STRATEGIC ENVIRONMENTAL ASSESSMENT

53

STATUS, CHALLENGES AND FUTURE DIRECTIONS

Ministry of Housing, Spatial Planning and the Environment of The Netherlands

International Study of Effectiveness of Environmental Assessment

The EIA-Commission of The Netherlands

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Ministry of Housing, Spatial Planning and the Environment

Publication of:
Ministry of Housing,
Spatial Planning and the Environment

Price: Dfl. 31,00
Distributioncode: 18503/192

You can order this publication
and publication nr. 54
SEA, Environmental Assessment of Policies;
briefing papers on experience
in selected countries
(distributioncode: 18504/192) at

Distributive trades VROM,
Postbox 351,
2700 AJ Zoetermeer,
The Netherlands
Phone 31(0)79-3449449

About This Report

This report documents and compares SEA trends, issues and directions in selected countries and international organisations. It describes the 'state of the art' of process and practice in this emerging field. A key feature of the report is the extensive use of institutional profiles and case studies of SEA applications which draws on the collective experience of participating agencies. SEA is identified as a "core process" for the initial study of EA effectiveness. The study is preparatory to further analysis of the quality of SEA practice. But it is also intended to be of wider use to practitioners and administrators. The work described here has been led by the Netherlands Ministry of Housing, Spatial Planning and the Environment in collaboration with the Dutch EIA Commission and other study partners.

Note the views expressed are those of the authors and do not necessarily reflect the position of participating institutions.

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Preface

Evaluating practice to improve performance, that is the central goal of the International Study of the Effectiveness of Environmental Assessment. This report is about the theme of strategic environmental assessment: the application of environmental assessment at the level of strategic decision making. There is also the need for (environmentally) informed decision making.
The Netherlands had from the start of the International Study a special interest for the SEA theme, partly on the basis of our own practice with EA at the level of plans, but also to improve the application and to enter new fields at the policy level.
The aim of this report is to show the state of the art of SEA around the world and the challenges and future developments.
In the framework of the International Study the Dutch Ministry of Housing, Spatial Planning and the Environment has organised in December 1994 a workshop on SEA which was attended by almost 45 colleagues from 22 countries and organisations from different parts of the world. Papers on practical SEA experiences were prepared for a preceding national workshop and are also publicized in a separate document under the title "Environmental Assessment of Policies, Briefing papers on experience in selected countries" (ETA-report 54, distr-code: 18504/192).
These papers, the discussions in this and other workshops and other sources form the basis of this report. The authors, Barry Sadler and Rob Verheem, have used these sources in a way that gives an almost complete overview of the very diverse aspects, developments and directions of SEA. They deserve our gratitude for all the work on this theme, which was far more than originally expected.
I see this overview of the state of the art as a solid basis for the growing practice and fruitful use of SEA. The SEA practice will grow by learning from experiences and successes of others. Reporting on experiences with approaches of SEA is, therefore, important.
Many thanks for all the participants in the preparatory workshops and to the authors in providing us with this stepping stone for the development of SEA.

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of the Netherlands

1. Introduction

"The ability to choose policy paths that are sustainable requires that the ecological dimensions of policy be considered at the same time as economic (...) and other dimensions – on the same agendas and in the same institutions. This is the chief institutional challenge of the 1990s"

World Commission on Environment and Development, 1987, 313.

Strategic environmental assessment (SEA) is one response to the challenge identified by the Brundtland Commission. A number of countries and international organizations have adopted this approach already. Other jurisdictions propose to introduce SEA or are reviewing its potential and feasibility for integrating environmental considerations into decision making at the policy, plan and programme levels. With limited exceptions, SEA is at a relatively early, fluid stage of process development. In many respects, its status is comparable to project level environmental impact assessment (EIA) in the mid to late seventies. Now as then, institutional, procedural and methodological innovations are taking place that will lay the foundations of future practice and performance.

Recent progress in SEA, accordingly, is a focus of critical interest for the international study of EA effectiveness. During the initial phase of the study, SEA was a prominent theme of discussion at several international workshops. Based on these inputs, SEA occupied a major place on the agenda of the International Summit on Environmental Assessment (Quebec City, June 12 - 14, 1994). Following the Summit, SEA was confirmed as a priority area for further research and development under the work programme established by the steering group of national and international EA agencies (listed on the front page).

The purpose of this report is to take stock of the status and challenges of SEA processes and practice. Specific objectives correspond to those generally established for the effectiveness study (see Box 1.1). These are:

- to identify key trends and issues in the use and application of SEA;
- to examine, as far as possible, the contribution of SEA to decision making;
- to document strengths and weaknesses of current approaches; and
- to recommend, where appropriate, practical improvements to SEA frameworks, procedures and methods.

Our starting point, consistent with the research design for the effectiveness study, is that SEA represents a promising approach to incorporating environmental and sustainability considerations into the mainstream of development policy making. But it is not yet fully "tried and tested", many practical issues remain outstanding and decisionmakers and their senior advisors remain sceptical about the use of SEA. These concerns have guided the information gathered and the analysis undertaken in this report. Specifically, the emphasis is on drawing lessons from "hands on" experience with

SEA – which is both relatively limited and insufficiently understood. We have relied primarily on country status reports and case studies, supported by other research findings, to draw a comparative profile of recent developments in this area. This canvass is preliminary and preparatory to further work.

A draft version of this report was reviewed at an international workshop on the status and the effectiveness of SEA organised by the Netherlands Ministry of the Environment (the Hague, December 15-16, 1994). The meeting was attended by representatives from approximately 20 countries and institutions, including those with a record of experience with SEA (e.g. Australia, Canada, Denmark, the European Commission, the Netherlands, New Zealand, UK, USA and the World Bank). The final report also benefited from a preceding workshop, also organised by the Netherlands Ministry of the Environment, to preview its proposed 'environmental test' of policies and to compare frameworks and procedures established by other countries for policy level environmental assessment. In addition, the work reported here incorporates findings from several previous workshops and meetings held by or for the effectiveness study, (see Box 1.2) and is coordinated with the preparation of the UNEP *Draft Guide to EIA Good Practice*.

The report covers four main aspects:

- a framework of analysis;
- a survey of the evolution of and experience with SEA;
- a review of challenges of current practice; and
- an outline of future directions for the field.

Each chapter includes boxes and files of information, comprising conference reports, institutional profiles, cases studies and 'tool kits' of SEA concepts, methods and procedures.

BOX 1.1

Effectiveness Study Design

Objectives	*Modes of Approach*	*Progress to Date*
• to review current issues, emerging trends and future directions in EA	• literature review, surveys, workshops and consultation • background studies, challenge statements for IAIA '96	• framework of 10 themes; EA Summit reports
• to examine relevance of EA to decision making	• country status reports, audits of cases and successes	• response to questionnaire by IAIA members and others
• to document what works well in existing approaches	• case studies and good practice • UNEP project on developing countries	• database of case studies and other materials (Australian EPA)
• to recommend measures for improved practice	• interim and final reports	• interim report

BOX 1.2

Conferences and Workshops Contributing to the SEA Report

Discussions at and results of the following seminars were used in this study:

- IAIA Annual Conferences (Shanghai, 1993; Quebec City, 1994)
- Hong Kong-Canada EIA Workshop (Hong Kong 1994)
- 7th Tripartite Australia-Canada-New Zealand Workshop (Canberra, 1994)
- Nordic EIA Effectiveness Workshop (Tuusula, 1994)
- CEMP ThinkTank on EA Effectiveness (Banchory, Scotland, 1994)
- International Summit on Environmental Assessment (Quebec City, 1994)
- UNEP Expert Group Meeting on EIA Good Practice (Nairobi, 1995)

2. Background to the Report

"The theme of the [effectiveness] study Ls "Evaluating Practice to Improve Performance". It focuses on the status of EA in different countries and organisations, and its strengths, weaknesses and relationships to the challenges [identified in] Agenda 21.

Information Bulletin No. 1

International Study of the Effectiveness of Environmental Assessment, 1994, 6.

This report on SEA forms part of a larger investigation of the effectiveness of environmental assessment. A draft framework for evaluating effectiveness guides the overall study (Sadler, 1994). It proved useful for organising the general approach taken to reviewing progress with SEA. However, additional considerations are introduced because SEA is still at the formative stage of process development compared to project EIA. The record of practice and performance is correspondingly less clear.

The purpose of this chapter is to situate SEA in the context of the effectiveness study. A brief summary is given of the rationale, aim and design of the study (further information is provided in the information bulletin above and its updates). SEA is then related to other themes of the effectiveness study. Next, the use of effectiveness concepts and criteria to evaluate progress and performance in this area are described. Finally, the issues of SEA practice are identified from inputs to previous workshops and meetings; we have used these as scoping exercises to draft an agenda of questions and focus subsequent analysis and discussion in the report.

2.1 OUTLINE OF THE EFFECTIVENESS STUDY

Rationale:
Environmental assessment has reached several milestones. Most notably, 1994 marked the quarter centenary of the passage of the US *National Environmental Policy Act* (NEPA, 1969), which first introduced this requirement. Recently, EA has become widely used by many countries and international organisations; Principle 17 of the Rio Declaration on Environment and Development (1992) calls for its universal adoption; and additional requirements are introduced by international agreements (e.g. UN Convention on Biological Diversity). Despite this record of progress, it is also recognised that EA falls short of realising its full potential to contribute to informed decision making. This intersect of trends established the rationale for the international study of EA effectiveness.

Aim and Scope:
The effectiveness study is a broadly-based attempt to take stock of how well EA works, internationally. As indicated previously (Box 1.1), the focus is on benchmarking progress, evaluating performance, identifying enabling conditions and components of sound practice and building on strengths and accomplishments to improve EA as a sustainability instrument. The scope of review encompasses:

1) core process and practice, namely project EIA, SEA, and the use of EA for sustainability assurance; and
2) contingent trends and issues in EA policy, practice and professional development that influence effectiveness and performance.

Research Strategy:
A collaborative approach to information gathering is followed. It is based on work-sharing, with partner countries and organisations undertaking responsibility for different programme components (e.g. the Netherlands has the lead on SEA). The research design has a number of common elements, including:
- focus on practice and case application;
- pooling information and exchanging insights;
- identifying lessons that have wide application, and
- documenting collective experience.

2.2 SEA IN THE EFFECTIVENESS SCHEMA

Based on initial consultation and discussion, ten themes of EA effectiveness were identified for the overall EA effectiveness study. These are described in file 1 at the back of this chapter, together with a list of corresponding questions. With subsequent amendments, this classification was used to organise the background review of trends and issues. It is subdivided into four main categories:
- foundations of EA;
- new dimensions of contemporary practice;
- process strengthening; and
- capacity building, centred on developing country needs.

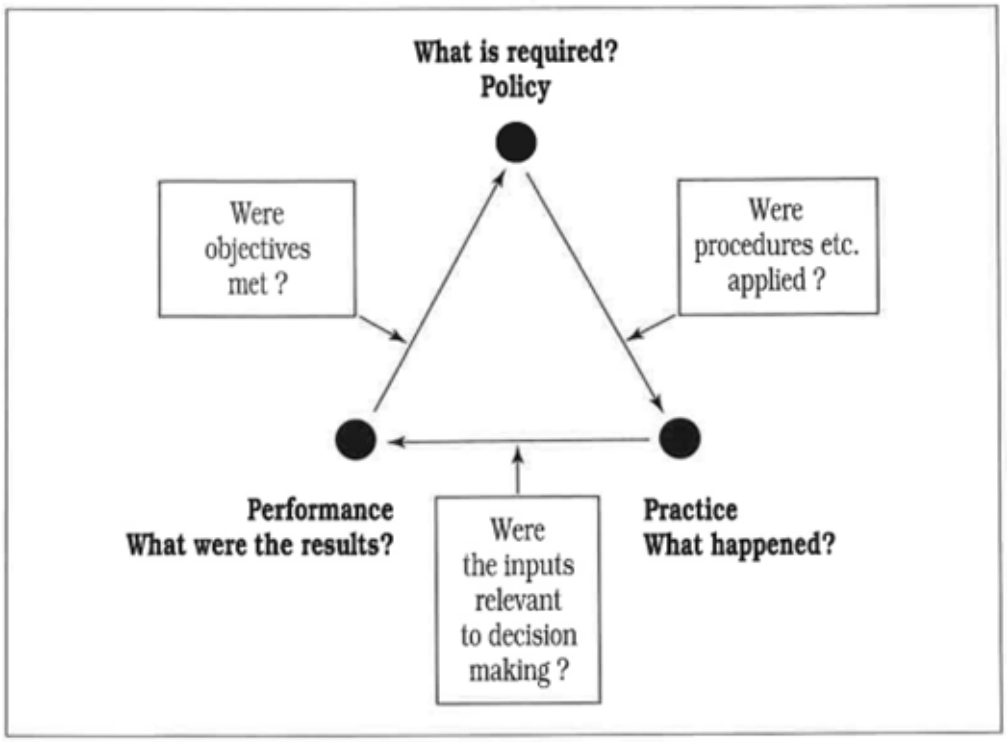
The present version includes both core processes of EA and contingent issues (as described above).

SEA is bracketed – with sustainability concepts and cumulative effects – as one of three 'new' dimensions of EA practice. In this framework, SEA is a process that:
1) facilitates the translation of sustainability concepts into policy making;
2) addresses cumulative and large scale effects at an early stage; and
3) strengthens and supports project level EIA.

The contribution of SEA to these three areas is elaborated in Chapter 3.

In evaluating *effectiveness*, the concern is with how well SEA actually works, which components and activities contribute to or detract from success, and what realistically could be done to improve the process(es) under review. A schema for this purpose is outlined in Figure 1; it illustrates evaluation as a continuum in which the key judgements are made by relating policy against practice, and practice against performance. The accompanying questions are generic prompts to review SEA experience. Additionally, effectiveness concepts and criteria can be used to identify and evaluate different levels and aspects of SEA practice.

Figure 1. Schema for Evaluating EA Effectiveness



2.3 DIMENSIONS OF SEA EFFECTIVENESS

EA performance is determined by the extent to which it meets established purpose(s), goals and objectives (substantive effectiveness) and accepted provisions and principles (procedural effectiveness). This analysis can be undertaken at a macro (system-wide) level, a micro (process-specific application) level, or some immediate level (e.g. aggregate review of screening performance). Numerous studies of the state of the art of EA cover aspects of system and process effectiveness. These aspects are also highlighted by periodic reviews of the implementation of EA requirements (e.g. Commission of the European Communities, 1993), by ongoing reviews of EIS quality (e.g. Netherlands EIA Commission, 1993), and by occasional impact audits and process evaluations (e.g. Sadler, 1987). As yet, however, there appear to be few counterparts for SEA.

Many aspects of EA effectiveness are difficult to evaluate. EA is a multi-dimensional process; typically, it involves a complex of activities and is moulded by numerous influences. As a result, it is difficult to measure and attribute the results of process application (e.g. impacts avoided or mitigated, decisions influenced or proposals altered). This is especially the case with SEA compared to project EIA because often the chain of cause and effect is unclear or attenuated (see Chapter 3). With few exceptions, information on the effectiveness of SEA practice is limited, the evidence tends to be circumstantial and, likely, is interpreted differently by key actors in the process. However, their views and experiences, as well as written documentation, can

help to piece together a record of what happened and what was achieved. A disciplined approach to reviewing the status and effectiveness of SEA involves three main steps as described below:

- Establish the enabling conditions of sound practice by reference to SEA requirements, procedures and arrangements (e.g. is there a legal basis / mandatory provision?).

- Apply the test of relevance for decision making, noting whether and how SEA informs choice and influences the actions taken (e.g. are policies altered to incorporate the environmental considerations identified?).

- Examine the 3r's of operation excellence, comprising rigorous analysis, responsive consultation and responsible administration (e.g. are these applied in accordance with established principles?).

The focus of this report is primarily on the first dimension of effectiveness.

2.4 AGENDA OF SEA ISSUES

The discussion of SEA at several international workshops was helpful to gain an initial picture of the field. Firstly, the workshops confirmed the importance attached by practitioners to introducing and implementing SEA. Secondly, the workshops were helpful in identifying relevant trends and developments in this area. Thirdly, the workshops highlighted concerns and questions about SEA practice. In Box 2.1, these are packaged as an agenda of issues[1]].

The chapters and sections of the report approximate to the order of questions listed in Box 2.1, beginning with basic questions about the what, why and how of SEA. Many practitioners noted these aspects need to be clarified, or perhaps reconsidered, prior to the wider acceptance of SEA (see Chapter 3). SEA practice is still incompletely or poorly known and, in some cases, may be misunderstood. A slate of *institutional, procedural, methodological and capacity-building* issues require further examination. These also encompass significant, cross-cutting challenges, such as:

- the feasibility of accommodating SEA within existing policy structures;
- the applicability of EIA-based methods to SEA;
- the practicality of public involvement at this level; and
- the utility of SEA for policy making.

Such concerns underline the importance of highlighting lessons of experi-*ence, of exemplifying the benefits that SEA can deliver.*

[1] In paragraph 8 (boxes 8.2, 8.3 and 8.4) a brief summary of some main findings of this study is given, referring to most of the questions mentioned in box 2.1.

BOX 2.1

Key Issues Of SEA Practice

Frame of reference

What is SEA?
- Definition
- Decisions covered

Why *is SEA useful?*
- Rationale for SEA

How is it related to decision making processes and instruments?
- 'integrated' planning
- socio-economic assessment

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

How is SEA related to EIA?
- EIA based process development
- Comparisons with other policy tools

Institutional issues/decision making

How to incorporate SEA in existing decision making?
- Pre-requisites for SEA
- Formal versus informal arrangements
- Types of SEA provision
- Scope of application

Process/Procedure

What are elements of an effective SEA process/procedure?
- Role of the public
- Role of environmental agencies/authorities
- Suitability of EIA procedures for SEA
- Linkage of SEA to project EIA
- SEA quality standards and review mechanisms

Methods/Techniques

What is the state of art of SEA techniques and methods?
- Preparation of SEA studies
- Development of alternatives at the strategic level
- Identification and analysis of impacts/issues in SEA
- Dealing with uncertainties at the strategic level
- Analysis of cumulative impacts
- Analysis of effect on sustainable development

File 1

THEMES OF THE EA EFFECTIVENESS STUDY
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?
1 Guiding values and principles	• purpose and orientation of EA • basic requirements for an 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 these be expressed in law, policy and institutional arrangements?
B. NEW DIMENSIONS	SCOPE OF EA PROCESS	WHERE IS EA GOING?
2 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?
3 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, what are their strengths and weaknesses? What are requirements for and barriers to an effective process?

Organising theme	*Level & focus of review*	*Key issues*
4 Cumulative and Large Scale Effects	• definitions and requirements for addressing cumulative effects • project oriented versus eco-system approaches • framework 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?
5 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 actions? What changes might improve their relevance for this purpose?
6 Integrated approaches to impact analysis	• 'best guess' science paradigms and practices • traditional knowledge • user-friendly tools, techniques and information technologies • relationship of socio-economic, bio-physical, 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?

Organising theme	*Level & focus of review*	*Key issues*
7 Public participation and dispute settlement	• conflict resolution in the EA process • provisions for public scrutiny and involvement • forms of participation and negotiation • relationship to decision making powers and responsibilities	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 resolution procedures being used and with what success?
8 Follow-up and post-projects analysis	• requirements for follow-up to EAs • 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?
9 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 transboundary 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?
D. CAPACITY BUILDING 10 Capacity building	• needs and demands • training, networking and cooperation • research, development and pilot projects • EA skills 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?

3. SEA: Definition and Perspective

"SEA is often oversold, especially as a clone of big project EIA".

7th Australia-Canada-New Zealand EIA Workshop, Canberra, 1994

"The all 'bells and whistles' approach is a recipe for resistance by development and fiscal agencies that does us [EA administrators and practitioners] no favours".

Policy Think Tank on Effectiveness of Environmental Assessment, Centre for Environmental Management and Planning, Banchory, Scotland, 1994.

SEA is currently the focus of considerable research and the volume of literature on the subject is growing rapidly. Not unexpectedly, an early preoccupation centred on examining ideas and principles of SEA[2]. In principle, the case for SEA appears to have gained considerable acceptance among EA professionals. However, this recognition is not universal; nor does it imply there is agreement on the apparent directions being taken or proposed for SEA in the literature (as indicated by the comments above).

Heads of agencies and senior officials who attended the 1994 International Summit on Environmental Assessment took a conservative view of SEA. The Final Report of the Summit concludes that there is no consensus on the feasibility of applying SEA to policies and programmes, endorses a low-key approach to its promotion and recommends consideration of other terms and concepts (see Box 3.1). Recently, several correspondents of the EIA *Newsletter* (10, 1995) argued for taking a more critical perspective on SEA. For example, Scheurs and Devuyst (1995) consider that the role and benefits of SEA are "vague and obscured"; Meehan (1995) notes that these and other issues need to be addressed "before SEA is likely to be seen as a useful input to environmental policy"; and Wagner (1995) concludes that it is no longer enough to pronounce SEA as an 'article of faith' – "it has to be demonstrated".

In this chapter, we begin by (re)examining core terms and concepts of SEA. These are still open to interpretation; and the field, in Partidario's (1993) words, "lacks a practical conceptualization". More precisely, various models of and approaches to SEA are promoted; these encompass different assumptions regarding its scope, form and relationship to existing decision making processes. For example, the state of the art of "policy impact assessment", as defined at IAIA workshops, is summarised in File 2 at the back of this chapter.

[2] For example Jacobs and Sadler, 1989; World Bank, 1991; UNECE, 1991; Project Appraisal, 1992; Therivel et al 1992; Wood and Djeddour, 1992.

At this stage, we endorse taking a flexible, pragmatic perspective on SEA. This frame of reference is elaborated here in response to the first four basic questions identified in Box 2.1, namely:

1) what is SEA? (definitions);
2) why is SEA useful? (rationale);
3) how is SEA related to policy making? (boundaries); and
4) when and where is SEA useful? (applications).

SEA - A View from the Summit

BOX 3.1

"Strategic EA is a relatively new concept. It involves the application of EA principles to decisions at program and policy levels, rather than to decisions on specific projects. The term "strategic EA" has been applied to a range of assessments – sectoral, regional, and policy. Such a blanket definition may hide real differences and difficulties. On the one hand, the application of EA to sectoral and regional levels has proven effective in reducing the costs and amount of work required in project-level EAs, and in some cases even eliminating the need for an EA for such projects. However, there is no consensus that EA should or can be applied as easily to policy or program proposals. By their very nature, policy decisions are based on intangible, political factors, and may not be easily accommodated into the relatively rigorous analytical process of EA. As well, there may be a danger in "pulling EA in too many directions". Some developing countries, for example, may need to strengthen their processes for handling project EAs before taking on regional or policy EAs.

The tools and techniques of policy EA are not well developed. The goal is not to do an EA of policy, but rather to ensure that the environmental considerations of policies are taken into account in an integrated way. In this light, a new term – such as "environmental appraisal" or "environmental test" might help clarify the conceptual differences".

Source: Final Report, International Summit on Environmental Assessment, 1994, 11.

3.1 INITIAL DEFINITION AND DELINEATION

What is SEA?

As used here, the term SEA describes a systematic process for evaluating and anticipating the consequences of decisions taken prior to the project stage (see Box 3.2 for a core definition). Its purpose is to ensure that environmental considerations and alternatives are addressed as early as possible and on a par with economic and social factors in policy, plan or programme development. So defined, SEA is a decision-*aiding* rather than a decision making process. Like

the policies, plans and programmes to which it applies, SEA also can be Djeddour, 1992). However, to avoid confusing ends and means, we refer here to SEA as an *instrument* (or tool) for policy-making, planning and programming and see the later as key stages in a decision cycle.

The core definition of SEA in Box 3.2 reflects basic principles of EIA. It is also consistent with the concept of integrated decision making as stated by the World Commission on Environment and Development (1987). Note that a requirement to use EIA *procedures and methods* at the strategic level does not necessarily follow from the core definition. While their use and adaptation for this purpose is widespread, other approaches are and can be used in parallel or in combination with EIA based elements. For this reason, we have chosen not to highlight particular requirements as part of a core definition (cf. Therival et.a1.1992); however, these issues are addressed elsewhere in the report.

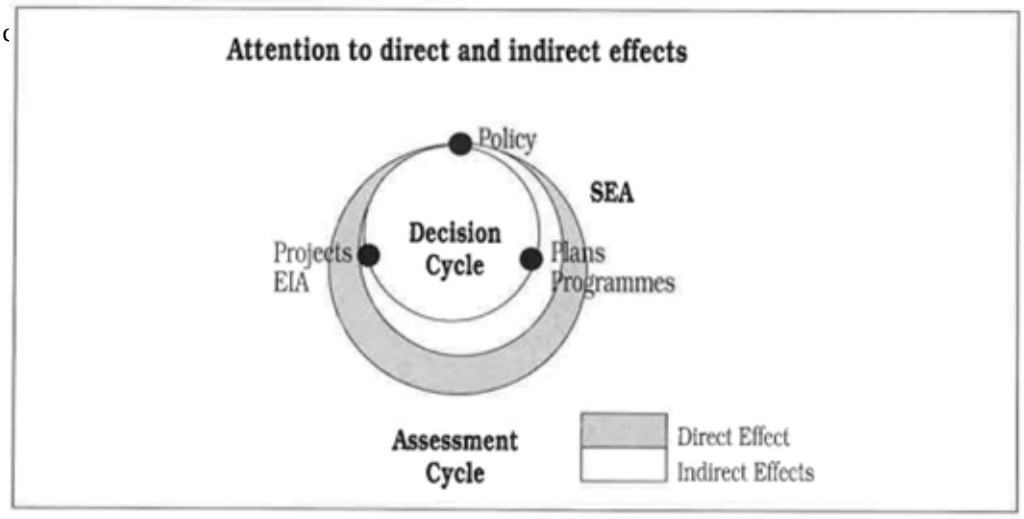
BOX 3.2

Core Definition of SEA

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

Policies, programmes and plans (the 3P's)
These terms mean different things in different countries. Since their use is dependent on the political and institutional context, the precise meaning of a policy, plan or programme is a matter for country- or agency-specific determination. For present purposes, generic definitions of the 3Ps are stipulated (see Box 3.3) and their interrelationships and collective linkage to SEA are shown schematically in Figure 2 (including the varying emphasises of attention to either direct or indirect effects that need to be given at the various levels of decision making).

Figure 2. SEA and the Decision Cycle



The 3Ps - A Glossary of Terms

BOX 3.3

The following definitions are generic and meant to have sufficient flexibility to encompass terminology used in different countries.

Policy:
a general course of action or proposed overall direction that a government is, or will be, pursuing and which guides ongoing decision making

Programme:
a coherent, organised agenda or schedule of commitments, proposals, instruments and/or activities that elaborates and implements policy.

Plan:
a purposeful, forward-looking strategy or design, often with coordinated priorities, options and measures, that elaborates and implements policy.

Project:
a proposed capital undertaking, typically involving the planning, design and construction of a large-scale plant, facility or structure.

The 3Ps:
policies, programmes and plans may have a national (government-wide), sectoral or spatial focus; often these terms are used in a sequential or interchangeable manner.

As described, policies are broad statements of intent that define and focus the political agenda of a government and initiate the decision cycle. These directives are given substance and effect by plans and programmes – which have closely overlapping, often interchangeable, functions. For example, both plans and programmes involve evaluating and selecting options to achieve policy objectives and specifying how, when and where projects and activities will be carried out. This process narrows the range of choice such that most options are foreclosed by the project phase. In reality, of course, policy making does not necessarily unfold as a logical, hierarchical sequence of discrete, technical steps (O'Riordan, 1986); a fact that has a critical bearing on the application of SEA.

Environmental Effects
However defined, policies, plans and programmes encompass the generic range of strategic decisions that are likely to cause environmental concern. Not all strategic decisions will fall in that category. A “pre-screening” check can be made, based on a short series of questions to establish the proposals that are of concern (see Box 3.4). Key considerations include:
1) the policy area or sector covered; and,
2) the type of environmental concern that can be anticipated.

Firstly, the nature and scope of environmental consequences will vary with the policy area under review. Energy, transport, industry and housing are examples of development sectors with well-known environmental effects. In general, all policy areas which concern or lead to changes in the use of land and natural resources, the production of raw materials, chemicals and other hazardous products and/or the generation of pollutants, wastes and residuals, are potential candidates for SEA[3] (U.K. Department of the Environment, 1991).

Secondly, environmental risk and consequentiality vary with the level of generality involved in decision making. 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 programmes that initiate and locate specific activities. *Indirect effects* are associated with policies and with certain types of plans and programmes, such as legislative and fiscal initiatives, that are not easily separable into discrete actions. Often, these policies, plans and programmes will have an environmental dimension: for example, they may influence social attitudes and consumer behaviour toward personal mobility, green products or waste recycling; or they may provide the main or only opportunity to address sustainability concerns, global changes and other cumulative effects.

Because the environmental considerations related to policy making vary, so the focus and form of assessments are likely to differ. A critical distinction is made in Box 3.4 between:

1) **indirect** environmental effects where the analytical focus is on *implications* and *issues;* and
2) **direct** environmental effects where the analytical focus is on *impacts*.

Alternative modes of analysis follow from this distinction; these are described in section 3.4.

3.2 PURPOSE AND RATIONALE

Why is SEA important?

Many reasons are given for introducing SEA as an instrument for decision making. In broad terms, the rationale for SEA of policies, plans and programmes is threefold:

- strengthening project-level EIA;
- addressing cumulative and large scale effects; and
- incorporating sustainability considerations into the `inner circles' of decision making.

[3] By extension, SEA should cover all actions and decisions taken by government that aim at or contribute to stimulating population and "throughput" economic growth (Goodland and Sadler, 1995). However, in the absence of politically acceptable alternatives to traditional modes of economic management, we concede that this may not be a practical interpretation.

Prescreening For SEA

BOX 3.4

The following questions can be used to make a *quick* judgement about whether or not 3P proposals are likely to have environmental consequences that merit attention and possibly require an SEA:

- *What is the actual content of the proposal?*
  - is it concerned only or primarily with broad general direction(s); or
  - does it address or specifically include operational measures (projects, activities etc.).

- *What policy area or sector is targeted in the proposal?*
  - is it one known to have or likely to cause environmental effects (e.g. energy, transportation, housing, agriculture); and/or
  - are there components which are likely to have cumulative or long term consequences for the environment (e.g. trade, industrial diversification, technology development).

- *What environmental considerations are raised by the proposal?*
  - the proposal appears likely to initiate actions that will have direct or evident environmental impacts;
  - the proposal appears likely to raise broad environmental implications and/or issues that should be addressed; or
  - the proposal appears likely to have marginal or no environmental consequences.

Strengthening project level EIA

EIA is now established in most countries, either under national law or policy or as a requirement of international lending or assistance. The instrumental contribution that this process makes to development planning and decision making is widely acknowledged; for example, in Principle 17 of the Rio Declaration on Environment and Development.[4] But it is recognised also that EIA, as typically institutionalised, is constrained by certain limitations and weaknesses. These include structural weaknesses,[5] centred on the circumscribed role of EIA in decision making and relatively late stage at which it is applied (Sadler, 1986). With certain exceptions, noted later, EIA is focused primarily on *how* a proposed development should take place so as to minimise adverse environmental impacts.

[4] Principle 17 of the Rio Declaration reads: "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 and are subject to a decision of a competent national authority".

[5] As defined here, structural limitations are distinguished from methodological and procedural constraints which respectively concern the tools and techniques of analysis and the provisions and components of the EIA process.

At this stage, 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 partly countered by provisions to addressing project justification and alternatives in EIA (see Chapter 4). In reality, however, prior policy, technological and locational options are not open to serious environmental reexamination; neither is project-by-project EIA an effective way of doing so (Sadler and Jacobs, 1989; Lee and Walsh, 1992; Gibson 1993). Far preferable is the use of SEA or an equivalent approach to incorporate environmental considerations and alternatives directly into policy, plan and programme design. The case study in Box 3.5 exemplifies these points.

The introduction of SEA can help to refocus and streamline project EIAs, making them more consequential and reducing the time and effort involved in their preparation. For example, SEA will help to clarify and establish an integrated policy framework of goals, objectives and principles against which project EIA can be conducted effectively. Without this context, it is difficult to evaluate the significance of predicted impacts and the real opportunity costs of development (as described in Box 3.5).

Addressing Cumulative and Large Scale Effects

The environmental impacts of human activity are now occurring at global, continental and regional scales. Well known examples include loss of biodiversity, climate warming, thinning of the stratospheric ozone layer and widespread acidification of lakes and rivers (e.g. in North America and Central Europe). By definition, cumulative and large scale environmental effects build up incrementally over long periods of time, result from the addition and interaction of multiple activities and stresses and are pervasive, cutting across both policy sectors and ecological boundaries. The point introduced here is the "mismatch" between the time and space scales at which many types of cumulative effects are expressed and the narrow scope of project EIA (Canadian Environmental Assessment Research Council and US National Research Council, 1986).

Over the last ten to fifteen years, a considerable effort has been made to extend EIA-based frameworks to encompass certain types of cumulative effects (see Chapter 4). More progressive jurisdictions have dealt reasonably well with the ancillary impacts of large scale projects (e.g. dams, transport infrastructure) and the incremental effects of numerous, small scale actions of a similar type (e.g. road realignment and improvement). However, many activities and practices which have environmental repercussions still escape assessment (e.g. agricultural and residential developments). For example, the Coastal Zone Inquiry conducted by the Australian Resource Assessment Commission (1993) documents the cumulative effects associated with the 'tyranny' of small, incremental decisions, relates these to poorly coordinated, case-by-case approval processes, including EIA, and recommends taking a strategic approach to decision making (see Box 3.6).

From Project EIA to Comprehensive Regional Assessment
The Lancaster Sound Panel Review, Canada.

BOX 3.5

Background:
Under the federal Environmental Assessment system, a formal (public) review by an independent panel is required for major proposals with potentially significant environmental impacts. Lancaster Sound was one of a series of EA reviews of major energy developments proposals undertaken in Northern Canada in the late 1970s.

Analysis:
In 1978, Northlands Petroleum proposed drilling a single oil and gas exploration well, offshore in Lancaster Sound (at approximately 74N, 81W). The proposal was referred for panel review by the initiating agency, with a request for regional clearance for drilling in other locations. Lancaster Sound, the eastern entry to the Northwest Passage, is: i) a unique, marine ecosystem, with an unusually high concentration of Arctic wildlife, on which the local Inuit traditionally depend for subsistence; and an ice-infested physical environment, with a short summer season for deep water drilling. These concerns led the panel to an interim conclusion that "a meaningful assessment of exploration drilling in Lancaster Sound cannot be made in isolation from the broader issues" – which require a "relative assessment and comparison of ...policy options"... In its final report, the panel recommended: i) a deferral of drilling "until such time as the government has addressed the issue of the best use(s) of Lancaster Sound" and ii) that "any future request for regional clearance should be supported by a comprehensive regional assessment". Subsequently, the Canadian Government initiated the Lancaster Sound Regional Study, a two year comprehensive public review of the future of the area that identified the basis for a new policy and planning regime.

Lessons:
The Lancaster Sound review:
1) underlined the importance of a coherent policy-planning context for project-by-project EIA;
2) resulted in comprehensive regional assessment as part of policy making and planning for optimum resource use(s); and
3) emphasised the importance of taking account of concerns of indigenous peoples.

Source: Report of the Environmental Assessment Panel Lancaster Sound Drilling. Ottawa: Federal Environmental Assessment Review Office, 1979.

SEA of policies, plans and programmes serves as an "early-warning" system for anticipating and managing cumulative effects, including global change (Sadler and Jacobs, 1989). Where policies, plans and programmes initiate projects, SEA can address potential impacts and interactions. Under other circumstances, it can help understand the significant environmental issues and implications that will arise. A number of case studies demonstrate the application of environmental appraisal to UK policy making and planning,

including several that deal with measures, options and costs of a national programme to reduce CO_2 emissions by 10 mtC in 2000 (Department of the Environment, 1994). For all forms of policy making, SEA can help to identify development alternatives that minimise cumulative effects and, except for actions that are indivisible (e.g. taxation), it also establishes a framework against which these effects can be tracked and examined at a later stage.

BOX 3.6

Addressing Cumulative Effects
The Example of the Coastal Zone Inquiry
Resource Assessment Commission, Australia

Background:
The Resource Assessment Commission (1989-1993) was established to provide independent policy advice to government on natural resource management issues. Under Section 7 of the *Resource Assessment Commission Act* (1989), it is required to take an integrated approach and to have regard to efficiency, ecological integrity and equity considerations. During its tenure, the Commission undertook a number of public inquiries within a multidisciplinary, strategic framework of assessment.

Analysis:
The Coastal Zone Inquiry was based on a "broad-brush" assessment of cumulative effects, i.e., linking patterns of growth to region-wide environmental change. Urban sprawl and tourism development are identified as the principal causes of stress on marine, estuarine and terrestrial ecosystems, e.g. pollution loadings, shell fish contamination, habitat depletion and deterioration, and agriculture land alienation. Strip development is almost uninterrupted in some coastal regions (e.g. Northern New South Wales - Southern Queensland). The Commission made the telling point that decisions and commitments made already will ensure that non-metropolitan urban sprawl and its consequences likely will continue for another decade. A process of "regulatory rubber-stamping" of individual developments (unobjectionable in themselves) with no overview of the larger environmental consequences lies at the heart of the problem. The coastal zone is a jurisdictional tangle of overlapping spheres of government and divided sectoral responsibilities, where signals often conflict. The Commission concluded that a national approach is required, based on common goals and principles that are implemented locally.

Lessons:
The Inquiry recommended a National Coastal Action Programme that emphasises three elements which are critical to addressing cumulative effects:

- adopting a long term, holistic perspective (over short term expediency);
- greater community and industry involvement in decision making; and
- use of innovative tools and measures to assist integrated Coastal Zone management (e.g. economic instruments to fully implement the polluter-pays principle, strengthening the integrity and reliability of the EIA process).

Source: Resource Assessment Commission (1993).

Incorporating Environmental Sustainability Considerations into policy-making

Sustainable development, to paraphrase the Brundtland definition, meets human needs without foreclosing the environmental options for tomorrow. It involves balancing a commonwealth of environmental, economic and social objectives and criteria as summarised in Figure 3. Key trade-offs, summarised in Figure 3a indicate the importance of ecological integrity as the baseline condition of sustainability. This dimension is elaborated in inset b) to the diagram. Because the stock of natural capital is at risk of being overdrawn, EA has gained in importance a key to planning for sustainable development (Sadler and Jacobs, 1989; Goodland and Sadler, 1995). However, its full potential in that regard remains to be realised.

Figure 3. A systems perspective on sustainable development

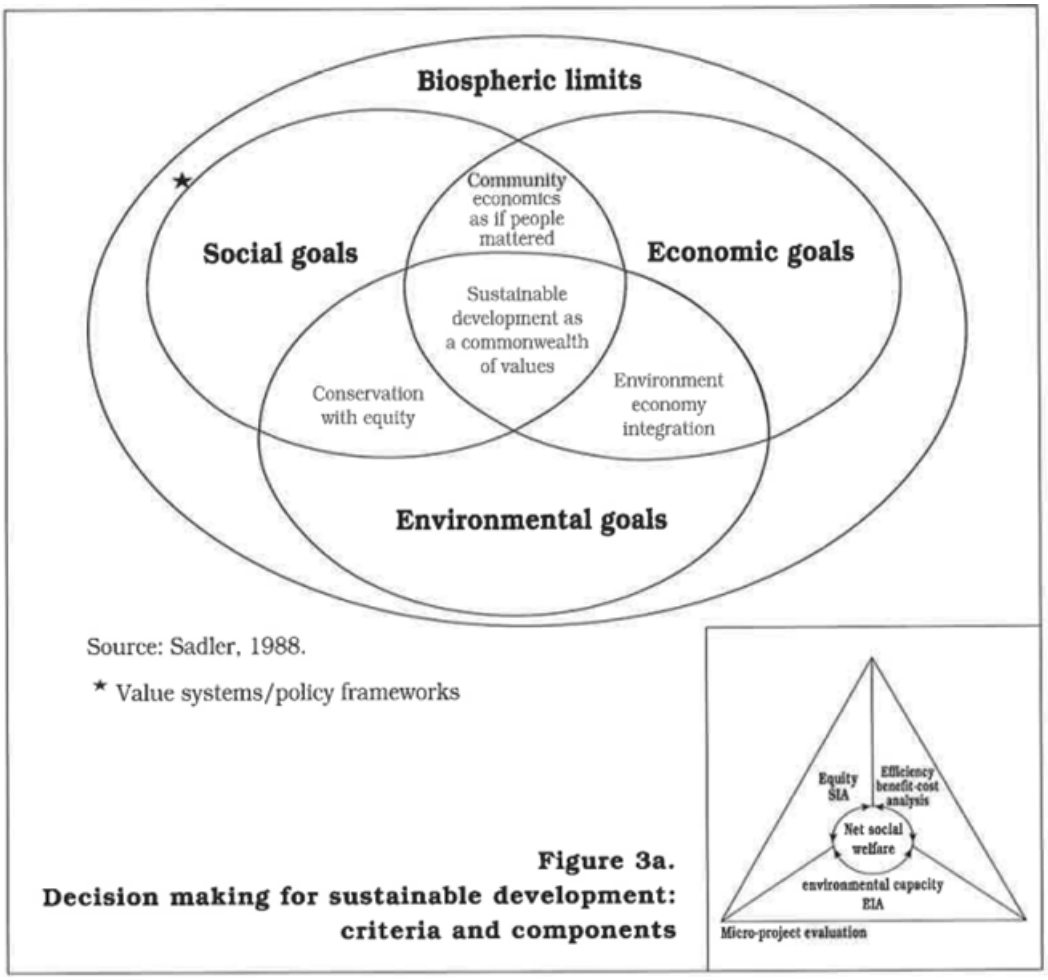


Figure 3a. Decision making for sustainable development: criteria and components

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 agenda, the emphasis is on tackling the environmental *symptoms or effects* of development in the "downstream" part of the decision cycle (see next section). 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 economic, fiscal and

trade policies that guide the overall course of development. SEA provides a mechanism for instilling environmental objectives and considerations into these decisions (Sadler, 1994).

A recent survey undertaken for the Environmental Protection Agency of Australia, as part of its review of the Commonwealth EIA process, found considerable support for the above principles, nationally and internationally (Court et al, 1994). The consultancy recommended "the adoption of SEA, incorporating cumulative impact analysis (CIA), as the principal means of achieving ecologically sustainable development". Interim options to introduce limited forms of SEA and CIA and to pursue less far reaching changes were also put forward. These are considered by the authors to have "diminishing benefits", although political constraints may temper process reform and dictate a phased approach to the use of SEA in support of sustainability goals.

3.3 RELATIONSHIP TO POLICY MAKING

How is SEA related to policy making?

The scope and form that SEA takes will be determined by the role it is assigned in policy making. However, this determination also depends upon the institutional arrangements that are in place. The concern here is with the relationship of SEA to policy making processes and to other, comparable instruments of analysis (e.g. benefit cost analysis). In this section, structural and operational aspects of this question are introduced, with particular reference to:

1) the linkage of SEA to policy and institutional frameworks; and
2) the extent to which social and economic factors are taken into account in SEA.

Structural Linkages

SEA is a means of integrating environmental considerations into policy making; at the same time, the "infrastructure" of policy making must be appropriate to the application of SEA. In reality, the feasibility and effectiveness of SEA will be conditioned by the extent to which environment and development considerations are *already* integrated in decision making. To date, few countries and international organisations have achieved the level of integration called for in Agenda 21. Key institutional attributes that will bear upon the use and quality of SEA are:

- *Applicability of Data Bases.*
  Up-to-date information on environmental conditions, trends and issues is a pre-condition for the sound practice of SEA. Relevant sources include state of the environment (SoE) reports and accounts, as well as on-line geomantic systems, baseline studies and other data assemblies that are traditionally used for *impact* analysis. With respect to its quality, environmental information can be rated for reliability, adequacy and accessibility (see Roots, 1992). To be useful for SEA, the information assembled must be problem-focused. In this regard, appropriate indicators are an indispensable aid to applying data bases.

- *Integrity of Policy Frameworks.*

At a minimum, environmental objectives and measures should be clearly specified. This will facilitate the use of SEA in evaluating the significance of the implications, issues and impacts of policy, plan and programme proposals. More optimally, environmental, economic and social goals will be integrated at different levels; for example, nationally in sustainability strategies and regionally and locally in land use, physical and structure plans. Policy and institutional analysis can help to understand the con-text(s) and options for SEA process development and application, including tiering to project EIA.

Approaches to SEA

Depending on the configuration(s) identified, one or more of the following approaches to SEA could be taken (Sadler, 1994):

1) Where policies and plans are reasonably well-integrated, SEA can be applied to scrutinise and check the environmental credentials of proposed developments or function as a 'sustainability test' to clarify the ecological, social and economic trade-offs.

2) In other contexts, SEA will need to be employed flexibly and, on occasion, comprehensively to review development policy, plan and programme initiatives that have a range of potentially significant environmental consequences.

3) Often, policy development is routine or incremental and SEA may be difficult to trigger. In these cases, policy audit and evaluation methods could be applied to sectoral activities that are environmentally perverse or damaging.

Operational Integration of Environmental, Social and Economic Factors

The extent to which economic, social and other considerations are included as part of SEA will be conditioned by the policy tools that are used or available for this purpose. For example, the use of benefit cost and other forms of economic analysis is well established in many countries and international organisations. In such cases, limiting SEA to biophysical considerations (e.g. changes to natural resources and land use) may be reasonable. The analogy here is to the rationale for originally introducing EIA, namely to inject environmental values into the economic calculus of project appraisal.

However, EIA and sustainability principles underline the requirement for a broad definition of environmental effects to include social, health, cultural and other relevant considerations. In principle, the case for SEA taking account of these cross-linkages seems clear. The equity dimension of the sustainability agenda is less advanced than its economic and ecological counterparts (Figure 3), with distributional questions (fairness, disparity etc.) being inadequately treated in policy appraisal and impact assessment. For example, frameworks and methods for policy level social impact assessment (SIA) are incomplete and speculative (see File 3 at the back of this chapter). In economic analysis, the use of social discount rates helps understand the distributional implications of development options (Dasgupta, 1993); but the perspective is much narrower than that taken in SIA (as described in File 3). Policy appraisal, based on economic valuation, is the equivalent of SEA in the United Kingdom and other countries (see Chapter 5). Its procedural rigour and scope of review of environmental effects is frequently criticised by EIA specialists (e.g. Lee and Walsh, 1992; Therivel, *et* al, 1992). We do not disagree with this argument; however, policy appraisal can be seen positively as a step toward *integrated* assessment of the ecological, economic and equity aspects of sustainable development (see, Sadler, et al, 1995). Where sound economic analysis is undertaken, the scope of SEA presumably becomes more limited.

3.4 AIDE-MEMOIR

When and how to use SEA?

This section pulls together the previous discussion. It outlines key points and perspectives regarding the use of SEA. When combined, these constitute an aide memoir on the subject, addressing the concerns of administrators and practitioners reported at the beginning of this chapter.

1. As defined here, SEA is a systematic process for examining and incorporating environmental considerations into the pre-project levels of decision making, policy, plan and programme design.
2. The advantages of this approach include:
   - strengthening and streamlining project EIA;
   - identifying and offsetting cumulative effects at an early stage; and
   - addressing the causes, rather than treating the symptoms, of environmental deterioration.
3. For the long term, SEA should be regarded as a temporary or transitional instrument that leads toward the goal of integrated policy making, planning and programming.
4. The role and relationship of SEA in decision making will be contingent upon the policy infrastructure that is in place, including the use of other analytical tools and the availability of information sources and systems.
5. Depending on the institutional framework, SEA can be used to:
   - check the environmental credentials of development proposals (e.g.- against sustainability strategies); or
   - compensate partially for the absence of policy integration (e.g. by taking a comprehensive approach).
6. The inclusion of social and economic considerations in SEA is optional on existing arrangements and alternatives range from integrated analysis to separate approaches; however, these must be coordinated at some stage to clarify the tradeoffs to be made by decision makers.
7. In practice, the scope and form of SEA will vary with the type of policy, plan or programme under review. A crucial question is whether or not the proposal:
   - will initiate or determine specific projects and activities (type, form, size, etc.); and
   - will likely result in direct or indirect environmental effects.
8. This distinction gives a preliminary indication of the suitability of apply-ing either:
   - impact analysis methods to identify direct environmental effects; or
   - other modes of policy appraisal to examine indirect environmental effects (issues, implications, etc.).

9. In Box 3.7, the above considerations are pulled together as an aide-memoir to clarify the basis for a generic approach to SEA. The steps outlined are preparatory to or may help qualify the application of specific SEA procedures and elements as discussed subsequently.

SCREENING FOR THE MOST APPROPRIATE SEA

BOX 3.7

1. ***Is the planning process 'integrated'?***
(i.e. the full consideration of environmental consequences is given or implicit 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, coordinate with socio- economic review
- ☐ **no** As far as possible SEA should include social and economic; if not, make sure mechanisms are installed and integration takes place

3. ***Should SEA include related policy instruments, such as risk-assessment and cost-benefit analyses?***

- ☐ **yes** Decide which instruments should be included
- ☐ **no** Make sure the application of SEA and related instruments is integrated

4. ***Will the policy, plan or programme to be adopted 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

File 2 On the State of the Art of Policy Impact Assessment

Background:
At IATA '93, a two day pre-conference workshop focused on Policy Impact Assessment (Policy IA). The discussion was based on and extended the report of an expert workshop on "Concepts and Principles for Policy IA", held in conjunction with IAIA '92 (see also File 3). Key points made by participants regarding the nature, characteristics and development of this area are summarised here.

Key Points:

1. *Current State of the* Art: Policy IA is still in its infancy and has yet to be clearly defined. It remains methodologically unsophisticated, when considered against basic principles of impact assessment; e.g. as a comprehensive, integrative, systematic and rational process.
2. *A General Definition:* Policy IA is the assessment of all outcomes of policies being planned, proposed or already in place. So defined, it is conceptually akin to technology assessment or the broader view of social impact assessment. In this formulation, policy IA need not just react to proposals – as compared to narrowly defined EIA. Rather it can *and should* clarify the problematic which a policy addresses, review all options and potential outcomes (not just externalities) and ask whether current objectives and directions are the "right" ones.
3. *Requirements for and Objectives of Policy* EIA: These include:
   - opening up and clarifying broad, fundamental government decisions;
   - forcing explication of often hidden policy assumptions and goals;
   - placing sustainability concerns on the political agenda;
   - identifying environmental and social considerations and trade-offs; and (via all of the above)
   - improving the efficiency and quality of decision making.
4. *Constraints* on *Implementation of Policy IA:* These include:
   - political sensitivity and reluctance to use assessment;
   - the osmotic, rather than logical, structure of policy-making;
   - often policy is expressed in vague, value-symbolic terms;
   - even when policy is more specific, the effects are often not clear; and, in turn
   - there are greater methodological difficulties with policy, as compared to project, analysis.
5. *Agenda for Research and Action:* A four part framework for promoting and instituting Policy IA was put forward:
   1) analyse the political culture and institutional framework for EIA, – e.g. to identify opportunities (or leverage points), as well as constraints, to implement Policy IA;
   2) clarify concepts and objectives of Policy IA - e.g. start with basic terminology and principles, then focus on their application to decision making process;
   3) upgrade decision making and information systems to support and guide the use of Policy IA – e.g. recognising the policy cycle as a continuous process of action research, policy testing, monitoring and learning that facilitates informed choice; and
   4) develop practical concepts and methodological skills – e.g. classifying information for decision making, integrating discrete factors, negotiating win-win solutions.

Conclusions:
From a practical perspective, three conclusions are important:

- policy IA must be promoted as a problem solving, not problem raising, approach;
- further research is needed on what governments are actually doing in Policy IA, SEA etc.; and
- this may help to partially close the gap between the "theory" and practice of Policy.

File 3 **IAIA/KLH Project on Social Impact Assessment of Population Policy**

Background: In collaboration with the Indonesian Ministry of State for Population and Environment (KLH), IAIA convened three expert workshops to examine the application of social impact assessment (SIA) at the macro policy level, particular reference to environment, population and development. This project resulted, *inter ailia*, in a conceptual framework for policy SIA; it also led to recommended amendments to the standard SIA methodology for application to population issues.

Indonesian Context: Indonesia is experiencing rapid economic and population growth. It has a population of approx. 175 million, with high densities on the inner islands of the Indonesian archipelago (e.g. concentrations of 500-800 persons/km^2 in Java). EIA is well established and includes social impacts – which are recognised as difficult to predict and as requiring further work. Recent legislation on the enhancement of population and development of the family has led to critical interest in the potential of policy SIA.

Conceptual Framework. A five part framework for policy SIA was developed, comprising:

1. Issue identification
2. Goal determination:
   - quality of life/equity
   - sustainability
3. Policy alternatives
4. Impact assessment:
   - identify impacts
   - determine significance
5. Preferred policy:
   - pilot design
   - mitigation measures
   - monitoring programs

Application of SIA Methodology to Population Policy: Generic SIA methodologies need to be specified to population issues and modified, as necessary, to take account of the political-cultural context and other considerations that apply in developing countries. Some examples follow.

1. Data limitations mean that short-cut methods may be necessary; if so, 'triangulation' methods to cross-check and minimise errors has proved useful in other contexts.
2. With regard to population, different approaches may be needed for resettlement policies, as compared to population control and family planning policies. Demographic and attitudinal data gathering require special attention.
3. The response of affected publics is also a critical feature (and comprises an additional step to the general SIA methodology). Methods for eliciting response to future population conditions are poorly developed, not very accurate, and often fail to take account of interactions (e.g. of established with incoming populations in the case of major resettlement).
4. The participation component, which is a central aspect of SIA methodology, will need to be culture-sensitive and attuned to value systems, other than those of the mainstream population. In Indonesia, this was a critical and, at times, contentious issue, especially in regard to the outer islands of East Timor and Iran Jaya.
5. An experimental (trial and error) approach may be helpful to resolving the points above, such that policies are introduced gradually on a limited (or pilot scale) before being widely implemented - which is often not possible for concrete projects.

Conclusions:

- little hard information could be found on experience with policy level SIA;
- much work will be required to improve the state of the art; and
- lack of prior commitment by governments is both a cause and product of this situation.

Source: Unpublished Report (1992) prepared for KLH on behalf of IATA by Rabel Burdge, David Marshall, Roy Rickson and Barry Sadler, with annexes by Peter Boothroyd and Kurt Finsterbusch.

4. SEA and Related Policy Instruments

" ..EIA is more than a technical process. It is foremost an informing and testing of policy and these are its roles in the United States National Environmental Policy Act or, at least, its intended roles."

Caldwell, 1988, 71.

The preoccupation with project EIA is a convention of practice rather than a principle of law or policy. As enacted in the earliest institutional frameworks, the scope of EA was broadly drawn to include (or, at least, did not rule out) policy, plan and programme 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 major federal actions". Similarly, early guidance on Canada's Environmental Assessment and Review Process (established in 1973) directed federal agencies "to ensure that environmental effects are taken into account early in the planning of new federal projects, programmes and activities".

In practice, the countries that adopted EA first moved cautiously and incrementally towards consideration of broader policy level questions. By the mid-1980s, however, several elements of SEA were established as part of standard practice in ETA. A larger kit of policy tools was also available in related areas, e.g. technology assessment, land and resource planning. These instruments serve similar functions to SEA as defined in chapter 2 and/or support its application and implementation. In this chapter a brief survey is given of SEA elements based on EIA and of corresponding and supporting policy instruments. For developing countries especially these instruments, in combination or individually, may serve as realistic options to or surrogates for SEA, recognising that resources are limited and that the SEA process is only means to an end – that of incorporating environmental considerations into policy making.

4.1 EIA BASED DEVELOPMENTS

How has SEA evolved?

The evolution of EIA reflects a continuing tension between the broad intent of informing policy making, as exemplified by NEPA, and its project specific application. Various innovations in law, procedure and method have expanded the scope of EIA, in general, and its focus on the higher, pre-project level of decision making, in particular. These trends are summarised here as six main phases of process development, comprising the EIA elements that provide the basis and precedent for SEA. The case studies in Files 4 to 9 at the back of this chapter describe both the chronology of change and the contemporary relevance of these elements.

Project EIA as a Stepping Stone

At the project level, EIA takes place with varying degrees of reference to the larger policy context of a proposal. In many jurisdictions, the requirement to

consider need and alternatives to a proposal provides an entry point into the surrounding policy and planning framework. From the outset of NEPA, for example, examination of alternatives was recognised as helping to clarify the policy objectives and planning framework of a project (see File 4 at the back of this chapter). However, there are evident limits on addressing these considerations in project EIA, as described earlier. With complex and controversial public sector proposals, the EIA process can be a "stepping stone" to policy reappraisal, backing up from impact and mitigation concerns into larger issues. As James (1995) notes, this opportunity is restricted in the case of private sector proposals.

Environmental Inquiries as a Policy Mechanism

Beginning in the 1970s, public inquiries into major development proposal were undertaken in Australia, Canada, the United Kingdom and other countries. Their scope of review often included policy elements (see O'Riordan and Sewell, 1981). An early Canadian landmark was the MacKenzie Valley Pipeline Inquiry (1974-1977), conducted by Mr. Justice Thomas Berger, which set important procedural precedents (e.g. intervenor funding) and influenced public policy on Arctic development (e.g. settlement of native land claims). Similar contemporary roles were played by the Ranger Inquiry in Australia (see File 5 at the back of this chapter) and, to a lesser degree, by the Wind-scale Inquiry in the UK. Since Ranger few EIA-initiated inquiries have taken place at the federal level in Australia (Richardson and Boer, 1995); however, the Resource Assessment Commission (1989-1993) conducted several major inquiries into national resource policy issues within an explicit sustainability framework (as described in Box 3.6). In 1991, for the first time, the World Bank established an independent review of one of its major lending projects; the inquiry into the Sardar Sarovar dam on the Narmada River, India, considered important policy and human rights issues (e.g. involuntary resettlement of tribal peoples), as well as assessing the environmental impacts (Berger, 1994).

Programmatic and Class EA

In the United States, the use of programmatic environmental impact statements (PEISs) is long standing (Webb and Sigal, 1992). PEISs apply to regulatory, development planning and resource management decisions that initiate specific projects and activities. Their use has grown steadily, though unevenly, across and within federal agencies. US experience with PEISs demonstrates their value to forward planning, tiering and focusing project EIA, addressing cumulative effects and examining hazardous and new technologies; for example, the use of plutonium in the nuclear fuel cycle and the impact of deep seabed mining (see File 6 at the back of this chapter). In Ontario, class assessment have a more restricted function than PEISs; typically, they are applied to categories of small and medium scale activity that do not merit individual assessment but that are likely to cause cumulative effects. Recently, the class assessment process has been applied to major development programmes. The first application, to timber management plans for all crown (public) lands of Ontario, was a highly controversial, four year review. It was widely criticised as inefficient and ineffective (Gibson, 1993); however, the government did respond to many policy issues raised by the public outside of the EA process (Doyle and Sadler, in press).

Area-wide or Regional Assessment

In 1978, the US Department of Housing and Urban Development (HUD) initiated area-wide assessment, primarily as a mechanism to examine the cumulative long term effects of its activities, as required by NEPA. HUD (1981) applied this approach, informally and formally, to gain environmental clearance and to establish frameworks for "next level" review, e.g. EIS of metropolitan and corridor growth plans for areas targeted for multiple housing projects or major lending assistance. Other US federal agencies also undertook regional type assessments in advance of anticipated or proposed energy, mineral, water, transportation or industrial development (see Ballard et al, 1981). These were implemented to meet NEPA and various other legal requirements, or, in some cases, represented one-time, reconnaissance studies with little apparent continuity or link to decision making. In other countries, elements of regional assessment are used to support comprehensive land and resource use planning. For example, Canadian and Swedish approaches were compared at a recent seminar (Boverket, 1993); and Alaskan and Scottish experience with offshore oil and gas development is reviewed in File 7 at the back of this chapter to draw lessons about 'with-versus without-EA' approaches to regional planning.

Integration of EIA and Planning Processes

A closely related trend to that described above is the coordination and integration of EIA and comprehensive land and development planning. Australian states, Canadian provinces and New Zealand (at the central government level) were among the first to recognise the need for this relationship and to adopt initial measures to give it effect (see Clarke, 1981). These included, notably, the New South Wales *Environmental Assessment and Planning Act* (1979), which established a statutory framework for incorporating EA into all levels and stages of the state planning system (see File 8 at the back of this chapter). In other Australian states and Canadian provinces, a similar, but more limited, coordinating function is served by various ad *hoc* mechanisms, such as planning appeal tribunals (e.g. Victoria) and joint hearing bodies (e.g. Ontario and Alberta). The New Zealand *Resource Management Act* (1991) provides a comprehensive framework for integrating planning and assessment functions (see Chapter 5). It is backed by the longer standing powers of Office of Parliamentary Commissioner for the Environment to "review the performance of [national environmental management] agencies and processes" and to "investigate the effectiveness of planning by [local and regional] public authorities".

Ecosystem and Landscape Approaches

As noted previously, the problem of addressing cumulative effects drove EIA toward a more strategic form in the 1980s. In Canada and the United States, a synoptic, "ecosystem approach" was and is promoted as a key to understanding the critical stress-response relationships that influence ecological integrity and resilience. The US-Canada International Joint Commission (IJC) was and still is a leader in *applying* this framework, notably in the Great Lakes region (Francis, 1993; Sadler, 1993). Examples include: monitoring the movement and bioaccumulation of toxic substances in the food web; estimating the risks to human health; and a 'prototype' SEA of the basin-wide impacts of water use and diversions (File 9). A recent adaptation of the ecosystem approach, based on principles of landscape ecology, is a

risk-based methodology for assessing and comparing wetland losses at the regional scale (Leibowitz, *et al*, 1992). This was developed by the US Environmental Protection Agency specifically to assist regulatory agencies in reviewing proposed discharges under the Clean Water Act, but also has wider potential application.

4.2 RELATED AND SUPPORTING TRENDS

Which other policy tools correspond to and reinforce SEA?

The innovations reported above lie at the intersection of EIA with broader planning frameworks. Several related trends in other areas of impact assessment, in resource and land use planning and in environmental policy and management reinforce and potentially extend EIA-based developments. As described below and listed in Box 4.1, these are in rough chronological sequence and also progress from specific to general policy tools. To date, their relationship to SEA is not well recognised in the literature on the field.

Technology Assessment
Generally, technology assessment (TA) is more broadly-cast, future-looking and policy-oriented than EIA (Porter, 1995). The US Office of Technology Assessment (1972-1995), for example, reviews the environmental, social, economic and political effects of technological change and advises Congress on policy alternatives for addressing unintended consequences. A case example is given in File 10 at the back of this chapter. In the 1980s, several European countries established equivalent offices (e.g. France, the Netherlands, Austria, Denmark, Germany, United Kingdom). Their status , function, scope of work and linkages to government decision making vary (see Vig, 1992), but many technology assessments correspond to large scope SEAs. For example, recent investigations by the Danish Board of Technology have focused on ecologically stable cities and settlements and traffic technology and the environment; and the Netherlands Organisation for Technology Assessment is undertaking a pilot study for reducing waste in ten small, medium and large enterprises.

Resource Assessment and Land Use Planning
Physical and spatial planning systems are in place in most countries. These have many functional and procedural similarities to EA systems as described by Wood (1988) and others. In the past, resource inventory and land classification provided an environmental 'baseline' on which to ground local, regional and other processes of spatial planning. Now, geographic information systems (GIS) bring a dynamic perspective to resource allocation, incorporating "three-dimensional" simulation of impacts, rather than "two-dimensional" physical capability ratings. An update on the application of GISs to EA is provided by Kjorven (1995). File 11 at the back of this chapter describes the use of habitat analysis to simulate wildlife carrying capacities as part of a strategic assessment of timber management plans. Despite their power, GISs are data- and user-demanding and, to date, model only a few aspects of the environment; however, their value can be augmented by the use of expert judgement, policy dialogue and other techniques (see chapter 6).

Extended policy Tool Kit
policy tools corresponding to and reinforcing SEA

BOX 4.1

- *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*
  - set objectives, targets, time frames and measures for achieving environmentally sustainable development,
  - incorporate "assessment of current conditions" (as per Agenda 21).

- *International Environmental Law and Policy*
  - EA protocols and requirements incorporated in Rio agreements, 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).

Environmental Reporting

A major characteristic of the last fifteen years has been the development of environmental information for strategic planning and policy making. This trend can be summarised by reference to three frameworks (see File 12 at the back of this chapter):

1) *environmental profiles* – beginning in the 1980s, these were prepared for developing countries by bilateral agencies as investment and project reference documents on the natural resource base, areas of concern the institutional arrangements and management capabilities;
2) *state of the environment reports* – comprehensive assessments of environmental conditions, trends in quality, development pressures and risks, undertaken annually or periodically, on a national or international basis, e.g. for OECD member countries; and
3) *environmental accounting* – drawing up a "balance sheet" of the resource stocks, sources, uses and loss and change (additions, depletion, deterioration) over time, using physical and/or monetary measures.

Green Economics

In recent years, work on measuring and valuing natural resources and ecological services has increased substantially. For example, economic analysis of environmental impacts is widely used by the World Bank and other aid and lending institutions to clarify resource management and development options (see File 13 at the back of this chapter). This approach also provides a basis for more integrated and comprehensive treatment of the environmental costs and benefits associated with development policy making. Full cost accounting addresses the "asymmetry of valuation" – the inherent development bias against conservation options that occurs because environmental assets are not marketed, and damages are often externalised or passed on to others (unless regulated). Recent advances at the macro-level include environmental accounting, as described above, and at the micro-level include modified benefit-cost analysis, e.g. to incorporate sustainability criteria into project and programme appraisal (Pearce et al, 1993, Dixon, 1995).

Sustainability Strategies

A new phase of strategic (or green) planning can be dated to the *World Conservation Strategy* (1980). Many initial applications of this approach took place in or for developing countries (see Carew-Reid et al, 1994). Early models included National Conservation Strategies (promoted by the World Conservation Union) and National Environmental Action Plans (required by the World Bank). These versions had certain characteristics in common though each had specific aims. By contrast, the sustainability strategies and 'green plans' developed by OECD countries tend to be more individualistic, unfettered by external conditionalities (Sadler, in press). Some of these were based on state of the environment reports and assessments, e.g. the Dutch National Environmental Policy Plan (NEPP). The NEPP provides a framework for action, including proposals to strengthen SEA and other instruments and measures for attaining sustainable development (see File 14 at the back of this chapter).

International Environmental Law and Policy

The road from Stockholm to Rio, from the 1972 UN Conference on the Human Environment to its counterpart, the 1992 Earth Summit, is marked by an increasing number of bilateral, regional and multilateral agreements on the environment. Many of these establish either legally binding obligations or policy commitments that affect the practice of EA by signatory countries and international organisations. International environmental law and policy open potential opportunities for the use of SEA to assist compliance. Notable examples are the UN Conventions on Biological Diversity and Climate Change (see File 15 at the back of this chapter) and, more generally, Agenda 21, the global programme of action to achieve sustainable development. Other incentives to use SEA can be identified in trade agreements and in cooperative measures for the management of regional seas, shared water and wildlife resources, and pollution of the circumpolar Arctic.

4.3 TOWARDS AN INTEGRATED APPROACH

How do SEA and related policy instruments fit together?

When linked together, SEA and similar policy instruments described above provide the basis for an integrated approach. Their relationship is illustrated schematically in Figure 4. In this framework, the building blocks of a strategic approach to environmental assessment are derived from the foundation of experience with project EIA. As such, they represent innovative and often long standing attempts to deal with limitations and issues encountered when assessment is carried out largely or exclusively at the latter level (described in Section 3.2). SEA is "new" only in the sense of its formal application to policy, plan and programme decision making along the lines discussed in Chapter 5.

This point is not always widely appreciated and may be misunderstood, even by SEA advocates. It is important for practical reasons. Firstly, past experience and lessons gained in policy and planning applications of EIA based elements and other policy instruments can inform contemporary discussion about SEA approaches, methods and procedures. Secondly, a menu of options, previously tried and tested, is available to introduce or "phase" in SEA based on EIA experience (Box 4.2). The case files at the back of this chapter document these and other possibilities for process development that can be tailored to the circumstances and requirements found in jurisdictions and organisations.

The Western Australian Environmental Protection Authority (EPA) for example, adopted a deliberate strategy of using the EIA process to build precedent for and confidence in SEA, initially at the plan and programme level and subsequently for policies. A number of cases are described by Sippe (1994) where project EIA was used for this purpose and to exploit opportunities to influence policy. These include ElAs which integrated SIA and risk components (see Figure 4) of two mineral sand mines and a liquified petroleum gas facility respectively. In the first EIA, 'policy advice' on the community and environment impacts of road versus rail transportation options led to the preparation of a regional strategy; in the second case, risk assessment was related to the wider policy implications for environmental management of the State's primary heavy industry zone. As a result, new directions were set. Other jurisdictions also use project EIA to focus attention on policy options, e.g. A470 corridor study in Wales (UK Department of Environment, 1994). However, the strength of the Western Australian approach lies in explicitly capitalising on EIA as an interim step to SEA.

BOX 4.2

From EIA to SEA
A Menu of 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 a wide-ranging environmental implications.

- Apply programme assessment in sector plans that will lead to specific projects and activities and 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 sectoral developments or multiple use plans, especially for resource systems with heritage values or that are already under stress.

- Coordinate project EIA and land use planning requirements or establish an integrated system.

- Employ an ecosystem approach to determine inter-regional significance and risks of resource conversion (e.g. wetlands) and deterioration (e.g. water quality).

- Require formal SEA for all development policies, plans and programmes which have potential environmental effects or establish an equivalent process of policy and plan appraisal.

A fully fledged SEA process, tiered to project EIA, would provide a comprehensive basis for "full cost" analysis of the environmental effects of development proposals. This "next or second generation" EA system is a necessary but not sufficient condition for achieving sustainability. Other policy instruments, including those described in Section 4.2 and shown in Figure 4, are required to address economic and equity dimensions and to integrate these with environmental considerations in national policy making and regional and local planning. With available processes and instruments, SEA can act as a catalyst for their application to specific policy proposals and decisions. In turn, the components arranged in Figure 4 can support and empower SEA.

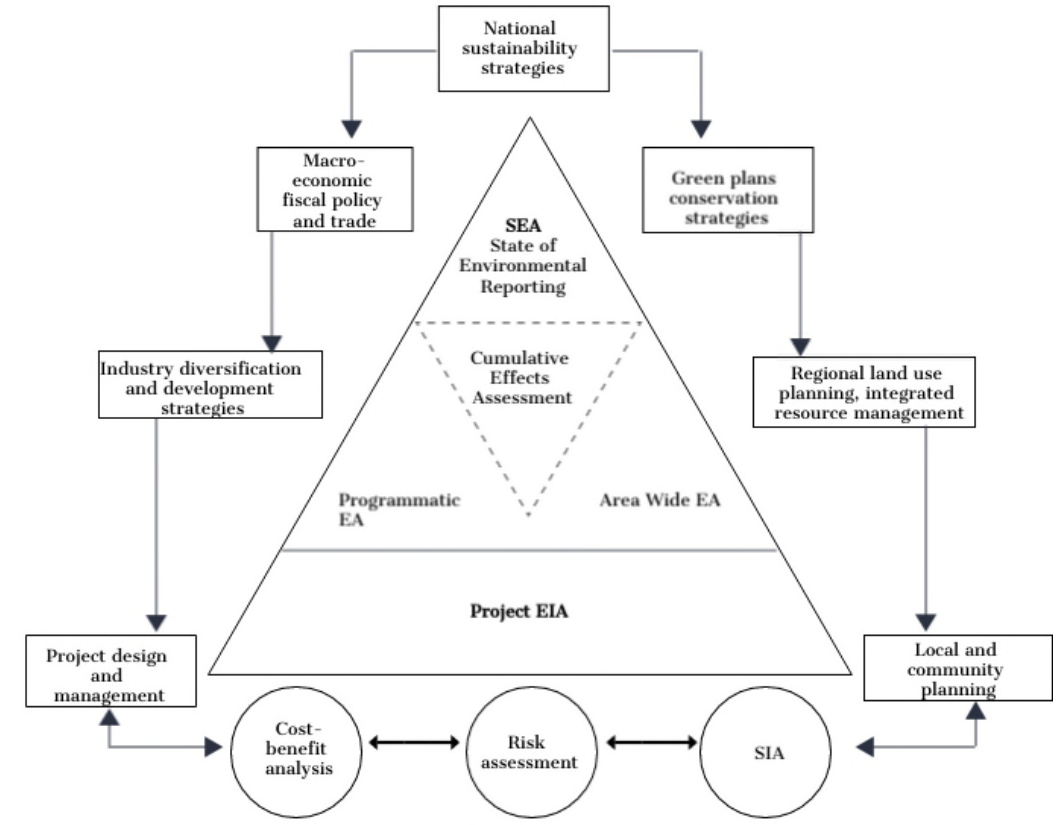
For example, New Zealand has established an integrated environmental assessment, land use planning and resource management system. This has been analysed by Dixon (1994) in the context of the SEA framework shown in Figure 4. Specific comparisons are summarised in Figure 5. Relevant features include:

- national environmental strategies and standards;
- regional policy statements as integrative documents;
- preparation of regional (resource) management and district (landuse/settlement) plans; and
- integration of EA with plan making (SEA) and project authorization (EIA).

In this case, SEA/EIA is no longer a 'stand-alone' process, but has become part of a more comprehensive framework of planning activities. New Zealand's approach exemplifies why we referred earlier to SEA as a transitional instrument or stage toward integrated policy making and planning. However, the level of integration attempted here is exceptional; also, process implementation is by no means complete (see Chapter 5). In most cases, SEA elements will be a more discrete, and process development can be aided by coordination with:

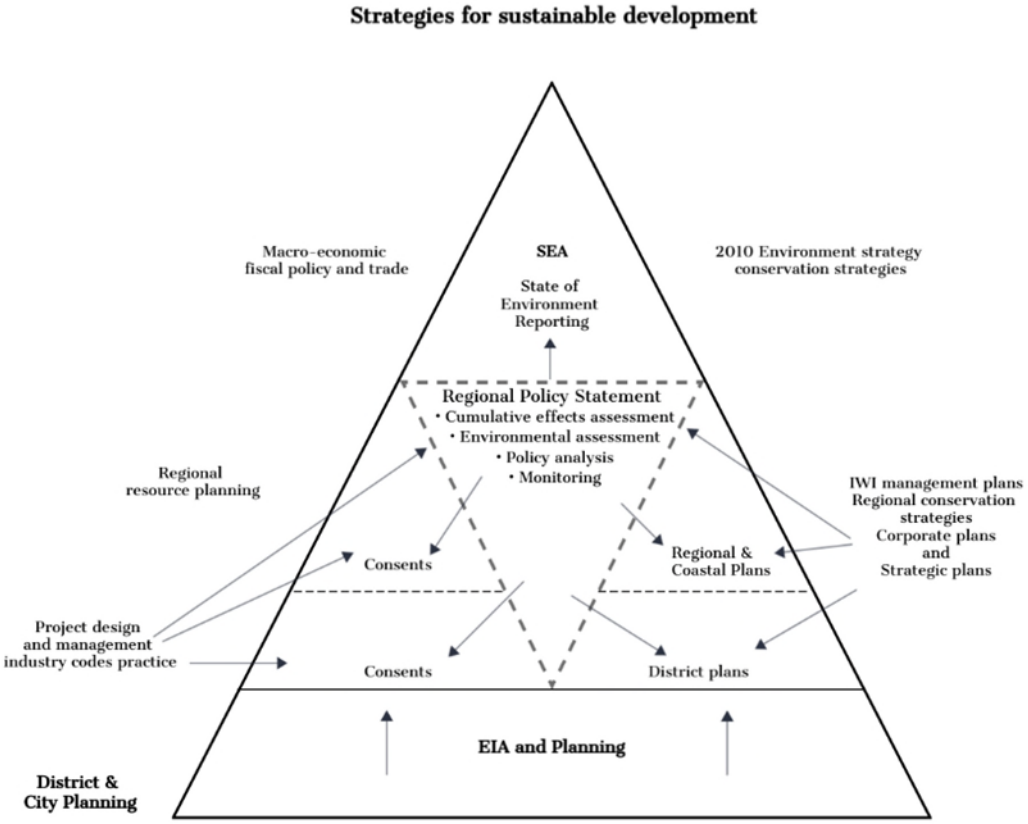
- sustainability strategies and regional plans – to provide context and direction;
- environmental accounts, SOE reports, etc. – to give background and reference information on trends and indicators; and
- other domains of impact assessment - for extending analysis.

Figure 4. Integrated approach to environmental assessment-policy and project linkages



Source: Sadler, 1994.

Figure 5. Strategic Environmental Assessment in New Zealand



Source: Dixon (1994), adapted from Sadler (1994)

File 4

Review of Alternatives as an aid to Policy Clarification
Cyanamid's Proposal for Ocean Dumping, USA

Background

Section 1052.4 of CEQ Regulations for Implementing NEPA requires, *inter alia*, that an EIS "presents the alternatives in a comparative form, thus sharply defining the issues...". A clear presumption is that the process of generating alternatives helps to reveal the basic policy goals and objectives that underlie a proposed course of action. Court decisions quickly reinforced this presumption, ruling that alternatives, including the no-action option, must be carefully considered. The Cyanamid case illustrates that policy considerations were included in NEPA analysis from the beginning.

Analysis

In 1967, the State of Georgia informed American Cyanamid Corp. that it would have to cease dumping chemical waste from its titanium oxide plant into the Savannah River within five years. Subsequently, Cyanamid proposed to change to ocean dumping (over which, at the time, the US Government exercised no regulatory control beyond the three mile limit). However, this course of action involved applying to the US Army Corps of Engineers for a permit to build a barge dock. In accordance with the provisions of NEPA, the Corps decided that an EIS was needed for all aspects of the proposed dumping activity, not only the site-specific impacts of the barge dock. The draft EIS opened the door to opposition from the public and several federal agencies. Before the Corps of Engineers completed its review, Cyanamid abandoned the option of ocean dumping and decided to build a waste recycling plant that would produce a marketable byproduct.

Lessons

The EIS process:

1) broadened the definition of the problem and the issues and trade-offs at stake;
2) exposed the wider policy and regulatory implications of the activity; and
3) facilitated the choice of the best practicable environmental option.

Source: Orloff, N. and G. Brooks, 1980. The National Environmental Policy Act: Cases and Materials. Washington, D.C.: BNA Books.

File 5 The Ranger Uranium Environmental Inquiry, Australia

Background

In the early 1970s, several proposals to mine uranium for export were submitted for remote areas in Queensland, Northern Territories, South Australia, and Western Australia. Uranium mining and milling generate a range of environmental and social-cultural impacts and issues; in this case, involving aboriginal land and sacred sites. The Ranger Uranium Environmental Inquiry (1975-1977) was undertaken consistent with Section 5 of the Commonwealth *Environmental Protection (Impact of Proposals) Act,* (1974). It encompassed components of policy review, regional planning, technology assessment and project EIA.

Analysis

The Ranger Inquiry concerned an application to mine uranium at Jabira in the Kakadu region, Northern Territory, a large wilderness area, encompassing wetlands of international significance, rich in wildlife and then subject to aboriginal land claim. Following a lengthy, formal hearing process (approx. 120 sitting days), the Commission produced a final report (400 pp., approx. 100 recommendations). It concluded that "...the major project as proposed ... should not be allowed to proceed..."; but went on to note "...if the plan we propose is carried out ... adverse environmental consequences can be kept within acceptable limits..."

Stipulated measures included:

- granting aboriginal title to traditional lands;
- establishment of a Kakadu National Park ("leased back" under aboriginal title);
- use of best practicable technology to prevent environmental damage;
- compensation for losses resulting from mining operations;
- adoption of uniform code(s) of practice for uranium mining and milling industry; and
- sequential rather than simultaneous development of future mines in the region.

Lessons

The Inquiry established the basis for:

- a national policy and regulatory regime for uranium mining;
- regional land use allocation, including park designation and land claims settlement; and
- project authorization, including detailed terms and conditions for environmental management.

Source: Ranger Uranium Environmental Inquiry, 1977, *Second Report.* Canberra: Australian Government Publishing Service.

File 6 Deep Seabed Mining. Programmatic Environmental Impact Statement, USA

Background

In the early 1970s, a number of applications were submitted for exploration permits to mine manganese nodules within a 13,000,000 km^2 area of the east-central Pacific Ocean. The US National Ocean and Atmospheric Agency (NOAA), pursuant to *NEPA* and the *Deep Seabed Hard-Mineral Resources Act,* prepared a programmatic environmental impact statement (PEIS) of the potential marine and onshore impacts of mining, transportation and processing of the manganese nodules. Now, as then, deep seabed mining represents a policy, environmental and technological frontier.

Analysis

The PEIS was based on environmental baseline data, simulation and monitoring of pilot-scale mining tests. It focused on the environmental impacts expected from first generation mining technology, using a collector which is pulled or driven along the sea floor with nodules pumped via pipe to a mine ship and transferred to an ore carrier for on-shore processing - probably in Hawaii. With limited exceptions, benthic impacts and sub-surface discharge of particulates and dissolved substances were determined to be relatively in-significant. Other activities with potentially significant effects included use of port facilities, transportation and processing of nodules, and storage and disposal of wastes (with incompletely known chemical and physical characteristics). Alternatives were focused on regulatory arrangements and NOAA's role. Subsequently, the agency undertook marine and onshore research to update findings and tiered EISs for exploration license and permits to the PEIS.

Lessons

The PEIS exemplified:

- an "early warning" review of a new technology/development activity;
- backed by ongoing impact and regulatory research; and
  tiered to activity and area-specific impact exploration activities.

Sources: NOAA. 1981. Deep Seabed Mining. Programmatic Environmental Impact Statement. Washington, D.C.; NOAA. 1984. Deep Seabed Mining. Environmental Impact Statement on Issuing an Exploration Licence to Ocean Minerals Company. Washington, D.C.

File 7

Regional Planning for Offshore Oil and Gas Development A 'With' versus 'Without EA' Comparison of Alaskan and Scottish Experience

Background

During the 1970s, the northern coasts of Alaska and Scotland were the focus of large scale offshore oil and gas development. Both are relatively remote, sparsely populated areas. In Scotland, many deep sea wells and related port facilities were built during this period. By contrast, offshore and onshore development was limited in Alaska.

Analysis

The diverging patterns of development in Alaska and Scotland reflected, to a considerable degree, the application of different planning and management processes, characterised by stringent versus inconsistent requirements for EA. Under NEPA and Alaska State regulations, there was a systematic open process of prior examination of oil and gas activities, technology and environmental and social impacts. This encompassed strategic planning, comprehensive coastal zone inventory and the use of EIA; notably EISs of oil and gas leasing and regulations. Under the *Town and Country Planning (Scotland) Act,* a staged process of negotiated development occurred, with "outline permission" followed by government-industry resolution of issues. An initial proliferation of proposals, especially for oil platform fabrication yards along the scenic, unspoilt West Coast, led to widespread concern about environmental and social impacts and criticism of the *ad hoc* approach to site allocation. Subsequently, coastal zoning policy was initiated but did not fundamentally alter the distribution of development activities. EIA was used on a limited, uneven basis with apparently no application to ancillary road and airport expansion schemes. However, there was a strong and largely successful response to offshore oil and gas development in the Shetland Islands (as in the North Borough of Alaska), based on containment of oil terminal and related facilities to one area (Sullum Voe) and the use of land use planning, EIA, monitoring and other control mechanisms to anticipate, avoid and address development impacts.

Lessons

A comparison of Alaskan and Scottish offshore oil and gas experience demonstrates the *sequent* importance of:

- region-wide (and programmatic) assessment and strategic planning for optimum allocation of large scale development;
- systematic application of EIA to all major facilities and supporting infrastructure; and
- careful site planning, especially for remote, isolated areas, where environmental and social impacts can seriously disrupt traditional and social lifestyles.

Sources: Nelson and Jessen, 1981; Clark et al, 1981.

File 8 Experience Under the New South Wales Environmental Assessment and Planning Act (1979)

Background

Previously in New South Wales (NSW), planning was focused on local government areas and often reflected existing land use. EIA was applied on *ad hoc*, add-on basis. In practice, there was both project-level duplication and failure to resolve major regional land use issues. The 1979 legislation was the first in Australia to aim at integration of EIA with planning at the state, regional and local level.

Analysis

The Act (still in force with modifications) established three environmental planning instruments: state policies, regional plans and local plans - which are the primary vehicle for development control. Regional environmental plans (REPs), *prima facie*, appear to be of particular promise for providing context for specified types of development applications (including "designated developments" which require an impact statement and public review). REPs also require a prior environmental study (e.g. baseline capability, issues and conflicts to be addressed, etc.). Following public exhibition and comment on the study, a draft plan is prepared and follows the same review process. In practice, REPs have evolved incrementally and taken various forms. The main emphasis has been on establishing a management-type framework of rules and guidelines. Recently, the process has assumed an explicit SEA direction (e.g. focusing on cumulative effects and urban growth management issues).

Lessons

NSW experience indicates:

- in principle, the Environmental Assessment and Planning Act provides a flexible integrative framework, with provision for regional environmental plans serving as a critical bridge between state policy-making and development control; while
- in practice, as elsewhere, integration has proven difficult, in part because REPs have yet to realise their potential.

Source: Background materials and discussion, 7th Australia- Canada-New Zealand Workshop on EIA; pers. comm. Helen Green, Director of EIA Branch, Government of New South Wales.

File 9

An Ecosystem Approach to Cumulative and Large Scale Effects
The International Joint Commission Reference on Great Lakes Use and Diversions (1985)

Background

The goal of the Great Lakes Water Quality Agreement (1978) between Canada and the United States is to restore and maintain the chemical, physical, and biological integrity of the "inland seas" of North America. An ecosystem approach is identified as the basis for the cooperative management of the basin (521,730 Km^2). Under the Agreement, the International Joint Commission, a standing body established by earlier Treaty, is assigned responsibilities for monitoring implementation. It is also given "references" to investigate issues of mutual concern to both countries.

Analysis

In 1985, the Commission responded to a reference on Great Lakes Diversions and Consumptive Uses, principally by reviewing the physical and engineering aspects of controlling flow levels. Longer term, basin wide prospects for water use and allocation were also addressed. This component of the study incorporated elements of SEA, in general, and have contributed to the articulation of an ecosystem approach, in particular. Aspects considered included:

- projected increases in demand that are significant enough to warrant early action;
- proposed small scale, inter-basin diversions, with potential cumulative impacts;
- long term, climatic changes that may have a significant effect on water supply and demand (e.g. projected 3°C increase in regional mean annual temperature within next 60-100 years); and
- major structural changes in economic and social conditions, e.g. world/continental population and food supply trends may lead to renewed interest in large scale inter-basin transfers.

The Commission concluded that possible effects of discontinuities, such as climate change, suggest a non-linear approach to planning, one that is more adaptive and responsive to societal values.

Lessons

The IJCs report:

- exemplified an "anticipate and prevent" approach to resource management;
- considered the interrelationship of water use in a basin wide, ecological context, stressing the "other than economic" importance of the system; and
- recommended that both governments foster institutional adaptiveness, noting that present arrangements are not designed to respond quickly to new situations.

Source: International Joint Commission. 1985. *Great Lakes Diversions and Consumptive Uses.* A Report to the Governments of the United States and Canada Under the 1977 Reference.

File 10 Technology Assessment of Biotechnology in a Global Economy, USA

Background

The Office of Technology Assessment provides the US Congress with independent advice and information on the potential effects of technology change. In this cases example, the technology assessment (TA) focused on the effects of industrial application and government regulation of biotechnology – defined as the use of recombinant DNA, cell fusion and novel human and animal health, food supply and the quality of the environment. However, many scientific and public policy issues remain unsettled; the focus here is on environmental considerations.

Analysis

From a resource and environmental perspective, the TA identifies three areas of concern with respect to the use of biotechnology:

- to increase food productivity, by manipulation of agricultural crops and animals (e.g. trans-genic pigs);
- to clean up waste using micro-organisms, (e.g. use of micro-organisms in Exxon Valdez oil spill); and
- to shift energy production from non-renewable to renewable resources, (e.g. from oil to biomass).

Imposing regulations to mitigate the environmental and social effects of the use of new technology is difficult, precisely because the risks associated with it are new and poorly understood. Worldwide, three basic approaches are followed:

- no regulation (e.g. growth-oriented economies of SE Asia);
- limited regulation (e.g. Australia, Canada, France, Japan, Netherlands UK and USA); and
- stringent regulations (e.g. Denmark, Germany).

Environmental regulations are one of ten factors that have an overall influence on biotechnology use and competences. Other barriers including public perception. In this regard, attention is directed to the provisions for risk and impact assessment of biotechnology use, including field tests of modified plants and micro-organisms. US federal government requirements in this area were criticized as burdensome and disproportionate to the risks involved especially for small and medium enterprises (SMEs).

Lessons

The TA of Biotechnology in the Global Economy found:

- no examples of adverse environmental and social effects caused by biotechnology;
- that risks are uncertain and poorly understood, but can be assessed using existing approaches; and
- that strategy of risk assessment and regulation vary, according to the three models identified above.

Source: Office of Technology Assessment, 1991. Biotechnology in a Global Economy. Washington, D.C.: US Government Printing Office.

File 11 Integrated Forest Management in New Brunswick Strategic approach to Carrying Capacity

Background

Under the New Brunswick Crown Lands and Forest Act (CLFA, 1980), management plans must demonstrate that timber harvest is sustainable for an 80 year growth cycle and that other land use objectives are met. Plans are renewed every five years for government approval. The first plans (1982) focused primarily on sustainable timber supply; the second ones (1987) included wildlife and other values; and the most recent (1992) allocate habitat areas to maintain wildlife populations at specified target levels or carrying capacities.

Analysis

Typically, habitat management has entered the planning process in the form of constraints to timber allocation and harvesting. Using US-based habitat supply analyses, a proactive landscape-level approach can be taken to address the question of how changes to forest composition and structure will affect wildlife populations. In New Brunswick, habitat availability was predicted under current forest management plans. This exercise indicated, for example, a shortage of mature, conifer-dominated forests, which are preferred or required habitat for a number of birds and mammals. Based on key indicator species (e.g. American Marten), upper and lower habitat thresholds (size and spatial configuration) necessary to maintain a viable population were simulated. Trial management plans were then developed to determine the associated wood supply costs of meeting these objectives. Final habitat objectives were set at a "safe minimum" standard of maintaining 10% of the coniferous dominated forest on each timber license; approximately 3.5 times the level for a viable Marten population (e.g. 250 resident adults). This resulted in a reduction in the annual allowable cut (AAC) of timber.

Lessons

Forest Management Planning in New Brunswick exemplifies:

- a strategic, landscape-level approach to integrating timber harvesting and wildlife/habitat-maintenance;
- the use of the precautionary principle in decision making, using "best information" available and recognising the underlying unknowns and uncertainties; and
- the application of GIS-based modelling tools.

Source: Sullivan (1994).

File 12 Environmental Profiles, Reports and Accounts

Background:
The three frameworks described below provide a basis for and incorporate aspects of SEA. However, they are retroactive rather than proactive in approach and their link to decision making is indirect. As such, they do meet the definition of SEA given in Chapter 3; rather the frameworks support the application of this process.

- *Country Environmental Profiles (CEP):* These serve multiple purposes and are used by host countries, development banks and bilateral agencies. For aid agencies and development banks, CEPs provide a context for identifying and ranking environmental issues, priorities and opportunities, thereby strengthening programming capabilities and providing a framework for project implementation. For a host country, the CEP can be an instrument for establishing a consensus and catalysing action on national environmental policy.

  Example: The goal of the *Jamaica Country Environmental Profile* (1987) is to contribute to sustained economic development. Key objectives are:
  1) to prepare a draft environmental policy statement for Jamaica; and
  2) to identify programmes and projects for further environment and development objectives that could be financed by the Government of Jamaica and/or the private sector with financial and technical assistance from US Agency of International Development and other donors.

- *State of the Environment (SoE) Reports:* National SoE reports vary considerably in origin, content, approach and indicators and quality of data included. The US Council on Environmental Quality, for example, has prepared 24 Annual Reports on environmental conditions, trends and policy responses. Following OECDs lead in 1979, most member states, had completed SoE reports by the mid-1980s, and have updated them periodically (or annually). With varying rigour, these all attempt to answer the bottom line question of whether or not the environment is improving.

  Example: Canada's second national state of the environment report is organized into five parts. Following an introduction, Part II describes the quality of environmental components (air, water, etc.) and the major sectors of activity that influence them (e.g. forestry, mining). Part III comprises six regional case studies, ranging in scale from the Arctic lifezone (approx. 2,400,000 Km^2) to the upper Bay of Fundy dikelands (267 Km^2). Part IV reviews “cross cutting” environmental issues that are of particular concern to Canadians (e.g. toxic chemicals, climate change, acidic deposition). Part V assesses the implications of environmental trends and issues for achieving sustainable development, concluding that Canadian actions do not yet meet this test, despite signs of progress.

- *Environmental Accounting:* Sustainability concepts underline what economists have long known, namely that economic growth and progress was and often still is measured by some misleading indicators. In particular environmental damage (or deterioration of natural capital as compared to man-made capital) is not recorded in GNP based economic accounts. As a result, they can give a false picture. For example, the rapid short term liquidation of a renewable resource (e.g. over-harvesting a forest or fishery) would show as rising current income, without adjustment for depletion of the asset base. Some countries have made a substantial effort to better account for aggregate environmental loss and change, either using physical or monetary accounts.

Example: The Norwegian accounting system was the pioneer physical approach, subsequently followed by France, Canada and other countries. It divides resources into two categories – material and environmental. With the latter, quality becomes an important consideration and is captured by emissions and state of environment accounts. The data collected by these methods have been used to prepare forecasts of future use of natural resources and their potential environmental impacts. So-called "resource budgets" are easier completed for some resources than others.

Sources:

1) Government of Jamaica and Ralph M. Field Associates. 1987. *Jamaica Country Environmental Profile*. Kingston: USAID;
2) Environment Canada. 1991. *The State of Canada's Environment.* Ottawa: Supply and Services Canada;
3) Pearce et al, 1993, 93-119.

File 13 Environmental and Economic Analysis of Development Options Bacuit Bay, Palawan Island, Philippines.

Background

In recent years, economic analyses of environmental projects have increased considerably. This approach is relied on by bilateral and multilateral aid and lending agencies to identify the benefits and costs of proposed developments, and clarify broad resource management options. The Bacuit Bay case exemplifies the latter approach.

Analysis

Bacuit Bay in the Philippines is used by three main industries - logging, fishing and tourism. Logging operations have resulted in soil erosion and coastal sedimentation, with consequent reductions in fish catch and die-off of coral reefs, which are a focal attraction for sport diving and the basis of a growing tourism industry. An environmental and economic analysis of two resource management options was undertaken. Option 1 imposed a logging ban that preserved the fishing and tourism industry. Option 2 allowed continued logging but resulted in long term impacts on fishing and tourism. Using estimates of gross revenue, the analysis compared the gains and losses under both options. The results showed that the projected net cost of continued logging over a 10 year period was US$17 million, computed in foregone tourism and fishing revenue. Since these industries generate considerable total employment, important equity issues were also at stake.

Lessons

The environmental and economic analysis:

- did not explicitly identify and evaluate the significance of environmental impacts;
- provided a comparative assessment of the social and economic costs of resource management policies and alternatives; and
- resulted in the Government of the Philippines reassessing its logging policy in ecologically sensitive areas.

Source: Dixon (1995).

File 14 National Sustainable Development Strategies: The Dutch Experience.

Background

The Dutch National Environmental Policy Plan (NEPP, 1989) represents the most far-reaching-sustainability strategy prepared to date. Aptly titled *To Choose* or *to Loose*, the initial version was a policy response to a state of the environment report that documented the cumulative risks to human health and constraints on development resulting from critical pollution and contaminant loadings. Based on this assessment, the NEPP recognised that environmental quality would continue to deteriorate if traditional policies are followed and that radical measures are unavoidable to restore carrying capacity within a generation. The document was updated in 1990 *(NEPP Plus)* and again in 1994.

Analysis

Over 200 measurable actions, including quantified targets and timeframes, are set out in the Plan. At all levels, the targets specified involve drastic or sharp emission reductions. In the *NEPP Plus*, additional and accelerated measures are identified for implementing the strategy, including further actions to stabilise CO_2 emissions (e.g. limiting the growth of car traffic, afforestation for carbon sequestering), to limit acidification of woodlands (e.g. more stringent NO_x emission norms for waste incineration), and to decontaminate soil (e.g. where pollution constrains urban renewal). Further changes are specified to the instruments for coordinating the NEPP with water, nature and physical planning and a mix of regulatory, fiscal (incentive) and voluntary arrangements are proposed to internalise environmental costs and alter present processes of production and consumption. The latest version of NEPP proposed the introduction of an environmental paragraph or test for policy (see File 21 at the back of chapter 5).

Lessons

The NEPP:

- recognizes the Netherlands has reached resource carrying capacity limits that are constraining on development;
- provides a comprehensive response to the deteriorated state of the environment;
- includes targets and timeframes for reducing a broad range of emissions; and
  introduces the requirement for an environmental test or paragraph to check that development policies, plans and programmes conform with the objectives and measures set out in the plan.

Sources: Ministry of Housing, Spatial Planning and the Environment (1989, 1992, 1994).

File 15 International Law and Policy on the Environment - Implications for SEA

Background

There is a growing body of international agreements on the environment. Recently, major developments have occurred with respect to formal, legally binding treaties on global change, as exemplified by the conventions on Climate Change and Biological Diversity, and to so called "softer" instruments, such as the policy statements contained in Agenda 21. States and international organisations that are signatory to treaties are governed by their rules and principles; and they are also expected to meet their commitments in endorsing policy documents and guidelines. EA provides a means of responding to these obligations; in turn, global concerns draw attention to potential uses of SEA.

Analysis

The ***Convention on Biological Diversity*** aims to conserve the biosystem, population and genetic diversity, and to promote sustainable and equitable use of these resources. *Article 14* makes specific reference to EA as follows:

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 minimising such effects* and, *where appropriate, allow for public participation in such procedures.*

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

The ***Framework Convention on Climate Change*** aims to stabilise greenhouse gas concentrations in atmosphere at a level and within a time frame that will avoid serious implications, e.g. to food production, sustainable economic development and ecological integrity. *Article 4* makes specific reference to EA as follows:

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.*

In both cases, SEA of policies, plans and programmes may provide an appropriate cost-effective means for responding to the above requirements. For example, meeting the requirement to stabilise CO_2 emissions by 1990 levels by the year 2000 is best addressed on a country-wide rather than site-specific basis. Similarly, biodiversity loss is a pervasive cumulative effect from multiple activities and sources. Again, this concern is best dealt with by tackling policy causes rather than project symptoms.

5. National and international SEA systems

"[T]here are few SEA systems in operation... In most countries, SEA has evolved upward from...EIA of projects, rather than as a means of trickling down the objectives of...environmental policy."

Therivel, 1993, 145-6.

During the 1990's, SEA has become a more formal and structured process, applied *explicitly* to policy, plan and programme levels of decision making. The adoption and use of SEA varies internationally (and nationally within federal states). Only a handful of countries and international agencies have established SEA systems, i.e. in which process and practice is formally organised. Many other countries use SEA elements under informal arrangements. By comparison to project EIA, SEA systems are less clearly delineated and not as well understood with respect to practice and performance.

The SEA systems established by eight countries and two international organisations are described and compared in this chapter, with a view to gaining an initial understanding of their operational aspects. Major components of SEA systems are:

1) institutional arrangements – law, policy and duties which establish the provision for SEA;
2) the process and procedure(s) followed – which determine the application of SEA; and
3) the activities and results of implementation – which indicate the contribution of SEA.

Information on these components was gathered from source documents and through consultations with senior officials of the systems reviewed. The survey is not meant to be representative; it is both incomplete and limited with regard to experience in other countries. As far as possible, however, we have tried to interpret the status and effectiveness of SEA systems within the framework set out earlier (Chapter 2).

Specific questions and criteria for reviewing SEA systems are outlined in Box 5.1. The focus is on the *pre-conditions, requirements, procedures* and *roles and responsibilities* that guide SEA practice and influence its quality (e.g. as indicated by inputs to decision making). Following a country and organisational survey, institutional arrangements and trends in practice are comparatively reviewed. The chapter concludes with a statement on the relevance of SEA for policy making.

Status of SEA Systems
A Checklist of Effectiveness Review Criteria

BOX 5.1

- *Basic Requirements*
  - What must be done?
    (e.g. mandatory versus advisory provision)

- *Scope of Application*
  - Which issues/levels of decision making are covered?
    (e.g. full versus partial coverage)

- *Responsibility for Compliance*
  - Who is accountable for what actions?
    (e.g. self-assessment versus regulatory oversight)

- *Due Procedure*
  - How is the SEA process applied?
    (e.g. formal versus informal provision)

- *Public Involvement*
  - What is the role of NGOs and communities? (e.g. open versus closed process)

- *Quality Control*
  - When, how and by who(m) are SEAs reviewed?
    (e.g. internal versus independent review)

- *Inputs to Decision Making*
  - Are SEA inputs timely, relevant and influential?
    (e.g. use versus non-use of SEA in policy design/approvals)

5.1 COUNTRY & ORGANISATIONAL STATUS REPORTS

SEA systems, worldwide, can be divided into three main categories reflecting the stage of development and actual experience gained by a country or international organisation:

1. A number of European, North American and Australasian countries, and a few international organisations, have SEA or near equivalent systems in place (as described below).
2. Other countries and international organisations have SEA-type provisions and elements as part of their EIA and planning processes (e.g. Japan, Israel, South Africa, Indonesia, Brazil, China, India, and certain eastern European, south east Asian and Latin-American/ Caribbean states).
3. Many domestic and doner-driven EIA and planning systems are at a more rudimentary stage, reflecting fundamental institutional and resource constraints; however, these are now being addressed by multilateral and bilateral aid agencies in capacity-building programmes.

National and international SEA systems can be located only approximately in this general classification. Some countries may not fit readily into one or other of the categories. As well, SEA provisions, processes and practices vary considerably within each category. The leading SEA systems, reviewed here, illustrate the different arrangements in force, demonstrate options for applying SEA, and exemplify operational experience and issues. A more detailed description is contained in the institutional profiles which conclude the chapter (files 16 to 25).

Australia *(See File 16)*

No specific provisions for SEA are currently in place at the Commonwealth (national) level. However, a comprehensive review of the EIA system is being undertaken with a view to strengthening it in support of the objectives and principles of ecologically sustainable development (Commonwealth Environment Protection Agency, 1994). The adoption of SEA is recommended by many participants, including, reportedly, state ETA authorities. As yet, only Western Australia has any significant record of SEA activity, although other states, notably New South Wales and Victoria, have coordinated project EIA and land use planning systems.

Western Australia's *Environmental Protection Act* (1986) explicitly provides for EA of policies, plans and programmes. A combination of formal and informal options is used for this purpose, rather than a standardised procedure (e.g. as applied in Canada and Denmark). Experience to date in Western Australia has largely been at the plan and programme level, and in general, results are positive. Policy-level assessment has been more limited and proven difficult with EIA procedures. In addition, other mechanisms are applied as an alternative to policy EA, including: i) the proactive use of environmental protection policies and measures; and ii) the use of project EIA and SEA of plans and programmes to retroactively influence policy (Sippe, 1994).

Canada *(See File 17)*

Following major reform in 1990, a two-track system of project EIA and SEA is in place at the federal level. Unlike project EIA, which is based on legislation, the SEA process operates under Cabinet (administrative) directive. It requires federal agencies submitting policy and programme proposals for Cabinet decision to consider and document their potential effects. A "self-assessment" process is followed by the department or initiating agency. The so called "blue book", drafted by the Federal Environmental Assessment Review Office (FEARO, 1993) specifies the basic principles and requirements that should be followed, notably for public disclosure and reporting. Recently, the Canadian International Development Agency (1995) has produced a draft guide for assessment of its policy and programme initiatives.

No estimates are available of the annual or total number and breakdown of environmental statements and supporting analyses attached to Cabinet submissions. The Canadian Environmental Assessment Agency (CEAA-which has replaces FEARO) is nominally responrsible for administering the SEA process; however, it reportedly does not receive agency documentation and is not in a position to monitor and oversee what happens. A recent spot-check of departmental documentation and is not in a position to monitor and oversee what happens. A recent spot-check of departmental found a decidedly mixed track record, with poor overall compliance balanced by leading-edge examples of policy and programme EA (LeBlanc and Fischer, 1994. Except for Nova Scotia, Canadian provinces do not have a comparable system, although several have elements of SEA (see Doyle and Sadler, in press).

Denmark *(See File 18)*

EIA was implemented in 1989 within a regional planning system. A process for policy EA was established in 1993 by an Administrative Order of the Prime Minister's Office. The Order requires an assessment of all bills and other government proposals presented to Parliament that are expected to have a significant impact on the environment. In 1995, a new Administrative Order enlarged the scope of assessment, adding resources, buildings and cultural heritage to the earlier list of health and biophysical impacts which must be considered.

The procedure and content of SEAs is the responsibility of the ministry initiating legislation or other proposal (policies, plans, programmes). Advisory guidelines on policy EA have been issued by the Ministry of the Environment. In practice, process and procedures are evolving incrementally, and initial SEAs are reported to be "highly variable" in scope and quality (Johansen, 1994). However, to some degree, this reflects the unique application of the Danish system to laws passed by parliament (see also European Commission). In the future, the wider use of SEA is expected, e.g. for regional development plans where agriculture, conservation and recreation options often conflict (Elling, 1995).

European Commission *(See File 19)*

A recent report on the implementation of the EIA Directive within Member-States concluded the potential of EIA had not been fully realised (European Commission, 1993). Subsequently, proposals to revise the EIA Directive and adopt an SEA directive were contained in the ECs 1995 legislative programme. Within Member States, there are an increasing number of SEA-type processes. These differ widely in their mandate, coverage of policies, plans and programmes, and degree of compliance with accepted principles and requirements (Lee and Hughes, 1995). An update on SEA trends in Member States of European Countries, other than those reviewed individually, can be found in Box 5.2.

Within the Commission, itself, internal provision and procedures for EA of new legislative proposals and actions were established in 1993. The main steps are (Norris, 1994):

1) screening of all proposals to identify their environmental impact;
2) preparing an environmental statement for initiatives with potentially significant effects; and
3) describing and justifying that impact and the environmental costs and benefits involved.

Screening is carried out by Directorate General (DG) X1-which is responsible for environment; the preparation of environmental statements is the responsibility of the initiating DG in accordance with procedural and content requirements that "allow for maximum flexibility".

BOX 5.2

Update on SEA Trends in Six European Countries[6]

Austria
Environmental aspects are considered and incorporated in the establishment of various plans and programmes, e.g. land use, waste, traffic, energy and water management.
A study on SEA has been commissioned and its results will form the basis of further discussion of measures for process implementation.

Belgium
In Flanders, the Brocken Commission for the Revision of Environmental Law has proposed framework legislation which includes both EIA and SEA. This proposal provides a well-balanced basis for the structural improvement of EA.

Finland
The Finnish EIA Act requires SEA for certain plans, programmes and policies, but provides little detail on how this process should be carried out. The Finnish Environment Agency will undertake research to establish a clear view of what strategic decisions are.

France
Since 1990, through the use of laws, experiments and research, the French Government has tried to introduce SEA (e.g. Ministry of Environment Decree of 25 February, 1993 that EIA must assess the programme to which a project is linked). The introduction of SEA (environmental test) was part of President Chirac's recent election platform.

Germany
As a result of the Espoo Convention and the expected EC Directive on SEA, discussions are now centred on further development of EIA. Expectations about SEA may need to be lowered, based on the experience gained from the implementation of Directive 85/337/EEC.

Ireland
Elements of a SEA approach are evident in a number of national/regional planning contexts, e.g. related to transport and tourism programmes that refer to particular projects and locations. A number of issues need to be resolved before SEA can be formally introduced.

[6] Source: Waltraud Petek; Paul Scheurs and Dimitri Devuyst; Mikael Hilden; Max Falque; Dieter Wagner; Brian Meehan. EIA Newsletter 10, 1995.

Hong Kong *(See File 20)*

The application of EA to policy proposals dates from October 1992. SEA is administratively-based (as a crown colony – until 1997 – the Hong Kong Government is executive-led). All policy proposals submitted to the Executive Council (EXCO is the functional equivalent of a Cabinet) have to contain an environmental implications section (EIS). Similar provisions also apply to papers submitted to the Legislative Council, notably funding proposals for government works projects-in effect, SEA of programmes. The department initiating a proposal is responsible for preparing an EIS in consultation with the Environmental Protection Department, which provides "pre-clearance" advice.

Initial experience with this process is generally considered to be positive. Early pre-policy identification of environmental issues provides invaluable "purchase" on means of addressing them. However, findings at this stage tend to be vague and generalised; in part, because there is an ad-hoc approach to SEA screening and reviewing (Law, 1994). Currently, a more systematic SEA process is being applied to help formulate the territorial Development Strategy – which forms the apex of the planning hierarchy in Hong Kong and serves as an actual framework for coordination of policy, programmes and sub-regional and local plans (see Au, 1993; Nair *et* al, 1993).

The Netherlands *(See File 21)*

Under the EIA Decree (1987), SEA is required for certain sectoral policies, national and regional plans and programmes. These include all national physical plans fixing the location of the projects for which an EIA is mandatory. At this level, the provisions and process for SEA and project EIA are identical (e.g. full public involvement, independent review by the Dutch EIA Commission). In effect, a tiered EA system is in operation for those sectors specified for SEA (e.g. water supply, electricity generation, waste disposal). The early SEAs were not considered successful; they were often overly complex and had marginal influence on decision making (Huisman, 1990). Recent experience, as monitored by the EIA Commission, is more positive (Verheem, 1992, 1994).

Environmental integration is also promoted through other strategic frameworks and instruments, notably the *National Environment Policy Plan* (NEPP). In the latest version (1994), an *environmental paragraph* or *test* is proposed for policy and plan initiatives that require Cabinet decision but are not now subject to SEA and EIA. Since 1995 such an environmental test is mandatory for a number of initiatives at the highest strategic level. It is a flexible instrument, with a minimum of procedural and content provisions, in line with the objective to introduce the environmental test in a low-key manner (de Vries, 1994). Another recent development is the application of SEA to selected overseas and programmes by the Dutch Ministry of Foreign Affairs. With these additions, the Dutch SEA system is one of most comprehensive in coverage of levels of decision making and policy sectors.

New Zealand *(See File 22)*

The *Resource Management Act* (1991) consolidates a range of planning, assessment, pollution control and other regulatory functions previously exercised separately. It provides a comprehensive statutory framework with a single purpose of promoting "the sustainable management of natural and

physical resources" (Section 5). Under the Act, the basic presumption is for protection, via rigorous limits on discharges and a requirement for environmental effects assessment for all resource use consents (Gow, 1994).
A hierarchy of national and regional policy statements and regional and district plans form the cornerstone for implementation of the Resource Management Act. This framework promotes an integrated approach in which SEA and EIA are used in combination to establish the environmental "bottom lines", with regional policy and district plans setting the context and parameters for subsidiary project ElAs. However, the practical implementation of the Act's provisions is occurring slowly. Experience to date indicates that local governments still rely overly on project EIA, rather than undertaking policy and plan-level assessment to frame and focus its application (Dixon, 1994; Gow, 1994).

United Kingdom *(See File 23)*
Environmental appraisal of policies and plans represents the British equivalent of SEA. This process is non-mandatory, i.e. no formal provisions or standardised procedure are prescribed. Instead, the Department of the Environment (1991, 1993) has issued "good practice" guidance on environmental appraisal of i) policies formulated by central government, and ii) statutory development plans prepared by local governments. Policy appraisal incorporates the framework of cost-benefit analysis; plan appraisal follows a three step approach to record environmental stock, scope the relevant issues, and apply a policy impact matrix.
Despite criticism of their discretionary nature, the UK guidelines have a clear sustainability orientation and incorporate recent advances in thinking, e.g. with respect to stock of natural capital. "Best-case" experience also indicates a useful, even innovative, start was made to apply these principles, using economic techniques, to evaluate the environmental effects of central government policies. Overall, however, policy appraisal is not yet as systematically and consistently practised by government departments as it should be (Department of the Environment, 1994). While guidance with respect to development plans is more recent, several local authorities are reported to have undertaken thorough and effective environmental appraisals and others are now following their lead (Zetter, 1994).

United States *(See File 24)*
The *National Environmental Policy Act* (NEPA 1969) applies to "legislation and other major Federal actions". As interpreted by the Council on Environmental Quality (CEQ), this refers, inter alia, to policies, plans and programmes. CEQ regulations on NEPA compliance set out general procedures (e.g. on whether and how to prepare an environmental impact statement). Other than these, Section 1052.4(b) notes an EIA may be prepared for broad Federal actions, such as the adoption of new programmes or legislation. Programme environmental impact statement (PEISs) comprise a relatively well established area of NEPA practice (see Chapter 4).
This process, typically, focuses on a family of activities that are related regionally, generically by stage of technology development or otherwise connected (e.g. by reference to potential cumulative effects). PEISs are applied to various sectors, including resource management, water development and flood protection, pest control, waste disposal and regulatory actions and proposals (Webb and Sigal, 1992). Recently, PEISs have gained currency as a means of facilitating long-range planning, of dealing with cumulative effects, of tiering

actions requiring project EIA, and, under prodding from court rulings, of evading costly litigation. So far, NEPA provisions have yet to be applied to broad government policies. With certain exceptions, such as California (Bass, 1990), SEA is not well developed in state EIA systems.

The World Bank *(See File 25)*

Under Operational Directive 4.00 (1989), World Bank policy for EA of its investment lending operations is to ensure that development options are environmentally sound and sustainable. To that end, provision is made for project-specific, regional and sectoral EAs. Sectoral EAs are used at the programme-level for reviewing investment alternatives, proposed policy changes, institutional requirements, and the cumulative effects of several, interrelated capital projects or a number of smaller, similar investments. Regional EAs are used where a number of development activities, with potentially significant cumulative effects, are proposed for a reasonably well defined natural system or administrative area (World Bank 1991a).

To date, World Bank experience with sectoral EA is greater than with regional EA, and it is furthest advanced with respect to application to the energy, transportation and agricultural sectors (World Bank 1991b, c). Sectoral and regional EAs have important benefits, including:

1) reducing the time and effort required for subsidiary project ElAs;
2) early identification of issues and impacts associated with development options; and
3) facilitating selection of the most environmentally friendly alternative.

However, this latter conclusion is open to argument; also it is not clear if regional and sector EAs meet their basic purpose of ensuring that development options are environmentally sound and sustainable (see Goodland and Tillman, 1995).

5.2 INSTITUTIONAL ARRANGEMENTS FOR SEA

Box 5.3 summarises the institutional arrangements for SEA that are in place in the countries and organisations reviewed previously. It highlights the provisions, procedures and responsibilities of SEA systems and compares similarities and differences. These aspects are discussed further here, together with related considerations, such as the pre-requisites for establishing SEA systems. The latter area is of interest to a large number of countries and international organisations, which have yet to introduce SEA.

A short overview of institutional arrangements for SEA in a number of countries

BOX 3.3

Country / institution	*Provision*	*Procedure*	*Responsibility*
Western-Australia (File 16)	The Environmental Protection Act 1986/93 allows for the EA of programmes, plans and policies. EIA has been applied to programmes and plans; more limited experience with respect to policies. No structural SEA procedure to new legislation, decisions of executive government or State budgets.	No formal requirements for SEA procedure; ad hoc determined by EPA.	The Environmental protection Authority (EPA) determines form, content, timing and procedure of the assessment.
Canada (File 17)	The Cabinet Directive of 1990 requires all federal departments and agencies to apply EA to policy and program proposals submitted for Cabinet consideration.	No formal requirements for SEA procedure; guidelines only	Individual Ministers are responsible for assessment of the proposals generated in their departments and agencies.
Denmark (File 18)	The Administrative Order of February 1993 requires Bills and other proposals to Parliament to include an assessment of the environmental impacts in the documentation attached if they are expected to have significant impacts on the environment.	No formal requirements for SEA procedure; guidelines only.	Responsibility for the SEA lies with the lead ministries; guidance is provided by the Ministry of the Environment.
European Commission (File 19)	Internal communication of June 1993 requires screening and assessment of all future Commission actions (almost always strategic of character) and new legislative proposals if likely to have a significant effect on the environment. The Commission is discussing with Member States the need for an SEA Directive.	No procedural or content requirements are set to allow for maximum flexibility.	Responsibility for the statement lies with the responsible Directorate General.

Country / institution	*Provision*	*Procedure*	*Responsibility*
Hong Kong (File 20)	The October 1992 initiative of the Governor of Hong Kong requires all policy papers submitted to the Executive Council (similar to a Cabinet in other administrations) to contain an Environmental Implications Section (EIS). An EIS is also required for Information Notes issued by the government, briefs recommending new legislation and all papers seeking funding for government works projects.	Limited guidance on the content of SEA reports.	The proponent agency is responsible for drafting an EIS and should consult the Environmental Protection Department (EPD) at an early stage of the policy formulation.
The Netherlands (File 21)	The 1987 EIA Act requires an SEA of a *lands* number of plans, programmes and sec- toral policies. The Dutch Ministry of Foreign Affairs has decided to use SEA - where appropriate -in its planning of development assistance.	For SEA the same (comprehensive) procedure applies as required for projects.	Responsibility for the SEA lies with the lead agency.
	Since 1995 an environmental test is mandatory for all policy and plan initiatives that require Cabinet decision and that might have significant environmental effects (not requiring a mandatory SEA under the EIA Act).	The environmental test has minimal procedural and content requirements to provide for flexibility.	The environmental test should be carried out by the lead authority. with the mandatory involvement of the Minister of the Environment.
New Zealand (File 22)	The 1991 Resources Management Act (RMA) requires the integration of environmental considerations in all policy statements and plans at national, regional and district level prepared under the provisions of the Act.	Rather than establishing a distinct SEA process, the RMA aims at the integration of environmental issues in all stages of decision making. All policies and plans under the RMA are subject to public scrutiny.	The consideration of environmental issues is the responsibility of the agencies responsible for the policy, plan or programme (national, regional and district authorities).

Country / institution	*Provision*	*Procedure*	*Responsibility*
UK (File 23)	No formal SEA provisions at the national level; local planning authorities are required to 'have regard to environment considerations' in preparing their land use plans; a number of these have prepared SEAs for County Structure Plans	No formal requirements for SEA procedure; 'good practice' guidance only	Policy appraisal is the responsibility of lead central government agencies. Plan evaluation is the responsibility of local planning authorities.
USA (File 24)	The US National Environmental Policy Act of 1969 requires EA for major federal actions significantly affecting the quality of the human environment, including programs, rules, regulations, plans, policies, procedures and legislative proposals.	SEA procedures are the same as for project EIA	EAs should be prepared by the agency at a point in the planning process when it can highlight potential environment problems and allow a wide range of alternatives to be evaluated.
World Bank (File 25)	The system is policy based; recommends use of sectoral and regional EA, e.g. where sector investment projects and loans through financial intermediaries involve numerous subprojects. In some instances sectoral EA is also used as a planning tool in the early stages of project preparation without a formal link to subproject EA work.	The Bank's regional environment division for Asia (ASTEN) has developed standard procedures for sectoral EAs.	World Bank Divisions

Pre-requisites for SEA

The pre-requisites for SEA are established, in general, by the prevailing political (or organisational) culture, and, specifically, by the structure of decision making. At a basic level, the political culture – the customary laws, rules and conventions that frame and guide all aspects of decision making – will determine *whether* and under what circumstances SEA can be formally or informally introduced. *How* SEA is applied will depend, in part, upon the type of policy and planning processes that exist to accommodate or "house" the approach. These pre-feasibility issues were studied in some depth by the Canadian Environmental Assessment Research Council (Bregha, *et al*, 1990) and were a focus of international discussion at the 6th Australia-Canada-New Zealand Tripartite Workshop on EIA (1991).

Aspects of political culture that establish opportunities to or constraints on the introduction of SEA include (O'Riordan and Sewell, 1981):

- the character of the policy making process, e.g. the degree to which it is open or closed, pluralistic or élitist, innovative or traditional;
- the level of political accountability, measured by due process, access to information and recourse to the courts; and
- the degree of activism and influence of interest and community groups, reflected by their ability to mobilize resources, undertake critical analysis and generate political pressure.

Several institutional barriers to the integration of environmental considerations into policy-making, in general, and the use of SEA, in particular, are listed in Box 5.4. In the final analysis, political will or support for the process is probably the only real precondition, although the other factors identified in Box 5.4 will certainly influence the scope and pace of SEA implementation. These enabling conditions should be a key priority for institutional capacity building to support the development of an SEA system; for example, by means of training, information or education activities.

Some Institutional Barriers to Introducing and Implementing SEA

BOX 5.4

The following barriers are interrelated and mutually reinforcing:

- *Insufficient political will* – as indicated by low priority given to environmental concerns, public participation and integrated decision making;
- *Lack of clear objectives* – e.g. absent or incomplete direction given to incorporating environmental goals into sectoral policies, plans and programmes;
- *Narrow definition of issues* – reflected in prevailing emphasis on economic growth and failure to consider the strategic environmental implications;
- *Compartmentalised organisational structures* – typically, consideration of environmental matters is curtailed by the sectoral division of political powers and agency responsibilities;
- *Absence of accountability* – often, economic agencies are not held responsible for the environmental implications of their actions;
- *Lack of incentive* – policy makers and their senior advisors are seldom rewarded for anticipating and avoiding environmental problems; on the contrary, taking these into account usually generates additional pressures;
- *Exigencies of decision* making – often political stresses dictate a fast response to events in which there is too little time to review and weigh economic consequences, let alone environmental ones; and
- *Bureaucratic prerogatives* – environmental requirements encroach on "turf and territory" of other sectors, which is zealously guarded by officials, especially at the policy level.

Source: Adapted from Bregha, *et al* (1990), with certain modifications based on discussion at the 6th Australia-Canada-New Zealand Tripartite Workshop on EIA, Wellington, 1991.

Types of SEA Provision

In the systems reviewed, three types of provision for SEA can be distinguished:
1) legislation (e.g. New Zealand, USA, Western Australia);
2) administrative order or Cabinet directive (e.g. Canada, Denmark, Hong-Kong); and
3) advisory guidelines or operational policy (e.g. UK, European Commission, World Bank).

Legislation establishes a mandatory requirement for SEA; administrative provision may be classified as "quasi-mandatory" advisory and policy guidelines are considered as non-mandatory, although, in practice, they may be interpreted as "binding".

However defined, these distinctions are important. In principle, law provides a more rigorous basis for process application. For example, there are significant differences in the statutory authority of the Canadian Environmental Assessment Agency to oversee project EIA, as compared to its loosely prescribed administrative responsibilities for policy and programme assessment. The Netherlands is also adopting a two-tier system, with a 'test' of policy based on administrative order added to the statutory requirement for SEA of certain types of plans and programmes. Initially, at least, this pragmatic approach merits consideration. An alternative option, supported by many legal and policy analysts, is exemplified by the US NEPA system, where PEIS requirements include case law precedent as well as CEQ regulations. Elsewhere, litigation appears less important, although a case is currently before the Supreme Court of Western Australia challenging the application of EIA to plans.

Experience to date is insufficient to draw specific conclusions regarding the effectiveness of legislative versus administrative-based SEA systems. In either case, rigid and overdetailed prescription 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 key principles from EIA which are relevant to the policies, plans and programmes (see Box 5.5).

Principles of SEA

BOX 5.5

The following principles appear to be widely supported:

- *initiating agencies are accountable* for assessing the environmental effects of new or amended policies, plans and programmes;
- the assessment process should be *applied as early as possible* in proposal design;
- *scope of assessment must be commensurate* with the proposal's potential impact or consequence for the environment;
- *objectives and terms of reference* should be clearly defined;
- *alternatives* to, as well as the *environmental effects* of, a proposal should be considered;
- *other factors,* including socio-economic considerations, to be included as necessary and appropriate;
- evaluation of *significance* and determination of *acceptability* to be made against policy framework of *environmental objectives and standards;*
- provision should be made for *public involvement,* consistent with potential degree of concern and controversy of proposal;
- *public reporting* of assessment and decisions (unless explicit, stated limitations on confidentiality are given);
- need for *independent oversight* of process implementation, agency compliance and government-wide performance;
- SEA should result in *incorporation* of environmental factors in policy making; and
- *tiered* to other SEAs, project ElAs and/or monitoring for proposals that initiate further actions.

Procedural Models of SEA

In broad outline, the SEA systems reviewed earlier exhibit three procedural forms. These can be described as:

- *standard (EIA-based) model* – SEA of policies and programmes is generally patterned after project EIA (as in Canada);
- *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).

Obviously, the above variants are overlapping, and their process components are variously represented and combined in different countries.

When considered collectively, the three models indicate the range of adaptation that is necessary to account for the realities of policy-making. For example, the standard EIA-based procedural model reportedly works best when the process followed in policy, plan or programme design is comparable to that applied to projects. As described earlier, the 3Ps come in various forms; often they are developed through open-ended, non-hierarchical processes. The uniform, *apriori* adoption of an EIA procedural model, widely promoted in the literature is an inappropriate response to many circumstances and configurations of policy making. In practice, a more discriminating, differentiated process has emerged in which the form of SEA is adapted to the function required (rather than vice-versa).

The development of a two-tier SEA process holds particular promise in that regard. As noted earlier, the Netherlands uses an EIA-based approach to review physical and sector plans and now introduced an environmental 'test'' or paragraph for policy decisions, to ensure these are consistent with the *National Environmental Policy Plan* for achieving sustainable development. The former approach incorporates vigorous, technical procedures, including independent review. The proposed policy 'test' will be a flexible, minimal process. It will be guided by 3 rules (de Vries, 1994; Burger, 1994):

- practical and simple requirements;
- "less as possible" procedures; and
- initiator has responsibility to implement but discretion on how to do so.

Process Administration and Responsibilities

Usually, the competent authority for policy, plan and programme development is responsible for undertaking SEA. In effect, the process is one of self-assessment. This approach has pros and cons. Giving responsibility for SEA to sector authorities promotes the long term internalisation of environmental values and facilitates informed decision making. However, self-assessment also demands the establishment of internal and external mechanisms to monitor performance and verify accountability. SEA systems need to incorporate checks and balances to ensure the process is properly applied and to maintain public confidence in its integrity.

In practice, development agencies are subject to varying degrees of legal, regulatory and administrative review. Depending on institutional arrangements, these roles are respectively undertaken by a judicial or executive body (e.g. USA), an environmental department (e.g. Western Australia), or a specialised assessment agency (e.g. Canada). National reviews (and case studies) indicate that, in general, SEA systems do not change existing decision making powers. US court rulings, mentioned earlier, are a special case in that regard; they are judicial orders that are binding on the agency in question. The New Zealand Parliamentary Commissioner for the Environment has independent, ombudsman-type powers to scrutinise and report on agency performance, including environmental assessment. Elsewhere, public concern and involvement constitute the major avenue for letting sunlight into the SEA process.

National SEA systems differentially circumscribe and influence the competence of development agencies. For example, the Western Australia Environmental Protection Authority appears to have significant residual powers for SEA decision making, and the Dutch EIA Commission undertakes an independent review of the quality of all SEAs of plans and programmes (but will not have a role in the E-test of policies). In other countries, environmental and assessment agencies tend to have an *ad hoc*, low key, even "hands-off" role in SEA, intervening through negotiation, persuasion or, as a last resort, at the political or executive level (e.g. Hong Kong, UK, Canada). Evidence to date, admittedly slim, suggests that environmental and other outside agencies need to be more fully engaged in overseeing the SEA process at all levels, from initiation to decision making. This is especially the case in the first years of SEA application, when circumstances indicate that external and environmental agencies might opt for a more decisive role. Establishing clear ground rules and actively fostering a culture of "good practice" in accordance with the principles in Box 5.5 need not to be inconsistent with pragmatism as described above, although it is a difficult balance to strike in practice.

5.3 TRENDS IN PRACTICE

The test of institutional arrangements for SEA lies in their implementation. An initial survey of trends in SEA practice is undertaken here with reference to four institutional considerations:

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

In addition to the institutional profiles (Files 16-25 at the back of this chapter), approximately 40 case studies were reviewed to identify relevant experience in the above areas. Examples are listed in Box 5.6 (with cases described in detail in Files 26-49).

Scope of Application

More than any other aspect, perhaps, the scope of application of SEA is a critical indicator of the status and effectiveness of practice. Four questions are scrutinised in this regard:

- At what 3P level is SEA applied?
- Which sectors are covered?
- What factors are included?
- When is SEA undertaken in relation to decision making?

Policy, Plan and Programme Focus

While overall coverage is still very limited, examples can be found of SEAs carried out for all levels of decision making. As shown in Box 5.6, these include environmental assessments of broad national policy and legislative proposals, notably in the Canadian and Danish systems which are linked to Cabinet and Parliamentary decision making respectively. There are also cases of innovative, *ad hoc* and informal uses of SEA at the policy level, for example, to examine national park policy advice (Western Australia, box 5.9), to unofficially review a national budget (Canada, file 41) and to consider the environmental repercussions of political party platforms (the Netherlands, file 42). Not unexpectedly, however, the majority of formal SEAs are for sec-toral plans and programmes and regional development and land use plans.

Sectors and *Areas Covered*

At this level, SEA seems to be applied most often to three key development sectors: energy, transport and waste management. The USA and, more recently, the Netherlands have relatively strong credentials in these areas. Natural resource management issues (e.g. water, forestry, agriculture and wildlife) are moderately well represented in our canvass of SEA practice. Other candidate areas for SEA, including tourism, housing and settlement, are less frequently targeted. However, these aspects are incorporated within regional development and land use plans, which are also subject to SEA.

Range of Factors Included

Most SEAs reviewed 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. disposal of radio-active waste in UK). Relatively few examples are to hand of integrative assessment, i.e. identification of environmental, social and economic considerations, trade-offs and policy options. The Australian Forest and Timber Inquiry and the Lake Burullus case both demonstrate an integrative approach (see Files 36 and 37 at the back of this chapter). Finally, cumulative effects are not always addressed sufficiently; which is surprising in light of the claims often made for SEA.

Timing of Assessment

A key principle of SEA calls for the early application of this process, as an integral part of policy, plan or programme design. Many of the examples cited in Box 5.6 were reportedly applied in accordance with that principle (e.g. Amendment of the Western Grain Transportation Act, Canada). Because of political or decision-making circumstances, other cases were applied at a

later or even post-decision stage. Although this is less than ideal, it still may be useful in guiding the implementation of policy. For example, Canada's environmental review of the North American Free Trade Agreement was applied after a decision-in-principle was taken; however, it is widely credited with "greening" the negotiations and leading to the establishment of a tri-countries environmental commission (see file 28).

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 The Hague Workshop). At the strategic level, certain exemptions may need to be introduced to safeguard Cabinet and fiscal confidentiality (Bregha, et al 1990), and some degree of flexibility is necessary to take account of the open-ended nature of policy making (Sadler, 1994). However, these restrictions should be kept to a minimum. Depending on the nature and scope of issues, there is a gradient of public involvement, comprising:

- *information* (the passive form)
- *consultation* (the opportunity to respond and comment)
- *participation* (characterised by varying degrees of working interaction) and
- *mediation* (and other consensus-based negotiation processes).

Some degree of public involvement occurred in many of the cases reviewed; but it was absent or unclear in others[7]. Often, involvement appears to take the form of information provision or selective consultation with non-government organisations. For example, this approach characterises the Canadian process of policy and programme assessment; in part reflecting the requirements of Cabinet submission. Overall, more widespread forms of public participation occur in SEA of development plans and programmes, especially where these influence the siting of specific projects and facilities likely to arouse controversy and interest. An exception is the use of public inquiries to review national policy issues; for example, extensive use was made in the Australian Forest and Timber Inquiry of hearings, community surveys, extended consultation and dispute analysis.

[7] In reality, policy making still takes place predominantly behind closed doors, involving a relatively small number of power holders and brokers who set the agenda. For example, as noted by the UK Minister of the Environment in criticism of an early draft of the ECs proposed SEA Directive, the policy making process is diffuse, complex and iterative and these characteristics underline the importance of maintaining flexibility (cited in Therivel et al., 1992). However, this is a reason for caution, not in action with respect to the application of SEA, in general, and public involvement in particular.

Case Examples of SEA Applications

BOX 5.6

Legislative Proposals

- Amendments to Western Grain Transportation Act, Canada (File 26)
  - environmental effects and issues were integrated into policy development,
  - comprehensive assessment of environmental, social and economic effects.

- Bill on Protection of Coastal Zones, Denmark (File 27)
  - law aimed at nature conservation and its integration with new development (e.g. recreation),
  - short (2pp), qualitative assessment in support of new environmental planning and regulatory framework.

Fiscal and Trade Initiatives

- North American Free Trade Agreement (NAFTA), Canada (File 28)
  - policy assessment of environmental implications of complex, regional trade pact,
  - led to the introduction of environmental side-agreements and institutional arrangements.
- Fiscal and Physical Measures in Transport Planning, UK (File 29)
  - appraisal of impact of fiscal and physical measures on road traffic and emission levels in cities of varying size and form,
  - clarified policy options, e.g. improved public transport, congestion changes, parking restraints.

National and Regional Energy Plans/Programmes

- Second National Structure Scheme Electricity Supply, Netherlands (File 30)
  - long term strategy for electricity supply, includes decisions on siting of power stations, fuel mix, maximum generating capacity,
  - SEA had major impact on final scheme.
- Distinct Heating Rehabilitation Project, World Bank/Estonia (File 31)
  - proposed investment,
  - SEA helped to evaluate environmental impacts and options for harvesting, processing and using peat and wood fuels.

National and Regional Waste Management Plans/Programmes

- Environmental Restoration and Waste Management Programme, USA (File 32)
  - integrated programme for management of spent nuclear fuel and other mixed and hazardous wastes, including containment and clean up measures,
  - risk and impact analysis of major alternatives for waste management and environmental restoration activities, respectively.

- Second Solid Waste Management Project, World Bank/Mexico (File 33)
  - proposed financing for modern system of municipal waste management,
  - sectoral EA included institutional review to identify gaps, tiered to project EIA for individual sites.

International, National and Regional Transportation Policy/Programme

- European High Speed Train Network, European Commission (File 34)
  - proposal responds to increasing transport demands on and environmental problems of road and air transport in the European Union,
  - SEA of outline plan identified environmental consequences.
- Nordrhein-Westfalen Road Programme, Germany (File 35)
  - country (Under) 5 year programme to extend road network,
  - SEA of routing and overall design for 240 proposed regional roads.

National and Regional Resource Management Strategy

- Forest and Timber Inquiry, Australia (File 36)
  - public review of use and management of the national forest estate,
  - integrated assessment of resource capability, environmental and social issues, timber supply-demand projections to identify five policy options for forest management.
- Lake Burullus Development Plan, World Bank/Egypt (File 37)
  - regional assessment of ecologically sensitive lagoon system (Ramsar site) to screen socio-economic options (e.g. fisheries, irrigated agriculture),
  - four policy scenarios developed and subjected to integrative assessment.

Regional and Area Plans

- Bedfordshire Structure Plan, UK (File 38)
  - the structure plan broadly organises land use at county level, in accordance with policy statements (e.g. settlement, rural landscape, tourism/recreation, etc.),
  - plan evaluation carried out in accordance with UK guidelines on good practice, e.g. using impact matrix to review environmental effects of policy statements.
- San Joaquin Comprehensive Planning Programme, California, USA (File 39)
  - plan identified existing and new urban communities to accommodate projected population and employment growth,
  - SEA reviewed environmental impacts, possible mitigation measures and alternatives to plan.

Dutch, USA and Western Australian practice, amongst others, demonstrate the use and benefits of public input to SEA of development plans and programmes. In the Netherlands, for example, public consultation on those plans that require an SEA under the EIA Act occurs at two stages of the process: in scoping and in reviewing the quality of the report. Usually, inputs are sollicited via written comments or through public hearings. Dutch case studies show that this form of public consultation creates little or no delay in the planning process. Equally important, it brings valuable information into the SEA and increases the credibility of the plan finally accepted. An attempt is made in Box 5.7 to distil these and other findings into draft guidelines for public involvement in SEA.

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 recommended as a logical approach to focus and streamline SEA and EIA (e.g. Wood and Djeddour 1992). Once in place, tiering ensures that environmental *implications, issues and impacts* of development decision making can be addressed at the appropriate level(s) and with the degree of effort necessary for informed choice. SEA and EIA should be consistent with and reinforce each other, with the former providing a frame of reference for the latter.

In practice, however, varying degrees of integration are possible. Tiering is most easily achieved with SEA of plans and programmes that initiate specific projects. In the United States, for example, project EISs are routinely tiered to prior-order Programmatic EISs. As yet, however, this does not extend to higher levels of policy. By contrast, in countries with policy-level assessment systems, preliminary evidence suggests these are difficult to tier to project EIA (e.g. Canada). For specific sectors of technical planning (e.g. energy and waste management), the Netherlands has an integrated assessment system in which SEA and EIA are tiered (Box 5.8). 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; but it is yet to be fully implemented in that regard.

Toward Draft Guidelines for Public Involvement in SEA

BOX 5.7

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 programme and reflect the interests and values affected.

Depending on that determination, the strategic approach can be selected from the gradient of public involvement, comprising:

- *information*
- *consultation*
- *participation*
- *mediation*

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, where relevant,
- 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, e.g. for policies, plans or programmes where the environmental effects are indirect or uncertain, and the general public may be less interested.

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).

Example of Tiered Assessment
Waste Management in the Netherlands

BOX 5.8

At the national level:

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

At the regional level:

- decision(s) are taken on *where treatment sites* will be located;
- SEAs assess locational options and their environmental consequences.

At the project level:

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

As noted in Chapter 4, "horizontal" integration with other policy instruments (e.g. economic and land use planning) is also important. Figure 6 illustrates how these elements might be interrelated using energy development as an example. It is based on the key issues of environmental assessment (i.e., whether development is needed, what technology, which location, and how to design and mitigate). These issues are correlated with different types of SEA, including the regional and sectoral approaches used by the World Bank, and with the types of economic and land and resource planning instruments that would be necessary to support integrated decision making. While all of these components are in place in many of the countries reviewed here, their integration does not yet approximate the level shown on the diagonal axis of Figure 6.

Figure 6. Emerging process of tiered and integrated environmental assessment

	Justification	Alternatives		Mitigation
		Technological	Locational	
Policies	Macro-Economic policy / Environmental policy	Sectoral development strategies e.g. transport and energy	Regional development plans	Mega-projects e.g. Channel tunnel (UK) and hydro-development (Quebec)
Programs	Conservation strategies	Energy supply e.g. oil and gas, nuclear and hydro		
Plans	Integrated river basis management		Hydro facility plans e.g. reservoir silting, transmission corridors	
Projects	Environmental standards e.g. Water quality and fisheries protection			Site-specific Impact assessment

Note: the basic elements for this process are in place; however, as yet, it is seldom integrated in the way shown. In practice, for any system, an understanding of the way division making processes *actually work* is necessary for the effective application of SEA. Often, for example, the relationship between the tiers will not be straightforward and the policy decisions that set the boundary conditions will not be coherent or consistent (see Valve and Hilden, 1994).

Source: Sadler (1994): See also Lee and Wood (1978)

Relevance for Policy Making

The impact of SEA on policy making is open to a considerable latitude of interpretation (for reasons identified in Chapter 2). It is not always clear whether or not decisions are informed or guided by SEA. Despite many ambiguities, some general observations and insights can be drawn from the activities and examples found in the SEA systems profiled here. The following points have been aided by discussion with administrators and practitioners who attended the Hague workshops.

- *Policy Leverage*. At a basic level, the requirement for SEA provides a "purchase" on the environmental consequences of policies, plans and programmes. By definition, it requires development proponents to at least think about and more critically take account of the environment. In SEA systems that are structured to executive decision making, a degree of (initial) influence is reflected by the percentage of proposals to Cabinet, parliament or other form of executive government that are subject to SEA (e.g. 25% of bills/proposals in Denmark; 50% of policy papers in Hong-Kong). However, it is not clear how many proposals with potentially significant environmental effects escape SEA; although this is identified as an "area for concern and improvement" (e.g. in Denmark and Canada).

- *Acceptance and Influence.* Not unexpectedly, most SEA systems appear to have a mixed track record in terms of informing and influencing policy making. In all cases, both positive and negative examples were identified by practitioners. Often, too, policy making is a much more fluid process than project approvals and assessment is overtaken by political events and circumstances. With more established SEA systems, however, there is a sense of increasing acceptance and use by decision makers of the information provided. For example, this trend is documented for plan and programme assessments in the Netherlands and the USA (see Files 21 and 24 at the back of this chapter).

- *"Best Case" Experience.* With few exceptions, the case studies listed in this report resulted in environmental factors being incorporated into policy, plan and programme proposals (see Files 26-49). This is a "litmus test" of SEA performance. Although "best case" experience cannot be generalised, it does demonstrate the feasibility and utility of SEA for decision making. In some cases, the benefits of the process were also officially or informally acknowledged by initiating agencies and/or development proponents (e.g. Sichuan Gas Development Plan, China/World Bank; Second National Structure Scheme Electricity Supply, Netherlands; Amendment to Western Grain Transportation Act, Canada). These findings are also corroborated by the results of a study of SEA methodology in which DHV Environment and Infrastructure (1994) canvassed key participants regarding their appreciation of the process. Responses were generally positive in the twelve cases selected (some of which are also reviewed here).

- *Ingredients of Success.* The ingredients of relevance for policy making correspond to the principles of EIA/SEA drawn up previously (Box 5.5). The matrix in Box 5.9 illustrates the application of key EIA principles in the environmental assessment of policies in Western Australia (described in box 5.10), that resulted in the incorporation of environmental factors in policy planning. Cross referencing principles against cases in the matrix indicates the contribution of process to performance. Where the SEA process is well founded, based on the application of all or most of the principles listed, the greater appears to be the likelihood of its relevance to decision making. This represents a critical area for further work and comparisons.

- *Cost Effectiveness.* The time taken to complete the SEAs reviewed here ranges from a few hours or days (e.g. for preparation of 'environmental paragraphs') to five years (for the PEIS of Environmental Restoration and Waste Management, USA). However, the latter case is unique. Comprehensive SEAs of sectoral development plans and programmes take about six months (e.g. in the Netherlands). Case examples and workshop discussions indicate that the time to prepare SEAs can be reduced, perhaps significantly, as proponents and practitioners gain experience, and with further adaptation of methods and procedures as discussed in the next chapter.

Except for the World Bank, hard information on costs is not readily available. At the Bank, sectoral EAs are reported to be "comparatively inexpensive" (average cost US$100,000) compared to one for project EIAs (average cost US$200,000 to $300,000 or roughly 0.1% of total project cost). These figures are for international professional consultancy fees (and are in line with those in industrialised countries). Note, however, that for many SEAs the percentage of overall costs is meaningless or contrived because there is no clear link to capital investment. While undoubtedly the completion of SEAs adds to time and cost of overall planning (e.g. in UK structure plan appraisal), the general consensus is that this is a reasonable and modest charge in the light of the benefits derived.

BOX 5.9

A Review of the Application of Key EIA principles to SEA of policies in Western Australia

	Western Australian Policies (see box 5.10) a) b) c) d) e) f) g)
Key EM Principles: basic	
1) Proponents (of policies) take primary responsibility for environmental protection	●●●♦●●♦
2) Objectives defined	●●●●●●●
3) Alternatives considered	♦♦●●●●●
4) Incorporate environmental factors in policy planning and include short and long term, direct and indirect, total and cumulative effects	●●●●●●●
5) Provide for public information, participation and response mechanisms	●●●●●●●
6) Evaluate and adapt for environmental acceptability against standards, criteria, regulations, best practice, etc.	●●♦●♦●●
7) Provide basis for monitoring and adaptive management	●●●●♦●●
8) Report publicly on environmental assessment	♦●●●●●●
9) Measure post-implementation performance	♦●●●♦●♦
Key EM principles: desirable	
10) Guidelines (scoping) on key issues	●●●●●●●
11) Environmental costs and benefits and where borne in the community	●♦●●●●●
12) Timetables for assessment process	♦♦●♦♦●♦
13) Independent (of proponent) evaluation	♦●●●●●♦

● = meets the principle
♦ = fails to meet the principle

SEA of Policies in Western Australia:
description of cases (referred to in box 5.9)

BOX 5.10

a) *State Conservation Strategy:*
tiered to World and Australian conservation strategies; set long term policy objectives for sustainable environment and resource management (20-30 year time horizon); informally assessed.

b) *Nature Conservation Strategy:*
draft document that identified protection policies and measures for landbase; informally assessed.

c) *Planning for the Future of Perth Metropolitan Region:*
despite title, more a policy document with far reaching urban design options (e.g. consolidated v sprawl development); SEA of environmental costs and benefits.

d) *Sustainable Development and the Kwinara Industrial Area:*
policy document outlining general principles and industry best practice; SEA reinforced environmental performance criteria.

e) *Exploration and Mining in National Parks* and *Nature Reserves:*
policy issues (whether/how) under review by government established committee; committee advice was assessed by EPA.

f) *Forest Region Management Plans:*
timber and conservation strategy for state forests; includes policy options for protected areas (e.g. one large reserve v several smaller ones); subject to SEA in 1987 and 1992.

g) *Use of Heptachlor for Pest Control:*
the chemical is applied in Western Australia to control Argentine Ants and Termites; SEA of implications for environmental health.

Source: Sippe (1994)

PROFILES OF SEA SYSTEMS IN SELECTED COUNTRIES & INSTITUTIONS

File 16

AUSTRALIA
SEA OF POLICIES IN WESTERN AUSTRALIA

The basis for SEA of programmes, plans and policies, as well as project EIA, is the Western Australia *Environmental Protection Act* (1986). The Environmental Protection Authority (EPA) is the responsible authority for SEA and EIA. It determines the form, content, timing and procedure of assessment. Western Australia does not have a 'structural' procedure of SEA, applied to new legislation (e.g. as in Denmark) or to Cabinet decisions (e.g. as in Canada at the federal level).

The SEA process is initiated in accordance with a proposal's likely effect on the environment. Depending on this significance test, which is widely applied in other Australian jurisdictions, the proposal follows one of four tracks:

- full, formal application of SEA process;
- informal review with non-binding advice;
- referred to the Department of Environment Protection for approval and licence control; or
- no assessment necessary.

Results of SEA, to date, generally have been positive at the level of programmes and plans. With respect to SEA of policies, there has been more limited experience. Some examples of SEA application are to: nature conservation strategies; planning for the future of the Perth Metropolitan Region; sustainable development and the Kwinana Industrial Area; Forest Regional Management Plans; the use of Heptachlor for the control of Argentine Ants and Termites; and exploration and mining in National Parks and Nature Reserves. Methods and procedures based on project EIA appear less applicable at this level, compared to plans and programmes that have physical and locational correlates.

The quality of assessment is influenced by the “bottom up” approach taken to SEA in Western Australia. SEA frameworks and methodologies are built on the experiences and successes of project EIA. This strategy is useful because it:

- reduces the amount of change required to existing thinking;
- appears less threatening to those uncomfortable with the concept of SEA of policies; and
- builds public and government support for and credibility of established processes.

Further development of SEA in Western Australia can be expected in areas where EPA has appropriate powers.

Other mechanisms are also used in western Australia for environmental policy legislation. These can be applied instead of or in support of SEA of policy when political resistance to its use is encountered. Key instruments are:

- retroactive use of SEA of plans and programmes or project EIA to influence policy and
- environmental protection policies which provide a proactive means of setting statutory performance criteria in advance of strategic or project decision making so that non-conforming proposals are subject to SEA or EIA.

Source: Sippe (1994)

File 17

CANADA
POLICY AND PROGRAMME ASSESSMENT AT THE FEDERAI, LEVEL

The provision for policy EA was established by Cabinet Directive in 1990. The Directive was part of a comprehensive proposal to reform the federal Environmental Assessment and Review Process (EARP). Subsequently, EARP was replaced by the *Canadian Environmental Assessment Act* (1995), which applies only to development projects (requiring federal government support or approval). In effect, a two-level EA system is in force, with project EIA mandated by statute and SEA based on administrative order. For example, the SEA Directive does not apply to emergency situations, to matters of national security or to matters requiring urgent consideration.

Guidelines require federal departments and agencies to:

- take account of the potential environmental effects of policy and program proposals submitted for Cabinet consideration;
- outline the environmental effects considered in memoranda to Cabinet and other relevant documents;
- prepare a public statement demonstrating that environmental factors have been integrated into the decision making process; and
- consult with the public, when appropriate.

The SEA process is meant to be flexibly applied in accordance with several basic principles:

- self-assessment – by the initiating Minister (i.e. department or agency responsible);
- separate from project EIA – non-legislated and possibly requiring different approaches and methods because potential effects are often non-specific;
- discretion and flexibility – agencies can develop and use approaches and procedures suited to needs and circumstances, e.g. deciding whether or not to consult with the public; and
- level of effort – the scope and content of policy EA should be proportional to the magnitude of the potential environmental effects identified, i.e. no more and no less than required.

The results of activity, to date, are mixed. In 1993, what is now the Canadian Environmental Assessment Agency initiated a review of the implementation of the SEA process. Major findings include:

- some departments have yet to apply the process;
- others, including development agencies, are not aware of the environmental implications of their proposals or of the relevance of policy assessment;
- few departments and agencies have directed adequate resources to the process;
- in general, very little support exists for SEA and awareness of the requirements of the Cabinet Directive is limited;
- where SEA is applied, various approaches, procedures and guidance material are used;
- some agencies integrate environmental considerations into policy design;
- others assess the effects after a proposal has been developed – either before a decision or before implementation;
- considerable variation exists in the nature and extent of SEA documentation; and
- relative little consultation has taken place with either the public or environmental experts.

Given these candid findings, it is expected that the federal government will propose options for improving policy and programme assessment. An interdepartmental committee is presently reviewing ways and means of strengthening procedures, improving accountability, promoting early integration of environmental issues in policy making and developing appropriate guidance. While critical, the above review enhances rather than detracts from process credibilities, providing a platform for improvement.

Source: LeBlanc and Fischer, 1994

File 18

DENMARK
EA OF GOVERNMENT BILLS AND PROPOSALS

The provision for SEA came into force on October 1,1993 by Administrative Order of the Prime Minister's Office. An environmental assessment must be included in the documentation attached to government bills and other proposals to Parliament that are expected to have a significant impact on the environment. In January 1995, a new order extended the range of impacts that must be assessed. These are: health and safety, flora and fauna, soil, water, air, climate, landscape, resources, buildings and cultural heritage.

SEA Procedures are relatively limited; the Administrative Order contains few requirements. A pragmatic strategy is being followed with respect to SEA process development. Responsibility for carrying out the SEA lies with the initiating ministry. Guidance is provided by the Ministry of the Environment. This includes a checklist for scoping and screening, criteria for the assessment of significance, and a collection of case examples of SEA.

The results of activity, to date, can be gauged from data for the period from October 1,1993 to May 27, 1994. During this time, 261 bills/government proposals were presented in Parliament: 13% were found likely to have significant impacts on the environment and had a description of the impacts in the attached documentation;
13% were found likely to have insignificant impacts on the environment, which was stated in the attached documentation; and
74% did not have any remarks on environmental impacts in the attached documentation.

Most of the bills/proposals concerned administrative or procedural rules that will not in themselves have any environmental impacts. The most comprehensive reviews are found in proposals which have as their main objective environmental improvement; e.g. Energy 2000 strategy, Traffic 2005 and proposals by the Ministry of Environment.

The extent and *quality of the assessments* carried out varies considerably. 'Statements' of environmental impacts ran from a few lines to several pages. In most case, environmental impacts were described very briefly and in general terms. Often, of course it is not possible to quantify the impacts. However, the case of the assessment of the "energy effectiveness" bill exemplifies the calculation of environmental gains. In many cases, SEA of bills is, and likely will remain, qualitative. Finally, the Administrative Order aims at the gradual, feasible integration of environmental considerations into policy making having regard to costs and cash runs. Further actions to improve the quality of practice include:

a) addressing the shortcomings identified above; and
b) applying SEA to comprehensive action plans for sustainable development of safer sections.

These plans contain specific environmental targets and timeframes against which evaluation can take place.

Source: Elling (1994)

File 19

THE EUROPEAN COMMISSION
EA OF LEGISLATIVE PROGRAMME

The integration of environmental considerations with other policy objectives is a long standing objective of the European Community. It is required by Article 130r (2) of the Treaty of Rome and is at the centre of the 5th Environmental Action Programme. As a key supporting measure, EA is both required by and undertaken within the European Commission.

The Commission's EIA Directive (85/337/EEC) – which is binding on all Member States – is confined to the project level. A Directive on SEA, introducing a minimum process in Member States, is still at the discussion phase. The introduction of a formal proposal is expected in the near future. (SEA experience in selected individual countries of the Union is reported separately.)

The Commission's internal communication *of June 1993* states that:

- Commission actions (almost all of them strategic in character) must be screened and environmentally assessed if they are likely to have a significant effect on the environment; and
- legislative proposals which are likely to have a significant environmental impact must be accompanied by an environmental statement describing and justifying the impact on the environment and the environmental costs and benefits involved.

A green star' screening process is followed with respect to legislative proposals. For example, all items on the Commission's 1994 legislative programme were screened to identify their environmental impact. A green star designation identifies proposals that require further assessment. This process is carried out by DG X1-which is responsible for the environment, nuclear safety and civil protection-and agreed by the Commission. DG X1 also provides technical assistance to other DGs and monitors general progress with respect to environmental responsibilities.

The preparation of environmental statements and other activities are the responsibility of the Directorate General (DG) which initiates the action or proposal. Supporting measure to assist DGs to meet this provision included internal training and the appointment of a senior official as the 'integration correspondent', responsible for ensuring that all policy and legislative proposals take account of the environment. Each DG also has to undertake an evaluation of its environmental performance and prepare an annual progress report. No other procedural or content requirements are set "to allow for maximum flexibility".

Source: Norris (1994)

File 20

HONG KONG
ENVIRONMENTAL IMPLICATION OF POLICY PAPERS

The provision for SEA was established in October 1992 by decision of the Governor of Hong Kong. With immediate effect, all policy papers submitted to the Executive Council (EXCO) have to contain an environmental implications section (EIS) that sets out clearly the likely environmental costs or benefits that would arise from implementing the proposal. Hong Kong is a British Crown Colony (until 1997 when it reverts to China). Under the present system, the EXCO is the equivalent to a Cabinet in other countries.

EISs are required for:

- proposals for new policies or strategies;
- amendments to existing ones;
- specific matters which involve environmental issues;
- proposals or projects for which an EIA had been carried out; and
- environmental strategies, policies and proposals.

In addition to EXCO policy papers, an EIS is also required in Information Notes issued by the government for the general public, briefs issued by the Government to the Legislative Council (LEGCO – responsible in Hong Kong for recommending legislation to the Governor) and, significantly, all papers put before LEGCO seeking funding for government works projects.

SEA process and procedure is flexible. Limited guidance is given on what is to be contained in a policy EIS, e.g.:

- likely impacts of the proposal on the surrounding environment;
- major impacts of the surrounding environment on the proposal; and
- environmental protection measures incorporated in the proposal.

It is the responsibility of the proponent agency to prepare the first draft of a policy EIS. The agency is required to consult with the Environmental Protection Department (EPD) at an early stage of policy formulation to examine any environmental implications and clarify any follow-up action that may be required. The proponent is also responsible for keeping EPD informed of any significant policy developments and changes which might impact upon the environment. Draft EXCO papers are sent to the Secretary for Planning, Environment and Lands for clearance and copied to the EPD, which advises on the acceptability of the EIS and what amendments may be required to make the EIS acceptable.

The results of activity, to date, indicate both benefits and difficulties with the approach taken. As of August 30, 1994, nearly 100 EXCO papers were subjected to the new requirement for inclusion of a policy EIS. Of these, roughly 50% involved environmental issues and required detailed environmental input. This provision allows environmental concerns and issues to be addressed at an early stage, when the opportunity to influence directions and options is greatest.

While extremely useful, the EIS requirement by itself, cannot ensure that environmental considerations are given adequate early attention in policy formulation. A critical issue of process effectiveness in Hong Kong revolves around the screening and scoping phases. It has proved difficult to determine which policy proposals submitted to EXCO raise significant environmental concerns, and, subsequently, what types of study are required to provide additional information that can assist in policy decision making without going into unnecessary detail. These problems are compounded by the lack of well-defined environment and sustainability objectives in sectoral policy statements.

Source: Law (1994)

File 21 **THE NETHERLANDS – TWO-TIER SEA,**

Under the EIA Act (1987), a number of plans, programmes and sectoral policies require an SEA. These include national plans on land development, water supply and electricity generation; national and regional waste disposal plans; and all national physical plans fixing the location(s) of projects for which a project EIA is mandatory.

Mandatory requirements apply to these types of strategic decisions as required for project EIA. For example these include: full public involvement and independent expert review at both the scoping and reviewing stages; examination of alternatives (including the 'environment' alternative); and evaluation and monitoring of the implementation of the policy/plan. Responsibility for the SEA lies with the lead agency for the policy, plan or programme

Activities to date (1995) can be illustrated by the following SEAs which have been completed and used in decision making:

National level:	National Waste Management Plans (2 now completed); National Guidelines for the Design of Sludge Deposits; National Structure Scheme Electricity Production; National Structure Scheme Land Development; National Structure Scheme for Industrial and Drinking Water Supply;
Regional level:	Provincial Waste Management Plans (15 SEAs now completed); Provincial Plans for the Management of Sludge (7); Provincial Plan for the location of new housing area (1); Plans for the selection of locations for waste depositing (3).

SEAs currently under preparation include: a number of regional land development plans and provincial waste management plans. Recently started are SEAs for the national plan on the location of a new housing area and future national housing strategy in the Netherlands.

The integration of environmental considerations into all policy areas and levels of decision making is a cornerstone of the Dutch National Environmental Policy Plan (1989; 1992) which is directed at the attainment of sustainable development. In NEPP 1 (1989), new and modified instruments for advancing the process of integration were identified as a priority for achieving the long-term objectives and targets that are considered necessary "to restore environmental carrying capacity within a generation". In NEPP 2 (1992), environmental screening of policies and plans, not presently subject to mandatory EIA and SEA was recommended.

An 'environmental *section* or paragraph' as part of an '*environmental test*' is required since 1995 for all Cabinet decisions with significant environmental impacts. This 'test' is implemented through administrative provision (a Cabinet Directive) and complements the SEA process as required under the 1987 *EIA Act.* Responsibility for preparing the paragraph rests with the lead authority, with a mandatory involvement of the Minister of the Environment.
The aim of the environmental section is to give environmental and sustainability concerns a full place in national policy-making. Basic principles for its implementation include:

- introduction in a low key manner;
- use of the environmental section should not delay decision making;
- scope and detail of the environmental section to a policy proposal must be geared to significance of the issues raised; and
- procedural and content requirements will be kept to a minimum to provide for flexible, efficient integration with other processes.

Finally, the Dutch Ministry of Foreign Affairs has decided to use SEA, where appropriate, in its planning of development assistance. So far, the Dutch EIA Commission has issued guidelines on the required content of SEAs that will be carried out for alternative development strategies in the Rio Paute Region in Ecuador, as well as for the Environmental Profile of Yemen. These SEAs are currently under preparation and it is to be expected that in the future SEAs will be carried out for other strategic development plans.

Source: Verheem (1995)

File 22

NEW ZEALAND
INTEGRATED POLICY MAKING, PLANNING AND ASSESSMENT

The Resource Management Act (1991), inter alia, significantly revised EA provisions, procedures and practice in New Zealand. As described in Section 5, the Act has a single overriding purpose: to promote the sustainable management of natural and physical resources. It integrates a range of planning and regulation functions for land (including urban areas), water (surface and groundwater), marine, geothermal energy resources and for noise and pollution. Under the *Resource Management Act,* the assessment of environmental effects is intended at the policy and plan level and is required for all resource consent or permit application, including discharge or physical disturbance.

An *integrated planning and assessment process* is to be followed at the strategic level through the preparation of:

- national policy statements, including environmental quality standards;
- regional policy statements, outlining resource management objectives, means of implementation, and results and expectations; and
- regional district plans establishing the ground rules for land use allocation.

In all policy statements and plans at national, regional and district level, an evaluation must be carried out of the likely benefits and costs (including environmental and social ones) to determine whether they achieve the purpose of the Act. These documents are subject to public scrutiny with any person having the right to make a submission on them, to comment on anyone else's submission, to have their submission heard and a decision made on it, or – ultimately – to lodge an appeal to an environmental court (the Planning Tribunal). Within the framework set by the policies and plans, requirements for projects or proposal specific assessment can be set. This is expected to lower the costs and time spent by resource consent applicants in preparing an acceptable application.

Integrated environmental policy making in New Zealand also occurs in other ways:

1. The central government policy system is characterised by a process of 'contestable advice' (i.e. for any policy issue, alternative views are expected from a range of relevant agencies). Usually, it does not include a formal SEA in the sense of a particular process. Instead, where any policy issue has environmental implications, the Minister of the Environment is expected to be a part of the policy analysis and advice process. Where necessary, its views are expressed separately in papers to Ministers, or raised in Cabinet Committees or in Cabinet itself.
2. To provide for checks and balances in this system, the Office of the Parliamentary Commissioner for the Environment reviews and advises on the integration of environmental issues in government actions and policy development. Where appropriate, the Commissioner independently carries out environmental impact audits.

Activities to date are limited because in certain respects, New Zealand's integrated system of environmental policy making has resulted in formal SEA being rarely used. It is no longer used to challenge policy that has already been determined. Rather, environmental issues and information are mostly part of the policy process.

Under the 1987 Environment Protection and Enhancement Procedures (EPEP) too, most assessments were limited. Occasionally, for environmentally contentious matters, a formal, comprehensive SEA report and related audit were commissioned. Examples include work on the implications of introducing myxomatosis and the aerial application of 1080 poison to kill possums in national parks.

Policy assessment under the RMA is new and not yet fully developed. The Act is still in a transitional phase and only applies to new policies and plans. There are still relatively few of these. However, to date local government generally seems to want to put more emphasis on full assessment at the project or proposal stage than to carry out detailed and explicit policy assessment.

Source: Gow (1994)

File 23

UNITED KINGDOM
ENVIRONMENTAL APPRAISAL OF POLICIES AND PLANS

No formal provision or standardised procedures for SEA are applied in the UK. In fact, the term appears to be deliberately avoided by official sources. However, equivalent, discretionary processes for environmental appraisal of i) policies (and programmes) and ii) development plans respectively are applied by the central and local governments. At both levels, environmental appraisal is carried out under advisory, "good practice" guidance from the Department of the Environment.

Guidance on Policy Appraisal and the Environment (1991) was drafted for those in central government who are charged with advising Ministers. The document is to: i) increase awareness of the need to examine the environmental effects of government policy; and ii) offer a systematic approach to the analysis of such impacts and issues. A comprehensive scope of coverage is promoted; most areas and sectors of government policy are noted as having some environmental impact, and particular reference is made to policies and programmes that may result in changes to the use of land and resources or involve the production and use of energy or materials. The Guide outlines key steps, principles and approaches to policy appraisal, drawing largely on the framework of cost-benefit analysis and available techniques of monetary valuation.

A companion report, *Environmental Appraisal in Government Departments* (1994), reviews recent experience with the application the Guide. The practice of policy appraisal is demonstrated by reference to case studies from several key sectors, including agriculture, energy and transportation. Policy appraisal in the UK covers not only the environmental effects of policy initiatives (e.g. costs and benefits of national forest expansion), but also the economic implications of environmental policies (e.g. greenhouse gas control), the cost-effectiveness of alternative means of implementing green strategies (e.g. public transport options), and ways of internalising environmental externalities (e.g. in waste incineration).

Experience to date is described in the above report. Several broad and somewhat guarded conclusions are drawn regarding UK trends in environmental appraisal of government policies, notably:

- a good start has been made that demonstrate the practical utility of the appraisal;
- however, the principles set out in the 1991 Guide are not being applied in every case "as systematically and consistently as we should like";
- departments need further guidance on valuation techniques; and
- there is still scope for the dissemination of best practice and for sharing experience (e.g. to give policy makers more confidence in using these studies).

Plan appraisal is also carried out. Under the *Planning and Compensation Act* (1991), all local planning authorities must prepare development plans. In 1992, the Department of the Environment issued a Guidance Note (PPG12) on the environmental appraisal of development plans, component land use policies and proposals. Subsequently, the Department published *A Good Practice Guide* (1993) with advice on procedures and techniques for incorporating environmental appraisal as an integral part of the plan making process. This, inter alia, encompasses:

- recording the condition of environmental stock or capital;
- checking the scope of the plan is appropriate to environmental concerns; and
- appraising the impact of policy options against each aspect of environmental stock.

Several local authorities are reported to have undertaken thorough environmental appraisal development plans and modified policies and proposals accordingly. Examples include the Lancashire, Kent and Bedfordshire structure plans (see Files 38 and 45).

Sources: UK Department of the Environment (1991, 1993, 1994a, b); Wood, 1994; Zetter, (1994).

File 24 USA PROGRAMME EIS

The US *National Environmental Policy Act* (1969) requires the preparation of an environmental impact statement (EIS) for major federal actions significantly affecting the quality of the human environment. Subsequently, the term 'major federal action' was defined by the Council on Environmental Quality (CEQ) as including projects and programs, rules, regulations, plans, policies, or procedures.

CEQ regulations on NEPA compliance set out general requirements and procedures, e.g. with respect to preparing an EIS. These do not distinguish among classes or levels, except in general terms. Section 1052.4b notes that an EIS may be performed "for broad Federal actions, such as the adoption of new agency programs or regulations". When preparing such statements, actions may be grouped geographically (e.g. covering a metropolitan are), generically (e.g. actions having similar methods of implementation) or by stage of technological development (e.g. federally assisted research on new energy technologies).

Programme EISs comprise a relatively well established area of practice. For example, between 1979, when CEQ regulations were issued and 1987, it is estimated that over 300 programme EISs were undertaken in the following sectors (numbers approximate):

- resource management (40)
- pest control (31)
- food control (30)
- wilderness (22)
- permits (21)
- technology development (18)
- water development (17)
- mineral/timber leasing and allocation(15)
- defense (12)
- policies regarding rates and permits (11)
- area-wide/regional development (10)
- waste (5)
- generic (3)

For much of the above period, federal agencies were reportedly reluctant to undertake PEISs, largely because of perceived costs, time delays and restrictions on action during preparation. Recently, this level of analysis has gained currency and the number of PEISs is increasing, in part because of court rulings. PEISs are now recognised as particularly relevant for dealing with connected actions, addressing cumulative effects and anticipating environmental problems, including complex issues where the comparative analysis of alternatives can highlight potential problems. They can and should be prepared at an early point in the agency planning process to highlight potential environment problems and to allow a wide range of alternatives to be evaluated.

So far, NEPA provisions have not been extended to broad national policies. However, CEQ has provided informal advice to federal agencies regarding the application of the EIA process to broad environmental issues, including global warming, depletion of stratospheric ozone and loss of biological diversity. These background reports, inter alia, generally point to the importance of adopting more strategic framework for NEPA analysis at national and regional levels.

Sources: Webb and Sigal (1992); Wood (EA of PPP A comparative Review, 1994)

File 25 THE WORLD BANK

Operational Directive 4.00 (1989) sets out the World Bank's policy for EA of its investment activities. It states: "the purpose of the EA is to ensure that the development options under consideration are environmentally sound and sustainable..." Provision is made for sectoral and regional, as well as project, EAs. To date, Bank experience is largely in the latter area; however, there is an increasing use of sectoral and regional EA.

Sectoral EAs are used as an early planning and design tool for investment programmes. Their increased use reflects the growth in programmatic and intermediary lending activities by the Bank. These activities generally involve large numbers of sub-projects, most of which have not been developed – or in some cases even identified – at the time of appraisal. Sectoral assessment focuses attention on the major environmental issues and impacts of development programmes, prescribes standard approaches (through environmental manuals, standards or guidelines) to project design and mitigation, and facilitates development of a data base.

Recent examples of sectoral EAs include: Water Consolidation Projects in India; the Kabupaten (district) Roads Project in Indonesia; and the District Heating Rehabilitation Project in Estonia. The Regional Environment Division for Asia (ASTEN) has developed standard procedures for this type of sectoral EA, including:

- screening to identify sub-projects with potentially significant environmental issues:
- assessment of the impacts associated with different types of sub-project; and
- action planning to eliminate, minimize or mitigate the impacts identified and to provide general guidelines for long-term management and monitoring.

World Bank experience generally indicates that sectoral EA is particularly suitable for reviewing:

- investment alternatives (e.g. centralised versus decentralised wastewater treatment);
- the effect of sector policy changes (e.g. management of water to reflect the full cost of the service);
- institutional capacities and requirements for strengthening environmental management; and
- cumulative impacts of several large projects (e.g. power plants) or a number of small, similar projects (e.g. run-of-the-river hydropower).

Regional EAs are used where a number of development activities with potentially significant cumulative effects are planned for a reasonably well defined natural system (e.g. watershed) or administrative area, or in cases where there is an institutional focus. This type of review fits into the Bank's project (decision making) cycle by:

- assisting in the early identification of environmentally sound projects;
- contributing to the implementation strategy for a related set of pre-selected projects;
- establishing criteria for environmentally sustainable regional development; and
- promoting frameworks for growth management.

Experience with regional EA is still at a relatively early stage. In 1994, the first project with a full regional EA - the Natural Resources Management Project in Paraguay – was submitted to the Board. A regional EA and an associated Regional Action Programme to address induced impacts were also conducted for the proposed Arun Hydroelectric Project in Nepal, which is under consideration by the Bank.

Source: World Bank (1994)

6. SEA procedures and methods: experience and issues

""In all studied SEA's, suitable tools have been available. Despite considerable uncertainties (...) major questions have been cleared up""

DHV, Environment and Infrastructure, 1994,37.

In this chapter, SEA procedures and methods are examined and compared. The focus is on the steps and approaches that are applied in practice, especially in the countries and international organisations described previously. A number of general comparisons have been made of SEA and EIA and their methodological differences and similarities (e.g. Wood and Djeddour, 1992; Lee and Walsh, 1992). These provide useful background. The following review draws primarily on source materials and case studies. Our concern is to illustrate the components and issues of basic practice, rather than attempt an exhaustive survey.

SEA systems and practices, as described in Chapter 5, exemplify the points of both similarity and difference with EIA. The similarities are especially evident where policies, plans and programmes are well structured and initiate projects and activities. In such cases, experience indicates that EIA process and methods can be readily applied and work reasonably well. Even so, modifications are necessary to take account of the greater degree of generality and uncertainty encountered in policy and plan making as compared to project approval. As the element of abstraction increases, the procedural and methodological differences to EIA become more noticeable - although principles and constituents are recognisable (e.g. the Dutch 'E'-test, the Hong Kong environmental implications section or paragraph).

6.1 SEA PROCEDURE

The report of the UNECE Task Force on Application of Environmental Impact Assessment to Policies, Plans and Programmes (1992) made a series of recommendations to the participating governments. In particular, the Task Force proposed that SEA procedures should as much as possible reflect the principles of EIA. Specific recommendations were directed at seven procedural elements: initiation, scoping, outside review, public participation, documentation and information, decision making, and post-decision analysis (or monitoring). Box 6.1 summarises the findings of the Task Force and can be used as a generic checklist of the extent to which EIA procedure is followed in SEA.

In one form or another, most or all of these procedures are included in leading SEA systems. As institutionalised, however, their scope, detail and interrelationships vary, sometimes significantly. The reasons stem from the continuous, iterative character of the policy making process (i.e. the factors that

account for difference between SEA and project EIA). SEA procedures, therefore must be applied flexibly throughout the entire process rather than followed in a narrowly defined sequence of fixed steps. UK guidance on policy appraisal exemplifies this approach (Box 6.2). Although not a formal standardised framework, it overlaps and incorporates the application of screening, scoping and other EIA procedures recommended by the UNECE Task Force.

SEA Procedural Steps
Recommended by UNECE Task Force

BOX 6.1

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

Scoping:
identify alternatives and impacts to be assessed, exclude irrelevant information.

Outside review:
seek input and advice of other governmental agencies, independent experts, interest groups and the public during scoping and after completion of the SEA.

Public participation:
involve the public in the SEA process, unless limited by legitimate confidentiality or timing requirements.

Documentation:
present the information, either in a separate document or a chapter or paragraph of the policy proposal.

Decision making:
take SEA conclusions and recommendations into account.

Post decision:
identify follow up measures of overall impact of projects and measures resulting from the policy, plan or programme.

Source: UNECE (1992)

BOX 6.2

Basic Steps in Policy Appraisal

1. ***List the objectives of the policy, plan or programme, including the formal decisions that need to be taken, and identify the constraints:***
   - give the objectives and priorities; identify any conflicts and tradeoffs between them; indicate how binding the constraints are and whether they might be expected to change over time or are negotiable; take into account the results of public involvement if this has taken place;

2. ***Analyse existing environmental problems and protection objectives***
   - focus on the main problems that could be affected by the policy, plan or programme, either negatively or positively; use relevant environmental policy plans to list the relevant environmental protection objectives for these problems; otherwise, employ extended screening or scoping

3. ***Specify feasible alternative options for planning decisions and identify their environmental consequences***
   - identify and evaluate environmental issues and impacts, including cumulative impact and sustainability issues; do not disregard likely effects simply because they are not easily quantifiable.

4. ***Identify measures to mitigate or compensate environmental problems and suggest a preferred option***
   - concentrate the analysis on those impacts which are material to the decision; compare them with relevant environmental protection objectives; compare alternative options; adapt where necessary policy options to the results of the impact identification; include a 'with and without proposal' comparison; test the sensitivity of the outcome of the analysis to possible changes in conditions or to the use of different assumption.

5. ***Set up any monitoring necessary and decide at which stage to evaluate the implementation of the action***
   - wherever possible, identify further requirements for assessment; specifically list any projects, activities, etc that may require EIA at the project level; indicate how monitoring results of projects will be collected and used to evaluate the implementation of the policy, plan or programme.

Source: UK, department of the Environment, 1991

Both procedural guides reflect and are elaborated by recent lessons of practice. These indicate the importance of:

- carefully screening for the most effective stage(s) at which to apply SEA;
- determining where, when and how to involve the public, or outside parties;
- ensuring that confidentiality is a legitimate reason (not an excuse) for excluding them;
- as far as possible, keeping SEA procedures short and simple;
- providing the right information at the right time;
- acknowledging that assessment is one step in a continuous process;
- monitoring or tracking a policy, plan or programme to (re)assess unfor-seen modifications; and
- bringing in new information and options as required.

6.2 SEA METHODS

A range of methods and techniques are used in SEA or are potentially available. These are drawn from two main sources:

1) project EIA (e.g. checklists, matrices, GIS); and
2) policy analysis/plan evaluation (e.g. scenarios, planning balance sheets, cost benefit analysis).

Recently, the existing methodology for SEA has been reviewed for the European Commission by DHV Environment and Infrastructure (1994). We refer readers to this review for a further explanation of SEA methods and examples of their application.

In files 50 and 51 at the back of this chapter, some of the methods often found in current SEA practice are listed, together with a short description of their characteristics. A distinction is made between methods for impact identification (file 50) and methods for impact analysis (file 51). When selecting the most appropriate method(s) for an SEA, the required level of detail and format (i.e. quantitative or qualitative results) will be important criteria. This distinction also points to the potential of a stepped methodology, in which policy appraisal tools are applied to generic proposals and impact assessment tools are used for policies, plans and programmes that initiate projects and activities (Sadler, 1994). However, this determination must be made in the context of a specific proposal.

Case experience indicates that most or, perhaps, all of the analytical methods and techniques needed for SEA are available already, either from project EIA or policy appraisal/ plan evaluation. With some adaptation, many of these have been used successfully. Examples of the application of methods to key stages of the SEA process are given in Box 6.3. Most of the tools listed here and in files 50 and 51 can be applied with the in-house expertise available within most government agencies. Some, however, are complex and may require specialised or outside expertise; examples include life cycle analysis, multi-criteria analysis and uncertainty analysis.

Application of methods to SEA

BOX 6.3

Step	*Examples of Methods*
Baseline Study:	• SOE reports and similar documents • environmental stock/setting • 'points of reference'
Screening / Scoping:	• formal /informal checklists • survey, case comparison • effects networks • public or expert consultation
Defining Options:	*(by reference to):* • environmental policy, standards, strategies • previous commitment precedents • regional/local plans • public values and preferences
Impact Analysis:	• scenario development • risk assessment • environmental indicators and criteria • policy impact matrix • predictive and simulation models • GISs capacity/habitat analysis • benefit/cost analysis and other economic valuation techniques • multi-criteria analysis
Documentation for Decision Making:	• cross-impact matrices • consistency analysis • sensitivity analysis • decision 'trees'

Sources: FEARO, 1992; DHV Environment and Infrastructure, 1994.

6.3 GENERIC STEPS IN SEA

The main steps in the preparation of SEA, as identified in Boxes 6.1 and 6.2, collectively outline a methodological as well as procedural framework. With certain additions and modifications, we have used the combined frameworks as a basis for analysing key assessment tasks and activities.

Screening to Initiate SEA

With few exceptions, screening (or scoping) triggers the SEA process. Most countries use a checklist or equivalent device to identify whether a proposal is likely to have potential environmental effects, and to establish the level of

examination that is required. Danish guidelines, for example, call for the use of a screening/scoping checklist to make a quick assessment of whether or not a government bill or proposal is likely to have significant environmental impacts. Other countries, where SEA is applied primarily to plans and programmes, may apply a more extended screening or public scoping process to test for significance (e.g. Western Australia, USA). In cases where screening/ scoping procedures are not required (or not enforced), difficulties are reported in initiating or subsequently applying SEA (e.g. Hong Kong).

When SEA is applied as part of a tiered process, additional considerations are introduced. A balance must be struck between the issues that are to be dealt with now compared to those that can be more effectively dealt with at a later stage. Based on case review and discussion at the The Hague Workshop, the necessary degree of clarification is not always achieved with the result that process efficiencies are foregone.

In most cases, strengthening screening procedures could bring key process benefits. It would allow practitioners to decide, early in the process, on:

- the necessity for SEA;
- the stage at which assessment should take place;
- the extent and type of involvement of outside parties, in the light of planning; and
- requirements.

Objectives-led Scoping

Following screening, scoping can be used in SEA as an amplifying step to focus on the important issues and determine the process for addressing them. Scoping is also used instead of screening. The distinction, reflecting the institutional arrangements that are in force in different countries, does not appear to have important repercussions on practice. More important is whether scoping is applied on an informal basis or as a formal, public process – as in the USA and Netherlands at the plan/programme level. In the latter case, scoping can become an extensive and significant activity. For example, the US Department of Energy held twenty three public scoping meetings over a two month period, following a Notice of Intent to prepare a PEIS of the thirty year strategy for Environmental Restoration and Waste Management. These laid the basis for an (unusually) complex five year process of technical analysis of risks, impacts and alternatives (see File 32 at the back of this chapter).

Other than procedural guidance, most countries do not prescribe scoping 'methodology'. An exception is the UK good practice guide on development plan appraisal (Department of the Environment, 1993). Scoping is the second stage of a three part process. The first step involves defining environmental stock to establish the baseline against which policy options and plan proposals are to be evaluated. An environmental checklist or other means is then used to define appropriate scope of the plan and then check actual against appropriate scope. This approach, according to Zetter (1994), puts the environment at the centre of plan making, identifies the issues that require particular attention, sets standards and targets for use in the plan, and draws attention to policy alternatives.

In scoping an “objectives-led” approach can help to focus SEA and policy appraisal processes (Raymond, 1995). In particular, it is important to identify the relationship between policy objectives and priorities, including possible trade-offs and conflicts among them, recognising that addressing environmental concerns, usually, will be one of a number of goals. These, of course, will be given particular focus in an SEA and a `baseline' or environmental stock or other background review will be important (as indicated in Step 2 in Box 6.2). A case study of an objectives-led approach is given in Box 6.4.

Evaluation and Comparison of Alternatives

The next step in SEA is to establish policy options for evaluation and comparison. Usually, these tend to be limited in scope, but large enough to illustrate contrasting solutions to the problem being addressed and/or to the preferred solution. In all cases, the alternatives should include the case for continuing with the existing situation, as well as the need for modification. Sometimes the no-action or zero option may be a feasible response (or represent political compromise between competing preferences, see Lake Burullus case, File 37 at the back of this chapter). At a minimum, it facilitates comparison and provides a useful reference for decision making.

Often, alternatives are developed using an ‘optimisation’ technique to group a subset of objectives. For example, the Australian Forest and Timber Inquiry identified five strategic options or scenarios of resource management: maximise timber production; growth plan (industry revitalisation); business as usual; transfer timber production to plantation forests; halt logging of native forest. Each alternative scenario encompasses a range of measures with different environmental, economic and social implications, costs and benefits. Based on SEA the pros and cons of alternatives are identified, and trade-offs and conflicts clarified. In some cases, multi-criteria analysis will help to determine preferences where issues are politically charged (e.g. Lake Burullus, File 37). Also, sensitivity analysis can be used to examine the effect of robustness of policy options.

Evaluation of alternatives is a critical element in facilitating informed choice. This is a particularly strong feature of many PEISs prepared under US NEPA regulations. For example, the use of the matrix shown in Box 6.5 provides an “at a glance” comparison of five alternative strategies for managing a multiple use wildland (approx. 13 Km wide x 60 Km long). As indicated here, the aim is to show, as clearly as possible, what is gained or lost by selecting a particular alternative. In some cases, the best practicable environmental option (or equivalent characterisation) will be reasonably clear, e.g. as in the SEA of the Dutch Ten Year Programme in Waste Management (File 46). But this is not always so, and the burden of choice will usually remain - unless the proposal is developed primarily to meet environmental objectives, as in the Danish Bill on Coastal Protection (File 27).

Example of objectives-led scoping
SEA of Firth of Forth Transport System, Scotland

BOX 6.4

Background:
Setting Forth is a transport strategy for South East Scotland in an area around Edinburgh. The policy/plan was subject to environmental appraisal. A six stage approach, corresponding to the DoE good practice guidelines (reported earlier), was followed. Steps 1 and 2 involved the definition, respectively of policy objectives/basic principles and appraisal objectives.

Analysis:
In *Setting Forth,* the government established three key principles/objectives for transportation development:

- enhancing accessibility to and from Scotland north of the Forth must be a priority;
- measures taken must improve the environment of Edinburgh by contributing to the role of public transport; and
- any new works must be environmentally acceptable.

Using these principles, a set of "working" objectives were defined against which policy options could be appraised. Two additional requirements of government policy were added, namely that:

- any new transport infrastructure should have a positive economic benefit to users; and
- the policy should respect the principles of sustainable development as set out in the UK Sustainable Development Strategy and Agenda 21.

A series of appraisal objectives were defined, expressed in terms in which the performance of policy options would be measured. For example, environmental objectives included the following:

- to minimise emissions of carbon dioxide and other traffic related pollutants;
- to minimise loss of or damage to resources of importance to nature conservation, landscape and cultural values; and
- to minimise impact on local environmental quality for residents and others.

Most of the objectives were directional; they were expressed in terms of maximising or minimising some effect, although some absolute targets were set.

Lessons:
The appraisal exemplified an 'objectives-led' approach, that:

- starts with a clear understanding of the purpose and principles of the proposal; and
- translates these into 'working' objectives for appraisal e.g. against which options can be assessed and the implications of choices clarified.

Source: Raymond, 1995.

BOX 6.5

Matrix to Compare Alternatives in the EIS of Area-wide Resource Management, USA

Comparison of Major Differences Between Alternatives

	alternative	*alternative*	*alternative*	*alternative*	*alternative*
	A	*B*	*C*	*D*	*E*
Commercial Timber Harvesting allowed?					
Silvercultural System?					
Lands Eligible for Commercial Harvest (acres)					
Open Land Maintenance (acres)					
Biosphere Reserve Core Areas (acres)					
Visual Quality Zones Along Roads, Trails and Lakeshore (acres)					
Hunting, Trapping, interior Fishing allowed?					

- Alternative A is the no change option; it reflects the current land management plan;
- Alternative B calls for more intensive forest management to increase overall diversity of wildlife habitat and to increase timber productivity.
- Alternative C would reduce substantially present resource management activities (e.g. no forest or wildlife harvesting).
- Alternative D is a modification of C, allowing hunting, trapping and farming.
- Alternative E is the preferred option, with reduced levels of silverculture and wildlife management, and visual values increased by a more natural appearance (than A or B).

Source: Draft Environmental Impact Statement on the Natural Resources-Management Program at Land Between the Lakes – Tennessee Valley Authority (TVA), Knoxville, 1995.

Coping with Uncertainty in Assessment

At the core of SEA, the analysis of environmental effects and consequences is undertaken to compare alternatives, identify mitigation or equivalent measures, and to facilitate policy choice. Screening and scoping of the proposals will determine the scope of SEA, the type of information required (e.g. qualitative or quantitative) and the mode of analysis (e.g. impact analysis/identification). The methods employed for effects analysis depend on a combination of factors including (DHV Environment and Infrastructure, 1994):

- the level of generality of the proposal;
- the nature of the issues to be assessed;
- the scope, magnitude and potential significance of effects;
- the requirements of decision making; and
- the time and resources available.

Examples of the application of many of the methods for impact identification and analysis (listed in Files 50 and 51) can be found in the case studies. These include:

- qualitative and quantitative appraisal of environmental implications of Danish bills (Files 27 and 40);
- application of policy impact matrix in environmental evaluation of UK structure plans (Files 38 and 45);
- indicators-based assessment of policy scenarios for waste management in the Netherlands (File 46);
- modelling and analysis of socio-economic effects of Canadian legislative amendments (File 17);
- combining economic and multi-criteria analysis to weigh costs and benefits of resource management strategies in Egypt (File 37); and
- use of GIS for baseline study route optimization and impact analysis in German road network planning (File 35).

In most SEAs, there is a significant uncertainty factor to deal with impact identification and analysis. This occurs as a result of the greater level of abstraction found in policies, plans and programmes, as compared to projects. Often, cause-effect pathways or networks are blurred or attenuated. Also, there may be a mix of development assumptions, concepts, broad alternatives and project specific elements that require different methodologies, as in the Beaufort Sea example (File 47). The uncertainty introduced in impact identification and analysis is magnified in each succeeding stage, for example, in establishing mitigation measures and the consequences of different choices. An adaptive approach is the best insurance.

Several methods to identify, analyse and clarify uncertainty have proven useful in SEA, including:

- *use of scenarios:* to demonstrate ranges of uncertainty, e.g. full-scale response v no response to a policy guideline;
- *sensitivity analysis:* to identify uncertainty in final results by looking at the effect of different choices regarding assumptions or weights; and
- *expert qualitative judgement:* to address uncertainty, by drawing on experience, knowledge, cases and the results of similar actions in the past.

Quality Documentation for Decision Making

SEA reports can range from a paragraph or page (e.g. for certain Danish bills) to a programmatic EIS (e.g. for a 10 or 30 year waste management strategy). Quality of information and relevance of decision making matter far more than size. These aspects are relative; they can be judged only in the context of the policy/planning process followed in a particular country and with reference to specific proposals and circumstances, including the current state of applicable scientific knowledge. However, it is possible to make a number of general points about what constitutes good quality information in SEA. These are outlined as requirements for SEA reporting in Box 6.6; based on limited experience to date.

In general, a SEA can be considered to be of good quality if it provides decision makers and other parties involved in the process with a concise, and clear description of:

- the proposal and its overall policy/planning context;
- the environmental consequences of policy options and how these alternatives compare;
- the difficulties encountered in the assessment and what is the resulting uncertainty in the SEA results;
- (where appropriate) recommendations on terms for approval and implementation of the proposal, together with, where appropriate, clarification of trade-offs; and
- arrangements for monitoring and post decision analysis.
- For longer reports, an executive summary should be included for ease of reference and to encourage the incorporation of the information in policy, plan and programme development.

Finally, it is important to underscore the necessity of cost-effectiveness in SEA report preparation. As noted previously, policy making processes are often fluid and continuous. This places a premium on getting the right information to decision makers at the right time. Otherwise the SEA, no matter how high a standard, risks being irrelevant. In some cases, review of experience and workshop discussion suggests a tendency to include more information and undertake more sophisticated analysis than is strictly necessary for the task at hand, possibly influenced by the prescriptive literature on the field. Disciplined scoping, backed by review of SEA quality, can correct over-elaboration.

BOX 6.6

GENERAL SEA INFORMATION REQUIREMENTS

A good quality SEA will include, as far as relevant in the context of a specific planning process and reasonable in the light of current scientific knowledge, a description of:

1. what is the planning process all about, i.e.:
- the policy, plan or programme to be approved, including an overview of relevant past developments,
- its main objectives
- the relationship of the planning process to further decision making and an indication of how it will influence concrete projects
- the way environmental policy goals and standards have been taken into account in its development,
- main mitigatory measures and alternative options that have been investigated in formulating the policy, plan or programme

2. what is the context of the planning process, i.e. information as to:
- existing environmental quality of and problems in the area affected
- objectives for environmental protection and related measures
- linkages to other relevant planning processes in the area

3. what are the environmental consequences[8]] of policy options, i.e.:
- identification of environmental consequences of options
- comparison of options in the light of:
  - the attainment of sustainable development
  - existing environmental quality of the area affected, including environmental problems relevant to the planning process
  - objectives of environmental protection

4. what are the arrangements for monitoring and post decision analysis of the implementation of the policy, plan or programme, including:
- requirements for EIA in later stages
- review and use of monitoring results of project ElAs

5. what are the difficulties and uncertainties, i.e.:
- overview of the difficulties (e.g. technical deficiencies or lack of knowledge) encountered in compiling the required information
- discussion of the resulting uncertainty in the provided information and what this uncertainty means for the planning process

6. where appropriate[9]], what are recommendations for decision making:
- approval/disapproval of proposal(s)
- terms and conditions for implementation

7. a summary of the provided information

[8] Both direct and indirect consequences, with particular attention to cumulative and irreversible consequences.

[9] Some countries choose to include these recommendations in the policy, plan or programme itself.

Review of Quality

Like project EIA, SEA is a "self-assessment" process. Quality is the responsibility of the proponent agency. In most SEA systems, as described in Chapter 5, environmental agencies undertake oversight and monitoring activities. These include certain checks and balances to ensure acceptable performance with respect to quality of information provided as well as procedural compliance. Public scrutiny and involvement also plays an important role in this respect.

However, there are a number of examples where environmental agencies and the public have insufficient involvement in the SEA process, and play little or no role in quality assurance. Other countries have established independent review bodies (e.g. Dutch EIA Commission) or give statutory agencies residual powers concerning quality of assessments (e.g. US Council on Environmental Quality). Where these are in place, they are generally regarded as significantly adding to the quality, objectivity and influence of the SEA. The examples in box 6.7 illustrate the role of the Dutch EIA Commission in that regard.

A Final Word on SEA Effectiveness

The effectiveness of an SEA is defined by the extent to which it meets its objectives, including:

- providing adequate environmental information on which to make informed choice;
- inclusion of checks and balances so that this information is taken into account in the planning and policy making;
- involving relevant parties in the planning and assessment process;
- keeping to budget and timeliness;
- preparing information that is relevant to the planning process, reasonable in the light of current knowledge and compiled within an appropriate time frame.

Meeting the above objectives, requires, inter alia, sound procedure, appropriate methodologies, competent practitioners, and above all, a reasonably supportive political culture.

BOX 6.7

The role of the Dutch EIA Commission in reviewing EIS's: two examples

Provincial Waste plan

This plan is concerned with domestic waste, large domestic refuse, industrial waste, building and demolition rubble, sewage sludge, chemical waste, hospital waste, dredged sludge and manure. It is of strategic nature, laying down the outline for a new provincial policy on waste.

In drawing up its advice on guidelines, the EIA Commission considered what environmental information might be relevant to decision making at this level. Given the strategic nature of the plan, the policy laid down will determine the size and distribution of waste flows among the various links in the waste disposal chain (prevention, recycling, incineration, etc.)

Since waste disposal has less harmful effects on the environment the earlier in the chain the waste is dealt with, the impact of the policy on the chain can be taken as a yardstick of its likely impact on the environment. The Dutch EIA Commission advised in this case to focus the SEA on the impact of waste policy on the various waste flows, rather than on the actual environmental effects. This should provide sufficient information to distinguish between the various alternative options, while significantly diminishing the time and resources needed to prepare the studies.

Provincial Contaminated Silt Plan

This plan relates to a decision on how to dispose of contaminated dredged silt in a specific province. Three policy alternatives were identified in the SEA:

- minimal dumping (i.e. maximum use of separation, purification and recycling prior to dumping);
- maximum dumping under water; and
- maximum dumping on land.

On the basis of the overall environmental impacts to be expected (predicted irrespective of the features of specific sites) the option of maximum dumping under water was selected by the provincial authority.

During its review of the SEA, the EIA Commission gave as its opinion that the environmental aspects of silt disposal will probably be determined to a large extent by the specific situations at the actual dumping sites, such as soil conditions, geohydrological conditions and the technical design of the facilities. Therefore, without information on the actual dumping sites no more than a very rough provisional idea can be gained of the environmental effects. It was the view of the EIA Commission, that this rough idea is insufficient to support a decision on one of the policy alternatives mentioned.

File 26 SEA of Amendments to the Western Grain Transportation Act (WGTA), Canada

Background

The WGTA (1983) increased contributions from the federal government and the grain shippers to railways to compensate (subsidise) them for transporting prairie grain to Canadian ports. One of the Act's environmental effects was to constrain diversification into livestock and forage production and discourage crop rotation practices. In 1992, Agriculture Canada initiated a review of the WGTA in response to pressure from the livestock and food processing sectors. This triggered a policy assessment under the Cabinet Directive of 1990.

Analysis

The SEA was undertaken within a short time frame. However, senior management were committed to full consideration of environmental issues and challenges in the policy review. As a result, environmental concerns were integrated into the development of policy options from the beginning of the process.

Key features of the SEA included:

- assembling a multi-disciplinary team, including government staff and private consultants with economic, environmental and agricultural expertise;
- use of quantitative and qualitative studies, including modelling the likely economic and social impacts of the policy options considered;
- analysis as a basis to identify and assess the potential environmental effects;
- this information was incorporated in further developing and refining policy options
- assessing potential environmental effects related to transportation (e.g. increased trucking) and to land use (e.g. crop production, fallow and land cover).

Other notable developments were peer review of all modelling, analyses and assessments; and summary and comparison of the potential environmental effects of each policy option. An executive summary was prepared for presentation to decision makers. However, the proposal did not go before Cabinet following a revised budget to meet national debt and deficit constraints.

Lessons

The SEA:

- identified and compared positive and negative environmental effects of options considered for amending the Act;
- established the basis for integrated strategy (even though it was not submitted to Cabinet for budgetary reasons); and
- exemplified a “best case” approach and factors contributing to success for other agencies.

Sources: LeBlanc and Fischer, 1994, Davis, 1995.

File 27 SEA of the Danish Bill on the Protection of Coastal Zones

Background

The aim of the Bill is to improve the protection of Danish coastal zones. Nature and landscape values are to be effectively protected, while not prohibiting all new developments at the coast (e.g. recreation). Further objectives relate to health and the creation of diversity corridors for flora and fauna.

Analysis

The SEA included descriptions of valuable coastal zone elements that need protection, and of landscape, recreational values, flora, fauna, and visual aspects to be taken into account in the implementation of new developments. Assessment was essentially qualitative. This is probably due to the fact that the bill itself has an environmental objective. The SEA report, itself, consisted of 600 words, and additional information on environmental protection was also included in attached documentation. In many respects, the SEA can be judged as of good quality. It is not expected that the SEA will have direct value for subsequent project ElAs and approval procedures in the coastal zones. However, the planning and regulatory framework as laid down in the bill is presumed to enhance the effectiveness and quality of project EIAs.

Lessons

SEA process and documentation:

- was short and to the point;
- helped to focus the environmental issues and to advance protection objectives; and
- exemplified a cost-effective approach to assessment of sustainability legislation.

Source: Elling, 1994.

File 28 **Environmental Policy Review of North American Free Trade Agreement (NAFTA), Canada**

Background

Formal negotiation of the NAFTA by Canada, Mexico and the United States began in June 1991 and concluded in August 1992. It was the first trade agreement to undergo environmental review. Each NAFTA country was responsible for undertaking its own assessment. Canada's review took place under the requirements of the federal process for policy and programme assessment (1990 Directive).

Analysis

The objectives of the review were to ensure that environmental considerations were taken into account during the negotiation process and to document the potential environmental effects of NAFTA on Canada. An interdepartmental working committee was struck for this purpose. It met regularly with key members of the NAFTA negotiating team, consulted widely with other advisory bodies and canvassed input from non-government sources.

The integration of environmental concerns in NAFTA negotiations (objective 1) represented a preventative approach. Although its day to day role was not clear, the representation of environmental concerns unquestionably had an important impact: it led to the conclusion of a 'side-agreement' on environmental cooperation which established the North American Commission on Environmental Cooperation.

The assessment of the potential environmental effects of NAFTA (objective 2) covered:

- the environmental provisions of the Agreement;
- its impact on Canada's environment;
- potential industry migration to take advantage of less stringent environmental standards; and
- follow up mechanisms for addressing trade-environment relations and issues.

A report on the findings of the review (121pp. with annexes) was submitted to Cabinet at the same time as the NAFTA. Key conclusions were that: the NAFTA establishes "a new benchmark for environmentally sensitive trade"; it would have no "measurable impact on Canada's environment"; and "there is likely to be minimal, or no relocation in Canadian industry due to (...) differences in pollution abatement costs". Few would argue with the first conclusion, but some might contest the second prediction.

Lessons

The environmental review (also labelled as a policy appraisal):

- catalysed a parallel process of environmental cooperation;
- positively influenced environmental provisions for implementation of NAFTA; and
- established important precedents for assessment of trade agreements in the future.

Source: Government of Canada, 1992.

File 29 Environmental Appraisal of Fiscal and Physical Measures for Transport Policy-Planning

Background

In the UK, outside London, the responsibility for urban transport planning rests primarily with local authorities. The Department of Transport commissioned a study on 'public transport options for the environment.' The objective was to estimate the urban-wide impact of fiscal and physical measures on road traffic and emissions levels in cities of varying size and form.

Analysis

The appraisal was based on models of travel behaviour and traffic flows in urban areas based on data from participating cities. Phase I of the study, completed in 1990, developed a simple model of travel behaviour for a medium, sized English City of roughly 500,000 population. In phase II (completed 1993) the model developed for phase I was compared with two alternative models. The original model was then used for policy testing on a further four cities with differing characteristics. The results of these tests were then compared with those obtained for the city which was originally modelled in Phase I.

The analysis concluded that even extensive improvements to public transport, including the construction of new light rail lines, had much smaller effect on emissions than policies which directly discouraged the use of cars (e.g. greater restrictions on parking, changing options). The study also suggested that city centre traffic restraint options, while leading to significant transfers to public transport, would lead to a reduction in total trips to the city centre. This effect, however, could be partially offset by the addition of measures to make public transport more attractive. Phase II largely confirmed these findings, indicated that congestion charging would be at least as effective in reducing emissions as radical parking restrain measures; and identified important differences between cities in the modelled effects of the same policies on trip patterns, road speeds and emissions.

Lessons

The environmental appraisal:

- was a 'pre-policy' study rather than a SEA strictly defined;
- however, it clarifies the effect fiscal and physical measures have on transport planning; and
- presents a mix of options with their relative environmental advantages.

Source: UK, Department of the Environment, 1994

File 30 SEA of the 2nd Dutch National Structure Scheme Electricity Supply

Background

The sector plan describes the long term strategies for electricity supply in the Netherlands, including particular decisions on:

- Siting of large power stations;
- type of fuel used at specific sites (e.g. coal, gas);
- maximum generating capacity in the Netherlands for each type of fuel;
- development of decentralised generation; and
- routing of power supply lines.

Analysis

High and low scenarios for electricity demand in 2010 were developed. These were based *inter alia* on differing assumptions about growth of the economy and energy saving. Based on these, two alternatives for the mix of fuel types to be used in electricity generation were identified: 50% natural gas/50% coal; or 33% coal/67% oil gasification.

For both alternatives a number of variants were developed on the basis of differing choices regarding technological options and mitigating measures. The alternatives/variants in both the high and the low demand scenario were assessed on the following environmental parameters:

- emissions: SO2. NO, and CO2, chloride, fluoride, borium, selenium, mercury and dust;
- waste and residues;
- radiation (in waste and emissions); and
- use of natural resources.

24 potential locations for power stations were assessed regarding their suitability using the following environmental criteria:

- thermal effects (because of the use of cooling water);
- other effects on surface water quality (e.g. toxic substances in waste water);
- effects of fuel transport to and from the location;
- spatial impacts, e.g. landscape disturbance and effect on habitats;
- noise; and
- safety including radiation.

Lessons

The SEA:

- was thorough and well structured, based on existing data in literature;
- had a major impact on the structure scheme finally adopted; but
- covered some aspects in more detail than was strictly needed for decision making at this level.

Source: Verheem, 1992; DHV Environment and Infrastructure, 1994.

File 31 SEA of the Estonia District Heating Rehabilitation Project

Background

This World Bank project aims to improve district heating systems in Estonia's three largest cities – Talinn, Tartu and Parnu – and in smaller towns and villages throughout the country. It is intended to reduce fuel costs and impact requirements by increasing the use of indigenous fuels, peat and wood for heating. A sectoral EA was prepared by a joint international and local team to evaluate the potential short- , medium- and long-term environmental impacts of harvesting, processing and using peat and wood as fuels.

Analysis

The SEA was undertaken during the design phase of the project. It analyzed possible alternative programs for the sector as a whole, including the following:

- continuing to rely on heavy fuel use (business as usual);
- introducing more modern boilers and heat distribution networks using imported fuel and modern air pollution control equipment; and
- relying solely on peat or wood fuel.

After considering economic, social and environmental factors, the proposed mix of fuels and technology upgrading was selected as the best option. In addition environmental reviews were also undertaken for a number of subprojects (e.g. measures to protect biodiversity). The SEA process helped shape the project by a series of policy recommendations for the sector, and the identification of concrete mitigation, management and monitoring measures for subprojects. Additional reviews will be held to assess user fees for public and private harvesting of peat and wood, including management and site rehabilitation costs. Peat harvesting is to be conducted at currently drained sites, and wood fuel harvesting should occur in the context of forest management plans. The Estonian Ministry of the Environment, which administers natural resources and is responsible for the implementation of results in cooperation with other organisations, took an active role throughout the process.

Lessons

The SEA:

- was rated 1.00 by the Bank in terms of environmental performance (no significant problems);
- had an evident influence on overall programme design and sub-project implementation; and
- involved close collaboration with the domestic agency primarily responsible for follow through on the results and recommendations.

Source: World Bank, 1993, 1995.

File 32 PEIS for the US Environmental Restoration and Waste Management Programme

Background:
At present, most environmental restoration and waste management activities are conducted on a site-by-site basis. Recently the US Department of Energy undertook a long term (30 years) integrated approach to these tasks. Key elements of the programme include: environmental clean-up of existing sites, spent nuclear fuel management and treatment of six waste 'streams' (e.g. high-level waste; transuranic waste; low-level mixed waste; greater than class C level waste; hazardous waste).

Analysis:
During an initial, three month phase (1990 - 1991), the Department conduced 23 scoping meetings and six regional workshops. Over 1200 peopled intervened or submitted written comments. Subsequently, a draft implementation plan (1992) and a draft PEIS (1994) were issued for public and inter-agency review and comment. The final PEIS was issued in 1995.
The draft PEIS focused on programmatic alternatives for environmental restoration and waste management. As well, the Department of Energy also prepared a PEIS for reconfiguring its nuclear weapons complex and for managing spent nuclear fuel. Preparation of these documents was coordinated with the environmental restoration and waste management PEIS, which summarised the cumulative effects of all proposed programmes.

Waste management alternatives were examined for each of the categories of waste. These encompassed continuation of current approach, (no new action); decentralised, regionalised and centralised approach. Five environmental restoration alternatives were considered in the draft PEIS:

- no action (baseline risk assessment);
- compliance with environmental standards and the use of various treatment and recovery technologies (to the maximum extent possible);
- forseeable land use to define likely exposure scenarios and appropriate strategies;
- balancing remedial worker and transportation risks to risks surrounding population; and
- consideration of worker and transportation risks.

For each set of alternatives, the following risks and impacts were evaluated:

- transportation risk (collision, shipment and spillage);
- risk from construction, operation and effluent release at the treatment facility;
- impacts on land, water, energy and use of construction materials;
- potential for recycling;
- impacts on air quality, noise, biological resources, socio-economic factors, archaeological interests, surface and groundwater;
- near term risk (including industrial, radiological and hazardous material); and
- residual risk (including the cumulative risk to the public from exposure to radioactive and hazardous material).

The impact analysis was primarily qualitative and descriptive, using standard modelling. Methods and application of risk assessment incorporated guidelines established by the US Environmental Protection Agency and were subject to poor review.

Lessons:

The PEIS resulted in:

- incremental inputs to technical and political decisions throughout the process;
- a comparative examination of alternatives for long term solutions to environmental waste problems; and
- clear recognition of the inherent uncertainties associated with health and ecological risk and impact analysis of contaminated facilities.

Source: Sigal and Webb, 1994.

File 33 SEA of the Mexico Second Solid Waste Management Project, World Bank

Background

The project is designed to improve environmental quality on a broad scale in Mexico. It provides financing to improve systems of municipal solid waste management and to extend their coverage. A sectoral EA, coupled with project specific EAs for individual landfills, was identified by the World Bank and the Mexican Government as an appropriate and cost-effective approach.

Analysis

So far, the approach was adopted has reportedly prove successful. It uses environmental, social and economic cost criteria for site selection. To a large degree, project design grows out of SEA site identification. As well, the SEA has identified specific gaps and overlaps in regulatory and institutional frameworks, and clarified sectoral needs in terms of environmental norms and regulations. The SEA was aided by the integrated solid waste management plans already developed for seven cities and is currently feeding this experience into plans already developed for other municipalities. In addition, the SEA was also linked to the World Bank's Northern Border Environment Project, which aims to strengthen environmental management capability via a series of action plans and priority investments. A series of recommendations have been made regarding waste management strategy (e.g. sanitary landfills as the most suitable option for small and medium-sized Mexican cities) and for site-specific EIA and pollution controls.

Lessons

The SEA:

- identified selected landfill sites country-wide, all of which the Bank found environmentally acceptable;
- clarified institutional and sectoral needs for strengthening environmental management; and
- provided cost-effective guidance for investment and technical decisions.

Source: World Bank, 1995.

File 34 SEA of the European High Speed Train Network

Background

A European High Speed Train (HST) network is proposed to respond to increasing transport demand and environmental problems of road and air transport in the EU. An outline plan has been drafted for 9 800 km of new line (speeds to 300 km/hr) and 14,400 km op upgraded line (speeds to +200km/hr). The proposal was subject of an SEA.

Analysis

Four alternative scenarios for the outline plan were developed:

- existing situation as of 1988;
- reference situation 1 (2010 situation) assumes no further extension of the existing network would take place, transport demand is met by car, plane and classical train;
- reference situation 2 (2010 situation) taking into account the extra mobility a full-fledged HST network would generate (= the same mobility as in the proposed outline plan) and
- the proposed outline plan (preferred situation).

Environmental impacts and issues were broadly assessed to include: primary energy consumption, air pollution, noise pollution, spatial impact, i.e. land use, landscape sensitivity, etc. and traffic safety. The methodologies used for this purpose included: GIS, traffic simulation modelling and expert judgement and extrapolation of known data. Both technological developments and national environmental policy objectives were taken into account. The study forecast that the HST network would change the model split of intercity travel. A “with” versus “without” proposal comparison indicated the HST network would reduce air pollution, lower energy consumption and improve safety (estimated against a roughly equivalent network of main roads and commercial flights).

Lessons

The SEA

- documented the relative environmental gains associated with the proposal based on a comparison of alternative transport modes and scenarios;
- applied quantitative methods to predict total (absolute numbers) and relative impacts (i.e. per passenger/Km).

Source: Alfaro and Dom, 1994; DHV Environment and Infrastructure, 1994.

File 35 SEA of the Nordrhein-Westfalen Road Programme

Background

The German countries (Lander) prepare 5 year programmes for the extension of road networks (with the exclusion of national highways). Environmental objectives are an important component of these. An SEA was carried out for the Road Programme of the Country of Nordrhein-Westfalen, comprising the routing and general design of 240 newly proposed regional roads.

Analysis

Routes and designs were developed in three stages:

In step 1 the sensitivity of the environment for road development was mapped out with the aid of a GIS (incorporating baseline data on residential areas, valuable habitat, water resources, landscape, amenity, etc.).

In step 2 the various sensitivity criteria were aggregated into an overall index, and routes were optimized for passing through the least sensitive areas.

In step 3 the environmental impact of the optimised routes on high value areas and factories was estimated.

Mitigation measures were proposed where environmental "bottlenecks" – or impact concentrations – occurred. Residual impacts after mitigation were classified for each section of the programme as 'extraordinary', 'above average', 'average' and 'small'. Impact amelioration by mitigation measures was classified as high, medium and low.

Lessons

- SEA methodology was criticised, with regard to the baseline data and aggregation method used;
- however, the environmental quality of the resulting proposals is much better than without the use of SEA; and
- each specific section of motorway will be subject to a project ElAs tiered to the programme SEA.

Source: DHV Environment and Infrastructure, 1996.

File 36 Forest and Timber Inquiry, Australia

Background

The Forest and Timber Inquiry was the first reference issued by the Prime Minister under the *Resource Assessment Commission Act* (1989). The Commission was to identify and evaluate options for the use and management of Australian forest and timber resources. It was to take into account existing strategies for this purpose as well as alternative proposals made by the Forest Products Industry and the Australian Conservation Foundation.

Analysis

The inquiry combined industry and government submissions, public hearings and independent technical analysis. Major study components included:

- resource capability, tenure and use inventories;
- evaluation of forest management strategies and institutional arrangements;
- wood supply and demand projections; and
- economic, social and environmental trend analysis.

For example the review of the environmental effects of logging covered soil productivity, aquatic systems, flora and fauna, nutrient recycling, and the function of forests as a sink for sequestering carbon dioxide. A broad survey was also undertaken of the social and cultural uses and of values of forests and community attitudes to management issues.

Five strategies of forest use and management were identified ranging from maximization of timber production to no further logging of native species. These policy alternatives were designed to facilitate public choice and canvass response, including comments on the analytical methodology used. During the three year inquiry, the Resource Assessment Commission compiled and analysed a mountain of evidence on these options. The final report contained numerous conclusions and recommendations, however, these were of a largely general nature and did not identify the preferred (sustainability) alternative.

Lessons

The Forest and Timber Inquiry:

- was a comprehensive, integrated SEA;
- applied sustainability principles and criteria (specifically equity, ecological integrity and economic feasibility); and
- clarified the choices and trade-offs at stake – though it did not provide specific (contestable) advice to the government.

Source: Resource Assessment Commission, 1992.

File 37 SEA of the Lake Burullus Development Plan, World Bank/Egypt

Background

Lake Burullus is a coastal lagoon, situated on the Mediterranean coast. It is listed as a Ramsar site (i.e. wetland of international significance). For local communities, the lake is an important fishery. An SEA was carried out to investigate policy options for socio-economic development and resource management, and their possible impacts and trade-offs. From the start, a main aim was to integrate socio-economic and ecological issues in the analysis.

Analysis

Lake Burullus was interpreted as an ecological system with 22 functions; e.g. fishery, waterpur-ification, biodiversity, scientific value/significance for breeding, migrating and wintering birds. Preliminary studies indicated that the ecological and the socio-economic system are not in equilibrium; e.g. too many fish are caught. Four policy scenarios were developed:

- base case (existing situation);
- water supply – storage of Nile water for agriculture – based on 100% and 50% of the present lake capacity;
- environment protection or 'strong sustainability' policy, including measures aimed at preserving and, where possible at reasonable cost, restoring ecological functions; and
- fishery management to explicitly address concerns of local communities, taking the maximum sustainable yield as a benchmark.

The scenarios were assessed against several criteria:

- investment and recurrent costs of policy measures;
- ecological functions; e.g. eutrophication, siltation, heterogeneity/biodiversity, pollution;
- income in the fishery sector;
- contribution to reduction of excess (Nile) flow and hence to irrigated agriculture;
- private sector risks, i.e. consequences for social classes such as low-income groups and their willingness to participate in scenarios; and
- public sector risks, i.e. capacity of government to implement scenarios.

Monetary costs (direct costs, fishery income, agricultural benefits) and externalities (including qualitative ecological costs and benefits) were assessed in a Cost Benefit Analysis (CBA). Because Lake Burullus is a politically sensitive issue, a Multi Criteria Analysis – including weighting of criteria on a scale from 1 to 6 – was carried out to complement the CBA. The results showed that different social groups valued the options differently. Combining the weights with the results of the CBA showed that the Ministry of Public Works and Water Resources and the Land Reclamation Department gave preference to the 100% storage scenario. All other groups gave preference to the base case scenario.

Lessons

The SEA:

- exemplified the use of multi-criteria analysis to weight four resource management scenarios;
- included equity/distribution considerations (e.g. for low-income groups); and
- concluded the base case (no action) alternative was preferred by other than proponents.

Source: Netherlands Economic Institute/IWACO, Rotterdam, May 1994

File 38 SEA of the Bedfordshire Structure Plan

Background

In the UK, structure plans organise land use in a broad sense. Their preparation is the responsibility of county councils. Since 1992, plan-making is to be carried out in accordance with Planning Policy Guidance Note 12, backed by "good practice" guidelines for environmental appraisal (Department of Environment, 1992, 1993). An appraisal was carried out for the Bedfordshire Structure Plan.

Analysis

Both the existing and new structure plans for Bedfordshire were subject to environmental appraisal. Structure policies were appraised against an impact matrix comprising 15 environmental dimensions, namely:

Local environment:	• quality of life in towns & villages • open space & public access • landscape character & open countryside	• cultural heritage • quality of buildings
Natural resources	• Air • minerals/fossil fuels • waste	• water • land & soil • wildlife habitats/woodland
Global environment:	• transport emissions • energy	• industrial & other emissions • biodiversity

In stage 1 an appraisal was carried out of the existing plan. In stage 2, the appraisal of the new plan content was undertaken in two steps. First, at the level of establishing the broad strategy, three strategic options were assessed:

- concentrate development on existing large urban areas, i.e. no green field development;
- dispersal of growth throughout the County; and
- concentrated option together with transportation corridor development. Secondly, at the policy development stage specific options were considered, selected and refined.

The policy impact matrix was applied to select the preferred strategy/policy option. In a first step, a brief description of the effects of a policy is inserted into the impact matrix and rated as 'enhancing', 'harmful' or 'neutral'. In a second step, the effects are judged as either 'important' or 'marginal'. More detailed weighting was avoided. A final step involves assessing the effects for future generations of each selected policy option for a number of so-called 'subject-areas', e.g. agriculture, landscape, housing. On the basis of the assessment, option 1, with some elements of option 3, was selected as most appropriate. However, none of the options fulfilled all requirements – which is only to be expected.

Lessons:

The SEA/appraisal:

- was recognized as a valuable exercise;
- moves the structure plan in the right environmental direction; and
- Identified measures that can improve the methodology.

Source: Bedfordshire County Council, 1994

File 39 San Joaquin Comprehensive Planning Programme, California

Background

San Joaquin County covers approximately 373,600 ha in central California. In 1991 a Comprehensive Planning Program (CPP) identified areas for new residential, commercial and industrial development in existing urban communities to accommodate 70 percent of expected growth in population and employment, and sites for five new/expanded communities to accommodate the remaining 30 per cent. The CPP was subject to an environmental impact report prior to its adoption.

Analysis

In the SEA 20 types of environmental impact were considered, e.g.:

- land use;
- water quality;
- library facilities;
- energy;
- public health; and
- safety.

The document describes existing conditions, identifies cumulative, countywide impacts of the plan and specifies possible mitigation measure to reduce significant impacts to acceptable levels. These include changes to:

- policies in the county general plan;
- development regulations; and
- zoning arrangements.

The SEA also considered alternatives to the CPP, such as:

- not building/expanding the five new communities; and
- reducing their number and area.

The SEA found that the amount of land designated for development by the CPP was more than twice than that necessary to accommodate projected population and employment growth. A key recommendation was to withhold approval for five new/-expanded communities. In adopting the Plan, the County included only two of the five new /expanded communities.

Lessons

The SEA:

- demonstrated the value of area-wide impact analysis to address cumulative effects;
- had a significant influence on plan approval and content; and
- led to a more environmentally acceptable option for urban growth management.

Source: Therivel, *et al*, 1992, 50.

File 40 SEA of Standards for Energy Effectiveness for Equipment Design, Denmark

Background

The Bill is a follow-up to the Danish Environmental Action Plan on energy-effectiveness (Energy 2000'), and to the European Commission's Directive on energy labelling of household equipment. The Bill enables the Minister of Energy to set standards for equipment design and energy consumption. The SEA was conducted for setting standards for household refrigerators and washing machines.

Analysis

The SEA report was very short (only 140 words). However, environmental objectives and (positive) environmental impacts to be expected from setting standards are described further in other attached documentation. A quantitative assessment was carried out. The SEA showed that the proposed standards for refrigerators would lead to net savings of 460 GWh in the year 2005 (equal to 4 PJ fuel saving and 0.35 million tons of CO_2). In the long run, the saving would count for approximately 40% of the existing situation. For washing machines, the figures were 46 GWh in 2005 and in the long run 15% of the existing situation. The SEA demonstrated the environmental gains that could be anticipated from the legislation governing numerous small activities. The effects could only be properly calculated at this stage of decision making.

Lessons

The SEA:

- addressed an initiative that could not be reasonably assessed at a later stage;
- confirmed the environmental benefits of the energy conservation bill; and
- quantified the net savings that can be expected from the legislation.

Source: Elling, 1994.

File 41 SEA of Federal Budget, Canada

Background

This exercise was commissioned by a major Canadian newspaper chain and undertaken by a private consultancy. It was essentially a preliminary commentary on the environmental implications of Canadian government expenditures and was limited to three major sectors (energy, agriculture and industrial development). The value of the exercise lies in demonstrating the value of scrutinising annual budgets as environmental statements and illustrating how this can be done.

Analysis

The examination of expenditures was conducted with reference to four principles of sustainability:

1. anticipation and prevention of environmental problems – do expenditures encourage emphasis on energy efficiency or soil conservation?
2. environmental-economy integration or full cost accounting – do sectoral programmes subsidise environmental deterioration?
3. equal competition of options – are government interventions biased against low impact energy or agriculture?
4. least-costs planning (in the case of energy) and support for environmental values (in the case of agriculture and industry).

Although general, the analysis highlighted important discrepancies between stated commitments to environment-economy integration and fiscal priorities.

Lessons

The ES of the federal budget:

- was an 'unofficial', media-sponsored exercise;
- highlighted differences between environmental policy and fiscal priorities; and
- exemplified a potential approach to examining the annual budget as an environmental impact statement, e.g. the kind of question that can and should be asked.

Source: Resource Futures International, 1991.

File 42 SEA of Political Programmes, Netherlands

Background

All major political parties in the Netherlands include the attainment of sustainable development as one of their major objectives. Their political programmes contain environmental objectives and measures for all sectors of society, e.g. environmental taxing measures. In the course of the 1994 election campaigns, most of the larger parties asked acknowledged national research institutes to calculate the environmental impact of their programmes.

Analysis

The assessments of the political programmes of Dutch parties were carried out for a limited number of indicators, such as emission of CO_2, acid compounds and emission of nutrients. Although the uncertainties in impact identification are large, all programmes were calculated using the same models. Therefore, the results are generally regarded as comparable. The institutes involved used geographical databases and previously developed computerised impact models. In general, the results of the assessments were accepted by all parties. On relatively minor issues, some controversy remained, e.g. about the positive impact to be expected of replacing air transport by rail transport, as no model was available to calculate the extent of this impact.

Lessons

The SEA of Dutch political platforms for sustainable development:

- contributed to political debate in the 1994 parliamentary election; and
- illustrates an innovative and unusual application of the approach and the possibilities for its wider application.

Source: DHV Environment and Infrastructure, 1994.

File 43 Appraisal of Options for Management of Solid Radio Active Waste in the UK

Background

The safe long term management and disposal of different radioactive waste streams is a major environmental issue in the UK. The overall objective of this policy appraisal, initiated by the UK Department of the Environment (DOE), was to 'identify alternative strategies for storage and disposal of low and intermediate level waste which would be the optimum from a number of different viewpoints'.

Analysis

A multi-attribute approach was used to determine preferences between acceptable options for the management and disposal of the waste. This approach was chosen because the subject is one on which there is a wide divergence of opinion. Five options were determined for the management of the waste: sea disposal, offshore boreholes, and three forms of land burial (shallow, engineered trench & deep cavity). The impacts considered within the assessment included: costs; occupational collective doses of radioactivity; and collective dose to the public, nationally, regionally and globally, from both storage and disposal.

To evaluate the acceptability of each of the options, four sets of weights were developed. These were designed to reflect distinct sets of views perceived to be held in society:

Set I: emphasis on reducing costs, but taking into account the risk to workers in the industry and short term collective doses to the public;

Set II: less concerned with costs, more oriented to reducing risk to individuals and collective doses; with low weight given to impacts in the future;

Set III: very concerned with local impact, with high weight given to reducing risks from accidents at storage facilities and low weight given to cost; and

Set IV: low weight on cost and a high weight on reducing doses to the public.

Note that in Set IV (the environmental option) the weight given to workers doses is 100 x Set I.

The results were used at two levels. Firstly, to identify the options which resulted in the lowest level of impact and, secondly, to illustrate the implications of choosing one option over the others for a particular waste stream, given the importance which society places on them.

Lessons

The appraisal concluded that:

- shallow burial for all weighting sets was the best option for low-level and short-lived waste;
- the increased costs of other options outweighed the small predicted differences in radiological impacts;
  the preferred option for Magnox wastes containing long lived materials was 10 year storage followed by disposal in an engineered trench; and
- for other waste streams the choice varied considerably depending on the weighting set being considered.

Source: UK, Department of the Environment, 1991.

File 44 SEA of the Sichuan Gas Development and Conservation Plan

Background

The province of Sichuan, Peoples Republic of China, proposed to further develop production of natural gas. The plan covered activities to be financed by the World Bank, including seismic survey, exploration drilling, production and transportation of natural gas. The SEA and the Plan were prepare simultaneously with the aim of identifying environmental sound technologies and siting rules for projects and pipeline routes, and rehabilitating the existing transmission system to improve performance and eliminate methane gas emissions.

Analysis

As part of the SEA process, studies were carried out to ensure that all phases of the Plan and project design conformed to international engineering and safety standards and to sound environmental management practice. Site selection rules and procedures for project ElAs were based on emission standards. Using a worst case approach, it was found that local environmental impacts could be minimised to an acceptable level. The worst case was defined by case studies for safety assessment, noise and ambient air pollution, and based on generalised cases (i.e. hypothetical plants with an assumed typical environment for Sichuan, surrounded by sensitive areas as close as possible under the proposed siting rules). Public consultation was built into the siting process. Both the Chinese authorities and the World Bank (the financier) reportedly considered the SEA was an effective approach to defining environmental issues and preven-tion/mitigation scenarios for individual projects. Subsequently a comprehensive mitigation plan was established including measures for gas leakage detection, waste management, groundwater protection and treatment of waste gas for sulphur recovery.

Lessons:

The SEA:

- was rated 1.00 by the Bank in terms of environmental performance (i.e. no significant problems);
- helped to integrate environmental and development on local and regional levels; and
- supported implementation of gas development and conservation plan aimed at reducing coal consumption and consequently CO_2, SO_2 and particulate emissions.

Source: World Bank, 1995; DHV Environment and Infrastructure, 1994.

File 45 SEA of the Revised Lancashire Structure Plan

Background

The structure plan organises land use in Lancashire (UK) in a broad sense. It consists of 13 policy areas (rural landscapes, environmental measures, green belts, agricultural land, tourism and recreation, residential development, shopping, employment and industry, settlements, health/social services/eduction/public utilities, transportation, waste disposal, minerals). Each policy area contains a number of short policy statements, totalling 164 for the entire plan. The appraisal carried out to assist revision of the Plan was one of first to follow UK "good practice" guidance.

Analysis

Environmental impacts of the draft structure plan were analysed by reference to a policy impact matrix. Impacts were estimated for the following environmental resources: geology, soil, air, water, energy, land, wildlife, landschap, man-made features, open space and human beings. Using a 5-point scale (from -2 to +2) impacts were scored by an environmental scientist to indicate the relative effect of policy directions proposed. These scores were aggregated to give an overall value or sustainability "score" for each policy statement. High negative scores led to advice to consider the statement. Policy areas were compared using percentages of maximum attainable scores. The total impacts on each of the environmental resources were also given.

The assessment, including reporting, was completed in 6 months. Despite criticism of aspects of the applied methodology, the SEA generally was favourably received by the people involved in plan preparation. Many of the recommendations were incorporated into the revised structure plan, which is a "radically different" document from the old plan.

Lessons

The SEA of the structure plan:

- was one of the first carried out under UK good practice guidance;
- resulted in a revised plan which incorporates many of the recommendations; and
- moved the type and pattern of development in the "right direction", i.e. toward "sustainability".

Source: Pinfield, 1992.

File 46 **SEA of the Dutch Ten-Year Programme on Waste Management 1992-2002 Use of Indicators and Life Cycle Analysis**

Background: The programme is meant to plan and coordinate the technology needed and capacity required for final waste processing in the next ten years in the Netherlands for a number of waste flows from domestic, industrial, construction and demolition, office/shop/services, collection, shredder and (normal) hospital sources. Under the EIA Act (1987), an SEA of the waste management programme was required. It applied, *inter alia*, sustainability-oriented indicators. For the next Ten Year Programme life cycle analysis will be used to identify the environmental consequences of strategic options.

Analysis: The SEA procedure included full consultation with competent and environmental authorities and the general public and review by the independent Dutch EIA Commission. As a basis for the development of policy options for final waste disposal, two scenario's for the *waste volumes* to be expected in the future were developed:

- the '*policy scenario*' - all stated national objectives are fully achieved; and
- the '*head wind scenario*' - based on more pessimistic assumptions.

The following alternatives were and assessed:

intended policy = focus on incineration of all combustible waste;
alternative I = focus on waste dumping;
policy alternative II = focus on maximum pre-separation and re-use of waste; incineration of remaining waste; and
alternative III = as II, but remaining waste is dumped.

The impacts of the alternatives were assessed using indicators to represent the most significant environmental issues (or 'themes') as identified in the 'National Environmental Policy Plan':

theme	*indicators*
dispersion	heavy metals (Hg+Cd), Poly-Aromatic Carbonhydroxides; dioxines; organic substances
acidification	SO2 and NOx
disturbance	odor
climatic change	CO2 and CH4
energy	net energy production
removal	residuals to be dumped; chemical waste to be dumped; recovery of residuals
use of space	space occupied

No further aggregation or weighting of data took place. Tables and graphics were used to compare alternatives. On the basis of this comparison, it was concluded that alternative II should replace alternative III as the best environmental option.
In general, the quality of the SEA was judged as 'good' by all parties involved. It was felt that the broad consultation in an early stage contributed to this quality. Also, the full participation of the regional and local authorities in the SEA led to a broad acceptance of the SEA results and the conclusions in the programme. The SEA was prepared in 5 months; the whole EIA procedure took approximately 10 months.

A second 10 year waste management programme has been prepared in 1995. As an experiment, the SEA for this programme used 'Life Cycle Analysis' (LCA) as main methodology for assessing the impacts of alternative policy options (see Box 7.1).

Lessons:

The SEA of the first Dutch Waste Management Programme:

- applied key indicators to compare alternatives and select the Best possible environmental option and
- resulted in conclusions that gained wide acceptance.

Source: Verheem, 1994.

File 47 SEA of the Beaufort Sea Hydrocarbon Production and Transportation Proposal

Background

This panel review combined elements of policy, program and project review. As a hybrid process, the Beaufort SEA review is unprecedented to date in Canada. It took four years to complete, reflecting the sheer magnitude of the $40 billion proposal for Arctic offshore and onshore oil and gas production. An enormous range of environmental and social issues were at stake, virtually amounting to a choice of future for Northern Canada and especially for its indigenous peoples.

Analysis

The task of identifying the potential impacts of the development scheme was difficult because the proposal was referred for review in preliminary of concept form with many provisional components that were dependent on unproven technology. Other aspects, however, were based on physical projects and activities for which it was possible to apply impact analysis. A multi component review process included both conventional and innovative approaches and methods. For present purposes, there were three notable features:

a) extensive public review of a seven volume environmental impacts statement of the biophysical and socio-economic effects and risks associated with the proposed development;
b) policy and institutional analysis of government planning and management capabilities; and
c) ex-post evaluation of process effectiveness.

The evaluation confirmed the importance of a phased, integrated approach to strategic and project EIA (Sadler 1990a). In the Beaufort Sea case, the EA process led to the introduction of conservation (later sustainability) strategies and regional land use planning. These components, ideally, should guide project review. Where they are absent, the preparation of an environmental management strategy (EMS) rather than an EIS should provide an initial framework for guiding planning and analysis of regional development schemes.

Lessons

The Beaufort SEA review:

- covered policy and project elements;
- was a fine censuring process; and
- demonstrated the importance of separating SEA and EIA components and the limitations of impact analysis in examining development concepts and broad alternatives.

Source: Sadler, 1990

File 48 Sea of the National Plan on Drinking and Industrial Water

Background
The main issues of this SEA were to determine effects on nature of alternative national water production policies, and to compare alternative methods for water production on environmental and other aspects.

Analysis
The nature effects of alternative water policy options were assessed in four steps:

1. Development of several alternatives for future national water production policy:
- focus on the use of *existing production methods* – three alternatives: *increasing* total drinking water production, *decreasing* total drinking water production and decreasing *industrial use* of water;
- aiming at a *change in production methods* – one alternative based on *increasing* the existing use of ground water (shallow & deeper ground water, infiltrated river water) and one alternative based on *decreasing* existing use of ground water.

2. Development of national hydrological models (both for ground and surface water) and an appropriate GIS. With the help of these models and prognoses of the future water production capacities needed in each of the alternative policy options, the effect of alternatives on surface and ground water in the Netherlands were determined.

3. Development of a method to determine existing natural values of moist and wet ecosystems in the Netherlands (the DEMNAT model). Main features of this method are the identification of homogenous ecosystems (so called 'ecotope groups') and the estimation of existing natural value of these ecosystems per km2 on the basis of:
- presence of ecotope groups
- national and international rarity of these groups.

4. Determination of changes in existing natural values, to be expected because of the effect of policy alternatives on surface and ground water.

The above described method led to the following results:
- there is a *direct relation* between the amount of water production and effect on nature
- ending all ground *water* production would lead to a 12% increase in natural value of moist and wet ecosystems (as compared to 1988);
- ending all *drinking water* production would lead to a 10% increase in natural value;
- ending all *industrial use* of water would lead to a 2% increase;
- ending the use of shallow ground water is most effective to increase natural value, followed by deep ground water, infiltrated river water and industrial use.

As to the *comparison of production methods*, the SEA compared the following production methods: use of ground water (shallow ground water, deeper ground water and infiltrated river water), use of surface water (direct extraction, via a natural reservoir and via an artificial reservoir) and use of artificial infiltration (surface infiltration and deep infiltration). Comparison took place on the following environmental aspects: nature effects, landscape effects and effects on the abiotic environment (use of resources, waste production, energy). In addition to environmental aspects the following aspects were assessed: public health, use of space and technical/economical aspects (such as availability, flexibility, vulnerability and costs of methods)

The following assessment method was used:

- for each aspect several sub criteria were defined
- a mix of quantitative and qualitative information was used, on the basis of which each of the sub criteria was scored
- scores on sub criteria were translated into one score, using a mix of methods (normalisation)
- thorough sensitivity analyses were carried out
- per aspect methods were classified from 'best' to 'worst', on the basis of a multi criteria analysis, weighing from different perspectives: health, abiotic environment, nature, landscape and economy.

It showed that from all perspectives the main conclusions were broadly the same:

- bestscore: deep ground water, infiltrated river water and deep infiltration
- medium score: surface infiltration and natural reservoir surface water
- worst score: direct surface water, shallow ground water and artificial reservoir

Lessons

The Dutch EIA Commission reviewed the SEA as of good quality. In particular the development of the DEMNAT model was judged very favourably. However, the lead authority was advised to be careful in applying the results of the assessment at the regional level. The production techniques that score best in the SEA could score different in specific regions, in particular because of the specific hydrological situation (not in all regions water production is influencing nature) and/or developments in related sectors in a region, such as agriculture. For example, it would not be very effective to end in a specific region the use of ground water for drinking water production, if that would mean that this same water would then be pumped away and discharged to surface water because of agricultural objectives (e.g. to increase soil stability to allow for the use of heavy machinery). The Commission advised to distill from the SEA for each specific region a framework of measures aiming at the protection or development of nature (in as far as related to water production).

The competent authority concluded that the SEA influenced the decision making process. The results of the SEA were taken into account in policy formulation at the national level regarding future public water infrastructure in the Netherlands. Furthermore, it was mentioned that the methods developed as part of the SEA both stimulated and structured project-EIA's in the water sector, by this facilitating the taking into account of the National Plan in plan development at the regional level.

Source: Verheem, 1996

File 49 **SEA of Hong Kong Territorial Development Strategy Review Environmental Sustainability Analysis**

Background

The territorial development strategy, equivalent to a nation-wide development plan in other places, provides a long term land use-transport-environment framework for Hong Kong up to 2011 to cater for an additional 1 to 1.8 million population on top of the existing 6.3 million population in Hong Kong. As part of the review of the strategy, a strategic environmental assessment (SEA) study was completed in December 1995 as a means to assess cumulative arid regional environmental implications and environmental sustainability. The SEA conducted has a major bearing on Government's thinking and further actions towards development and sustainability in Hong Kong.

Analysis

The SEA analysed the environmental implications of more than a dozen different alternative development scenarios for different rate and extent of economic and regional development. These scenarios included Hong Kong being the regional pole to serve the nearby Guangdong province in China as well as being the centre to serve a wider part of mainland China.

The SEA was conducted in a systematic, structured process fully integrated with the formulation and evaluation of alternative development scenarios. The steps taken include:

- a territory-wide environmental baseline environmental study;
- the establishment of environmental principles and criteria for formulation of development scenarios;
- the identification of strategic environmental issues for further assessment. The key issues are environmental carrying capacities of airsheds and water basins, the loss of ecological resources, cumulative impacts of development scenarios, cross-border environmental implication of sectoral policies;
- the development of suitable predictive and evaluation models to assess cumulative impacts and environmental carrying capacities;
  an environmental sustainability analysis.

The SEA covered two main dimensions: the issues of environmental carrying capacities and sustainability within Hong Kong context, and the environmental implications of the regional development in mainland China and the regional dimension of sustainability. Using simplified territory-wide models, territory-wide cumulative environmental implications of economic development and the increase in population for sewage disposal, water quality, noise, air quality, waste disposal and ecology were assessed. Both the bottom-up analysis through impact prediction and the top-down analysis were adopted to conduct the environmental sustainability analysis. A set of indicators for environmental sustainability analysis. A set of indicator for environmental sustainability were employed for evaluating different development scenarios. To overcome the limitations of data and time limitation, the scenarios were also evaluated against the Agenda 21 principles.

It was regarded as the most thorough-going strategic environmental assessment ever conducted in Hong Kong. An inter-departmental working group was set up under the Chairmanship of a representative of the Environmental Protection Department to draw up the study brief and guide the study. Throughout the process, the findings of SEA influenced the strategy formulation, with a number of environmentally damaging options discarded or significantly modified as a result of SEA. The SEA also mapped out initially an ecological footprint of Hong Kong's development, and underscored the need for effort to tackle environmental implications of regional development

strategy for Hong Kong. The results rang the bell that the predicted impacts cast doubt on the long term sustainability of developments within the current bounds of policies and technology, and called for a more comprehensive sustainable development strategy for Hong Kong.

The SEA led to major policy issues being raised at the highest level of Hong Kong Government, and a commitment from the highest level to embark on a more comprehensive sustainability development strategy study. The findings triggered a series of high level debate on sustainable development in Hong Kong, and focused the policy makers' attention to environmental implications of sectoral policies. It also resulted in further actions through two major consultancies to develop more robust territory-wide air quality and water quality models to assess and evaluate environmental sustainability. It also sketched out an initial framework for a Strategic Environmental Monitoring and Audit, with a holistic approach toward effects of policies, strategies and plans on the environment.

Lessons

The SEA of the Territorial Development Strategy Review:

- proved to be an useful, effective tool to address the question of environmental carrying capacities, environmental sustainability, cumulative impacts and cross-sectoral policy implications;
- moved beyond EIA and conventional SEA into assessment of environmental sustainability;
- was conducted in a systematic, structured process with integration with the strategy formulation;
- has incorporated the environmental sustainability analysis, leading to changes in Government's thinking on sustainability and development;
- was based on a combination of bottom-up and top-down analyses, with a proper study management through inter-departmental (or agencies) working group;
- avoidance of environmentally damaging development components and led to further actions and high-level commitments to address environmental sustainability.

Source: Au, 1995

File 50 SOME METHODS FOR IMPACT IDENTIFICATION IN SEA

Literature search:

State of knowledge – survey to identify linkages between policy actions and environmental impacts. 'State of the Environment' reports and environmental policy plans will be useful documents to start with.

Case comparison – of examples from other policy domains or jurisdictions. Analysis of similar actions in other countries can provide insight into the possible impacts of policy options.

Expert judgement:

Delphi survey – iterative canvass of opinions and perspectives from recognised 'experts' in pertinent fields.

Workshops – structured meeting with a problem-solving focus, e.g. to develop alternatives or map possible impacts

Analytical Techniques:

Scenario development – projections, based on reasoned assumptions, to outline and compare the means by which, or conditions under which, a proposed action may be implemented; e.g. 'best' v. 'worst' case scenario of risks and impacts.

Model mapping – identification of cause-effect networks to qualitatively illustrate linkages; e.g. policies will influence plans and programmes, which will subsequently initiate projects.

Checklists – those developed for project EIA have proven useful at the strategic level too, in original or modified form.

Indicators – often, it will not be appropriate, possible or necessary to predict all environmental impacts of a proposed policy; instead, screening against relevant indicators may be sufficient for the purposes of an SEA.
In many cases, indicators can be used to establish networks focusing on emissions and paths rather than actual effects on flora and fauna. Because indicators, by definition, need little aggregation, this may reduce the workload considerably. Note, however, the possible distortion that may occur in the simplification process implied by aggregating environmental variables into one single indicator.

Consultative Tools:

Interviews – with experts, opinion leaders, political representatives, etc.

Selective consultation – with key interest groups and/or communities and sectors directly affected by a proposed policy, plan or programme.

Policy Dialogue – round table or other multi-stakeholder process to clarify issues, determine consequences and identify options that meet the concerns and interests represented.

Sources: FEARO, 1992; DHV Environment and Infrastructure (1994)

File 51 SOME METHODS FOR IMPACT ANALYSIS IN SEA

Extended use of identification methods

In most SEAs, relatively simple and straightforward methods will 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 an impact network, based on data from literature, indicative calculations or expert judgement.

Use of matrices

Grid diagrams can be used to cross-reference a list of (sub)actions to a list of environmental impact parameters. Most SEAs make use of matrices in some form. The UK Guide on SEA for Structure Plans recommends them as the main tool, including their use for consistency analysis to identify potential conflicts between objectives in different policy sectors.

Computer modelling

In some countries, computer models are used to calculate the impact of strategic options on environmental indicators. For example, these have been applied to habitat supply analysis in Canada and the US, and to simulate the impact of tax policy on (national) energy use, vehicle mileage and use of public transport in the UK.

Geographic Information Systems

These are especially useful in land use planning, routing studies and assessing cumulative impacts of several projects in the same area. Also, they may be used to support impact analysis, e.g. calculation of land occupation or measuring environmental impacts as function of distance to pollution sources.

Cost effectiveness analysis

Used to select the option which achieves a target or goal at least cost (environmental or financial). This is a useful technique in cases where actions are clearly constrained by existing (environmental) targets or objectives, for example ambient air and water quality standards, emission limits under or resource harvesting allocations.

Cost-benefit analysis (CBA)

Technique in which as many impacts as possible are expressed in an unified value; the benefit-cost ratio is a basis for choice between the options reviewed.

Multi-criteria analysis (MCA)

This is an advanced form of CBA in which separate scores on a number of key evaluation criteria are given, rather than using one, unified value to express the significance of all impacts, (as is the case in CBA). Using mathematical operations, combinations of weights and criteria scores provide a ranking of options. The advantage of MCA over CBA is that it allows for the joint analysis of both environmental costs and financial costs, even when the environmental costs cannot be valued in monetary terms. MCA does not necessarily lead to one, unambiguous solution; it generally leaves some freedom to decision makers. A specific form of MCA is the 'goals achievement matrix' which helps identifying how an action may potentially contribute to a set of specified (environmental) objectives.

Aggregation methods

Used to translate 'groups of indicators' into one, composite indicator. The aim is to make the total amount of environmental information more manageable. In this process, results are often weighed against each other and 'trade-off choices are made. In principle, these are political decisions, and therefore, care should be taken in using aggregation methods for SEA. Usually however, some aggregation is needed and possible without generating controversy. Some methods are:

- index methods – aggregation by valuation and weighted summation;
- monetary methods – all impacts are translated into one unit: money – as yet, are insufficiently developed for use in EA;
- source methods – aggregation on an impact basis, for example energy sources according to their contribution to the emission of CO2, air pollution sources according to their contribution to acidification.

Life Cycle Analysis

A standardised method taking into account the total 'life cycle' of goods or services from use of natural resources, via production of goods to the treatment of waste. A standardised method is 'scored' on ten environmental issues: human toxicity, aquatic ecotoxicity, soil ecotoxicity, greenhouse effect, ozone production, acidification, eutrophication, smell, use of space and use of natural resources. Scores are weighed against existing environmental problems in area.

Sources: FEARO, 1992; DHV Environment and Infrastructure, 1994.

7. Extending the analysis

'The environmental assessment of the Lancashire Structure Plan cannot in itself produce a development plan that is 'sustainable'. What can be certain, however, is that the exercise is a move in the right direction (...)'

Pinfield, 1992,163

In this chapter, five steps are outlined from extending SEA as a tool of impact analysis and a sustainability mechanism. The five steps are:

1) life cycle analysis of total environmental impact;
2) disciplined application of SEA to address cumulative effects;
3) environmental (E) test of sustainability assurance;
4) specification of "no net loss" principle to offset impacts; and
5) linking EIA and SEA to other policy instruments for "full cost" sustainability accounting.

As listed, these steps range from: immediate, implementable actions that are proposed or being initiated (step 1); through measures that consolidate, extend existing mechanisms (steps 2, 3, 4); to their full integration at a level not yet achieved to our knowledge (step 5). The chapter concludes with a research and development agenda for SEA.

7.1 LIFE CYCLE ANALYSIS

Life cycle analysis is used by industry to systematically assess the environmental impacts of a product, process or activity from its introduction to final disposition. With other tools, LCA helps to secure what the World Business Council on Sustainable Development (WBCSD, 1995) calls "eco-efficiencies", i.e., the delivery of competitively priced products and services, while progressively reducing at each stage their ecological impacts and resource intensity. EIA and LCA share basic principles and certain elements of approach, e.g. goal definition and scoping are crucial to the effective application of both processes. As an assessment methodology, LCA attempts to identify the *total* environmental impact from all phases of an activity. In this regard, it combines aspects of EIA and SEA and has potential application to public policy making in certain highly technical sectors, specifically at the plan/pro-gramme level.

Recently, the Dutch EIA Commission (1994) concluded that LCA had some important advantages over the use of an indicators-based approach for the SEA of the Ten Year Programme (TYP) on Waste Management 1995-2005. The TYP is drawn up every three years to plan technology and capacities for a number of waste flows. The SEA for the TYP for 1992-2002, which used a series of scenarios, is summarised in File 46 and discussed in detail in Verheem (1994).

In its advice on the Guidelines for the SEA of the new TYP, the EIA Commission:

- identified several potential benefits in the use of LCA;
- recognised that uncertainties were introduced by applying it to the strategic level of decision making; and
- specified certain preconditions to the use of LCA that would help to reduce the uncertainty.

The advantage of using LCA for the SEA of waste management programme, according to the Dutch EIA Commission (see Box 7.1) centres on the comprehensiveness of this type of impact assessment. In particular, LCA:

- takes account of impacts in all phases of (final) waste processing;
- reduces the chance of overlooking impacts that may shift from one place to another (e.g. reuse of incinerated residuals);
- determines not only changes in emissions but also their contribution to continuing environmental problems; and
- avoids the limitations that go with selection of indicators.

However, the Commission also noted the use of LCA for the new TYP will introduce uncertainties. LCA is a relatively recent instrument, developed principally for impact assessment of concrete products, and its application to SEA is unproven. The most important uncertainties are with respect to:

- end results of LCA, as not all classification factors are known yet;
- credibility and transparency of the process for decision makers and the public because of the complexity of analysis;
- loss or obscuring of relevant information in the process of aggregation;
- availability of methods for 'normalisation' of results (see Box 7.1); and
- treatment of qualitative impacts, which are not automatically taken into account but may be important at the strategic level.

Many of the above uncertainties could be addressed by attaching certain preconditions to the use of LCA for SEA. In the case of the TYP, the Dutch EIA Commission stipulated that:

- considerable attention should be given to qualitative information; and
- a clear presentation should be made in the EIS of the steps of LCA, with
- explicit reference to assumptions and presumptions;
- identification of uncertainties in results (and from data analysis, weighting sources);
- discussion of their consequences for decision making; and
- preparation of a sensitivity analysis (see Box 7.1).

Finally, the Commission advised of the importance of discussing which individual environmental impacts had influenced the final results of the LCA the most 'key environmental impacts'. It could also be advantageous to compare policy alternatives on the basis of these key environmental impacts (cf the use of indicators in the SEA in File 46), as well as using environmental profiles. This could make the LCA more transparent to the public and relevant to decision making, e.g. encouraging the setting of new policy directions from waste processing consistent with the National Environmental Policy Plan.

The SEA was published in 1995. The lead authority concluded that the results of the LCA had significantly contributed to the development of the Ten Year Programme. In particular, it had become very clear that in deciding among alternative waste policy options the 'indirect' effects of options, i.e. the *avoided* emissions in primary production of iron, aluminium and electricity because of reuse of waste and production of electricity by waste incineration, are more important (often decisive) than the direct emissions (e.g. of waste treatment processes).
In its review of the SEA the Dutch EIA Commission underlined the value of the assessment. It was concluded that the SEA gives a good, overall impression of the effects of policy alternatives for waste management at the national level. However, it was also concluded that the uncertainties in the final results (inter alia because of the use of LCA) were not sufficiently identified and discussed in the Ten Year Programme. On the basis of this advice, the lead authority decided that uncertainties should be taken into account and dealt with in later stages of the planning process (i.e. at the regional level, as well as in the SEA of the next Ten Year Programme).

7.2 DISCIPLINED APPLICATION OF SEA TO CUMULATIVE EFFECTS

Cumulative effects are the net result of environmental impact from a number of projects and activities. By definition, they are combined within a time and space framework established through activity-effect relationships, both direct and indirect. This is typically bio-regional in scope, but can be extended to larger scale, cross regional effects. Acid rain and the long range transportation of air pollutants are well documented examples (e.g. Circumpolar Arctic). In addition there are truly global and pervasive cumulative effects, such as climate warming and loss of biodiversity, that are ground in the overall pattern and tempo of human activity.

As stated earlier, SEA can and does facilitate the analysis of cumulative effects. Where policies, plans and programmes lead to projects and activities, SEA permits an early, overall look at their potential relationships and impacts. Compared to project EIA, the scope of SEA is more appropriate to the time and space scales at which cumulative effects are expressed. On the other hand, however, activity-effect relationships are more uncertain at the strategic level. For example, many factors can intervene to modulate the translation of policies, plans and programmes into specific types of projects with potential impacts.

It is also evident that many methods developed for project EIA have limitations and qualifications when used to address cumulative effects. So long as these are recognised, however, they should not preclude SEA of policies, plans and programmes from considering cumulative effects. At the very least, a qualitative analysis and preliminary identification of possible types of cumulative effects can be given. These can serve as an early warning system, signposting further requirements for project EIA, environmental monitoring, and other forms of review. Box 7.2 gives an overview of the usability of a number of existing methods for cumulative impact analysis.

BOX 7.1

Life Cycle Analysis (LCA) and its Application to SEA

In LCA, there are live steps for determining the total environmental impact of an activity. This standardised methodology results in an `environmental profile', consisting of scores on ten issues or themes, i.e. human toxicity, aquatic ecotoxicity, soil ecotoxicity, greenhouse effect, ozone production, acidification, eutrophication, smell, use of space and use of natural resources. These scores are weighted against the total existing environmental problems in a certain area. A brief description of the five steps follows.

step 1: goal definition and scoping
Basic objectives of the specific LCA are set and the subject (or 'unit') of the LCA is defined. In the case of the SEA this will be 'the final processing of one ton of integral waste'.

step 2: inventory analysis of the total life cycle

i) As an example, the life cycle of 'incineration of 1 ton integral waste' would be: waste collection; waste incineration; cleaning of emitting gasses; production of heat and electricity; production of re-usable metals; reuse of other residuals and storage of chemical waste.
ii) The life cycle of a product is thus made up out of a number of individual `links' in a chain of activities and the environmental impacts of each one are predicted; e.g. use of space, use of resources or emissions.
iii) Adding the predicted impacts of each link determines the total impacts on the environment of the life cycle.

step 3: impact assessment – classification
In this step, the determined total of environmental impacts of a life cycle is re-calculated into scores on ten standardised environmental issues (see above). This is done by multiplying impacts with so-called 'classification factors' which take into account, for example, the transport-routes and -processes of a certain emission and the specific sensitivities of environmental receptors' to that. The ten scores make up the so called 'environmental profile' of the activity.

step 4: impact assessment – evaluation

i) The scores in the 'environmental profile' are first 'normalised', i.e. put in the same unit. For example, scores may be recalculated as percentages of the total existing environmental pollution in a certain area, or with respect to their contribution to environmental objectives and plans.
ii) After 'normalisation', the relative importance ('weighting') of scores is determined in the context of the decision that needs to be taken (several methods may be used here).
iii) Following 'normalisation' and 'weighting', all scores in an 'environmental profile'' are added, so that, in the end, one figure (the 'environmental index') describes the environmental impact of the activity or product.
iv) For all environmental profiles, the validity of the results is determined by sensitivity analysis.

step 5: improvement analysis
In the final step of LCA, the possibilities of improving an activity or product are investigated, based on the results in the environmental profile.

Source: Verheem (1994); based on "Toetsing van de LCA – methodiek aan de Kentallenmethodiek ten behoeve van de MER – TJPA" [Comparison of LCA and use of indicators for the EIA TYP]. Dutch Waste Management Council, 1994.

Overview of Methods for Cumulative Effects Assessment

BOX 7.2

category	*main ,feature*	*mode of analysis*	*representative method*
Analytical methods (without normative evaluation):			
spatial analysis	map spatial changes over time	sequential geographic analysis	GIS
network analysis	identify core structure and interactions of a system	flow diagrams; network analysis	loop analysis Sorensons's network
biogeographic analysis	analyze structure and function of landscape unit	regional pattern analysis	landscape analysis
interactive matrices	sum additive and interactive effects; identify higher order effects	matrix multiplication and aggregation techniques	Argonne multiple matrix synoptic matrix extended CIM modified CIAP
ecological modelling	model behaviour of an environmental system or system component	mathematical simulation modelling	hypothetic modelling of forest harvesting
expert opinion	problem-solving using professional expertise	group process techniques	cause and effect diagramming
Planning methods (with normative evaluation):			
programming models	optimize alternative objective functions subject to specified constraints	mass-balance equations	Linear programming
land suitability analysis	use ecological criteria to specify location & intensity of potential land uses	define acceptable levels of eco-system health and target thresholds utilizing eco-logical indicators	Land disturbance target ecosystem based planning
process guidelines	logic framework to conduct CEA	systematic sequence of procedural steps	Snohomish guidelines CEA decision tree

Source: Smit and Spaling, 1995.

Several frameworks and approaches for analysing cumulative effects can be used in SEA. These variously define and correlate complex cause-effect relationships (CEARC, 1986). In simplified form, they are based on and link three elements:

1) sources – the pattern and timing of activities that cause or will potentially initiate environmental change;

2) effects – the syndrome of impacts and long-term changes that occur in response to perturbation and stress, etc; and

3) processes – the ecological pathways, mechanisms and triggers that structure accumulation of effects.

Each of these elements provide an appropriate focus or point of entry for SEA to address cumulative effects:

1) Sectoral or programmatic level SEAs can focus on *sources* – the activities that lead to cumulative effects. In Europe, for example road and transportation strategies have been a particular target for SEA.

2) Regional plans shift the attention toward *effects* and the sensitivities and capacities of the receiving environment, as indicated by keystone species. In the USA, for example, studies of the cumulative effects of development on watersheds, wetlands and fish and wildlife have been undertaken.

3) Policy appraisals may benefit from taking a synoptic, *process* perspective of relationships and consequences. They can be valuable to identify large scale, global implications and issues associated with major economic initiatives e.g. emission of CO_2 and other greenhouse gases implicated in global warming, e.g. as in the UK.

With reference to specific policies, plans or programmes, cumulative effects may be assessed from four different standpoints, including:

1) accumulation of the same impact of a number of projects, e.g. dioxine emissions of a number of waste incinerators in a region;

2) accumulation of different impacts from a number of projects – for a certain class of impacts, e.g. neighbourhood noise footprints from all sources, or different classes of impacts, e.g. the combined effect on human health from all sources of environmental pollution;

3) accumulation over time (whether the same or different types of impacts), e.g. build up of toxic contaminants and trace elements in ecosystems.

A number of existing methodologies can be adapted to analyse the above types of cumulative effects. Early developments in this area have focused on expanding matrix methods and network analysis. However, interaction and network matrices that identify all possible direct and indirect configurations of effect, especially from multiple sources, quickly become complicated and

lose their practical value. The most useful examples express of source-effect linkages based on a limited number of common denominators. File 52 at the back of this chapter provides a short overview and discussion of some strengths and weaknesses of potential CEA methods.

7.3 SUSTAINABILITY ASSURANCE

Identifying the effect of policy options on the attainment of sustainable development is a key issue for SEA. A sustainability based approach to SEA implies some potentially far reaching adjustments to contemporary practice. These include refocussing and recasting SEA processes toward sustainability assurance rather than impact minimization (Sadler, 1995; in press). Sustainability assurance, for example, means adopting a proactive, forward looking approach that focuses on maintaining environmental bottom lines, the 'source and sink' functions of natural systems on which all forms of development ultimately depend.

The notions of carrying capacity, thresholds and limits to growth introduced here are well established in the conservation literature, but remain controversial because of their imprecision. Fortunately both the 'precautionary principle' and 'no regrets' policies are widely accepted decision rules that can serve the same end of promoting sustainability. SEA provides an important process for incorporating these considerations into designing and vetting of policies, plans and programmes where they will have their maximum dividend in terms of positively shaping development options. For example, SEA can be used to scope toward sustainability i.e., ensuring policies, plans and programmes are in accordance with national 'green plans' or consistent with the commitments made in endorsing Agenda 21.

A first practical step in that direction involves translating sustainability concepts and principles into operational terms. The immediate need is for a relatively simple environmental sustainability test that can be readily incorporated into or adopted for SEA of policies, plans and programmes. Various sustainability rules, environmental indicators and checklists can be applied to that end. These include:

1) 'input-output' rules of the World Bank (1991);
2) the proposed Dutch E-test checklist (Burger, 1991); and
3) sustainability indicators and "aide memoirs" for policy analysis (e.g. Jacobs and Sadler, 1990; Holmberg, *et al,* 1991).

The World Bank rules and Dutch E-test are combined in Box 7.3 into a template to guide SEA in scoping toward sustainability. In addition to the input and output criteria, we also introduce two qualitative tests for policy proposals:

1) 'conversion' of land use and habitat, which is a critical early indicator of potential cumulative loss and deterioration; and
2) opportunity cost as endorsed by option and intrinsic values that are foregone or lost. The conversion rule-test is based on principles of landscape ecology and conservation biogeography; the opportunity cost rule-test incorporates the principle of total economic value and directs attention to alternatives.

By definition, the template in Box 7.3 is a means of organising and asking the right basic questions about whether policies, plans and programmes contribute to or undermine environmental 'carrying capacity'. Without appropriate indicators (and the right information), however, the rule tests will not take us very far in applying SEA for sustainability assurance. In many cases, the standards and criteria already in use in project-EIA to screen and evaluate impact significance can be applied to good purpose for SEA, especially of proposals that initiate specific activities. As well, there is a rapidly growing body of research on sustainability indicators. This work draws on previous experience with specific ecological, economic and societal (quality of life) measures to build more integrative, customised frameworks (National Round Table on the Environment and the Economy, 1995).

7.4 "NO NET LOSS" PRINCIPLE TO OFFSET IMPACTS

At an aggregate level, environmental sustainability can be equated with the maintenance of natural capital, i.e. keeping resources, stocks and ecological processes more or less at their present levels. The premise here is that, world-wide, the availability of natural capital has become limited and is limiting on development. Many ecological economists and others argue that natural capital now must be treated and valued as a separate component in the production process, one that is complementary to rather than freely substitutable by man-made capital. The application of "no net loss" principle is consistent with and exemplifies the precautionary principle, which forms a cornerstone of decision making for sustainable development.

No net loss principles can be met in EIA and SEA processes by specifying a straightforward, but far reaching mitigation requirement for "full" impact compensation (Sadler, 1990, 1995, in press). In effect, all 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.

BOX 7.3

Environmental Sustainability Test for Policy, Plan and Programme Proposals

SUSTAINABILITY RULE	ENVIRONMENTAL TEST
• ***Rule for Renewables:*** Harvest rates or renewable resource inputs should be within regenerative capacity of the natural system that generates them.	***E-test:*** Identify effect on use of renewables (e.g. timber, fish).
• **Rule for Non Renewables:** Depletion rates of non-renewable resource inputs should be equal to the rate at which renewable substitutes are developed by invention and investment.	***E-test:*** Identify effect on non-renewable resources (energy, minerals, raw materials). Also describe effects on energy consumption and mobility.
• ***Rule* for Outputs:** Waste emissions should be within the assimilative capacity of the environment without unacceptable degradation of its future waste absorptive capacity or other important services.	***E-test:*** Identify effect on quantity and quality of waste flows and emissions to soil, air and water. Also describe effects on quality of products and production process, e.g. lifespan and composition of product.
• **Rules for 'Conversion':** Quantity: No net loss of natural habitat. Quality: Conservation of biodiversity (ecosystems, populations, gene pools).	***E-test:*** Identify the effect on use of space and existing functions (i.e. land use, wildlife corridors).
• **Rule for Opportunity Costs:** Avoid irreversible changes and maintain future options.	***E-test:*** Identify effect on option and intrinsic values. Describe the availability of more sustainable alternatives.

As such, impact compensation will need to be promoted and implemented pragmatically. This will be an onerous 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, plans, projects or programmes – which would have the effect of stultifying necessary development. The no net loss principle does, however, demand that a "good faith", best effort is made to replace or offset as far as possible what is lost, and to ensure that environmental baselines are maintained at or near current levels.

Other supporting changes may be necessary to reinforce the impact compensation requirement. For example, "safe minimum standards" (e.g. for ambient air and water quality) are well established and widely used as benchmarks for evaluating impact acceptability in environmental assessment. 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, which reverses the burden of proof so that usually 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 side-effect 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). In this context, there will be considerable scope for the creative application of impact compensation and offsets via resource conservation, rehabilitation or enhancement measures (next section). This approach will be particularly relevant at the policy, plan and programme level and opens the door to the use of SEA to positively shape development.

A comprehensive approach could involve:

1) screening economic and development policies against the E-test for their conformity with environmental sustainability principles;
2) preliminary assessment of development proposals to identify low-impact, resource-efficient alternatives (e.g. for energy, transportation, etc.);
3) more detailed sectoral assessment to identify an in-kind compensation package to offset potential cumulative effects; and
4) regional assessment to clarify safe minimum standards for managing the cumulative effects of development, e.g. on resource values, land use capabilities, ecological integrity and biodiversity.

7.5 TOWARD FULL COST ANALYSIS

In principle, the need for full cost analyses (FCA) is widely accepted as a basis for achieving sustainability. This approach was recommended, for example, in the report of the World Commission on Environment and Development (1987) and Agenda 21 (1992), two documents that were endorsed by national governments and international organisations. FCA requires that, as far as possible, all environmental and social, as well as economic, impacts are addressed and taken into account in decision making. However, that is easier said than done. Because it is well established already, EA affords a stepping

stone toward FCA. From that standpoint, the addition of SEA significantly extends the range of development costs considered.

A true FCA requires the combination of four approaches (Goodland and Sadler, 1995):

1) sound micro-economic analysis of development proposals, e.g. to internalise environmental costs that can be monetarized;
2) environmental accounting at the macro-economic level to establish the real balance sheet of natural capital assets and losses, i.e. treating depletion of resource stocks as environmental depreciation to arrive at adjusted level of national income;
3) restructuring and tiering SEA and EIA as a process for environmental sustainability assurance, e.g. along the lines described above; and
4) establishing an integrated process of environment and development decision making in which trade-offs are made within the "green margins" of safe minimum standards.

In the final analysis, FCA needs to be backstopped by the safety net of comprehensive policy and institutional response to maintain environmental bottom line and achieve sustainable development. Key elements include (Sadler, 1995):

1) "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;

2) 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;

3) strategic policy interventions to address the I/PAT formula, 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.

The use of SEA in the context of elements 1) and 2) has already been discussed; with reference to Section 3, these open up the possibility for the conduct of "bigger picture" approaches. A number of commentators have already indicated new potential areas of application, including (e.g. Sadler, 1994, 1995; Ortolano and Sheppard, 1995; Goodland and Tillman, 1996):

1) global change issues, e.g. climate warming and biodiversity loss;
2) overseas aid and development assistance, e.g. structural adjustment loans; and
3) poverty alleviation, overconsumption and lifestyle issues.

In addition, the prototype uses of SEA to address budget, fiscal trade and political programmes were noted in Chapter 5.

7.6 RESEARCH AND DEVELOPMENT AGENDA

Well-focused research and development programmes are necessary to move forward with SEA. Many studies of SEA are available, underway, or proposed. Some of them are sponsored by agencies directly responsible for administering SEA systems or elements. Typically these tend to be ad *hoc,* responding to specific concerns. As yet, there are few attempts to pull these together into a coherent SEA research and development programme or agenda that has wide agreement or buy-in.

To date, we are aware of only two initiatives that fall within that category, one national, one international. These are:

1) the Draft Strategic Research Plan of the former Canadian Environmental Assessment Research Council (CEARC, 1991); and
2) the agenda for EIA/SEA methodology and research drafted at the Third European Workshop of EIA Centres (Cassios, 1995).

Both initiatives, though not comprehensive, point toward directions for extending SEA and improving its immediate practice.

While the earlier of the two, CEARCs Strategic Research Plan was an ambitious proposal to substantiate the concept of sustainable development and to explore how improvements to EA could contribute to its delivery. Four themes were identified for organising research: project EIA, policy and programme evaluation (SEA), regional/ ecosystem assessment and sustainable development, which was understood to encompass social, economic and environmental factors. In the event, CEARCs budget was not renewed and the plan was never elaborated or implemented. Specific work that had begun earlier on integrating environmental and economic assessment was carried forward in the effectiveness study (Sadler, Manning and Dendy, 1995). Based on contributing papers, some promising directions for strengthening full cost analysis are summarised in Box 7.4.

The EU Workshop Report on EIA Methodology and Research (Cassios, 1995) includes a draft research 'agenda', that has particular reference for EIA centres established or proposed for member states. The agenda covers both EIA at the project level and SEA of policies, plans and programmes. It was drawn up through an interactive process. (The workshop, organised by the Greek Centre for EIA, was appropriately located in Delphi.) Working groups had the following terms of reference:

- to review deficiencies in current practice and methodology;
- to identify research priorities; and
- to recommend measures for their implementation.

Research Directions for Strengthening Full Cost Analysis

BOX 7.4

The following areas of interest are interrelated and comprise possible building blocks for a comprehensive research and development programme:

- *strategic analytical frameworks* that correlate ecological functions with socio-economic values;

- *non-monetary evaluation techniques* that help correct the undervaluation of environmental goods and services, e.g. as priced in markets;

- *incorporating a sustainability premium* (or constant) into benefit-cost and other monetary evaluation techniques at the programme level (e.g. to represent the no-net loss principle);

- *linking analytical* (e.g. EIA) and *negotiation* (e.g. mediation) *principles* to clarify trade-offs associated with development options (e.g. determining in-kind impact compensation and offset packages); and

- *pilot studies* to characterise the bio-regional attributes of natural capital and ecosystem integrity, e.g. for wetlands, old growth forests, Arctic tundra.

As participants in the process, we consider that the list of SEA research priorities correspond closely to ones that are indicated by the analysis in this report (see Box 7.5). The process followed, moreover, was distinguished by a significant degree of international consensus; it was also supported by the European Commission and should help to focus research by the participating EIA Centres. The Delphi workshop identified the further measures that are necessary for this purpose. These include (Lee, 1995):

- establishment of a coherent research strategy identifying:
  a) priority projects;
  b) supporting measures (e.g. networking and training); and
  c) financial arrangements;
- other supporting activities, such as evaluating EIA/SEA methodologies and best practices drawing on European and international experience; and
- further development of research programmes at both the EU and member state-levels with some coordination between them.

BOX 7.5

SEA Research Priorities

The following priorities (which are not ranked) were identified at the Delphi Workshop of European EIA Centres:

- *use of environmental* information in decision making for PPPs;
- *concerns of policy makers* regarding the use of SEA and how these can be reduced;
- *applicability of existing EM and policy/plan analysis methods* for use in SEA;
- *integrated environmental-economic-social evaluation* at this strategic level;
- criteria for determining the *significance* of strategic-level impacts;
- screening and scoping of the *indirect* and *cumulative impacts* in SEA; and
- the practicalities of *public participation* within the SEA process.

Source: Lee, 1995.

In conclusion, the research and development agenda and approach set out here has wide application and represents a useful starting point for other countries and organisations. By definition, however, the focus of the Delphi workshop was on methodology, broadly considered to include its relationship to current provisions and procedures. The institutional research needs associated with the framework of SEA law, policy and process are still incomplete. As reviewed here, national and case experience indicates several additional requirements in that regard. These include a better practical understanding of:

- configurations of policy making to which SEA applies (e.g. institutional mapping);
- integration of EIA and SEA (e.g. studies of experience with tiering);
- administration and oversight of SEA provisions (e.g. how to ensure compliance); and
- tracking policies, plans and programmes that have undergone SEA (e.g. monitoring implementation).

File 52 Some Methods For Addressing Cumulative Effects

Overview and Evaluation of CEA tools and methods:
Methods were evaluated on strengths and weaknesses on the basis of 6 criteria:

- consideration of temporal accumulation
- consideration of spatial accumulation
- consideration of perturbation type (single or multiple)
- consideration of cause and effect pathways or relationships (additive and interactive processes)
- consideration of effects on functions in areas (e.g. assimilative capacity)
- consideration of structural effects (e.g. population shift, habitat modification)

GIS: Spatial analysis with the help of digital mapping

Strength: powerful and useful tool for carrying out spatial analysis of cumulative environmental change; applicable to mapping sources of cumulative environmental change and cumulative effects, with limited application for the analysis of pathways of cumulative change.
Weakness: data requirements and variation in availability of data among different locales; inability to incorporate processes of accumulation

Network analysis: e.g. 'Loop analysis': a qualitative, network technique that is based on feedback relationships

Strength: scores positive on most criteria; recommended for analysis of cumulative effects
Weakness: its application in CEA remains largely untested.

Biogeographic analysis (e.g. Landscape analysis):
Land scape analysis emphasizes the spatial pattern of ecological components and processes within a defined land unit, usually a watershed or other naturally bounded region. Specific indicators that relate to structural and functional attributes at the landscape level are used to measure cumulative environmental change. E.g. cumulative effects in bottom land hardwood forests: three indices for structural aspects (forest loss, forest contiguity, forest pattern), five indices for functional aspects (change in stream discharge, change in water residence time, trends in stream nutrient concentration, nutrient loading rates, native biotic diversity).

Strength & weaknesses: see GIS

Interactive matrices (e.g. Argonne multiple matrix):
The Argonne multiple matrix was developed to analyse the additive and interactive effects of various configurations of multiple projects. The total cumulative effect of any configuration is assumed to be the sum of project specific effects adjusted for interactions among projects and their effects. Expert opinion is used to establish three types of data: scores that define the level of effect of each project on selected environmental components, weighting coefficients that reflect the relative value of each component, and interaction coefficients that measure the effect of each pair of projects on each component. These data sets are entered into matrices that are manipulated to calculate a total score indicating the cumulative effect for each project configuration.

Strength: consideration of the cumulative effect of multiple sources of environmental change.
Weakness: cumulative effects are not differentiated by type, and parameter values rely extensively on expert judgement.

Ecological modelling: (computer) modelling of ecosystems

Strength: theoretically, method scores very positive on a number of criteria
Weakness: application is dependent on reliable data, model validation and resources (time, money, expertise); models usually analyse the effect of multiple sources on only one environmental component; only applicable to environmental systems for which the system organisation and behaviour are reasonably well understood.

Expert opinion: Use of experts (e.g. in 'cause and effect diagramming' in flow diagrams)

Strength: provides an organizing framework for more empirical analyses
Weakness: scores negative on a number of CEA criteria

Programming models (e.g. Linear programming):
Linear programming is a tool that identifies resource allocations (solutions) which are feasible given specified environmental and other conditions(constraints), and then selects some `optimal' allocation based on a specified decision rule (objective function).

Strength: offers a potential planning approach to investigate and manage cumulative environmental problems
Weakness: application in CEA would be a novel departure from typical socio economic applications

Land suitability evaluation (e.g. 'Land disturbance target'):
The essence of this method is to select an indicator of environmental quality and to establish an allowable target or threshold for this indicator, which is then used as a decision criteria to evaluate the cumulative effects of existing and future developments within an area.

Strength: particularly suitable as a planning tool to evaluate and manage cumulative effects at the local and regional levels.
Weakness: on a single activity or sole indicator of environmental change (e.g. erodibility); data-requirements dependent on a time limited historical record; an assumption that past land use trends and environmental responses are continued into the future

Process guidelines (e.g. the Reference Guide to CEA Lane et al (1988):
The 'Reference Guide to CEA' approach consist of three main steps:

step one involves a decision tree diagram beginning with a series of directional questions to establish whether a CEA is needed for a particular problem. Major considerations include the type, size and number of project, and spatial and temporal scales of anticipated effects
step two requires a decision between two possible approaches to the analysis of cumulative effects, depending on the type identified in step one. Ex ante analysis is applied to identify and analyze cumulative environmental change in the future. Post analysis is implemented when cumulative effects are currently observable, but causality and origin are not known
step three involves evaluation of development scenarios, assessment of the acceptability of future states of the environment, and appraisal of management options. Interdisciplinary expertise, 'affected publics' and workshops are an inherent part of this step.

Strength: satisfactorily meets most relevant CEA criteria; suited as an organizing framework within which to carry out a comprehensive CEA, including the selection and application of more rigorous methods and techniques.
Weakness: lacks specificity

OVERALL EVALUATION OF CEA METHODS

In general, CEA methods are able to consider the spatial dimension more frequently than temporal aspects. This reveals an inherent difficulty in accounting for time dependent processes. For comprehensive CEA a mix of methods is appropriate, perhaps even necessary. Thus a CEA may begin with a method useful for conceptual understanding (e.g. cause-effect diagramming). This may be followed by more comprehensive approaches and empirical analysis, such as landscape analysis or simulation modelling. Results from the analytical investigation may be incorporated into a normative evaluation (e.g. MCA, land suitability evaluation) that contributes to environmental policy and decision making.

Source: Smit B. and H. Spaling, Methods for CEA.EIA Review 57, Jan 1995

8. Conclusions and Recommendations

"Since 1990, the federal government has required that all new policy (...) initiatives having potential significant environmental implications undergo review. This process used, for the first time in the negotiation of a trade agreement, has established a precedent for the future"

Government of Canada, 1992, 69, 74.
North American Free Trade Agreement, Canadian Environment

In this chapter, the main threads of the report are pulled together. Boxes 8.2, 8.3 and 8.4 at the back of this chapter sum up a number of findings by reference to the questions identified as key questions at the beginning of this report (see box 2.1). Below, conclusions and recommendations in the body of the text are distilled into eighteen lessons of recent experience. These are organised into four sections:

- statement of purpose and benefits of SEA;
- review of status and recent progress;
- pointers to sound practice and performance; and
- guide to process design and development.

Finally we argue for a reconsideration of SEA perspectives and approaches, avoiding moulding them too narrowly on EIA orthodoxy in favour of a multi-dimensional framework.

8.1 USES, ADVANTAGES AND BENEFITS OF SEA

1 *The purpose of SEA is to ensure environmental considerations are addressed and incorporated into policy, plan and programme proposals.* SEA should be applied systematically at the earliest appropriate stage of decision making so that environment factors are examined at the same time and on par with social and economic aspects. It is widely accepted that the value of SEA for decision making is maximised by taking such a proactive approach.

Although not ideal, case experience also shows that SEA can help to "green" later stages on decision making, e.g. post-formulation and pre-implementation activities. At this stage, no useful purpose is served by rigidly defining SEA to exclude such "defensive" or "safety-proofing" reviews, provided they are undertaken to achieve environmental improvement and are not just cosmetic, window-dressing exercises.

2 A number *of comparative advantages are gained by the use of SEA for problem solving, as opposed to reliance only on EIA.* Using SEA provides an enhanced capability to:

- deal with the policy sources, rather than the symptoms, of environmental deterioration;
- address cumulative effects at an early rather than late warning stage; and

- streamline and focus ETA, in those cases where policies, plans or programmes initiate projects and activities.

3 *Experience so far indicates that SEA can and does facilitate informed decision* making *and delivers other benefits.* This is a preliminary, qualified judgement; much about the use of SEA decision making documented in this report appear to have resulted in environmental factors being taken into account in policy, plan and programme formulation. In some countries, SEA is reportedly gaining increasing acceptance and currency with certain proponents recognising its value to forward planning and programming. From their perspective, key benefits include establishing a sound basis for subsequent project design and for securing timely approvals. The extra workload and costs of SEA appear to be roughly commensurate with gains and benefits, however, it is not clear yet whether there is a compensatory reduction of activity 'down-stream' in the decision making process. This is a critical area for further investigation.

8.2 OVERVIEW OF STATUS AND RECENT PROGRESS

4 *SEA of policies, plans and programmes is a rapidly emerging area of professional interest and practice.* It is seen as a promising approach to integrating environmental considerations into the higher levels of development decision making, as recommended by the Brundtland Commission, and in Agenda 21. The growing acceptance of SEA is exemplified by the number of conferences, articles and research projects that can be found on this subject. Above all, a body of case experience in the application of SEA is now being built in a number of countries and international organisations.

5 *By comparison to project EIA, SEA is still at a relatively early stage of process development.* Many institutional, procedural and methodological issues have yet to be satisfactorily resolved. There are also ambiguities and differences regarding terminology and concepts. Scepticism about the feasibility and practicality of current and proposed approaches is still widespread among proponents and policy makers. It is important for SEA advocates to address these concerns and to stop preaching to the converted. The audience to convince about the value of SEA are the decision makers, administrators and users of the process.

6 *Certain elements of SEA are well established, dating back to the initial phases of EIA development, and could be used to better advantage by many countries.* Early experience with EIA as a policy-shaping mechanism took a number of forms in the USA, Canada, Australia and other countries. These forms (described in Chapter 4), can be used to gain a comparative understanding of more recent trends in process and practice. With other policy tools, they are also indicate ways and means of building precedent for a confidence in SEA. This approach can pave the way to the introduction of a more customised process, recognising that for many developing countries SEA procedures can be over-prescribed.

7 *To date,* only *a few countries have introduced SEA systems, in which processes are institutionalised, relatively well structured and applied explicitly to policy, plan and/or programme decision* making. These systems are a major source of case experience and lessons regarding SEA process, practice and performance. A comparative review of institutional arrangements has proven useful to identify basic prerequisites, key principles and the main procedural forms of SEA. Many other countries apply elements of SEA under more informal or minimal arrangements. These diverse approaches deserve greater attention than we have been able to give them here, and work is especially needed on the status and progress of SEA in developing and transitional countries.

8 *In formal systems, there are significant differences* in *the role, scope and form of SEA, far more so than in EIA*. The SEA processes described in Chapter 5 vary considerably as to their legal, policy or administrative basis, mandatory versus discretionary provisions, procedural form and scope of application. Specific approaches range from:

- programmatic EISs (e.g. USA);
- sectoral and regional EA (World Bank);
- policy and programme assessment –
  - for Cabinet submissen (e.g. Canada);
  - for parliamentary bills (e.g. Denmark); to
- environmental (e) test or paragraph (e.g. Hong Kong).

In practice, the various approaches display a degree of overlap and aspects can be combined as context and circumstances warrant (e.g. policy and programme assessment in Canada encompasses aspects of EIA, policy appraisal and the environmental paragraph). One or two countries are moving toward differentiated systems (e.g. the Netherlands applies both an 'E test' of national policies and SEA of physical plans and programmes) or an integrated process of policy making, regional planning and project EIA (e.g. New Zealand).

9 SEA procedures *and methods draw from both EIA and policy appraisal sources*. While adaptations are still being made, the procedures and methods that are currently used or potentially available for SEA appear to be sufficient for "good practice". In general, SEA corresponds most closely to EIA, methodologically and procedurally, where projects and activities are directly infuenced by policies, plans or programmes. Where the 3Ps have greater degree of generality and abstruction, policy appraisal methods and procedures become appropriate. However, this determination can only be made in the context of specific proposals and requirements. As well, the approaches to policy appraisal and EIA-based SEA overlap and borrow from each other (e.g. use of screening and scoping steps in UK system).

10 *Overall, SEA is a catalyst for and an interim step toward more integrated, policy making and planning for sustainable development.* At present, SEA acts as an integrative mechanism on three main levels:

- tiering of EIAs, which occurs in certain countries where SEA is applied to plans and programmes that initiate projects;

- incorporating social, economic and other concerns into analysis, especially where these are not dealt with in other processes; and
- evaluating the proposal against broad policy framework especially with reference to environmental objectives and targets, green plans and sustainability strategies.

Where these objectives, plans and strategies are not fully developed or in place, SEA cannot substitute for them, but it can and should assist their forward preparation.

8.3 ON SOUND PRACTICE AND EFFECTIVE PERFORMANCE

11 *While still limited, case experience with SEA signposts the basic ingredients of sound practice and effective performance.* The points and lessons reported below assume that certain institutional arrangements and preconditions are in place. If this is not the case, then other approaches will be necessary, as described in section 8.4.

A quick test of performance effectiveness involves asking the following questions (although answering them may present a challenge):

- was relevant information provided for decision making? e.g.
  - accurate in the light of current knowledge;
  - sufficient given the requirements;
  - useful for problem solving.
- were environmental factors incorporated into policy making? e.g.
  - proposal was modified accordingly;
  - environmentally friendly alternative was selected;
  - green conditions or mitigation measures were imposed.

Good practice is the guarantee for successful performance, at least for the first part of the effectiveness test. The second component is open to outside influences, although the SEA process, itself, represents a check and balance of political accountability. Enabling conditions of sound practice can be audited. They include:

- clear provision for SEA;
- application of well founded procedures;
- use of appropriate methods;
- involvement of key parties, including affected public and interest-groups; and
- consistency with most or all of the other principles listed in box 5-.-5.

12 A *seven part generic* framework *of good practice, combining elements of approach from EIA base and policy appraisal is recommended.* The steps and activities outlined in box 8.1 should be undertaken flexibly and iteratively. Not all of them will need to be completed in every case. An SEA must be tailored to the consequentiality of the proposal, i.e., to the potential nature and scope of environmental effects and issues. Steps 1 and 2 in box 8.1 will help make that determination and indicate whether and how an SEA should be conducted.

BOX 8.1

A Generic Framework of Good Practice SEA

1) *Apply a simple screening procedure* to initiate SEA or exempt proposals from further consideration, depending on their consequentiality. Several methods can be used: categorical lists, case-by-case test for significance, some combination, or, where no formal guidance is available, the pre-screening questions in Box 3.4 of this report could be applied.

2) *Use scoping to identify important issues,* draft terms of reference where necessary for SEA, determine the approach to be followed, and establish other alternatives for consideration. This stage should be "objectives-led", clarifying the relationship between the priorities met by the policy proposal and the likely effects or implications for environmental protection goals, standards and strategies.

3) *Specify, evaluate and compare alternatives,* including the no action option. The aim is to clarify the trade-offs at stake, showing what is gained or lost, and point, where possible, to the best practicable environmental option (or equivalent designation).

4) *Conduct a policy appraisal* or *impact analysis* to the extent necessary to examine environmental issues and cumulative effects, compare the alternatives, and identify any necessary mitigation or offset measures for residual concerns. The "tool kits" available for this purpose, together with lessons on their application, are described in Chapters 6 & 7. An aide memoir for correlating direct and indirect effects with appraisal or impact assessment modes of approach is outlined in section 3.4.

5) *Report the finding of the SEA,* with supporting advice and recommendation to decision makers in clear and consise language. Depending on the proposal, the documentation may range from a few pages to an EIS; longer reports should have an executive summary.

6) *Review the quality of the SEA* to ensure the information is sufficient, and relevant to requirements of decision making. Depending on the process, this activity can range from a quick check to an independent review.

7) *Establish necessary follow up provisions* for monitoring effects, checking that environmental conditionalities are being implemented, and, where necessary, tracking arrangements for project ElAs. For policies, plans and programmes that initiate projects, tiering EIA to the SEA can significantly improve process effectiveness and efficiency.

13 *The capability of SEA to address cumulative effects* cart *be improved further by taking a targeted approach.* The value of SEA as an early warning mechanism for detecting and managing cumulative effects is widely acknowledged in the professional literature. However, it is more often said than shown. Our review of case experience and discussions with practitioners, although limited, suggests that a targeted approach should be followed, recognising that different types of SEA have comparative advantage for examining different aspects of the cause-effect relationship. For example:

- SEA of sectoral policies, plans and programmes helps to identify the *sources* of potential environmental changes, especially where proposals are made for new infrastructure and location of facilities (e.g. energy, transportation);
- SEA of regional and land use plans shifts the attention toward *effects* on the receiving environment (capacities, thresholds etc.); and
- SEA of macro-economic policies that broadly guide development or change behaviour might consider the *processes* by which choice leads to environmental consequence (e.g. tax/fiscal measures → mobility → carbon emissions).

14 *Wherever possible, employ SEA as* a *tool for sustainability assurance.* This means assessing policies, plans and programmes with an eye to avoiding irreversible and unacceptable changes to natural systems, keeping risks as low as reasonably practicable, and applying the precautionary principle as a basic rule when evaluating significance of impacts. Several steps can be better taken to use and strengthen SEA as a sustainability mechanism:

- screen/scope development proposals for their conformity with environmental protection objectives, sustainability commitments and targets;
- incorporate sustainability principles into operational tests, indicators and checklists for impact assessment and policy appraisal (see Box 7.3);
- establish no net loss of natural capital as the rule of thumb for "best effort" impact mitigation;
- require in kind (like-for-like) compensation or equivalent offset for major damages, consistent with the polluter-pays principle; and
- define impact acceptability on the basis of safe minimum standards in which presumption is for conservation and the burden of proof regarding conformity with standards rests with proponents.

8.4 GUIDE TO PROCESS DESIGN AND DEVELOPMENT

15 *As a first step, list the constraints and opportunities that determine whether and how SEA can be undertaken.* Prerequisites for SEA are established by the political and organisational culture, the processes of decision making that are currently in place, and the 'social support base' of consideration into policy making and using SEA (see section 5.2). However, political will or support is probably the only real pre-condition for SEA although bureaucratic responsiveness and, in some countries practical

skills, constrain the scope of application. Institutional analysis and 'mapping' can be used to identify specific constraints and opportunities that obtain in a country or organisation and help to customise a strategy in light of the principles noted below.

16 *When introducing or extending SEA systems, take a flexible adaptive approach, in which process design is related to the configuration of policy making, not vice versa.* Like architecture, form follows function. As noted in this report, policies, plans and programmes themselves take many forms. Often especially at higher levels, policy making is a fluid and non-hierarchical. SEA requires a different approach at this level (e.g. `E' test, policy appraisal) than with more structured plans and programmes where EIA-based procedures and methods may be more easily accommodated and appropriately used. In all cases, however, case experience indicates that flexibility is important: rigid and overdetailed provisions and procedures should be avoided.

17 *Follow an iterative strategy of process development and management, aimed at adding value to decision* making. The purpose of SEA – to aid informed decision making – bears repeating. Several steps can be taken to implement a functional approach:

- begin with 'fitness for purpose' process and procedure;
- recognise that SEA is a catalyst for change in the policy making process to which it is accommodated;
- establish performance measures and standards of quality; and
- adjust provisions and procedures on the basis of practice and the results achieved.

18 *Otherwise, establish SEA on* a *"when possible and appropriate" basis, using simple, easy to apply methods and procedures.* The important point is to start rather than wait – only applying SEA when certain prescribed conditions are met. In one form or another, many countries take this approach already. Gaining experience of and competency in (elements of) SEA should place developing countries and institutions in a better position either to introduce formal requirements or to move forward with other integrated forms of green planning. The use of SEA to support conditions of international lending and assistance (e.g. structural adjustment) is an area of growing interest, but actual practice is little known and warrants further study.

8.5 A LAST WORD – SEA RECONSIDERED

In the final analysis, SEA is best seen as an interim or transitional instrument that leads toward more integrated, sustainability-oriented policy making and planning. Eventually, under these circumstances, SEA and EIA would be fully incorporated into the policy tool kit for full cost analysis, development planning and resource management (e.g. supporting the range of elements described in Section 7.5). This explains why we give greater emphasis and credence to policy appraisal and plan evaluation than is commonly found among impact assessment specialists writing in the SEA literature. Despite procedural and

other shortcomings, these forms of SEA exemplify the potential for integrative, sustainability analysis.

In this respect, we have found actual SEA practice to be in advance of much of the preceptive literature. A richer mix of experience is gained by stepping outside the confines of EIA based developments. We also fear the SEA may be miscast and its larger potential missed by moulding the process too narrowly. Recent developments suggest the need for greater discrimination among the forms and types of SEA and their relation to actual (rather than idealises) processes of policy making and planning (see, for example, the list in Section 8.2, point 8). New opportunities for the potential application of SEA, described in Section 7.5, also invite reconsideration of the boundaries and dimensions of the field.

Looking ahead, much more needs to be known comparatively about the quality and effectiveness of SEA practice in order to improve current applications and capitalise on further opportunities. The Canadian and European research agendas noted in Section 7.6 point to some initial directions for further work on SEA. Many countries and international organisations are undertaking or commissioning SEA research to address specific concerns and interests. All the indications are that SEA, broadly considered, is a growth area for process development and practice. The countries, institutions and networks participating in the effectiveness study are asked to consider how international experience, lessons and information can be exchanges on this subject following the conclusion of the present exercise.

Key issues of sea practice – a summary of findings

BOX 8.2

FRAME OF REFERENCE & INSTITUTIONAL ISSUES

What is SEA?

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

Why is SEA useful?

- *To strengthen project EIA:*
  SEA can help to refocus and streamline project-level EIA by ensuring that primary environmental issues of need, justification and alternatives are dealt with at the appropriate policy, plan or programme level.
- *To address cumulative effects:*
  Existing coverage and treatment of cumulative effects can be significantly improved through the application of policy, sector and regional assessment.
- To *incorporate sustainability considerations:*
  SEA is a potentially valuable process for applying sustainability considerations to the formulation or review of development policies, plans and programmes.

How is SEA related to other decision making instruments?

- SEA should be applied in the context of other decision making instruments:
  - *environmental policies* and *state of the environment reporting* provide the background and context against which environmental impacts should be assessed;
  - in sectors with long established policies and plans, SEA of new initiatives should be backed by *environmental 'reviews'* or *'audits'* of existing policies, plans and programmes;
  - SEA should be regarded a 'temporary instrument': the long term goal is the establishment of integrated or 'green' planning in which the consideration of environmental considerations is implicit.
- An integrative assessment of both the environmental and the socio-economic effects of a proposed policy, plan or programme is crucial for the quality of the planning process. The integration, however, may be conducted *as part of* or *parallel to* an SEA.

When and where is SEA useful?

- The field of application of SEA throughout the world is very broad and ranges from the development of new legislation, through Cabinet decisions, to sectoral policies, program development and regional and communal physical planning. In most cases a screening process is applied to decide on the need for SEA on the basis of its likeliness to have significant environmental consequences.

- The 'most appropriate SEA' in a given situation may be identified on the basis of the specific context of a strategic decision making process, including the following choices:
  - integrated planning approach or discrete SEA process
  - in- or exclusion of socio-economic effects
  - in- or exclusion of related policy instruments
  - qualitative or quantitative assessment (or a mix of both).

How is SEA related to EIA?

- In some countries SEA has evolved on the basis of project EA systems and experiences. In other countries SEA has been based on existing strategic policy instruments. SEAs can therefore be distinguished according to the type of approach adopted, i.e. *standard EIA based process* or near *equivalent policy appraisal.* Both approaches can be effective or may be applied in a two-tier system.

How to incorporate SEA in existing decision making?

- An effective SEA system should take into account the political and organizational culture of policy making in a specific country. Effective implementation will only take place where there is a political will to use SEA and a bureaucratic responsiveness to carry it out.
- Both formal and informal SEA processes have been installed in different countries, both of which may be effective.

Key issues of sea practice - a summary of findings

BOX 8.3

PROCESS AND PROCEDURE

What are elements of an effective SEA process/procedure?

- *Role of the public:* public participation is essential for the quality of the SEA process and should be an integrative part of the SEA procedure, with certain exemptions for reasons of confidentiality. The continuous and complex, iterative character of strategic planning as well as the specific cultural/traditional background of a country or region requires careful selection of methods, timing and extent of public involvement.

- *Role of environmental agencies:* for an effective integration of environmental considerations in the development process appropriate environmental authorities must be fully engaged in both the SEA process – in particular during scoping and reviewing – and the development of the policy, plan or programme itself. Final responsibility for the SEA should stay with the lead authority.

- *Suitability of project EIA procedures:* SEA procedures adapted from project level EIA procedures in principle function well, although some significant differences exist. Main differences stem from the continuous character of SEA, its role in a tiered process and confidentiality issues. A key procedural step in strategic planning is screening to decide on stage(s) at which SEA should be applied, information that should be provided, extent and type of public involvement and alternative options to be assessed.

- *Linkage of SEA to EIA:* linking assessments at different stages of the planning process, including the project level, within a tiered process significantly adds to the effectiveness and cost efficiency of SEA by narrowing the range of alternatives and avoiding overlap, duplication and unnecessary level of detail of information.

- *SEA quality standards:* a good quality SEA will facilitate the provision of adequate environmental information, timely involvement of all parties relevant in the planning process, and will stay within appropriate time frames.

- *SEA review mechanisms:* both the public and environmental agencies play an important role in reviewing the quality of SEAs. In some circumstances this role is limited because of the vested interests of these two parties in the results of the planning process. Some countries have chosen to avoid this situation by establishing an independent review or advisory body as part of the SEA process.

Key issues of SEA practice – a summary of findings

BOX 8.4

METHODS AND TECHNIQUES

What is the state of the art of SEA techniques and methods?

- *Preparation of SEA studies:* in general five main steps in the preparation of SEA documentation may be identified:
  1. listing objectives and constraints of the planning process
  2. analysis of the existing environmental context
  3. specification of policy alternatives and impact identification
  4. impact analysis and identification of mitigating measures
  5. monitoring arrangements and evaluation.

- *Development of alternatives at the strategic level:* usually, it will be necessary to assess alternatives in SEA. The type of alternatives to be developed and described will largely depend on whether the planning process will directly influence concrete projects or not. The alternatives described should include the case for the existing policy, plan or programme staying in place unmodified (the business-as-usual'-alternative).

- *identification* and *analysis of impacts/issues in SEA:* although some adaptation may be needed, almost all methods and techniques needed for impact identification and analysis in SEA are already available, either in project EIA or as instruments in policy analysis and planning.

- *Dealing with uncertainties at the strategic level:* in most SEAs, there will be a significant uncertainty-factor to deal with in the analysis. This uncertainty, however, does not preclude an effective SEA. Normally, the environmental information provided in SEA will still make it possible to distinguish between alternative policy options and to determine mitigating measures needed.

- *Analysis of cumulative impacts:* compared to project EIA, the scope of SEA is more appropriate to the time and space scales at which cumulative effects are expressed. Several frameworks and approaches for analysing cumulative effects can be used in SEA based on and linking three elements: sources, effects and processes. Early developments on cumulative impacts assessment methods have focused on expanding matrix methods and network analysis. These appear to be most useful where a limited number of key indicators help focus relevant socio-effect relationships.

- *Analysis of effect on sustainable development:* a first step to incorporate an 'environmental sustainability test' in SEA could be to select appropriate environmental indicators showing whether policy options lead in the right or wrong 'direction' as regards sustainability. Several checklists have been developed for this purpose or may be readily incorporated in SEA.

References

Au, W.K.E. 1994. *Towards Policy and Program EA in Hong Kong*, paper to Canada-Hong Kong ETA Workshop, 7-10 March, 1994, Hong Kong.

Au, W.K.E. 1995. *EIA in Hong Kong: A Collection of Brief Summary of Case Studies*. Paper as a contribution to the International EA Effectiveness Study, March 1995, Hong Kong.

Ballard, S.C. et al. 1982. *Integrated Regional Environmental Assessments: Purposes, Scope and Products*. Impact Assessment Bulletin. 2: 5-13.

Bass, R. 1991. *Policy, Plan and Program EIA in California,* EIA Newsletter, 5,4-5.

Boverket (Swedish Planning Board), 1993. *Integration of Land use Planning and Environmental Impact Assessment.* Proceedings of a Canada-Sweden Workshop. Stockholm: Boverket.

Bregha, F. et al. 1990. *The Integration of Environmental Factors in Government Policy Making.* Ottawa: Canadian Environmental Assessment Research Council.

Burger, G. 1994. *The Netherlands Proposed E-Test.* Presentation to International Workshop on Policy Environmental Assessment, the Hague, 12-14 December 1994.

Caldwell, L.K. 1988. *Environmental Impact Analysis (EIA): Origins, Evolution and Future Directions*. Impact Assessment Bulletin. 6, 3/4, 75-83.

Canadian Environmental Assessment Research Council (CEARC) and US National Research Council. 1986. *Cumulative Environmental Effects: A Binational Perspective.* Ottawa: CEARC.

Canadian International Development Agency (CIDA). 1995. *Guide to Integrating Environmental Considerations*. Draft Report. Ottawa.

Carew-Reid, J. et al. 1994. *Strategies for National Sustainable Development.* London: Earthscan.

Cassios, C. 1995. *Environmental Impact Assessment Methodology and Research*. Athens: Greek Centre for ETA.

Clark, B.D. et al. 1981. *The British Experience,* in T. O'Riordan and W.R.D. Sewell, eds. *Project Appraisal and Policy Review*. London: Wiley, 125-154.

Clarke, S. ed. 1981. *Environmental Assessment in Australia and Canada.* Vancouver: University of British Colombia, Westwater Research Centre.

Commission of the European Countries. 1993. *Review of the Implementation of EIA Directive*. Brussels.

Commonwealth Environment Protection Agency (CEPA). 1994. *Review of Commonwealth Environmental Impact Assessment.* Canberra: CEPA.

Court, J.D. et al. *Assessment of* Cumulative *Impacts and Strategic Assessment in Environmental Impact Assessment.* Report prepared for Commonwealth Environment Protection Agency, Canberra.

Dasgupta, P. 1993. *Optimal versus Sustainable Development* in I. Serageldin and A. Steer, eds. Valuing *the Environment* Washington, D.C.: The World Bank.

Department of the Environment (UK). 1991. *Policy appraisal and the Environment.* London: IIMSO.

Department of the Environment (UK). 1993. *Environmental Appraisal of Development Plans. A good Practice Guide.* London: HMSO.

Department of the Environment (UK). 1994. *Environmental Appraisal in. Government Departments.* London: HMSO.

De Vries, Y. 1994. *The Netherlands Experience in Policy Environmental Assessment.* Paper to the International Workshop on Policy Environmental Assessment, the Hague, 12-14 December 1994.

DHV Environment and Infrastructure. 1994. *Strategic Environmental Assessment. Existing Methodology.* Brussels: Commission of the European Union Directorate General for Environment, Nuclear Safety and Civil Protection.

Dixon, J. 1994. *Strategic Environmental Assessment: The New Zealand experience,* paper to IAIA'94, Quebec City.

Dixon, J.A. 1995. *Experiences and Lessons from Environmental Applications of Economic Analytical Methods,* in B. Sadler, et al, eds. *Balancing the Scale: Integrating Environmental and Economic Assessment.* Toronto: Foundation for International Training: 37-54.

Dom, A. 1994. *Strategic Environmental Assessment of the European HST Network,* Paper to IAIA'94, Quebec City.

Doyle, D. and B. Sadler, in press. *Environmental Assessment in Canada: Frameworks, Procedures and Attributes of Effectiveness.* Ottawa: Canadian Environmental Assessment Agency for the International Study of EA Effectiveness.

Elling, B. 1994. *Policy Environmental Assessment in Denmark.* Paper to the International Workshop on Policy Environmental Assessment, the Hague, 12-24 December 1994.

Federal Environmental Assessment Review Office (FEARO). 1992. *Environmental Assessment in Policy and Program Planning. A Sourcebook.* Ottawa: FEARO

Federal Environmental Assessment Review Office (FEARO). 1993. *The Environmental Assessment Process for Policy and Program Proposals*. Ottawa: FEARO

CEAA, 1994 Final *Report, International Summit* on *Environmental Assessment.* Ottawa: Canadian Environmental Assessment Agency.

Francis, G. *Ecosystem Management.* Natural Resources Journal. 33(2): 315-346.

Gibson, R.B. 1993. *Ontario's Class Assessments: Lessons for Policy, Plan and Program Review,* in S. Kennett, ed. *Law and Process in Environmental Management.* Calgary: Canadian Institute of Resources Law.

Government of Canada. 1992. *North American Free Trade Agreement.* Canadian Environmental Review. Ottawa: Government of Canada (Cat.No.: E7454 /1992E).

Goodland, R. and G. Tillman. 1995. *Strategic Environmental Assessment Strengthening the Environmental Assessment Process*. Paper to IAIA '95, Durban.

Goodland, R. and B. Sadler. 1995. *The analysis of Environmental Sustainability: From concepts to Applications*. International Journal of Sustainable Development. Forthcoming.

Gow, L.J.A. 1994. *The New Zealand Experience in Policy Environmental Assessment.* Paper to International Workshop on Policy Environmental Assessment, the Hague, 12-14 December 1994.

Huisman, H. 1990. *EIA of Policies* and *Programms: the Netherlands experience,* paper tabled at International Forum on Environmental Policy and Management, The British Council, Alfriston UK.

International Study of the Effectiveness of Environmental Assessment. 1994. *Information Bulletin No. 1*. Ottawa: Federal Environmental Assessment Review Office.

Jacobs, P. and B. Sadler, eds. 1989. *Sustainable Development* and *Environmental Assessment: Perspectives on Planning for* a *Common Future*. Ottawa, Canadian Environmental Assessment Research Council.

James, D. 1995. *Environmental Impact Assessment: Improving Processes and Techniques,* Australian Journal of Environmental Management. Vol. 2, 78-89.

Johansen, G. 1994. *Policy EA in Denmark*. Paper to International Workshop on Policy Environmental Assessment, the Hague, 12-14 December 1994.

Kjorven, O. 1995. *Geographic information Systems. Update to Environmental Assessment Sourcebook*. Washington, D.C.: The World Bank.

Lancashire County Council, 1993. *Environmental Appraisal of the 1986-1996 Structure Plan,* Lancashire Structure Plan 1991-2006, Technical Report, LCC, Preston.

Law, R. 1994. *Environmental Assessment of Policy Initiatives. The Hong Kong Experience.* Paper to International Workshop on Policy Environmental Assessment, the Hague, 12-14 December 1994.

Le Blanc, P. and K. Fischer. 1994. *Application of Environmental Assessment to Policies and Programs: The Federal Experience in Canada.* Paper to International Workshop on Policy and Environmental Assessment, the Hague, 12-14 December 1994.

Lee, N. 1995. *EU Workshop Report on Environmental Assessment Research,* EIA Newsletter. 10: 14-15.

Lee, N. and J. Hughes. 1995. *Strategic Environmental Assessment Legislation and Procedures in the Community*. 2 Vols. Brussels: European Commission.

Lee, N. and F. Walsh. 1992. *Strategic environmental assessment in an overview*. Project Appraisal. 7(3): 126-136.

Lee, N. and C. Wood. 1978. EM - *A European Perspective.* Built Environment. 4(2): 101-110.

Leibowitz. S. et al. 1992. *A synoptic Approach to Cumulative Impact Assessment. A proposed Methodology*. Washington, D.C.: US Environmental Protection Agency. (EPA/600/R-92 /167).

Meehan, B. 1995. *Environmental Assessment in Ireland,* EIA Newsletter. 10:10.

Ministry of Housing, Spatial Planning and the Environment (Netherlands). 1989. *To choose or To Loose. National Environmental Policy Plan.*

Ministry of Housing, Spatial Planning and the Environment (Netherlands). 1992. *National Environmental Policy Plan.*

Ministry of Housing, Spatial Planning and the Environment (Netherlands).1994. *National Environmental Policy Plan.*

Nair, C. et al. 1994. *Strategic EM -- The Environmental Assessment of Plan, Policies and Programmes in Hong Kong.* Paper to Canada-Hong Kong EIA Workshop, 7-10 March, 1994, Hong Kong.

National Round Table on the Environment and the Economy (Canada). 1993. *Toward Reporting Progress* on *Sustainable Development in Canada*. Ottawa.

Nelson, J.G. and S. Jenssen. 1981. *The Scottish and Alaskan Offshore Oil and Gas Experience and the Canadian Beaufort Sea.* Ottawa: Canadian Arctic Resources Committee.

Netherlands, EIA Commission. 1993. *Year Book of the Commission for Commission for Environmental Impact Assessment.* VROM, 45a 94161/LI 2-94 6181/112.

Norris, K. 1994. *Policy Environmental Assessment in the European Commission.* Paper to International Workshop on Policy Environmental Assessment, the Hague, 12-14 December 1994.

O'Riordan, T. 1986. *EM: Dangers and Opportunities* Environmental Impact Assessment Review. 6(1): 3-6.

O'Riordan, T. and W.R.D. Sewell. eds. *Project Appraisal and Policy Review*. London: Wiley.

Ortolano, L. and A. Sheppard. 1995. *Environmental Impact Assessment: Challenges and Opportunities*. Impact Assessment. 13(1): 3-30.

Partidário, M.R. 1993. *Anticipation in Environmental Assessment: Recent Trends at the Policy and Planning Levels*. Impact Assessment. 11(1): 27-44.

Pearce, D, A. Markandya and E. Barbier. 1993. *Blueprint for* a *Green Economy*. London: Earthscan.

Pinfield, G. 1992. *Strategic Environmental Assessment and Land Use Planning.* Project Appraisal. 7(3): 157-163.

Porter, A.L. 1995. *Technology Assessment,* Impact Assessment. 13, 2, 135152.

Project Appraisal. 7(3). *Special Issue on Strategic Environmental Assessment.*

Raymond, K. 1994. *Strategic EA: Putting the Theory into Practice.* Paper to 3rd European Workshop of EIA Centres, Delphi, Greece.

Resource Assessment Commission. 1992. *Forest and Timber Inquiry. Final Report.* Canberra: Australian Government Publishing Service.

Resource Assessment Commission. 1993. *Coastal Zone Inquiry. Final Report.* Canberra: Australian Government Publishing Service.

Resource Futures International. 1991. *Environmental Assessment of the Federal Budget.* Unpublished report for Southam News.

Richardson, B. and B. Boer. 1995. *Federal Public Inquiries and Environmental Assessment* Australian Journal of Environmental Management. Vol. 2, 90-103.

Roots, E.F. 1992. *Environmental Information - A Step to Knowledge and Understanding.* Environmental Monitoring and Assessment. 20: 87-94.

Ross, W.A. 1987, *Evaluating Environmental Impact Statements,* Journal of Environmental Management, 25: 137-147.

Sadler, B. 1986. *Impact Assessment in Transition: A Framework for Redeployment,* in R. Lang ed. *Integrated Approaches to Resource Planning and Management.* Calgary: University of Calgary Press. 99-129.

Sadler, B. ed. 1987. *Audit and Evaluation in Environmental Assessment and Management.* 2 Vols. Ottawa: Beauregard Press Ministry of Supply and Services Canada.

Sadler, B. 1990. *An Evaluation of the Beaufort Sea Environmental Assessment Panel.* Ottawa: Federal Environmental Assessment Review Office.

Sadler, B. 1993. *Shared Resources, Common Future: Sustainable Management of Canada-United States Border Waters.* Natural Resources Journal. 33(2): 375-395.

Sadler, B. 1994. *Environmental Assessment and Development Policy Making,* in R. Goodland and V. Edmundson, eds. *Environmental Assessment and Development.* Washington, D.C.: The World Bank, 3-19.

Sadler, B. 1995. *Impact Compensation and the Maintenance of Natural Capital.* Operational Rule No. 1 for Sustainable Development. International Journal of Sustainable Development. Forthcoming.

Sadler, B., E.W. Manning and J.O. Dendy. eds. 1995. *Balancing the Scale: Integrating Environmental and Economic Assessment.* Toronto: Foundation for International Training/International Study of the Effectiveness of Environmental Assessment.

Sadler, B. in press. *Environmental Assessment: Toward Improved Effectiveness.* Interim Report and Discussion Paper - International Study of the Effectiveness of Environmental Assessment.

Sadler, B., in press. Sustainability *Strategies* and *Green Planning: Recent Canadian and International Experience,* in A. Dale and J. Robinson, eds. *Achieving Sustainable Development.* Vancouver: University of British Columbia Press.

Scheurs, P. and D. Devuyst. 1995. Environmental *Assessment in Belgium,* EIA Newsletter. 10: 5-6.

Sigal, L. and W. Webb. 1994, *A Case Study of the Application of Strategic Environmental Assessement (SEA) to an Environemental Restoration and Waste Management Program,* paper to IAIA'94, Quebec City.

Sippe, R. 1994. *Policy and Environmental Assessment in Western Australia: Objectives, Options, Operations and Outcomes*. Paper to International Workshop on Policy Environmental Assessment, the Hague, 12-14 December 1994.

Smit, B. and H. Spaling. 1995. *Methods for Cumulative Environmental Assessment.* Environmental Impact Assessment Review.

Sullivan, M. 1995. *Forest Landscape Management in New Brunswick*, in C. Caza and K. Kaarik, eds. *Envisioning Future Canadian Landscapes: A - Source Book*. Ottawa: Wildlife Habitat Canada, 74-77.

Therivel, R. 1993. *Systems of Strategic Environmental Assessment,* EIA Review. 13, 145-168.

Therivel, R. et al. 1992. *Strategic Environmental Assessment.* London: Earthscan.

US Department of Energy (DOE). 1994. *Implementation Plan. Environmental Restoration and Waste Management Programmatic Environmental Impact Statement.* Washington, D.C.: DOE/EIS-0200.

US Department of Housing and Urban Development (HUD). 1981. *Areawide Environmental Impact Assessment. A Guidebook*. Washington, D.C.: HUD.

United Nations Economic Commission for Europe (UNECE). 1992. *Application of Environmental Impact Assessment Principles to Policies, Plans and Programmes*. Geneva: UNECE Environmental Series No. 5.

Valve, H. and M. Hilden. 1994. *Strategic decisions and environmental assessement - the case of Finnish agricultural policy*, paper tabled at SEA workshop, the Hague, 15-16 December, 1994.

Verheem, R. 1992. *Environmental assessment at the strategic level in the Netherlands*. Project Appraisal. 7(3): 150-156.

Verheem, R. 1994. *SEA of Dutch Ten Year Programme on Waste Management.* Paper to IAIA'94, Quebec City.

Verheem, R. 1995. *Strategic Environmental Assessment: Experiences in the Netherlands*. Paper to the Conference 'Strategic Environmental Prevention in Master Planning', 30/3/95, Saarbrücken, Germany.

Verheem, 1996. *SEA in the Netherlands: Overview and some Case Studies*. Paper to the 'Fachtagung Umweltprüfung von Plänen und Programmen', 16/04/96, Vienna, Austria.

Vig, N.J. 1992. *Parliamentary Technology Assessment in Europe: Comparative Evaluation*. Impact Assessment Bulletin. 10(4): 3-23.

Wagner, D. 1995. *Environmental Assessment in Germany*. EIA Newsletter. 10:8-9.

Webb, W. and L. Sigal. 1992. *Strategic environmental assessment in the United States*. Project Appraisal. 7(3): 137-141.

Wood, C. 1988. EM in plan making, in P. Wathern. ed. Environmental Impact *Assessment: Theory and Practice*. London, Unwin Hyman, 98-114.

Wood, C. and M. Djeddour. 1992. *Strategic environmental assessment: EA of policies, plans and programmes,* Impact Assessment Bulletin. 10(1): 3-22.

Wood, C. 1994. *Strategic Environmental Assessment and Spatial Planning.* Paper to the International Seminar on EIA of Roads, June 1994, Palermo, Italy.

World Bank, 199labc. *Environmental Assessment Sourcebook*. 3 Vols.[abc] Washington D.C.: World Bank Technical Paper Number 139.

World Bank, 1993. *Annual Review of Environmental Assessment.* Washington, D.C.: World Bank Environment Department (Sec. M93-212).

World Bank. 1995. *The Impact of Environmental Assessment.* Draft report prepared by Land, Water and Natural Habitats Division, Environment Department, Washington, D.C.

World Commission on Environment and Development. 1987. *Our Common Future*. New York: Oxford University Press.

Zetter, J. 1994. *Environmental Appraisal of Development Plans. The U.K. experience*. Paper to IAIA'94, Quebec City.

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VROM 96293/h/6-96
18503/192