly defined). The key criterion here is relevance of EA, whether it makes a difference at the main stages of the decision making process. A checklist of questions can provide performance indicators (the 3 i's in Box 2.3):

i) does EA facilitate informed choice by providing clear, appropriate and balanced information;

ii) does EA influence a) ongoing project design, including siting and alternatives, and b) final approval, including the terms and conditions for impact monitoring and management; and
iii) does EA result in environmental gains and benefits.

(Note that the second and third orders of relevance are ultimately dependent on actions taken by decision makers and others.)

The enabling conditions of good performance may be clarified by reference to the following sequence of questions (the abc's in Box 2.3):

i) is there a well founded institutional framework of laws, policies and principles;
ii) is there a soundly-based process, with clear procedures and provisions; and
iii) are the core activities competently undertaken by administrators, practitioners and others.

Operational components of good practice can be reviewed by focussing on the technical, consultative and administrative performance at key stages in the process (the 3r's in Box 2.3):

i) is impact analysis undertaken rigorously, i.e., consistent with the application of best practicable science with regard to the nature of the issues at stake;
ii) is public consultation undertaken responsively, i.e., having due regard to the concerns of those affected; and
iii) is the process administered responsibly and consistently, i.e., according to established provisions and procedures.

The effectiveness study was launched to gain a more systematic and disciplined perspective on these aspects of practice and performance and their variation under different operating contexts and regimes. Initial information was gathered through international workshops and meetings of administrators, practitioners and others directly responsible for the application and conduct of EA. Other research tools include the preparation of country status reports, case studies and a questionnaire survey of practitioners (with IAIA members as the main reference group) to benchmark the status 'of EA practice. An on-line data-bank of information and documents has been established by the Australian Environment Protection Agency.

Box 2.3 Dimensions of EA Effectiveness

The 3i's of EA relevance for decision making
- information provided
- influence on project design and approvals
- impact avoidance

The abc's of effective performance
- appropriate institutional framework
- baseline procedure and process
- competency of practitioners

The 3r's of sound practice
- rigorous analysis
- responsive consultation
- responsible administration

2.3 A Brief Snapshot of the Status of EA

A recent canvass of IAIA members provides an initial "snapshot" of the status of EA. The survey was intended to benchmark overall progress to date, based on views of professionals who are active in the field. Subsequently, the questionnaire was also circulated to other regional and national networks to gain additional specialised inputs (e.g. European EIA Trainers) or information on developments of particular interest (e.g. implementation of the New Zealand Resource Management Act). Only selected findings from the first mail-back of responses by IAIA members are outlined here. These highlights convey a flavour of generic trends and perspectives; a full analysis is in press.

Standards of Practice. Approximately 20% of respondents considered the overall standard of practice in their field of EA had improved significantly during the last five years; 60% indicated it had improved moderately; and the remainder thought that there had been little or no change. In elaboration, two-thirds of respondents agreed that "state of the art" science was applied in assessment practice only about half of the time or less; only 7% considered it was usually or always applied. The main limitations on application of "state of the art" science are seen as institutional and functional constraints rather than methodological and scientific competencies.

Performance of Assessment Activities. For each of the major components or activities of EA, from screening to monitoring and follow-up, respondents were asked to rate performance on the basis of a five-scale system. The grades and profiles for seven key activities are outlined in Box 2.4. Certain patterns stand out: across the board, between one fifth and one third of respondents grade assessment performance as excellent or good. Using these

grades, EIS preparation and screening appear to be the most effectively performed activity. By contrast, monitoring was considered to be poorly or very poorly performed by almost 60% of respondents.

Aspects of Success and Shortfalls. Six parameters of success or shortfall for EA are identified in Box 2.5, together with the patterns of response obtained. These indicate, for example, that approximately two thirds of respondents consider EA is either marginally or not successful in making precise, veritable predictions, or determining the significance of residual impacts. By contrast, a similar proportion view EA as very or moderately successful in encompassing a full range of considerations (e.g. social), identifying appropriate mitigation measures, and providing clear, consequential information for decision making. The latter approval rating falls, from 60% to 40%, when the reference is to the advice given on alternatives.

Influence on Decision Making. Information and advice is one thing; influence is quite another. The former aspects of success lie within the "quality control" of EA administrators and practitioners; the latter aspect does not. However, for most of the considerations listed in Box 2.6, the EA process is seen as being very or moderately influential in decision making. Approximately two-thirds of respondents considered that EA ensured environmental considerations are fully taken into account in decision making and that the process influences the terms and conditions of approval. This figure drops slightly (to 55%) with respect to the extent to which EA leads to redesign or modification of proposals. EA is seen as somewhat less influential in ensuring social factors are taken into account, and only one-third of respondents believe it ensures appropriate provision is made for monitoring.

End Results. In the final analysis, the effectiveness of EA must be measured against the results achieved. The judgement of respondents about the level of environmental benefits and safeguards provided by EA is outlined in Box 2.7. It makes for sobering reading: at best, EA is seen as sometimes minimising impacts to "as low as reasonably practicable levels" by 50% of respondents, and often or always doing so by only 29%. Nearly one-half of respondents consider that EA seldom or never ensures development is placed on a sustainable basis and over one-quarter believe that it seldom or never avoids irreversible changes. With respect to these judgements, it must be remembered that the downstream post-approval effect of EA is open to influence by many other factors.

Box 2.4 Effectiveness of Assessment Components

Eight activities were rated according to the following scale of sound practice (i.e. recognising constraints imposed by the state of the relevant science(s)).

- A. excellent (thoroughly and competently performed)
- B. good (minor omissions and deficiencies)
- C. satisfactory (some omissions and deficiencies)
- D. poor (significant omissions and deficiencies)
- E. very poor (fundamental flaws and weaknesses)

	A.	B.	C.	D.	E.
a) Screening	5%	31%	28%	18%	7 %
b) Scoping	7%	25%	28%	25%	6 %
c) Impact Prediction	1%	21%	42%	23%	4 %
d) Impact Evaluation	3%	19%	41%	27%	6 %
e) Mitigation	4%	20%	38%	28%	5 %
f) EIS/report preparation	6%	32%	33%	17%	4 %
g) Review	6%	27%	29%	23%	11%
h) Monitoring	2%	8 %	20%	40%	19%

Box 2.5 Perceived Success of EA

	Very Successful	Moderately Successful	Marginally Successful	Not Successful
a) Including a full range of considerations	13%	48%	30%	6%
b) Making precise verifiable predictions	1%	32%	45%	16%
c) Identifying appropriate mitigation measures	10%	51%	30%	2%
d) Determining significance of residual impacts	4%	28%	43%	19%
e) Providing clear, consequential information for decision makers	15%	44%	25%	8%
f) Providing relevant advice or alternatives	8%	33%	36%	15%

All percentages rounded; may not add up.

Box 2.6 Perceived Influence on Decision Making

	Very Successful	Moderately Successful	Marginally Successful	Not Successful
a) Environmental consideration are fully taken into account	20%	48%	24%	1%
b) Social factors are fully taken into account	11%	31%	40%	11%
c) Proposal redesign or modification	12%	43%	29%	9%
d) Establishing terms and conditions of approval	20%	45%	25%	3%
e) Ensuring appropriate arrangements for monitoring	10%	24%	49%	10%

All figures are rounded out; may not add up.

Box 2.7 Perceived Results Achieved by EA

	Always	Often	Sometimes	Seldom	Never
Minimises impacts of development to as low as reasonably practicable	7%	21%	49%	19%	3%
Avoids irreversible changes	4%	13%	53%	24%	4%
Ensures development is placed on a sustainable basis (i.e. within thresholds of ecological tolerance and social acceptability)	4%	11%	34%	41%	7%

3.0 STRENGTHENING PROJECT EIA

To date, EA has been applied largely at the project-level. In most national EA systems, all major development proposals with significant environmental effects are subject to review. This is a critical safety net for analyzing and mitigating the adverse effects of development. As such, project EIA is the cornerstone of contemporary practice, the area where core processes and competencies are best developed and where the results and benefits of assessment are most apparent. However, it is evident also that there are residual areas of weakness in project EIA and considerable scope for introducing value added measures.

3.1 **Process Assets and Limitations**

The successes and shortcomings of project EIA are reasonably well documented both in general and country-specific terms. A summary of the pros and cons of practice is provided in Box 3.1; and widely agreed principles of good practice are outlined in Box 3.2. When properly applied, EIA realises several dividends. These include:

i) sound project design and planning;
ii) informed decision making; and
iii) mitigation and avoidance of adverse environmental effects.

In many cases, however, projects with potentially significant environmental effects still escape full EIA or the process is undertaken as paper exercise to gain approvals, with only a marginal influence on project design and impact management. The deficiencies of project EIA identified in Box 3.1 fall into five main categories:

i) ***attitudinal*** - project proponents and development agencies resist or circumvent EIA or apply it as a pro-forma or narrowly technical exercise;
ii) ***structural*** - EIA is poorly integrated with decision making , with project implementation and/or with other supporting policy, planning and regulatory processes;
iii) ***institutional*** - the scope of EIA is narrowly defined or applied, such that social, health factors and cumulative effects are inadequately covered;
iv) ***procedural*** - inadequate guidance and inconsistent enforcement of the EIA process is at the root of many "user" complaints about fairness, timeliness and efficiency; and
v) ***technical*** - the quality of EISs, the accuracy of impact predictions and the suitability of mitigation measures are often highly variable, even in relatively mature, advanced EA systems.

National reviews of EIA effectiveness have also been undertaken, both independently and in association with the current study, for Australia (Commonwealth Environment Protection Agency, 1994), the Netherlands (van de Gronden, 1994), and the Nordic Countries (Hilden and Laitinen, 1995). For example, the strengths and weaknesses of the Netherlands EIA system, as assessed by Dutch administrators and practitioners, are summarised in Box 3.3. These are of wider interest because the Netherlands EIA system is widely acknowledged as a leading model by practitioners in other countries. All of the heads of the national agencies who attended the International Summit on Environmental Assessment acknowledged their systems were capable of improvement.

Subsequently, four priorities were identified for strengthening the generic process of project EIA. These are: scoping, evaluation of significance, review of EIS quality, and follow-up. An initial perspective in the four areas is given below. It draws on work developed in several countries on behalf of the Effectiveness Study (Au and Sanvicens, 1995; Everitt, 1995; Hilden, 1995; Sadler, 1995; Scholten, 1995) and incorporates the results of discussion at the Canberra workshop on Project EIA organised by the Australia Environment Protection Agency.

Box 3.1 A Report Card On Project EIA

Positive Aspects of Performance

A number of case examples demonstrate what EIA can and should do, namely:

- facilitate informed decision making by providing clear, well structured dispassionate analysis of the effects and consequences of proposed projects;
- assist the selection of alternatives, including the selection of the best practicable or most environmentally friendly option;
- influence both project selection and design by screening out environmentally onsound projects, as well as modifying feasible proposals;
- guide formal approval, including the establishment of terms and conditions of project implementation and follow-up;
- result in best practice prediction and mitigation of the adverse effects of projects; and
- serve as an adaptive, organisational learning process, in which the lessons of experience are fedback into policy, institutional and project design.

Box 3.1 A Report Card On Project EIA (cont'd)

Negative Aspects of Performance

There are many case examples that demonstrate widespread or perennial weaknesses of EIA:

- inconsistent application to development proposals with many sectors and classes of activity omitted;
- operates as a "stand alone" process, poorly related to the project cycle and approval process and consequently of marginal influence;
- non-existent or weak follow-up process, lacking surveillance and enforcement of terms and conditions, effects monitoring, etc.;
- cumulative effects and other factors, such as social and health impacts and risks, are not considered or inadequately treated;
- public consultation is perfunctionary and substandard, undertaken too late and with little reference to the requirements of affected groups;
- EISs and EA reports are voluminous, poorly organised and descriptive technical documents which are unhelpful or irrelevant to decision making;
- the process is inefficient, time consuming and costly in relation to the benefits delivered; and
- environmental impacts are understated and insufficiently mitigated and, as a result, the process looses credibility.

Box 3.2 Initial Principles for Effective EIA Practice

EIA should be applied:

- to all development projects activities likely to cause potentially significant adverse impacts or add to actual or potentially foreseeable cumulative effects;

- as a primary instrument for environmental management to ensure that impacts of development are minimised, avoided or rehabilitated;

- so that the scope of review is consistent with the nature of the project or activity and commensurate with the likely issues and impacts; and

- on the basis of well defined roles, rules and responsibilities for key actors.

EIA should be undertaken:

- throughout the project cycle, beginning as early as possible in the concept design phase;

- with clear reference to the requirements for project authorization and follow-up, including impact management and monitoring;

- consistent with the application of "best practicable" science and mitigation technology;

- in accordance with established procedures and project specific terms of reference, including agreed timelines; and

- to provide appropriate opportunities for public involvement of communities, groups and parties directly affected by or with an interest in the project and/or it's environmental impacts.

EIA should address, whenever necessary or appropriate:

- other related and relevant factors, including social and health risks and impacts;

- cumulative and long-term, large scale effects;

Box 3.2 Initial Principles for Effective EIA Practice (cont'd)

- design, locational and technological alternatives to the proposal being assessed; and

- sustainability considerations, including resource productivity, assimilative capacity and biological diversity.

EIA should result in:

- accurate and appropriate information on the nature, magnitude and significance of potential effects, risks and consequences of a proposed undertaking and its alternatives;

- the preparation of an impact statement or report that presents this information in a clear, understandable and relevant form for decision making; and

- the EIS should identify the confidence limits that can be placed on predictions and clarify areas of agreement and disagreement among the parties who were involved in the process.

EIA should provide the basis for:

- environmentally sound decision making in which terms and conditions are clearly specified and enforced;

- the design, planning and construction of acceptable development projects that meet environmental standards and resource management objectives;

- an appropriate follow-up process with requirements for monitoring, management, audit and evaluation;

- follow-up requirements that are based on the significance of potential effects and the uncertainties associated with prediction and mitigation; and

- learning from experience with a view to making future improvements to the design of projects or the application of the EA process.

Box 3.3 EIA In the Netherlands -- Perspectives of Administrators and Practitioners

Strengths and assets of the Dutch system include:

- based in law and applicable to all jurisdictions;
- flexible and allows for innovation;
- provides for independent review;
- guidelines establish a framework for review;
- produces an adequate set of alternatives, including the most environmentally friendly option; and
- results in the application of mitigating measures.

Areas for improvement include:

- better provision of information in the notification of intent;
- greater focus on key issues in scoping process (guidelines needed);
- tailoring the EIS to decision making requirements and licensing documents to technical details and conditions;
- clearer identification of EIS information in the decision-record;
- applying EIA to the strategic level of decision making;
- training programs for upgrading EIA skills;
- more selective post project evaluation;
- targeting documentation for different "client groups" (executive and "popular" summary);
- facilitating pro-active involvement of the public;
- better exercise of individual responsibilities in the EIA process, with the competent authority recognising its leading role;
- linking the planning and EIA processes;
- earlier start to EIA procedure;
- identifying knowledge gaps for research; and
- assessment of public health and cumulative effects.

Source: Netherlands-Canada EIA Workshop, February, 1994.

3.2 Scoping

Scoping is a foundation for effective EIA. It refers to the process of identifying as early as possible:

- the appropriate boundaries of an EA study;
- the important issues and concerns (interests);
- the significant effects and factors to be considered; and
- the information necessary for decision making.

As an initial step in the process, scoping helps to place EIA on a sound basis. It has been an integral part of NEPA procedure and the US has over 20 years of practical experience in the area. A comparative assessment of the effectiveness of scoping is being undertaken by the US and Canada. For example, in both countries, public involvement is an essential ingredient of scoping. Because the process of issue definition is interactive, important "downstream' benefits are realised.

Major benefits of scoping include:

- focussing the EIA study on key impacts and alternatives;
- improvements in the efficiency of the process; and
- provision of timely, usable information for decision making.

Note, however, that even with a well-conducted scoping process, more detailed impact analysis will likely lead to some redefinition of significant issues and effects. These changes should be communicated to the involved public.

Experience in the US and Canada indicates that scoping is not always conducted in a disciplined fashion. In such cases, a number of problems occur, such as:

- significant or important issues are not identified, or identified too late in the review, resulting in costly revisions;
- irrelevant and insignificant issues are not eliminated, with consequent waste of time and money;
- information on impacts and environmental quality is often descriptive; and
- examination of issues and choice of alternatives often takes place outside of public view.

Scoping to evaluate and prioritize issues, first, involves generating a wide range of inputs. These need to be quickly winnowed down and consolidated. A step-by-step approach is outlined in Box 3.4. The completion of an effective scoping process should result in three tangible products:

- a strategy for addressing the issues that are identified;
- a clear, concise terms of reference for the EIA report; and
- an issue-based information system for storage, retrieval and analysis of the information that is generated during the EIA.

Box 3.4 A Step-by-Step Approach to Scoping

For large scale projects, the following steps may be necessary:

- assemble available information;
- interact with stakeholders;
- circulate basic information about the project and the environment;
- obtain input from stakeholders;
- evaluate and prioritise issues;
- develop an information system to track issues;
- formulate a strategy to address the key issues; and
- establish terms of reference for the EIA.

3.3 Evaluation of Impact Significance

Evaluating the significance of environmental effects is a critical activity in project EIA. Often, the determination of significance bears directly on project approvals and condition setting. In many jurisdictions, the standard practice is to evaluate significance after:

- predicting the nature and magnitude of impacts based on before versus after project comparisons; and
- identifying measures to mitigate these effects.

Key criteria that are or may be applied individually or in combination to test for significance, include:

- environmental standards;
- resource management objective; and
- sustainability principles and rules of thumb.

The above examples move from specification of ambient threshold levels (e.g., for acceptable pollutant loadings) toward progressively more qualitative approaches, based on professional judgement of the ecological context and functional consequences of predicted loss and change.

Often, a checklist of critical or early warning indicators for evaluating significance of residual impacts are contained in EIA guidelines. For example:

- rare or endangered species;
- commercially significant stocks; and
- heritage, wilderness or protected areas.

In practice, the evaluation of impact significance appears to be a difficult, blurred and ambiguous area of practice. Often, scientists evaluate significance differently and the intrusion of wider public concerns and social values is inescapable and contentious. To some degree, the evaluation of significance of effects is subjective, contingent upon values,

and dependent upon the environmental and community context. For example, the attribution of impact significance in the Netherlands, as compared to Australia or Canada, stem from the different pressures and capacity issues experienced in a small, intensively settled country.

In reality, then, "significance" can take on many connotations. The evaluation of significance need not be limited to a formal analysis of impact predictions; informal or intuitive evaluations can be made at several phases of the EA process. An alternative approach to the standard practice noted above emphasises the connections between different phases of significance evaluation, from screening to project approval and monitoring, and encompasses two "tracks" of evaluation. These are described in Box 3.5.

Box 3.5 Approaches to Evaluating Significance

Option 1:

- Technical criteria may be applied when major changes in the environment can be predicted with reasonable accuracy. In principle, this track can be handled conventionally by the competent authority with public input.

Option 2:

- When there is a lack of information on impacts, significance can be interpreted by reference to overall characteristics of the project and general sustainability principles. This qualitative interpretation of significance is best undertaken through "scientific negotiation" involving the main actors.

Note:
Depending on available knowledge, impact evaluation could combine both elements above, as follows:

Option 2, the negotiatory approach, is appropriate to the early phase of assessment; and
Option 1, the technical approach, is appropriate to the later phase of the process.

Source: Hilden,1995; EIA Workshop, Canberra, 1995.

3.4 Review of EIA Quality

A review of EIA quality typically takes place after the completion of an EIS or equivalent report and before its submission to the responsible agency. This pre-decision review focuses on:

- sufficiency of information provided (e.g., complete and conforms to study objectives);
- reliability of analysis or interpretation (e.g., consistent with state of scientific knowledge and methodology); and
- utility for decision making (e.g., clear description of environment consequences and, where appropriate, management options).

There are various institutional arrangements and approaches for reviewing EIA quality, including:

- review by the lead authority / agency (e.g., UK);
- review by environmental agency (e.g., Australia);
- inter-agency review (e.g., USA);
- public review by independent panel (e.g., Canada);
- review by an independent, standing commission (e.g., Netherlands);
- review by a standing commission within the government (e.g., Italy, Denmark) and, on appeal;
- review by an environmental ombudsman (e.g., New Zealand).

Independent review has a number of advantages. The Dutch system has been closely scrutinized in that regard. An independent Commission for EIA reviews the quality and adequacy of EISs for decision making and, when necessary, recommends the measures for remedying serious shortcomings in information. Usually, these recommendations are followed and implemented. The review by the Dutch EIA Commission, however, refrains from judging the desirability or viability of the implementation of the proposed activity. The actual decision on how to proceed with the project (go / no go, with or without conditions) is the responsibility of the competent authority. By contrast, independent panels in Canada do make recommendations on project disposition and, in certain provinces, also have decision making powers.

Various methods are or could be applied to EIA review, some of which mirror those used in impact analysis. For example, EIA review checklists used in Europe are based on a series of questions to determine whether the information is:

- complete -- all information relevant to the decision making process is available, and additional information is not required;

- acceptable -- the information presented is complete, and the omissions need not prevent the decision making process to proceed (additional information may be gathered in the course of subsequent steps); and

- adequate -- the information presented contains no major omissions or, additional information is necessary before the decision making process can proceed.

Experience with internal and independent review in a number of countries confirms the reservations, expressed earlier, about the quality of EIA. Typically, EISs are characterized by deficiencies and limitations of varying severity. Four examples from the Netherlands are summarized in Box 3.6. These also demonstrate that a review of EIA quality helps to correct the deficiencies of a specific report, to improve its utility for decision making and to reinforce overall competencies. In sum, the review of EIA quality should be seen as a learning and problem-solving process rather than a fault finding activity. A "best practice" approach to EIA review is outlined in Box 3.7.

Box 3.6 Examples of Deficiencies Noted in Reviews of EISs in the Netherlands

Objective of the activity is described too narrowly.

Example: The EIS describes the transport problem concerning the movement of people and goods between two places only in terms of road transport neglecting the potential for rail or other means of transport.

Selection of alternatives does not take into account environmental aspects.

Example: The EIS on a car racing circuit in a coastal dune landscape only considers alternatives meeting motor-sport requirements, visitor "needs" and public safety regulations, while overlooking environmental considerations such as noise abatement and ecological protection.

Key problems affected by the activity are not described.

Example: The EIS describes the proposed construction of a coal-fired power plant using surface water as a cooling medium. The EIS does not describe that the surface water body is already used by other industrial activities for the same purpose to the limit of its cooling capacity.

Sensitive elements in the existing environment are overlooked.

Example: The EIS on a pipeline project does not describe that the proposed alignment of the pipeline will dissect certain areas of ecological value.

Source: Scholten, 1995.

Box 3.7 A Proposed Approach to EIA Review

Based on "best practice" standards or guidelines, EIA review can determine one of four remedial options:

a) Deficiencies are serious and require a supplement to the EIS. When selecting this option, the review team must give a clear statement as to how the additional information can be collected and provide notification of delay to the decision making process.

b) Limitations are minor and can be rectified fairly easily by means of a set of explanations and conditions attached to the decision.

c) Shortcomings cannot be remedied immediately, e.g. by gathering additional information or attaching terms and conditions to the decision. Depending on their nature and severity, these may be addressed by impact monitoring and management.

d) In some cases, the review process itself may help to rectify limitations and shortcomings in the EIS. This option directly contributes to problem solving; but care must be taken not to comprise the review process.

Source: Scholten, 1995; discussion at Canberra EIA Workshop, 1995.

3.5 Follow-up

A systematic process of follow-up to EIA and decision making is critical to ensure:

- implementation of approvals;
- management of actual (as compared with predicted) impacts; and
- learning and dissemination of experience.

This phase of EIA is poorly developed and represents a major area of process weakness, especially in comparison to the attention and effort given to pre-decision impact analysis. Project surveillance and monitoring for compliance with condition setting represent bare minimum standards of EIA practice that are not always met (time, resources and competing demands are commonly cited). In some jurisdictions, the EIA process is advisory and the linkages to approvals, permitting and condition-setting is not explicit. Under these circumstances, enforceability and compliance become problematic.

Without some form of systematic follow-up to decision making, EIA is a pro-forma process for securing a development permit, rather than a meaningful exercise in environmental management. Because of the amount of effort, money and time that are devoted to project EIA, there is a need to safeguard the returns (i.e., environmental benefits, quality of decision making) on these expenditures. Systematic follow-up cannot turn an

environmentally unacceptable project into an acceptable one. At a minimum, however, it provides for quality control and corrective action. Because the actual effects of project construction and operation will probably differ from predicted impacts, additional mitigation measures or changes to compensation agreements may be necessary. This information is also helpful for gaining a better understanding of project activity (cause-effect relationships) and the utility of predictive and mitigative methods.

Key components of follow-up are:

inspection and surveillance -- to determine that the terms and conditions of the project approval are adhered to (or changes are made for good reason);

effects monitoring -- to measure environmental change during construction and/or operation to identify impacts that can be attributed to the project, to verify the accuracy of predictions and the effectiveness of measures;

compliance monitoring -- the periodic sampling and/or continuous measurement of environmental parameters, levels of waste discharge or process emissions to ensure that regulatory requirements are met; and

- environmental audit -- to verify the accuracy of the EIA predictions, the effectiveness of mitigation measures, and the compliance with regulatory requirements, internal policies and standards, or environmental performance limits.

Because of rapid economic growth, Hong Kong has given particular attention to follow-up once a decision is made to proceed on the basis of EIA findings. Recently, a systematic, comprehensive environmental monitoring and audit system has been developed, initially for the Airport Core Program Project (worth US $20.3 billion or HK $158 billion), and subsequently for other major projects in the territory. The system was put in place to reduce the gap between the promises made by proponents during EIA and performance during implementation. Its purposes are:

- to track the implementation of mitigation measures recommended in EIAs;
- to follow through the detailed design process to ensure that measures recommended in EIAs are fully and properly incorporated in design and contracting;
- to monitor the actual impacts of project implementation so remedial measures can be taken to reduce adverse impacts, where these are either worse than predicted or unanticipated; and
- to provide feedback for improving the EIA process and project planning.

Experience in Hong Kong and other countries indicates there are a series of actions that may be taken immediately to help establish or strengthen EIA follow-up:

- requiring the proponent to report back to government and the public during the EIA, thus improving accountability;

- closer surveillance of the implementation of terms and conditions of approval of major projects;

- focussing monitoring on verifying key impacts and providing quick feedback to those who are undertaking other similar EIAs; and

- documentation of the monitoring results and the implementation of the recommended measures.

The issues that need to be considered in designing and implementing a follow-up process are identified in Box 3.8.

Box 3.8 Establishing a Follow-up Process

Key issues for consideration are:

- nature and scope of follow-up requirements (e.g. monitoring, audit, etc.);

- roles and responsibilities of key players for meeting these requirements;

- institutional arrangements (legal, contractual or administrative) that are available to give effect to these requirements;

- resource and expertise needs for allocated tasks (e.g. independent consultancy team, in house staff, reliance on project proponent);

- coordination with the monitoring and follow-up activities undertaken by other agencies; and

- reporting of results.

Source: Au and Sanvicens, 1995.

4.0 EXTENDING STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA)

SEA is variously defined and applied. As used here, the term SEA describes the application of EIA principles at the higher - or pre-project - levels of decision making. Its aim is to evaluate and address the environmental consequences of and alternatives to policies, plans, programs and similar proposals at the same time and on the same level as economic and social concerns (see Box 4.1). This core definition is consistent with EIA principles and with the concept of integrated decision making, as stated in the sustainability agenda. In that context, SEA can be considered as a "transitional" instrument that facilitates and provides a vector for fully integrated policy making and planning in support of sustainable development.

While this approach shows considerable promise, SEA is both recent and restricted to a relatively small number of countries, sectors and categories of activity. Process development is still at an early, relatively fluid state, broadly comparable to that of EIA in the mid-seventies. Because SEA is at a formative stage, many critical issues regarding appropriate institutional arrangements, procedures and methods are yet to be resolved. An initial review of issues of SEA practice is undertaken in this section (see Box 4.2). It is based on a background report on the status and challenges of SEA (Sadler and Verheem, 1995), which incorporates the results of an international workshop, held under the leadership of the Netherlands Ministry of Housing, Spatial Planning and the Environment.

Box 4.1 Initial Definition of SEA

SEA is a systematic, proactive process for evaluating the environmental consequences of policy, plan or program* proposals in order to ensure they are fully included and addressed at the earliest appropriate stage of decision making on par with economic and social considerations.

* **Policies, plans and programs (the 3Ps) are terms that mean different things in different countries. Usually, however, the 3Ps refer to a hierarchy of decisions that preceed and either guide or initiate concrete projects.**

Box 4.2 Key Issues of SEA Practice

Frame of reference
What is SEA?
-- Definition
-- Evolving approaches
-- Relation with other policy instruments

Why is SEA useful?
-- Rationale for SEA

When is SEA useful?
-- Field of application
-- Screening for the most appropriate SEA

Institutional issues/ decision making
How to incorporate SEA in existing decision making?
-- Constraints & opportunities
-- Formal versus informal
-- Types of SEA provisions

Process/ procedure
-- How to involve the public?
-- What are the responsibilities of environmental agencies?
-- Are EIA procedures suitable for SEA?
-- How to link SEA to project-level decision making?
-- How to review the quality of SEA?

Methods/ techniques
-- How to prepare SEA studies?
-- How to develop alternatives at the strategic level?
-- How to identify and analyze impacts in SEA?
-- How to deal with uncertainties at the strategic level?
-- How to incorporate sustainability criteria?

Source: Sadler and Verheem, 1995.

4.1 Rationale for SEA

The case for undertaking SEA of policies, plans and programs is now well established and widely acknowledged. In brief, the rationale for SEA is threefold (see Box 4.3):

1. strengthening project-level EIA;
2. addressing cumulative and large scale effects; and
3. incorporating sustainability considerations into policy making.

Box 4.3 Advantages of SEA

Major benefits of applying SEA to policy making include:

- ensuring attention is given to environmental considerations and objectives in policy, plan and program development;
- providing environmental scrutiny of issues where project EIA is not possible, e.g. for policies, plans and programs that do not directly lead to concrete projects, such as fiscal or trade policies;
- allowing early identification and management of cumulative impacts, e.g., from multiple projects directly or indirectly initiated by a policy, plan or program and for classes of projects, which individually would not require EIA;
- establishing the basis for a tiered process of assessment of policy choices and options, e.g.,
  - -- waste processing (prevention, incineration or depositing?)
  - -- energy supply (supply mix , energy conservation?)
  - -- mobility management (public transport or building highways?); and
- strengthening EIA at the project-level, e.g.:
  - -- decreasing the workload through pre-assessment;
  - -- focusing on the residual issues of impact analysis and mitigation; and
  - -- narrowing the options to be considered, e.g. by pre-selecting environmentally-friendly and economically-feasible alternatives.

Source: Sadler and Verheem, 1995.

Strengthening project-level EIA. With certain exceptions noted later, EIA is primarily focused on how a proposed development should take place so as to minimise adverse environmental impacts. The prior questions of whether, where and what type of development should take

place are either decided or largely preempted by earlier policy making processes. Often, these decisions will have occurred with little or no environmental analysis. This foreclosure of the range of choice is only partly countered by provisions for addressing project justification and alternatives in EIA. Far preferable is the use of SEA or an equivalent approach to incorporate environmental considerations and alternatives directly into policy, plan and program design. This option also helps to focus and streamline project EIAs, making them more consequential and reducing the time and effort involved in their preparation.

Addressing Cumulative and Large Scale Effects. By comparison to project EIA, the scope of SEA is more appropriate to the time and space scales at which cumulative and large scale effects are expressed. Typically, cumulative effects result from the addition and interaction of multiple activities and stresses; as such, they are pervasive, building up incrementally over a long period of time, and cutting across both policy sectors and ecological boundaries. SEA is indispensable to address these at the earliest stage of decision making as described in Box 4.4. Many aspects of global change, for example, are best examined at the policy level. SEA of major energy and transportation initiatives could provide an important vehicle for reviewing options for stabilising CO^2 emissions consistent with the UN Framework Convention on Climate Change. It would also establish a strategic framework within which global issues can be incorporated into EIA of projects (see Section 5.4).

Incorporating Environmental Sustainability Considerations. When systematically applied, SEA can become a vector for the transition from the standard to the sustainability agenda for environmental protection, as called for by the Brundtland Commission. In the standard approach, the emphasis is on tackling the environmental symptoms or effects of development in the "downstream" part of the decision cycle. By contrast, the sustainability agenda promotes an integrated approach to government decision making that focuses on the sources or causes of environmental deterioration. These lie in the "upstream" part of the decision cycle, in the socio-economic policies that guide the overall course of development. SEA provides a mechanism for instilling environmental objectives and sustainability considerations into these decisions.

Box 4.4 Addressing Cumulative Effects

SEA of policies, plans and programs provides an important vehicle for addressing and offsetting cumulative and large scale effects. For example:

global issues , such as stabilising CO^2-emissions, can be addressed through review of macro-policies for energy, transportation, etc.;

sectoral assessment is particularly suited to reviewing the cumulative effects of many small activities, such as housing developments and agricultural improvements that may not require individual project EIAs; and

regional assessment helps to screen and identify environmental changes and losses that result from land use patterns and practices, such as agricultural and urban conservation of wetlands.

4.2 Evolution of SEA

The preoccupation with project EIA is a convention of practice rather than a basic principle of law or policy. As enacted in early institutional frameworks, the scope of EA was broadly drawn to include (or at least did not rule out) policy, plan and program decision making. For example, Section 102(2)(c) of the pioneering US National Environmental Policy Act (NEPA, 1969) explicitly refers to coverage of "proposals for legislation and other federal actions". In practice, the countries that adopted EA first moved cautiously and incrementally toward consideration of broader policy level questions. By the mid-1980s, however, a number of elements of SEA were in place.

These prototypes are identified in Box 4.5. As listed, they comprise a set of stepped options for introducing SEA, beginning with the review of alternatives in EIA as an aid to policy clarification. Looking back, elements of SEA are of longer standing than is credited in the literature. Many of the steps outlined in Box 4.5 may be of practical value for introducing SEA, e.g. in developing countries. Several related trends in other areas of impact assessment, in resource and land use planning and in environmental policy and management reinforce and extended EIA-based developments and indicate other process options. These are identified in Box 4.6.

Box 4.5 From EIA to SEA -- Step-by-Step Options for Process Development

- Use project EIA as an aid to policy clarification, e.g. by systematic review of alternatives, including the no-action or zero option.

- Call public inquiries into major projects that will set policy precedents, foreclose options, and/or have wide-ranging environmental implications.

- Apply program assessment to sector plans that will lead to specific projects and activities and then tier EIA requirements to these.

- Establish class assessments to identify the cumulative effect of numerous small scale related actions.

- Undertake regional assessment for pre-clearance of proposed sector or multiple use development, especially for resource systems with significant heritage value or that are already under stress.

- Employ an ecosystem approach to determine inter-regional significance and risks of resource conversion (e.g. wetlands), environmental deterioration (e.g. water quality), and the potential impact of global change (e.g. climate warming).

- Require formal SEA for all development policies, plans and programs which have potential environmental effects or establish an equivalent process of policy appraisal and plan (e.g. based on technology assessment, cost benefit analysis).

Box 4.6 Extended Policy Tool Kit for SEA

Technology Assessment
- documents environmental and social implications of technological change
- recent areas covered include biotechnology, energy and materials use, transportation and urban growth

Resource Assessment and Land Use Planning
- impact zoning and terrain classification for development approvals and control
- integrated, capacity-based approach to land-use allocation

State of the Environment Reporting
- identifies trends and issues in resource use and environmental quality
- establishes baseline conditions for major ecosystems

Green Economics
- macro and micro level valuation of environmental assets and losses
- alternative "social discount" rates to account for the welfare of future generations

Sustainability Strategies
- objectives, targets, time frames and measures for achieving environmentally sustainable development
- incorporates "full assessment of current conditions" (as per Agenda 21)

International Environmental Law and Policy
- EA protocols and requirements incorporated in Rio "Superstructure" comprising Agenda 21 and Biodiversity and Climate Change Conventions, etc.
- also included in regional trade agreements and cooperative institutions (e.g. European Commission, North American Free Trade Agreement)

4.3 SEA Systems and Provisions

During the 1990s, SEA has become a more systematic and structured process, directed explicitly at policy, plan and program decisions. The adoption and use of SEA varies significantly. Worldwide, SEA systems can be divided into three main categories reflecting the stage of development and actual experience gained by a country or international organisation:

1. Certain European, North American and Australasian countries, together with certain international organisations, have formally established an SEA or near-equivalent process.

2. Many other countries and international organisations have SEA-type provisions and elements as part of their EIA and planning processes (e.g. Poland, Japan, Israel, South Africa, Indonesia, Brazil, China, India and some other Eastern European, South East Asian and Latin-American and Caribbean states).

3. The remaining group of domestic and donor-driven EIA and plating systems are at a more rudimentary stage, reflecting fundamental institutional and resource constraints - which are now beginning to be addressed through capacity-building programs initiated by multilateral and bilateral aid agencies.

The focus here is on the countries and international organisations with established SEA systems and a record of experience in implementation. In these systems, three types of provision for SEA can be distinguished:

i) legislation (e.g. New Zealand, USA, Western Australia);
ii) administrative order or Cabinet directive (e.g. Canada, Denmark, Hong Kong); and
iii) advisory guidelines or operational policy (e.g. UK, European Commission, World Bank).

Both legislative and administrative provision can be classified as establishing a mandatory requirement for SEA, albeit with different degrees of stringency. Advisory and policy guidelines, by definition, are non-mandatory; in practice, however, they may be interpreted either as "binding" on complying agencies or as providing leverage on their decisions.

Experience to date is insufficient to draw specific conclusions regarding the effectiveness of legislative versus administrative-based SEA systems. In either case, rigid and over detailed prescriptions should be avoided. At this stage, flexible and pragmatic institutional arrangements are recommended. These should be:

- founded on a clear basic provision for SEA; and
- meet certain minimum requirements (based on response to Box 4.7).

Box 4.7. Status of SEA Systems: A Checklist of Considerations

- Basic Requirements (What must be done?)
  - mandatory v. advisory provisions
- Scope of Application (Which issues/levels of decision making are to be covered?)
  - full v. partial coverage
- Responsibility for Compliance (Who will be accountable for what actions?)
  - self-assessment v. regulatory oversight
- Due Process (How will the SEA process be applied?)
  - formal v. informal provisions
- Public Involvement (What will be the role of NGOs and communities?)
  - open v. closed process
- Quality Control (When, how and by who(m) will SEAs be reviewed?)
  - internal v. independent review
- Inputs to Decision Making (How will SEA be used)
  - advisory v. approval

4.4 SEA Process and Procedures

In broad outline, SEA systems exhibit three structural forms. These can be described as:

- ***standard (EIA-based) model*** - SEA of policies and programs is patterned after project EIA (as in the Netherlands);
- ***equivalent (environmental appraisal) model*** - policy and plan evaluation are undertaken to identify and take account of environmental effects (as in the UK) and;
- ***integrated (environmental management) model*** - SEA is undertaken as part of a comprehensive policy-planning framework (as in New Zealand).

The standard EIA-based procedural model reportedly works best when the process followed in policy, plan or program design is comparable to that applied to projects. Often, however, policy is developed through an open-ended, non-hierarchical process. In that case, the uniform adoption of an EIA procedural model, widely promoted in the literature, is not necessarily a suitable response. A more discriminating, differentiated process is called for, in which the form of SEA is adapted to the circumstances and configurations of policy making (see also section 4.7).

The development of a two tier SEA process holds particular promise in that regard. For example, the Netherlands uses an EIA-based approach to review physical and sector plans and now proposes to introduce an environmental "test" or paragraph for policy decisions, e.g., to ensure they are consistent with the National Environmental Policy Plan for achieving sustainable development. Environmental tests can be extended by more detailed appraisal of policies and plans, e.g. along the lines recommended by the UK guidelines. When systematically applied, environmental appraisal provides a broadly-based, integrative process that combines elements of EIA, economic evaluation and risk estimation. It is often compared unfavourably with EIA procedure in the literature but deserves reconsideration as part of a comprehensive SEA process that is tailored to policy realities.

For the most part, countries have adapted the steps and procedures used in project EIA as the process foundation for SEA The recommendation of a UNECE Task Force on the application of EIA principles in SEA has been influential in that regard. The key steps are well known and identified with specific reference to SEA in Box 4.8. Experience so far indicates that these work reasonably well. However, there are also significant differences between project EIA and SEA, notably with regard to the character of the decision making process within which they are accommodated.

Because of these differences, the following points need to be taken into account in the application and conduct of SEA:

- each proposal should be screened for the most appropriate type of SEA (see Section 4.7);

- SEA procedures should be simple and straightforward, geared to provide the right information at the right time in a continuing process; and

- SEAs should be flexible and tailored to the way the policy making process actually works, recognising this often is neither logical or hierarchical.

Box 4.8 SEA Process and Procedure

Initiation: determining the need for and type of SEA, by means of a list, a screening mechanism or both;

Scoping: identification of alternatives and impacts to be assessed, exclusion of irrelevant information;

Review: reviews during scoping and after completion of the SEA conducted by groups other than the sector authority, as an optimum including other governmental authorities, independent experts, interest groups and the general public;

Public participation: the public should be part of the SEA process, unless limited by confidentiality or timing requirements;

Documentation: presentation of the information, either in a separate document or in a specific chapter of the policy document;

Decision making: taking the conclusions and recommendations of the SEA into account;

Post decision: identification of overall impact of projects and measures resulting from the policy, plan or program, including a list of follow-up measures.

Source: UNECE, 1991.

4.5 Trends in Practice

The test of provisions and procedures lies in their implementation. An initial survey of SEA practice is undertaken here with reference to three main trends:

- scope of application of SEA,
- opportunities for public involvement; and
- integration of SEA with project EIA and other instruments.

Scope of application. ***This*** a critical indicator of the status and effectiveness of SEA practice. Four questions are scrutinised:

i) at what 3P level is SEA applied?
ii) which sectors are covered?
iii) what factors are included?
iv) when is SEA undertaken in relation to decision making?

i) While overall coverage is still limited, examples can be found of SEAs carried out for all levels of decision making. Not unexpectedly, however, the majority of formal SEAs are for sectoral plans and programs and regional development and land use plans.

ii) In terms of sectors and areas covered, SEA seems to be applied most often to energy, transport and waste management. Natural resource management issues (e.g. water, forestry, agriculture and wildlife) are moderately well represented in SEA practice.

iii) Most SEAs surveyed adopted a relatively broad definition of environmental considerations to include socio-economic, health and other relevant factors. In some cases, this was an explicit aspect of the terms of reference (e.g. policy appraisal of disposal of radio-active waste in the UK).

iv) A key principle of SEA calls for the early application of this process, as an integral part of policy, plan or program design. Many of the examples reviewed for this report were reportedly applied in accordance with that principle (e.g. Amendment of the Western Grain Transportation Act, Canada).

Public Involvement. In principle, it is widely accepted that public involvement can and should be an integral part of the SEA process. This recognition is based largely on the role and contribution of public involvement at the project-level (e.g. as discussed at the Hague Workshop, 1994). At the strategic level, certain exemptions may need to be introduced to safeguard Cabinet and fiscal confidentiality and some degree of flexibility is necessary to take account of the open-ended nature of policy making . However, these restrictions should be kept to a minimum.

In practice, public involvement appears to be a far less visible aspect of SEA compared to the situation in EIA. Yet, there are sufficient examples to indicate the value of consultative and participatory approaches. Some preliminary guidelines are outlined in Box 4.9. Where appropriate, the emphasis in SEA should be at the higher end of the gradient of public involvement (see also below). The involvement gradient comprises:

- information (the passive form);
- consultation (the opportunity to respond and comment);
- participation (characterised by varying degrees of working interaction); and
- negotiation (in which affected interests try to reach a consensus on the issues at stake).

Box 4.9 Toward Draft Guidelines for Public Involvement in SEA

Public involvement should be an integral part of the SEA process; it ensures procedural integrity and provides relevant information and input to policy development. While certain exemptions to this general principle may be required (e.g. for reasons of Cabinet confidentiality), these should be kept to a minimum and based on agreed criteria or otherwise clearly demonstrated.

The form of public involvement selected should be consistent with the nature and scope of the issues generated by the policy, plan or program and reflect the interests and values affected.

Depending on that determination, the strategic approach can be selected from the gradient of public involvement, comprising:
a) information
b) consultation
c) participation
d) negotiation

With respect to their application, the following aspects are important:
-- setting clear time limits for public involvement;
-- providing relevant information for the parties involved; and, for a) and b) above,
-- ensuring all participants have appropriate opportunity to provide inputs.

Some aspects of development policy making may require little more than public scrutiny of the process; others will lend themselves to widespread participation; and in certain situations, it may be appropriate to involve selected NGOs.

For policies, plans or programs, where the environmental effects are indirect or uncertain, the general public may be less interested and a case may be made for involving selected NGOs.

A degree of flexibility will be necessary in applying the above principles to policy making because of the diverse, often open-ended nature of the process(es).

Note: the above guidance draws on limited experience of a small number of western countries and international organisations; in other political cultures, the traditions and circumstances of a country or region will dictate decisions about whether and how to involve the public. For example, World Bank experience indicates that, in some case, public involvement requirements and techniques differ significantly from those in Western countries.

Integration of SEA with project EIA. ***As*** complementary, sequential activities, SEA and EIA can be tiered (or vertically integrated). Tiering is a familiar concept already in environmental assessment, e.g. in screening. It is also widely recommended as a logical approach to focus and streamline SEA and EIA. Once in place, tiering ensures that the environmental consequences of development proposals can be addressed at the appropriate level(s) and with the degree of effort necessary for decision making . SEA and EIA should be consistent with and reinforce each other, with the former providing a frame of reference for the latter. An example from the Netherlands is given in Box 4.10.

With varying degrees of integration, this approach is applied by many of the countries and international organisations that lead in SEA For example, the United States has tiered project EISs to prior-order Programmatic EISs almost from the outset of NEPA. Recently, the incidence of this activity appears to have increased. As yet, however, few examples can be found in the United States of SEA of national policy. By contrast, countries with policy assessment systems do not appear to systematically tier project EIA to these (e.g. Canada and Denmark). The New Zealand Resource Management Act (1991), perhaps the most advanced piece of sustainability legislation to date, prescribes an integrated approach to assessing environmental effects at the policy, plan and project-level; however, it is yet to be fully implemented.

As noted earlier, the application of a tiered process of assessment has a number of benefits. In order to ensure these are realised, the following guidelines should be kept in mind:
- assessments taking place at different levels should be consistent and reinforcing so efficiencies are achieved;
- screening and scoping are critical foundations for striking the right balance, identifying the issues and information requirements that are necessary now as compared to later; and
- public involvement and technical analysis should be matched to these requirements.

Box 4.10 Example of Tiered Assessment -- Waste Management in The Netherlands

National level:
- -- decision(s) *technologies for final waste* treatment, e.g. reuse, dumping or incineration and total treatment capacities;
- -- SEA carried out to identify available options and assess their impacts.

Regional level:
- -- decision(s) on where treatment *sites* will be located;
- -- SEA assesses locational options and their environmental consequence.

Project-level:
- -- decisions on *design and mitigation measures* for each of the selected locations;
- -- project ElAs are tiered to earlier assessments and decisions;
- -- as such, they are specific, limited and to-the-point.

Source: Sadler and Verheem, 1995.

4.6 SEA methods

The appropriateness of methods and techniques for SEA are still subject to discussion. While their further development can be expected, experience so far indicates that a wide range of methods and techniques are either used in SEA or are potentially available. These are drawn from project EIA (e.g., checklists, matrices, network analyses, geographic information systems, modelling, life cycle analysis) and policy analysis and planning (e.g., scenario and simulation analysis, goals- achievement analysis, cost-benefit analysis). With some adaptation, all of these methods can be applied also at the strategic level. Subsequent case experience will show if there is any need for the development of new more customized SEA methods.

Most of the tools currently used in SEA are applied with the in-house expertise available within most government authorities. Some, however, may be more complex to handle and may require the use of outside 'experts. This includes tools such as multi-criteria analysis and uncertainty analysis. For most SEAs, however, relatively simple and straightforward methods appear to be sufficient. Examples include: literature survey, case comparison, expert judgement, scenario development and model mapping. This last technique is reported to have been effective for SEA Often, it has proven possible to sufficiently quantify environmental indicators by filling in each parameter of the impact network, based on data from literature, indicative calculations or expert judgement.

Because there is a significant uncertainty factor in SEA, methods to identify and analyse this characteristic are seen as important. Examples that have been used with some success include:

- use of scenarios - to demonstrate ranges of uncertainty, e. g. worst versus best case outcomes for alternative policy responses to environmental problems and risks; and

- sensitivity analysis - to identify the uncertainty in predicted results by looking at the effect different choices, regarding assumptions or applied weights, have on these.

4.7 Toward a Disciplined Approach to SEA

When moving from the policy to the project stage of the decision cycle, environmental considerations correspondingly shift from indirect to direct effects. Direct effects, typically, can be correlated with projects and with plans and programs that initiate and locate specific activities. Indirect effects are associated with policies and with certain types of plans and programs, such as legislative and fiscal initiatives, that are not easily separable into discrete actions. Because these environmental effects are diffuse and pervasive, the focus and tenor of assessment will be different, concerned with *implications* and issues rather than *impacts*.

In particular, it is important to identify whether a policy, plan or program is likely to directly determine the type, form, size, etc. of concrete projects at a later stage of the decision making process, or whether its effects will be indirect, uncertain, unknown or influence consumer behaviour, e.g., regarding transport choices or energy use. Often, for example, sector plans and programs have a more direct link with projects than broad policies. However, case studies show that in practice this distinction is not always clear cut; some

policies directly affect projects and some plans and programs will only have indirect influence.

This is a critical distinction with respect to choice of SEA procedure and methodology. For example, an SEA of a planning process directly determining projects can often be used to identity and analyze reasonably well-defined impacts and concrete alternatives. To assess these, methodologies may be used that are based on existing ETA-methods at the **project**-level ("impact-assessment-methods"). With an SEA of a planning process that indirectly influences concrete projects, this approach often is not possible. In that case, SEA would focus on discussing the main environmental issues and identifying the environmental implications of alternative options ("policy-appraisal methods".) A generic screening method is proposed in Box 4.11 to identify the appropriate type of SEA and to facilitate choice of methods and procedures; it leads to either a policy appraisal or impact assessment track.

Box 4.11 Screening for the Appropriate Type of SEA*

1. Is the planning process "integrated" (i.e., is full consideration given to environmental consequence in the process)?

   yes: No SEA needed
   no: SEA needed

2. Are mechanisms for the assessment of social and economic impacts already in place?

   yes: SEA focuses on environmental concerns, coordinated with socio-economic review
   no: As far as possible, SEA should include social and economic factors; if not, make sure mechanisms are installed and integration takes place

3. What is the characteristic of the policy, plan or program to be adopted -- will it directly determine type, form, size, etc. of concrete projects?

   yes: SEA to identify well-defined alternatives and quantitative impacts (impact assessment track)
   no: SEA to discuss issues, broad options and (environmental) implications (policy appraisal track)

* Note: Most countries follow a screening process to decide whether or not policies, plans or programs are likely to have potential significant environmental consequences that warrant the application of SEA. Both case by case and positive lists are used for this purpose. However, these do not appear to distinguish between alternative approaches along the lines noted above.
Source: Sadler and Verheem, 1995.

5.0 OPTIONS AND RULES FOR ENVIRONMENTAL SUSTAINABILITY ASSESSMENT (ESA)

As currently applied, EA is a means of impact minimisation, i.e. designed to mitigate or reduce, as far as possible, the side-effects of development. The use of environmental assessment for sustainability assurance (ESA for short) demands a redirection of aim and approach. From a sustainability perspective, the key requirement is the maintenance of natural capital, which approximates in assessment terms to no net reduction of environmental baselines. Because the *no net loss* criterion is rigorous and onerous, it will need to be gradually phased into EA. However, the arguments for its introduction are compelling, writ large in current rates of resource loss and ecological deterioration.

In this section, a case is made for introducing ESA, in general, and for institutionalising a no *net loss* guideline, in particular. Operational rules and measures for this purpose are proposed. Simply stated, the maintenance of natural capital overall requires "in-kind' impact compensation, backed by "safe minimum" standards. If implemented, this approach would help facilitate disciplined trade-offs among the environmental, economic and social imperatives, i.e. allowing these to be made within acceptable limits and with reasonable assurance that current losses and future risks were being offset. This may be taken as a provisional definition of ESA.

5.1 The Importance of "Full Cost" Environmental Assessment

Environmental sustainability means maintaining life support systems. It refers to the capacity of the environment to assimilate wastes and regenerate raw materials. This is the enabling condition of sustainable development. All forms of human activity are dependent on the maintenance of environmental sources and sinks. When these are reduced or impaired, so correspondingly are the options for development. These constraints are becoming widely recognised in EA laws, policies and procedures. For example, the environmental policy of the World Bank (1991) is: "to ensure that each project affecting renewable natural resources (eg., as a sink for residues or as a source for raw materials) does not exceed the regenerative capacities of the environment".

In most cases, scientific understanding is insufficient to permit before-the-fact prediction of whether and when significant ecological thresholds will be exceeded, i.e. the operating point at which the cumulative effects of human activity will cause irreversible change or structural breakdown of natural systems. Resource and ecological constraints on development -- the "carrying capacity" for a given population and level of activity -- can only be interpreted in general, qualitative terms of what is an "acceptable" level of impact and risk. This is essentially a political judgement that will vary according to society and culture, and with prevailing trends and conditions. Many reputable scientists, however, consider that global and other critical ecological limits are now being pressed by current patterns of population and economic growth (see Box 5.1).

These concerns underline the importance of gaining a firmer grasp on what constitutes environmental sustainability. As a first practical step in that direction, existing policy instruments can be used to better purpose in supporting informed decision making. Four approaches to environmental sustainability are reviewed in a background report (Goodland and Sadler, 1995). These are:

i) sound micro-economic analysis of development proposals to internalise those environmental costs that can be monitorised;

ii) environmental accounting of natural resource assets and losses at the macro-economic level;

iii) EIA and SEA for extended project and policy appraisal; and as a "safety net"

iv) widespread application of the precautionary principle in resource management and development planning.

Applied together, the four approaches provide a basis for "full cost" assessment of environmental losses and change at all levels of decision making, as recommended in Agenda 21 and the report of Brundtland Commission. The basis for integrated forms of sustainability analysis, linking ecology and economics, are examined in two other background reports prepared for the effectiveness study (Sadler, Manning and Dendy, 1995; International Journal of Sustainable Development, in press). Because it is widely institutionalised, EA provides a key entry to their further development. In particular, EA process modifications can build on and accelerate the transition toward "anticipate and prevent" modes of approach, which are consistent with the sustainability agenda.

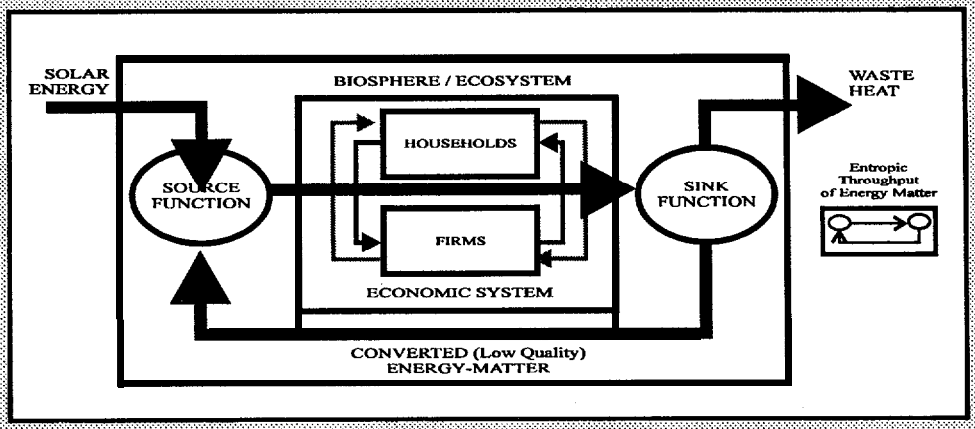
Three practical steps in that direction are:

i) translating the concepts and principles of environmental sustainability into operational terms;

ii) restructuring EIA and extending SEA to give effect to these new "rules of the game"; and

iii) directing these processes toward the maintenance of enviromnental "bottom lines", rather than the minimization of impacts.

Box 5.1 Dimensions of Environmental Sustainability



Environmental sustainability requires that the cumulative impact of throughput -- the total flow of energy, materials and services from the biosphere into economic production and use and back again as waste and residuals -- does not exceed the source and sink capacity of natural systems. The figure above illustrates this relationship; it indicates the biosphere as a finite system -- one in which source and sink functions have become closely interconnected as a result of exponential throughput growth.

Until recently, the main environmental sustainability concerns were about resource limits, e.g. running out of food or energy. Now, sink constraints appear to be more pressing, e.g. loss of biodiversity, depletion of stratospheric ozone, contamination of soil and water. It is estimated that human activity currently appropriates approximately 40% of terrestrial carrying capacity. With a projected doubling of world population and a five to tenfold increase in economic activity (i.e., the Brundtland prescription), the contradictions of throughput growth loom ahead.

The cumulative impact (I) on the environment can be approximately represented by the relationship: I = PxAxT (Population x Affluence x Technology). In the future, a fundamental change in one or all of these variables appears to be necessary if throughput is to be kept within the carrying capacity of natural systems. For example, current rates of environmental deterioration could be reduced by stabilising population, limiting consumption (which is a function of affluence), improving technology so as to reduce throughput intensity per unit output (i.e. achieving eco-efficiencies in resource inputs and pollution outputs), or, more realistically, by some combination of all three changes.

Sources: Goodland and Sadler,1995; Sadler et al, 1995.

5.2 Sustainability Concepts and Rules

Environmental sustainability can be equated with the maintenance of natural capital, i.e. keeping resource stocks and ecological processes more or less at their present levels. The premise here is that the availability of natural capital has become a limiting factor in development (see Box 5.2). In an ecologically constrained world economy, natural capital must be treated and valued as a separate component in the production process, one that is complementary to rather than freely substitutable for man-made capital (e.g. farms, factories, infrastructure). Worldwide, resource depletion and environmental deterioration are reaching critical levels and further draw down on natural capital carries serious risks for present and future generations. Accordingly, no net loss of natural capital is widely acknowledged as a prudent yardstick for ensuring environmental sustainability.

The application of no net loss criterion is consistent with and exemplifies the precautionary principle, which forms a cornerstone of decision making for sustainable development. It represents a form of assurance against risk and a 'best guess" hedge against uncertainty. A comprehensive, across-the-board, policy response will be needed to maintain resource and ecological assets at their current levels (see Box 5.3). To move toward full cost environmental assessment (the first component in Box 5.3), two key rule changes are necessary:

i) establishing safe minimum standards as a benchmark for impact acceptability; and
ii) requiring in-kind compensation as the basis for impact mitigation.

Safe Minimum Standards. In principle, safe minimum standards (e.g. for ambient air and water quality) are well-established and widely used. As such, they provide the foundation for directing environmental assessment and management toward the maintenance of source and sink 'bottom lines". In practice, however, these standards are not rigorously or uniformly applied, since their presumption is for conservation rather than development. A modified application of the safe minimum standard is used instead. This reverses the onus of proof so that usual development goes forward unless it can be reasonably or clearly proven that the environmental impacts are unacceptably high. Understandably, many see this as a pragmatic approach.

But now that cumulative and large scale effects are a pervasive feature of development, it may be time to reconsider the prevailing approach to safe minimum standards. Otherwise, we risk irreversible or structural changes, which, by definition, cannot be compensated, restored or otherwise offset (except through long term natural recovery). Benchmarking safe minimum standards (more accurately rules of thumb) for ecological, as compared to ambient, thresholds will be a formidable challenge, requiring multi party negotiation as well as the application of "best guess" science. However, many elements of approach are incorporated already in EA (e.g. significance criteria) and further criteria can be found in national policies and international agreements.

In kind Impact Compensation. Meeting the criterion of ***no net loss*** of natural capital also requires full cost impact mitigation. This rule means that resource losses and environmental deterioration occurring as a result of development must be matched by an equivalent (like-for-like) package of ecological gains and benefits. For example, the loss of fish habitat

would need to be compensated by replacement, on a sufficient scale, to ensure no net *loss* of productivity. Where this arrangement is not possible, a comparable offset would be required; for example, afforestation to sequester CO^2 emissions. Undoubtedly, this type of asset-trading and replacement will be crude and imprecise.

As such, impact compensation will need to be promoted and implemented pragmatically. This is a demanding requirement on development but one that is fully in keeping with the "polluter pays" principle that business and industry already accept. Because maintenance of natural capital is an aggregate yardstick of environmental sustainability, it does not translate into zero environmental damage for specific policies or projects. So there is scope for the creative application of impact compensation and offsets via resource conservation, rehabilitation or enhancement measures (see Box 5.3) This approach is being tried already by forward looking industries (e.g. Ontario Hydro in Canada). It also draws on established practice in resource management, it is in keeping with the commitments made by most countries to implement Agenda 21 and other Rio protocols and it can be readily applied as part of EA requirements.

Box 5.2 Natural Capital

When natural capital was considered infinite relative to the scale of human use, it was reasonable not to value and treat it as a separate component in development policy and economic analysis. Today, however, the limiting factor in development is more often remaining natural capital than extra manmade capital. For example, fish catch is now limited by remaining fish populations, not by fishing fleet or processing capacity; and timber harvest is limited by remaining forests, not by saw mills.

This is not an argument for keeping natural resources in their original state, either for our later use or for use by future generations. Natural resources represent capital that can and should be used -- or even used up -- to produce goods and services for societal benefit. Like other forms of capital, natural resources and the ecological processes that maintain their productivity and assimilative capacity need to be conserved in order to continue to support the productive process and provide other services that are increasingly valued by modern society.

Sustained yield policy for renewable resources, such as forests or fisheries, is long standing. When annual or periodic exploitation exceeds the natural rate of regeneration, capital stock is diminished. This reduction should be estimated and imputed as disinvestment. If the take falls below natural regeneration, then the stock is added to, through a passive act of investment (farmers call it fallow). Either way, the change of stock should be assessed, reflected in national accounts and the results incorporated into policy making.

Box 5.2 Natural Capital (cont'd)

Environmental accounting indicates when liquidation of renewable resources exceeds regeneration rates. It also includes rules of quasi-sustainability for addressing non-renewable resources, i.e., deplete at a rate equal to the rate of development of a renewable substitute (per El Serafy's formula). These measures essentially involve treating changes to resource stocks as depreciation, deducting it from gross income or product in order to arrive at an adjusted level of net income. Valuation remains a formidable problem, but it is not totally insurmountable. Where the market indicates prices, adjustments can be based on these. Otherwise, the recourse is to various shortcuts and imputations, such as inferring the cost of soil erosion from the decline of crop yields. Full adjustment will likely remain elusive. Equally critically, environmental accounting records changes after the fact -- which is why the application of a proactive, precautionary based process of environmental assessment is important.

Source: Goodland and Sadler 1995.

Box 5.3 Comprehensive Policy Response to Maintain Ecological Assets

Key elements include:

i) "full cost" environmental accounting, i.e., estimating and valuing the totality of loss and damage from development activities and internalising the costs via the "polluter pays" principle;
ii) "anticipate and prevent" environmental management, e.g.:
   - protection of critical habitats, landscapes and areas;
   - conservation of resource stocks and managed systems; and
   - rehabilitation of degraded lands and contaminated sites;
iii) regulating and controlling the pollution emissions and development activities that impact on resource use and environmental quality, e.g. by:
   - cradle to grave life cycle analysis of residuals and contaminants;
   - environmental monitoring and audit of industrial facilities and projects; and
   - establishing and enforcing environmental standards, capacities and limits.
iv) strategic policy interventions to address the I/PAT formula (see Box 5.1) e.g., by:
   - stabilising world population growth, *inter alia*, through reorienting overseas development assistance;
   - reducing perverse incentives and policies that encourage over-consumption; and
   - promoting the adoption of environmental appropriate technologies, especially for energy, water use and agro-forestry development.

5.3 Redesigning EIA and SEA

Some degree of redesign of environmental assessment is necessary to give better effect to sustainability concepts, in general, and the above operational rules, in particular. A graduated approach toward redesigning **EA** for sustainability assurance is proposed, beginning with minor process modifications that can be made immediately and leading toward longer term structural changes. The main steps are:

i) modifying EIA procedures to incorporate the ***no net loss*** criterion;

ii) applying **SEA** to scope for policy conformity with sustainability principles;

iii) using **EA** to address global change issues; and

iv) integrating **EA** with other policy and planning processes.

Modifying EIA Procedures. In order to incorporate sustainability principles, the Project EIA process could be modified as follows:

i) establishing safe minimum standards as the basic requirement for determining impact acceptability at the screening, scoping, assessment and monitoring stages;

ii) incorporating in-kind compensation as a basic requirement for impact mitigation;

iii) specifying no ***net loss*** of natural capital and other supporting principles (e.g., maintenance of biodiversity) as significance criteria -- recognising that these will be imprecise; and

iv) requiring evaluation of development alternatives, including identification of the best practicable environmental option in terms of i) and ii) above.

These elements require no more than a consolidation of good practice, although the pace of their implementation will need to take account of difficulties of compliance. More optimally, project EIA could be strengthened as a sustainability mechanism by bringing greater certainty and predicability to decision making. This is a long standing concern of industry and other participants in the **EIA** process. Sustainability assurance, however, implies not just revising the "rules of the game" but rethinking the "rules of choice". For example, the present burden of proof regarding impact acceptability could be reversed, so that the onus would be on development proponents to establish, with a reasonable level of confidence, that their project would meet safe minimum standards and unavoidable environmental losses and damages would be fully compensated. Various enforcement and performance bonding arrangements could be used to ensure these terms and conditions were carried out.

Using SEA to Scope Toward Sustainability. SEA provides an important avenue for ensuring that policy, plan and program proposals are consistent with sustainability principles. A comprehensive approach would involve:

i) screening economic and development policies for their conformity with environmental sustainability goals and principles;
ii) preliminary assessment of development proposals to identify low-impact, resource-efficient alternatives (e.g., for energy, transportation, etc.);
iii) more detailed sectoral assessment to facilitate early identification of potential cumulative effects; and
iv) regional assessment to clarify cumulative effects on resource values, land use capabilities, ecological integrity and biodiversity.

A key step to scoping toward environmental sustainability in SEA involves selecting appropriate indicators to show whether policy, plan and program options lead in the "right or wrong" direction. Many checklists are available or being developed for this purpose. Box 5.4 illustrates the bigger picture challenge. In many cases, however, updating criteria used in EIA will assist screening and analysis of strategic proposals and alternatives. Where policies, plans and programs have discernable potential impacts, the "safe minimum standard" test may be applied or equivalents rules adopted; for example, keeping risks as low as reasonably practicable -- the ALARP Principle.

Box 5.4 Possible Criteria and Indicators of Environmental Sustainability -- Elaborating the Big Five Challenges

1) **Greenhouse Gases:** No net increase in concentration of greenhouse gases in the atmosphere, beyond 2000 limit. Fossil fuel use to decline after 2010.

2) **Acidification:** No net increase in acidification hydrogen ion concentration in surface waters and soils, beyond current limit.

3) **Toxic Substances:** No net increase in toxic chemical and heavy metal concentrations in soil and water, beyond current limit.

4) **Source and Sink Functions:** Set aside 12% of resource base as ecological insurance. Preservation of all or most remaining natural forests, estuarine areas, coral reefs and other critical biomes, ecosystems and habitats.

5) **Biodiversity:** Maintain at approximately current levels. No (human-induced) extinction of threatened species per IUCN red book.

Source: modified from Goodland and Sadler, 1995.

Environmental Assessment of Global Changes

The agreements concluded at the 1992 Earth Summit, ***inter alia,*** establish new requirements for environmental assessment. In particular, the Conventions on Climate Change and Biological Diversity both specify EIA as a key instrument for implementing the measures agreed to. These constitute a legal obligation for signatory countries. It is not clear whether and how EIA will be adapted to take account of the effects of developments on climate change and biodiversity considerations, especially in the light of the "as far as possible" and "as appropriate" language of the articles (see Boxes 5.5 & 5.6). However, both conventions represent important policy levers on global change; they give EA an initial purchase on issues at this level.

The application of no-net loss of natural capital and other sustainability principles, noted previously, is less easy at the level of global change. For example, consider how a conventional EIA of a coal fired power plant might address climate warming. No matter how large the project, the contribution to world CO^2 emissions would be a minute decimal percentage. At a minimum, however, the application of the ***no net loss*** principle could trigger an equivalent offset response (e.g. carbon sequestering through forest planting - which may have a double dip of benefits). More optimally, assessment and mitigation of carbon loading could take place under a national or regional CO^2 'bubble" consistent with the Rio commitment to stabilise emissions at 1990 levels by the year 2000.

At both strategic and project-levels, established steps in the current process may be used to focus consideration of large scale, global effects. These include:

i) scoping to identify potential global effects of proposed activities;

ii) inclusion of biodiversity and greenhouse gas emission target indicators as criteria for determining impact significance; and

iii) requiring mitigation measures to meet the ***no net loss*** of natural capital rule - as discussed in section 5.2, but perhaps with a broader range of compensating arrangements.

The information base for environmental assessment of global changes is seriously deficient. At a minimum, however, we can begin to ask the right questions about large scale and global sustainability issues. Box 5.7 provides a preliminary checklist of biodiversity issues. In the longer term, the effective inclusion of large scale, global effects in EA will be dependent on the development of better predictive models of the regional consequences of human alternation of global cycles and systems.

Box 5.5 United Nations Framework Convention on Climate Change

Article 4

All parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances shall:

(f) Take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for example impact assessment, formulated and determined nationally, with a view to minimising adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change.

Box 5.6 United Nations Convention on Biological Diversity

Article 14

1. Each Contracting Party, as far as possible and as appropriate, shall:

a) Introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participation in such procedures;

b) Introduce appropriate arrangements to ensure that the environmental consequences of its programs and policies that are likely to have significant adverse impacts on biological diversity are duly taken into account.

Toward an Integrated EA Process

When considered collectively, the above proposals point toward and will require an integrated EA process. The tiering of SEA and **EIA,** as described in Section 4.5, can establish an initial framework. In the short term, for example, using SEA to scope toward sustainability policy will establish a firm basis for applying EIA as an impact compensation mechanism. Looking further ahead, a true "full cost" assessment and mitigation process for

sustainability assurance demands the integration of EA with other policy and planning instruments (to meet the requirements listed in Box 5.3). Because these instruments themselves are incompletely developed and integrated, early priority should be given to coordinating EA with *strategic* policy and planning initiatives. Key examples include national sustainable development strategies and regional land use planning.

National sustainable development strategies (NSDSs) are identified in Agenda 21 as a pivotal mechanism for implementing the principles and provisions contained in the text. Each country is responsible for drafting its own framework and approach, consistent with political realities, socio-economic aspirations and ecological imperatives. This process is at various stages of development, with many countries building on a previous generation of economic and green plans, conservation strategies, and similar initiatives. While experience is limited, it is evident that NSDSs differ from conventional policies and plans in a number of important respects; notably in their all encompassing purpose of integrating and balancing economic, environmental and social objectives, and, by extension, the comprehensive context they provide for the application of environmental assessment.

In this respect, the Dutch National Environmental Policy Plan is, by far, the most radical strategy for sustainability proposed by an industrial nation. It calls for a drastic reduction in industrial emissions and wastes, backed by clean up of contaminated soils, to restore and maintain environmental carrying capacities within the time frame of a generation. A mix of policy, economic, regulatory, and negotiation measures are identified to reduce risks and impacts at source, notably by closing raw materials - production - waste cycles. The targets and timeframes provide explicit framework against which SEA and project EIA can evaluate whether proposals are conforming or non-conforming.

At the regional level, land use and resource planning is a key instrument for integrating environment, social and economic objectives. By definition, the aim of this approach is the efficient allocation of competing demands on the resource base and the protection of natural areas and sites of special sensitivity or significance. This is usually done through some form of zoning scheme, based on resource assessment or ecological land classification. Regional planning thus facilitates managing towards carrying capacity. As such, SEA and EIA can be used to complement plans ensuring these are well founded and their components are consistent with environmental sustainability principles.

In this regard, the New Zealand experience is particularly instructive. Land and resource planning has been restructured under a new omnibus law that replaces a proliferation of previous planning and regulatory statutes. The New Zealand Resource Management Act, 1991, has a single purpose: the sustainable use of natural resources. It is aimed at meeting environmental bottom lines without unduly restricting the choice of development options. By contrast to the previous Town and Country Planning Act, for example, the Resource Management Act places greater emphasis on evaluating the environmental outcomes of land use, rather than promoting some optimum pattern. The presumption, in the final analysis, is for conservation rather than development.

Box 5.7 Biodiversity Assessment -- Toward Asking the Right Questions About Ecosystem Integrity

- What are the governing processes and interconnections?
- Do major systemic changes appear to be taking place?
- What are the historical trends, cumulative losses?
- Are we reaching thresholds or levels of capacity worth worrying about?
- Is this proposal likely to make the ecosystem more vulnerable or susceptible to change?
- Does it set a precedent for conversion to a more intensive level of use?
- Is it likely to significantly affect ecological functions?
- Does it contribute to or undermine sustainable use of biological resources?
- What is the level of confidence that can be placed on interpretations?
- Is use being made of surrogate, inferential, direct data?
- Is assessment based on long-term ecological monitoring, baseline surveys, field observation, desk research, etc.?

6.0 CONCLUSIONS

1. EA is an important policy instrument, widely used by many countries and international organisations. During the last 25 years, its scope of application has increased significantly, encompassing both a wider range of issues and factors and their examination at higher levels of decision making.

2. Overall, experience with EA is generally positive. The contributions to informed decision making are well documented, e.g. the provision of sound information and considered advice on the environmental consequences of development proposals.

3. Internationally and institutionally, the performance of EA in this and other respects is mixed and variable. A survey of status and effectiveness of EA systems, processes and practice indicates that, generally, standards have continued to improve. However, many residual problems remain and need to be overcome.

4. A report card on project EIA exemplifies the basis and principles of good or best "practice". It also identifies areas of deficiency that are still too common. On balance, overcoming the weaknesses and building on the strengths of EIA appears to be a relatively straightforward and practicable exercise, except for countries and organisations with severe resource and fiscal constraints. The experience of countries that are leading in EIA indicates four priority areas for effecting immediate process improvements: scoping, evaluating significance, reviewing EIA and monitoring and follow-up.

5. SEA ensures that environmental considerations are addressed in policy, plan and program proposals, thereby facilitating the strengthening and streamlining of project EIA. This approach is at an early, relatively fluid stage of process development, comparable with EIA in the mid seventies. New provisions and procedures are being introduced; the scope of application of SEA to levels and sectors of decision making is still limited; public involvement has a relatively low profile; tiering of SEA and EIA occurs on a proposal-specific rather than a system-wide basis; and discussion continues on the utility of methods and techniques drawn from policy appraisal and impact assessment.

6. The use of EA for sustainability assurance requires a redirection of aim and approach toward maintaining natural capital, as compared to minimising impacts. A phased approach to process redesign is proposed, beginning with two specific but far reaching revisions to the rules of the game. These are: prior specification of safe minimum standards and the requirement for impact compensation or comparable offset for resource depletion and ecological damage. Both rules of thumb are based on precedent and are consistent with the precautionary and "polluter pays" principle respectively, and also, more arguably, conform to "no regrets" policy.

7. Subsequently, process redesign toward ESA could proceed in four steps, namely:

   i) modifying project EIA guidelines and procedures to incorporate the no net *loss* criterion (e.g. in impact analysis, determination of significance, examination of alternatives, and mitigation);

   ii) applying SEA to scope toward accordance with sustainability principles at the policy, plan and program level;

   iii) extending EIA and SEA to include global change issues; and, more ambitiously

   iv) tiering EIA and SEA and integrating the process with other policy instruments to ensure that full cost assessment and mitigation is applied to all decisions and actions.

8. These proposals represent no more than a consolidation and immediate extension of elements of best practice. When brought together, they add up to potentially far-reaching change in EA practice and ***modus operandi.*** For this reason, the present report is being circulated as a discussion paper. It will be used to consult with and review the issues with study partners and other interested parties. The results of the consultations will be incorporated into a final report to be tabled in June 1996, at the IAIA annual conference, Lisbon.

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ANNEX I

From Sadler, B., ***Special Edition of IAIA Newsletter,*** 6(2), 1994

FRAME OF REFERENCE FOR INITIAL REVIEW OF TRENDS AND INNOVATIONS

ORGANISING THEME:	LEVEL & FOCUS OF REVIEW:	**KEY** ISSUES:
A. FOUNDATIONS	ADEQUACY OF EA SYSTEMS	WHAT IS THE ROLE OF "SECOND GENERATION" EA?
i) Guiding Values and Principles	• purpose and orientation of EA • basic requirements for all effective process • key values, objectives and principles of approach . procedural and methodological implications	How are the functions of EA changing? To what extent do the purposes and assumptions that guided the design and institutionalisation of the process still hold? What are the characteristics of effective EA process and practice? How are/might they be expressed in law, policy and institutional arrangements?
B. NEW DIMENSIONS	SCOPE OF EA PROCESS	WHERE IS EA GOING?
ii) Application of Sustainability Concepts	• nature and implications of sustainability concepts • translation into operational guidelines and rules of thumb • incorporation into EA policy and practice • adjustments to procedures and methods	What is the value and relevance of sustainability concepts, such as biodiversity, natural capital and inter-generational equity? How might these be substantiated and applied in EA? What accompanying process adjustments may be necessary, e.g. to significance criteria, impact analysis and mitigation?
iii) Strategic Environmental Assessment (SEA)	• rationale and potential of SEA • linkages to project EA and other policy and planning instruments • recent approaches and arrangements for the conduct of SEA • institutional and methodological constraints and opportunities	What institutional frameworks are in place for applying SEA? How is the conduct of SEA similar to or different from project EA? Which methods and procedures are employed and what are their strengths and weaknesses? What are requirements for and barriers to an effective process?

ORGANISING THEME:	LEVEL & FOCUS OF REVIEW:	KEY ISSUES:
iv) Cumulative and Large Scale Effects	• definitions and requirements for addressing cumulative effects • project oriented versus ecosystem approaches • frameworks for planning and monitoring • relationships to product assessment life cycle analysis and environmental audit	What is the status of the theory and the practice of assessing cumulative and large scale effects? How are incremental, regional or global changes addressed in EA processes? Which procedures and methods are employed and with what results? Where might immediate improvements be made to our approaches?
C. PROCESS STRENGTHENING	ELEMENTS OF APPROACH	HOW CAN EA METHODS AND PROCEDURES BE IMPROVED
v) Relationship to Decision Making	• utility of inputs to decision making process · importance of evaluation of alternatives · EA documentation and quality review · implementation of terms and conditions	How is EA related to types and levels of decision making? To what extent does this process focus on the justification for and to a proposal? How useful for decision making are EA reports in clarifying the pros and cons of proposed action? What changes might improve their relevance for this purpose?
vi) Integrated Approaches to Impact Analysis	• 'best guess" science paradigms and practices • traditional knowledge • user-friendly tools, techniques and information technologies • relationship of socio-economic, biophysical, health and risk components	How well does impact assessment serve decision making under conditions of uncertainty? Which approaches and instruments are or can be applied for "policy integration" of cross-media and cross-domain impacts? How can we best deploy scientific analysis and interest-based negotiation to integrate knowledge and values in the form of advice to decision makers? What tool kits are available to facilitate problem solving by local communities and groups?
vii) Public Participation and Dispute Settlement	. conflict resolution in the EA process • provisions for public scrutiny and involvement • forms of participation and negotiation	What are the roles and scope of public participation in EA? What procedures are followed to ensure openness and fairness of processes? Which methods are employed and with what results? Are mediation and other alternative dispute

	relationship to decision making powers and responsibilities	resolution procedures being used and with what success?
viii) Follow-up and Post-Project Analysis	requirements for follow-up to EA's experience with effects monitoring and impact management use and results of EA audits ex-post reviews for process development	What is the scope of EA review and follow-up? Which types of follow-up procedures are employed and with what results? How are the results incorporated into impact management, future project cycles, and EA policy and practice?
ix) Total Process Management	managing for quality, integrity and innovation coordination of EA processes with other policy, planning and regulatory instruments coherence of EA systems, including protocols and procedures for trans-boundary EA information and communication media	How can the cost-effectiveness of EA processes be improved? How is EA linked to other processes, such as sustainability strategies, land use planning and pollution control? What measures are followed to harmonise EA systems, nationally and internationally? How can administrators best communicate with EA users, including decision makers and the public?
x) Capacity Building	needs and demands training, networking and cooperation research, development and pilot projects EA shills and competencies for the 21st century international standards	What are the needs of industrial and developing countries, and how do they vary regionally and by country? What is the actual and potential contribution of EA training to professional and institutional strengthening? How might cost-effective networks of international support and cooperation be established? What are the priorities for EA research and development?

About the Study

The Study was initiated as a joint venture of the Canadian Environmental Assessment Agency (CEAA) and the International Association of Impact Assessment (IAIA). It is now taken forward under the direction of an international Steering Committee on which partner countries and organizations are represented. These include: Australia (Environment Protection Agency), France (Ministry of Environment), Hong Kong (Environmental Protection Department) the Netherlands (Ministry of Housing, Spatial Planning and Environment and the Commission for 'Environmental Impact Assessment), Nordic Council EIA Ad Hoc Croup (representing Denmark, Finland, Iceland, Norway and Sweden), United States of America (Council on Environmental Quality and Environmental Protection Agency), United Kingdom (Department of the Environment) and the United Nations Environment Program (UNEP). Other national and international organizations, EIA centres and networks also participate in the Effectiveness Study. IAIA members are involved through the work of regional chapters and on an individual basis.

About the **Report**

This is an interim report of the EA effectiveness study. It summarises preliminary results of work in progress. Much of the background analysis is omitted in order to focus on three core areas of interest to participating countries and organizations. These are: strengthening project EIA; extending SEA; and incorporating sustainability concepts and rules. Specific proposals are made for sharpening the use of EA as a mechanism for sustainability assurance. Because these go beyond-current practice, the report should be read as a discussion paper. Comments are invited and welcome.

Note : Ce rapport intérimaire est un document de travail. La version finale sera disponible en français.