

Environmental Impact Assessment

Comparative Study

Case study: United States, United Kingdom, New Zealand, Egypt

Presented by

Hosam Kotb EL-Sayed

**A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
CITY PLANNING**

**FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
April 2001**

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Mohamed Ahmed Riad

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**In the first and in the last
Much thanks and praise for ALLAH**

Then thanks for :

My parents (Father – Mother) and all of my family

**And My teachers who have teached me from the first
moment I joined school until now, and on the top of them
Prof. Dr. Tarek A. Aboul-Atta**

And All persons who did help me to achieve this research

ABSTRACT

لقد شعرت دول العالم المتقدم منذ سنوات طويلة بأهمية وخطورة القضايا البيئية وضرورة التعامل معها تقاديا لحدوث كوارث بيئية لا قبل لهذه الدول بمواجهتها ، ومن ثم ابتكرت هذه الدول وعلى رأسها الولايات المتحدة الأمريكية اسلوبا جديدا يسمى (تقييم الأثر البيئي) ENVIRONMENTAL IMPACT ASSESSMENT يقوم على اساس تقدير الأثار البيئية السلبية الناتجة عن مشروعات وبرامج التنمية بها ومن ثم تحديد الجدوى البيئية لتنفيذ المشروع بالإضافة الى الجدوى الاقتصادية والاجتماعية .

لقد شعرت دول العالم الثالث ومن بينها مصر منذ سنوات قلائل بأن التعامل مع القضايا البيئية اصبح ضرورة وحتمية وانه ليس دربا من دروب الرفاهية ، ولقد توجت مصر هذا الشعور بإصدارها قانون البيئة رقم ٤ لسنة ١٩٩٤ والذي افرد جزءا خاصا منة لتقييم الأثر البيئي .

وانطلاقا من شعور الباحث بأهمية دراسة الموضوعات المتعلقة بالبيئة من ناحية ، وتردى اوضاع البيئة فى مصر من ناحية اخرى سواءاً فيما يتعلق بارتفاع نسبة التلوث فى المناطق الحضرية ولاسيما مدينة القاهرة او ما يحدث من تدمير لكل عناصر البيئة الطبيعية (مياه - هواء - تربة - نباتات - حيوانات وطيور وكائنات بحرية نادرة) فى المناطق السياحية والمحميات الطبيعية ، وذلك حتى بعد صدور قانون البيئة والعمل به . ولهذا قام الباحث بإعداد هذا البحث والذي يهدف الى :

- دراسة وتحليل العديد من اساليب التقييم البيئي فى العالم (النظرية - العملية) وذلك من اجل اما استنباط اسلوب جديد يتلافى العيوب الموجودة فى الأساليب التى تم دراستها ويحتوى على كافة المزايا بها او تنمية وتطوير الأساليب الحالية لمعالجة مواطن القصور والضعف بها .
- دراسة العديد من الطرق والتقنيات المستخدمة فى التقييم البيئي فى العالم ، وذلك من اجل تحديد مميزاتها وعيوبها وتحديد انسب الظروف او الحالات لاستخدام كل منها بصفة عامة ، وما يتناسب منها لاستخدامه فى مصر .
- دراسة نظام التقييم البيئي فى مصر و تحديد أهم مشكلاته واسبابها ومن ثم وضع الحلول (التوصيات) المناسبة لحل هذه المشكلات

ولكى يتم تحقيق الأهداف السابقة فقد قام الباحث بصياغة منهجية البحث على أساس أنها تقوم على مدخلين (جزئيين) متكاملين أحدهما نظرى والآخر عملى كما يلى:

١. **المدخل (الجزء) النظرى :** ويتعرض فيه الباحث لما ورد بالأدبيات من اراء نظرية فيما يتعلق بهذا الموضوع ، وينقسم المدخل النظرى الى ثلاثة فصول وهى :

الفصل الأول : عبارة عن مقدمة للبحث يتم فيها شرح لأهمية البحث والأهداف الرئيسية له والمنهجية المقترحة والخطوات التنفيذية والنتائج المتوقعة منه .

الفصل الثانى : ويتناول خلفية تاريخية لتقييم الأثر البيئي ثم يتعرض بالدراسة والتحليل لمجموعه من المفاهيم واقتراح مفهوم جديد لتقييم الأثر البيئي ، ثم يتعرض لمجموعه من الأساليب النظرية واهم الخطوات بها ، وينتهى الفصل بنتيجة هامة ألا وهى اشتراك معظم الأساليب فى خطوات شبة موحدة مع بعض الفروق البسيطة .

الفصل الثالث : ويتناول الطرق والتقنيات المستخدمة فى تقدير والتنبؤ بالأثار البيئية وقد تعرض الباحث بالدراسة والتحليل لـ ١١ طريقة من هذه الطرق وانتهى الباحث فى هذا الفصل من خلال مقارنة هذه الطرق مع بعضها البعض الى ان لكل طريقة مميزاتها وعيوبها والموضوعات التى يمكن ان تعطيها بالبحث والقدرات الفنية للأشخاص القائمين على ادارة كل منها بالإضافة الى كم المعلومات المتاحة ، ولهذا فكل هذه الطرق مطلوبة وذلك طبقا لنوعية المشروع محل الدراسة .

٢. **المدخل (الجزء) العملى :** ويتعرض فيه الباحث للتجارب العملية لبعض الدول المتقدمة ومتوسطة التقدم فى تقييم الأثر البيئى ، وينقسم المدخل العملى الى ثلاثة فصول وهى :

الفصل الرابع : ويتعرض فيه الباحث للتجارب العملية لثلاثة دول تمثل الجيل الأول (المتقدم) والجيل الثانى (متوسط التقدم) فى مجال التقييم البيئى وهى الولايات المتحدة الامريكية والمملكة المتحدة (بريطانيا) ونيوزيلندا ، هذا بالإضافة الى تجربة جمهورية مصر العربية .

الفصل الخامس : تعرض الباحث فيه لقضية فعالية نظام تقييم الأثر البيئى بصفة عامة ، ثم تعرض لتقييم هذه الفعالية والعوامل المؤثرة عليها ومنها استنبط الباحث مجموعة من الأسس والمعايير (١٣ معيار) التى يتم على اساسها تقييم فعالية أنظمة التقييم البيئى فى الدول ، ومن ثم اتخذ البحث هذه المعايير كسبيل لعقد مقارنة تفصيلية بين أنظمة التقييم البيئى فى كل من (الولايات المتحدة الامريكية وبريطانيا ونيوزيلندا ومصر) لمعرفة مواطن القوة والضعف بها .

الفصل السادس : ركز الباحث فى هذا الفصل على نتائج المقارنة التى عقدت فى الفصل السابق ومنها تمكن الباحث من وضع يده على مواطن القوة والضعف فى كل من الأنظمة التى تم دراستها (انظر الجدول التالى) ، ومن ثم تقدم الباحث بمجموعة من المقترحات والتوصيات لتفعيل اداء نظام تقييم الأثر البيئى بكل دولة على حدى مع التركيز الشديد على المقترحات والتوصيات الخاصة بمصر والتى يمكن إيجاز بعضها فيما يلى :

◀ **توصيات بعيد المدى (استراتيجية بعيدة المدى)** تقوم على اساس :

- مبدأ التكامل بين كافة السياسات العامة للدولة (اقتصادية ، بيئية... الخ) .
- مراجعة كافة القوانين التى لها علاقة مباشرة او غير مباشرة بالبيئة .
- نشر الوعي البيئى بين كافة طوائف المجتمع .
- بناء القدرات فى مجال البيئة من خلال تكثيف البرامج التدريبية

◀ **توصيات قريبة المدى (استراتيجية قريبة المدى)** : وهى تنقسم الى :

- **توصيات عامة**

- انشاء مركز لأبحاث التقييم البيئى تكون مهمته مساعدة جهاز شئون البيئة فى وضع السياسة العامة لإدارة البيئة ، وتنمية ومتابعة عملية التقييم البيئى واصدار الدلائل الإرشادية لمراحله بالإضافة الى عمل البرامج التدريبية للعاملين فى هذا الحقل وتقديم المشورة والمعونة الفنية لكافة المتعاملين فى هذا المجال .
- تنمية المشاركة الشعبية والبحث عن آليات جديدة لتفعيل دورها .
- الشفافية فى التعامل بين كل العناصر المتداخلة فى عملية التقييم ، والتأكيد على أحقية المستثمر او صاحب المنشأة محل التقييم فى الحصول على كافة المعلومات المتاحة لدى الجهات المسؤولة عن عملية التقييم وغيرها .

- **توصيات خاصة**

- وهى تعنى بالتوصيات الخاصة بكل خطوة من خطوات التقييم البيئى نفسها لمعالجة القصور فيها (انظر الفصل السادس) ، وعلى سبيل المثال :
- الأساس القانونى للتقييم البيئى
- ضرورة ان تكون نصوص القانون واضحة بحيث توصف كل خطوة من خطوات عملية التقييم (والأنشطة التى تتم فيها) وصفاً واضحاً ومحددأ .
- ضرورة ان يكون القانون واضحاً عند التطبيق بحيث تكون التدابير القانونية كافية الوضوح عند التطبيق لكل من المسئول الذى يطبق القانون والمستثمر او صاحب المشروع او المنشأة .

Lists

- ضرورة ان يتمتع القانون بالعقلانية والمرونة وان تكون التدابير القانونية على درجة كافية من المرونة والقبول الشعبى.
- ضرورة ان يحدد القانون الحدود الزمنية لكل خطوة من خطوات التقييم البيئى وكذلك الحدود الزمنية لعملية التقييم ككل حتى لا تؤدى البيروقراطية الحكومية او تراخى الموظفين الى زيادة مدة عملية التقييم وبالتالي عرقلة حركة التنمية بصفة عامة .

جدول : تقييم فعالية انظمة التقييم البيئى فى الدول محل الدراسة

المعايير التى تحققت فى الدول محل الدراسة				معايير التقييم	معايير التقييم
مصر	نيوزيلندا	المملكة المتحدة	الولايات المتحدة		
١١	١٦	١٦	١٧	٢٠	الأساس القانونى
٥	١٣	٨	٨	١٥	المشروعات التى يشملها التقييم
٠	٨	٨	٨	١٠	بدائل المشروع
١٤	١٨	١٨	١٨	٢٠	فحص الأنشطة والمشروعات
٣	١٠	٤	١٨	٢٠	دراسة نطاق التأثير البيئى
٧	٤	٧	١٤	١٥	محتويات تقرير التقييم البيئى
٦	١٤	٧	١٤	١٥	مراجعة تقرير التقييم البيئى
٣	٥	٥	٥	١٥	صنع القرار
٤	٥	٥	٥	١٥	متابعة التأثيرات
٣	١٨	١٨	١٨	٢٠	إجراءات تخفيف التأثيرات
٤	٦	٦	٩	١٠	المشاركة الشعبية
٢	٤	٤	١٣	١٥	متابعة نظام التقييم البيئى
٤	٨	٨	٨	١٠	دراسة المنفعة والخسارة
٦٦	١٢٩	١٠٨	١٥٥	٢٠٠	نتيجة التقييم

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FIRST PART

THEORITICAL APPROACH

CHAPTER 1: *INTRODUCTION*

CHAPTER 2: *DEFINITIONS AND THEORITICAL PROCESS*

CHAPTER 3: *METHODS AND TECHNIQUES*

CHAPTER 1

INTRODUCTION

CHAPTER 1

INTRODUCTION

1.1 Interface

Since the dawn of civilization, the environment was not threatened by human activities. However, with the rise of the industrial revolution and the spread of industrial activities, many environmentally related problems appeared with form of air, water and land pollution.

Recently, this pollution reached unprecedented, dangerous and more complex levels. Leading among the major environmental problems are:

- The Ozone hole which allows the cosmic and ultra violet rays to penetrate our atmosphere causing skin cancers and other diseases;
- The rise in earth temperature which affects the snow melting in the northern and southern poles and subsequently increases sea and ocean levels causing the flooding of many coastal cities and shores in the world;
- Acid rain falling on many heavily polluted chemical industrial zones in the more developed countries; and many others...

Many developed countries, and specially the United States of America, have sensed the danger of these problems on the environment and welfare of its societies. As the first step they tried to develop methods that enables them to assess the impacts of existing projects on the environment or predict the effects of feature projects.

1.2 Reasons for selecting this topic

There are many reasons for selecting this topic, they could be summarized in the following:

- * *The environment issues are more important than ever before.*

Human activities are altering natural cycles and systems on an unprecedented scale. For the first time, the cumulative effects of development activities are estimated to be on par with biophysical processes as an agent of ecological negative change.

- * *Risks and impacts are more significant than ever before.*

We live in a greenhouse world of ozone holes and vanishing species. Many reputable scientists consider that the impact of human activities on the biosphere is reaching critical thresholds, with the consequent threat of ecological breakdown and social conflict.

- * *Negative effects on man's health.*

The increase of the environmental problems in the human settlements like noise, air, water and solid waste pollution that affect man's health and endanger their lives.

- * *Destruction of the precious natural resources.*

The destruction of rare animals, plants and marine environment in Egyptian coastal zones as a result of the random development programs and projects that have no respect for these precious values.

1.3 Scope of the thesis

In the last few years the environmental impacts became more complex on different levels. Thus the environmental assessment has been Categorized into two categories:

First, The Environmental Impact Assessment (EIA) which focuses on the assessment of environmental impacts of projects like a factory for something, power station or touristic village ...etc .

Second, The Strategic Environmental Assessment (SEA) which focuses on the assessment of environmental impacts of development strategies and policies such as the South Egypt Development Strategy or Water Resource Management Policy...etc

This research focuses only on studying the first category (Environmental Impact Assessment (EIA)) .

1.4 Goals of the thesis

The thesis have three main goals, as follows :

- The study and the analysis of many processes of the Environmental Impact Assessment (EIA) in the world and the identification of their shortcomings in order to develop them or elicit a new process containing all the advantages of the studied processes.
- The study of the methods and techniques of the Environmental Impact Assessment (EIA) in the world in order to determine their advantages and disadvantages, and identify the best conditions or cases to use each of them.
- The study and the analysis of the system of Environmental Impact Assessment (EIA) in Egypt in order to determine its main problems, the reasons of these problems and their relationship to the process or to the application, subsequently it aims at reaching the suitable recommendations to solve these problems.

1.5 Hypothesis of the thesis

This research depends mainly on gathering data about EIA systems in several developed countries. These data will be analyzed and compared with the Egyptian EIA system. The research hypothesis depends essentially on the outcome of this comparison as follows:

1.5.1 Group 1

In the case where a similarity exists between the systems in all the countries studied and the system in Egypt. ie:

They agree together on a process that is expect to achieve their preset goals. Thus the hypothesis will be that the problems of the Egyptian EIA system are related more to the application of the system rather than the theoretical process it self.

1.5.2 Group 2

In the case where the systems in all the countries studied are different from each other on the theoretical level.

Thus the research hypothesis will be that each country should formulate and tailor the system according to its specific conditions and requirements.

1.6 Methodology of the thesis

The research begins by a survey of the theoretical processes of EIA systems in many parts of the world. The results of this survey will be analyzed to deduct the major points of differentiation and similarity among them. The following steps will be carried out:

- 1- Studying EIA definitions and their historical evolution from the inception of EIA in the end of 1969 till now.
- 2- Studying a number of theoretical EIA processes, existing in the last thirty years and identifying the points of differentiation and similarity among them.
- 3- Studying the widely known methods and techniques of the Environmental Impact Assessment (EIA) and identify their strengths and weaknesses.

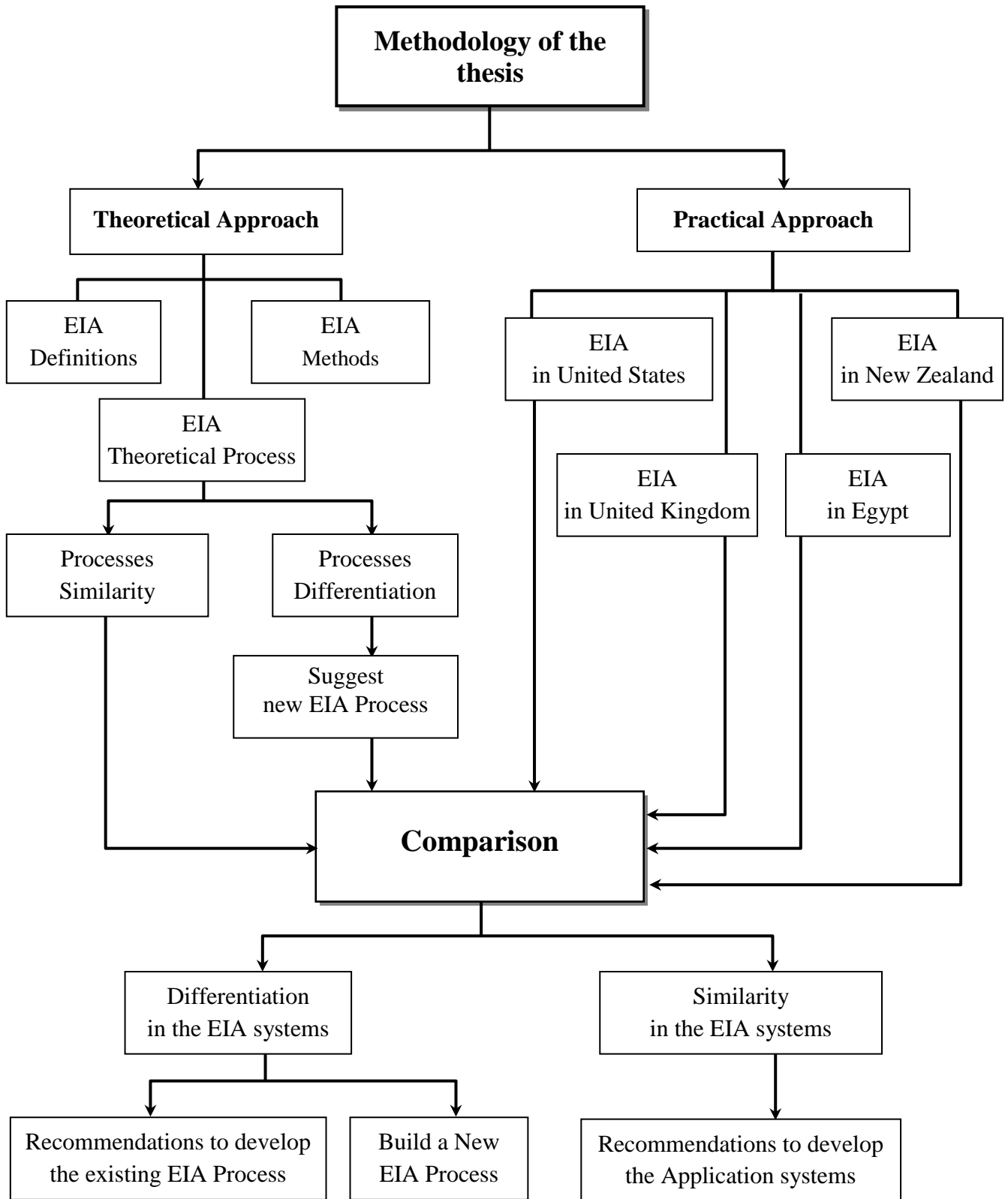
Introduction

The two previously mentioned cases will be hypothesized depending on the differentiation and similarity level of the comparison.

Four EIA systems will be studied in depth in the practical part of the research. The analysis of these four systems will focus on the differentiation or similarity level and the points weakness and strength in each of them.

The research concludes with the suggestion of an EIA system to Egypt that is expected to achieve its preset goals and the steps needed to implement it efficiently in Egypt.

Figure 1.1. Methodology of the thesis.



CHAPTER 2

DEFINITIONS AND THEORITICAL PROCESS

CHAPTER 2

DEFINITIONS AND THEORETICAL PROCESS

2.1 Historical Background

In the last thirty years since its inception, environmental impact analysis (EIA), a procedure for assessing the environmental implications of a decision to enact legislation, to implement policies and plans, or to initiate development projects, has become a widely accepted tool in environmental management. EIA has been adopted in many countries with different degrees of enthusiasm where it has evolved to varying levels of sophistication. In the following paragraphs simple ideas will be presented on the inception of EIA in developed world specially United States, less developed world, and Eastern Europe countries

In the United States, EIA required under the National Environmental Policy Act of 1969 (NEPA) has given a federal dimension to land-use planning which existed in only rudimentary form prior to 1970 and has created a situation where decisions on major federal activities can only be taken with foreknowledge of their likely environmental consequences. The influence of these federal measures can be gauged from the rapidity with which they have been echoed in state and local statutes. A host of other industrialized countries have since implemented EIA procedures. Canada, Australia, the Netherlands and Japan, for example, adopted legislation in 1973, 1974, 1981 and 1984 respectively, while in July 1985 the European Community (EC) finally adopted a directive making environmental assessments mandatory for certain categories of projects after nearly a decade of deliberation.

Definitions and theoretical process

Countries in the developed world have not been alone in realizing the potential of EIA. Many less developed countries (LDCs) have been quick to appreciate that the procedures offer a means of introducing some aspects of environmental planning, often in the absence of any formal land-use planning control system. Colombia became the first Latin American country to institute a system of EIA when procedures were adopted in 1974. In Asia and the Pacific region, Thailand and the Philippines now have long-established procedures for EIA. There is a dearth of information on the general situation in Africa, although a number of nations including Rwanda, Botswana and the Sudan have experience of EIA, and recently Egypt adopted legislation in 1994.

In the centrally planned economies of Eastern Europe, it is increasingly realized that EIA should be an integral component of state planning, although Marxist theory places another perspective on the interrelationships between development and the environment.

Many agencies have also become interested in the potential of EIA. The Organization for economic Co-operation and development (OECD) adopted recommendations concerning EIA within its constituent states in 1974 and 1979 and for development aid projects in 1985. The United Nations Environment Programme (UNEP) has provided guidance on the assessment of development proposals and supported research on EIA in developing countries. The World Health Organization (WHO) has become concerned with the need to assess not only the opportunities to improve the quality of life presented by development, but also consequent adverse effects upon human health mediated through environmental change.

Definitions and theoretical process

In recent years, the breadth of EIA has expanded perhaps even more rapidly than its rate of geographical spread. Thus, it now comprises a number of discrete specialisms and has spawned related disciplines concerned with other effects of development, particularly social impact assessment (SIA). Environmental health impact analysis (EHIA), assessing the health implications of development, is becoming increasingly important and appears to be on the point of developing into an independent discipline comparable to SIA. Thus, in a few short years a new subject area has emerged, generated considerable controversy, stimulated the development of new technical and administrative skills, become established and gained widespread acceptance.

EIA has been regarded as both 'science' and 'art', reflecting the concern both with technical aspects of appraisal and the effects of EIA upon the decision-making process. It is, however, somewhat artificial for they are inexorably linked. Thus, for example, certain EIA methods developed to deal with technical problems impinge directly upon decision making. In the extreme case of adaptive environmental assessment and management (AEAM), these two facets have become firmly intermeshed.⁽¹⁾

2.2 Definitions

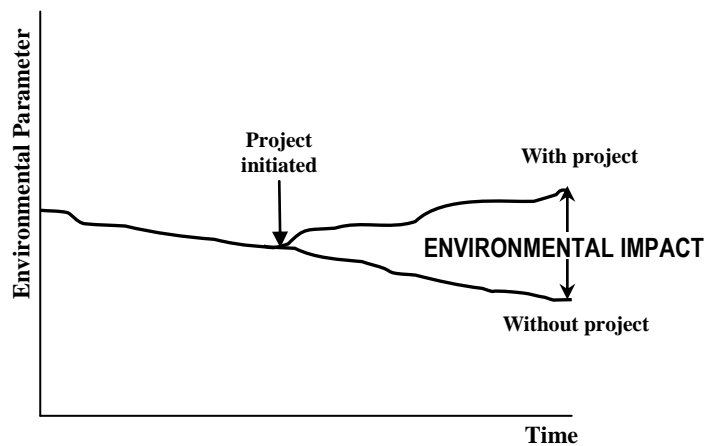
In this point some of the most widespread terms related to the topic of the thesis will be presented such as Environmental Impact, Environmental Impact Assessment (EIA), Environmental Impact statement (EIS), etc...

(1) **Wathern, P. (ed.);** “Environmental Impact Assessment: Theory and Practice”; Unwin Hyman; London; **1988.**

2.2.1 Environmental Impact

Many people consider the two expressions 'impact' and 'effect' to be exact synonyms, while others support the opinion that there is a difference between natural or man-induced changes in the biogeophysical environment. The effects that result as consequences to these changes are called impacts. An impact consists of both spatial and temporal elements. It can be described as the change in an environmental established limit, within a certain period and a defined area. It results from a particular activity compared with the situation, which would have taken place, if the activity had not been initiated. It is most easily envisaged graphically Fig. 2.1. ⁽¹⁾

Figure 2.1 An impact.



2.2.2 Environmental Impact Assessment (EIA)

There are many definitions to EIA all over the world, some of them will be presented in following:

2.2.2.1 First definition

In this definition (*Munn 1975*) defined EIA as an activity identifying and predicting tool, and he said that EIA means "An activity designed to identify and predict the impact on the biogeophysical environment and on man's health and wellbeing of legislative proposals, policies, programs, projects, and operational procedures, and to

(1) **Wathern, P. (ed.);** “Environmental Impact Assessment: Theory and Practice”; Unwin Hyman; London; 1988..

interpret and communicate information about the impacts".⁽¹⁾

2.2.2.2 Second definition

In this definition (*Munn 1979*) defined Environmental Impact Assessment (EIA) as: a process for identifying the likely consequences for the biogeophysical environment, man's health, and welfare of implementing particular activities and for conveying this information, at a stage when it can materially affect their decision, to those responsible for sanctioning the proposals.⁽²⁾

(*Davies & Muller 1983*) argue for an extension of this definition to cover socioeconomic effects to provide for a unified appraisal.⁽³⁾

Thus, EIA is a process having the ultimate objective of providing decision makers with an indication of the likely consequences of their actions.

2.2.2.3 Third definition

In this definition (*Jain, et al 1981*) defined EIA as a systematic analysis, and he said that "Environmental impact assessment requires a systematic interdisciplinary analysis of the physical, chemical, biological, cultural, and socioeconomic impacts of a proposed project or activity".⁽⁴⁾

2.2.2.4 Forth definition

In this definition (*Robin 1982*) said that EIA is specifically designed to look at both the nature (characteristics) and distribution (spatial spread, timing and effects on particular groups of society) of impacts that might result from a proposed action or program or policy initiative.⁽⁵⁾

(1) **Munn, R. E. (ed)**; "Environmental Impact Assessment. SCOPE5"; John Wiley; Clichester; UK; **1975**.

(2) **Munn, R. E. ;** "Environmental Impact Analysis. Principles and Procedures"; 2nd edn; SCOPE report no. 5; Clichester; Wiley; **1979**.

(3) **Davies, G.S. and F.G. Muller;** "A handbook on Environmental Impact Assessment for use in developing countries"; Report submitted to United Nations Environment Program; Nairobi; **1983**

(4) **Jain, R.K., et al.;** "Environmental Impact Assessment"; Academic press; NewYork; **1981**.

(5) **Robin Haynes;** "Environmental Science Methods"; Chapman & Hall; **1982**.

2.2.2.5 Fifth definition

In this definition (*Ahmed & Sammy 1985*) defined EIA as a comparative study based on Prediction, and a decision-making tool, as follows:

- A study of the effects of a proposed action on the environment;
- It compares various alternatives by which a desired objective may be realized and seeks to identify the one which represents the best combination of economic and environmental costs and benefits;
- It is based on a prediction of the changes in environmental quality which would result from the proposed action;
- It attempts to weigh environmental effects on a common basis with economic costs and benefits; and
- It is a decision-making tool. ⁽¹⁾

2.2.2.6 Sixth definition

In this definition (*Armoure 1989*) described EIA as: A process for identifying, predicting and evaluating the environmental effects of proposed activities through systemic and comprehensive analysis, which considers the alternatives of the proposed activities and its effects at a stage in the planning process where serious environmental disturbance, degradation or damage can be avoided or minimized and where an alternative may become the preferred solution. ⁽²⁾

2.2.2.7 Seventh definition

In this definition (*Diane Wiesner 1995*) said that EIA can be described as: A process identifying the consequences for the total environment of undertaking new developments and changing natural systems. It arose to resolve the competing demands for economic development with preservation of the quality of all of life in the surrounding areas. ⁽³⁾

(1) **Ahmad, Y. J. and G. K. Sammy;** “Guidelines to environmental impact assessment in developing countries”; London, Hoodder & Stoughton; **1985**.

(2) **Armoure, Audrey;** “Integrating Impact Assessment in planning process: from Rhetoric to reality. Integrating Impact Assessment in planning process: International Perspective and Experiences”; International Association for Impact Assessment; **1989**.

(3) **Diane Wiesner;** “EIA the environmental impact assessment process – WHAT IT IS and WHAT IT MEAN TO YOU”. Great Britain; Prism Press; **1995**.

2.2.2.8 Eighth definition

In this definition (*Egyptian Environmental Affairs Agency EEAA (1996)*) said that EIA is: A systematic examination of the unintended consequences of a development project or program with the view to reducing or mitigating the negative consequences and capitalizing on the positive ones. ⁽¹⁾

2.2.2.9 Ninth definition

EEAA (1997) defined EIA as an activity interested in identifying and investigating the likely consequences (impact) of particular activity or project on the biogeophysical environment and the human health and welfare.

Add: socioeconomic effects. ⁽²⁾

2.2.2.10 Conclusion of the definitions

After presenting nine of the EIA definitions and studying them, the following results could be presented:

2 definitions from 9 (first and ninth) said that EIA is:

An activity designed to identify, predict and investigate the impact on the biogeophysical environment and on man's health and welfare.

3 definitions from 9 (third, sixth and eighth) said that EIA is :

A systematic interdisciplinary analysis (or examination) of the physical, chemical, biological, cultural, and socioeconomic impacts of a proposed project or activity.

3 definitions from 9 (secondth, sixth and seventh) said that EIA is :

A process for identifying, predicting and evaluating the environmental effects of proposed activities.

(1) **Egyptian Environmental Affairs Agency**; “Environmental Guidelines for developing in the coastal areas”; **March, 1996.**

(2) **SEAM project/ Egyptian Environmental Affairs Agency** ; “Technical EIA training course” **1997.**

Definitions and theoretical process

2 definitions from 9 (second and fifth) said that EIA is :

a decision-making tool or process having the ultimate objective of providing decision makers with an indication of the likely consequences of their actions.

With the investigation of these results, it could say that all the former definitions agreed that EIA "designed to identify, predict and evaluate the environmental effects of proposed activities on the biogeophysical environment and the human health and welfare" although they differ in naming it. Some of them called it "a process" and others called it "an activity" and others called it " a systematic analysis" but all of them agreed with the main meaning.

2.2.2.11 Proposed definition (by the researcher)

From the previous review of many definitions and the analysis which have been made, the researcher could suggest a new s definition to EIA as follows:

EIA is a process designed to identify, predict and evaluate the environmental effects of proposed action, program or policy on the biogeophysical, environment and the human health and welfare through systemic and comprehensive analysis allows to:

- weigh environmental effects on a common basis with economic costs and benefits.
- look at both the characteristics and distribution (spatial spread and timing) of impacts.
- compares various alternatives by which a desired objective may be realized and seeks to identify the one which represents the best combination of economic and environmental costs and benefits.
- have the ultimate objective of providing decision makers with an indication of the likely consequences of their actions.
- consider the alternatives of the proposed activities and its effects at a stage in the planning process where serious environmental disturbance, degradation or damage can be avoided or minimized and where an alternative may become the preferred solution

2.2.3 Environmental assessment (EA)

John (1985) introduced EA as a document prepared by federal agency to determine whether an EIS is necessary, and EA must specify the need for the proposed activity, alternatives of the proposal and environmental impacts of the proposal and alternatives.⁽¹⁾ But *Sadler (1996)* introduced EA as a systematic process of evaluating and documenting information on the potentials, capacities, and functions of natural systems and resources in order to facilitate sustainable development planning and decision making in general, and to anticipate and manage the adverse effects and consequences of proposed undertakings in particular.⁽²⁾

2.2.4 Environmental Impact Statement (EIS)

The outcome of an EIA is usually some formal document. This report has a variety of names throughout the world, although the term 'environmental impact statement' (usually abbreviated to EIS) is most widely known and carries the least scope for confusion. 'Environmental assessment' and 'environmental appraisal' are commonly adopted synonyms. Despite minor differences throughout the world, there is a general consensus on the content of an EIS.⁽³⁾ Table 2.1

Table 2.1 Content of an EIS for US federal proposals as required by Council on Environmental Quality

Summary
Statement of purpose and need
Alternatives including proposed action
Affected environment
Environmental consequences
List of preparers

-
- (1) **John, H. Baldwin**; "Environmental Planning and Management"; Westview press; Boulder and London; **1985**.
 - (2) **Sadler, B.** ; "International Study of the Effectiveness of Environmental Assessment - FINAL REPORT, ENVIRONMENTAL ASSESSMENT IN A CHANGING WORLD: Evaluating Practice to Improve Performance"; **1996**.
 - (3) **Wathern, P. (ed.)**; "Environmental Impact Assessment: Theory and Practice"; Unwin Hyman; London; **1988**.

2.2.5 Social Impact Assessment (SIA)

(SIA) is a process of estimating the social consequences that are likely to follow from specific policy and government proposals, particularly in the context of national EA requirements.⁽¹⁾

2.2.6 Strategic environmental assessment (SEA)

is a process of prior examination and appraisal of policies, plans, and programs and other higher level or pre-project initiatives.⁽²⁾

2.3 EIA and EIS

It is desirable to draw a clear distinction between the Environmental Impact Assessment (EIA) and the Environmental Impact Statement (EIS). It is unfortunate that these terms have been used interchangeably by several authors, although they do not represent the same thing.

Both the terms of EIA and EIS have their genesis in NEPA and the CEQ regulations which followed it. In the specific context of NEPA and CEQ regulations, the EIA consider as a brief examination conducted to determine whether or not a project requires an Environmental Impact Statement. CEQ has established a set of guidelines which identify those projects for which a full environmental study would be required. Thus, when a new project is proposed, the EIA is the study of these guidelines. If the project is found to be exempted by the guidelines, a statement of negative findings is filed. If not, work on the full environmental study proceeds and the findings are reported in an EIS. The content and format of the EIS is spelled out in detail in the CEQ Regulations and other documents. Clearly, EIS represents the fundamental activity, and EIA is simply an introduction to it.

The above remarks are specific to the USA. They have been stated here to demonstrate how the confusion of terms comes about. In most of the rest of the world,

(1) **Sadler, B.** ; “International Study of the Effectiveness of Environmental Assessment - FINAL REPORT, ENVIRONMENTAL ASSESSMENT IN A CHANGING WORLD: Evaluating Practice to Improve Performance”; **1996.**

(2) The former reference.

the interpretation of EIA and EIS is far different. Generally, EIA is used to include the technical aspects of the environmental study, including data gathering, prediction of impacts, comparison of alternatives and the framing of recommendations. EIS (if the term is used at all) refers to the document, which summarizes the results of the study, and forwards recommendations to the decision-maker. . In marked contrast to the US definitions, the EIA in this context is the substantial technical activity, for which the EIS is a necessary reporting device.

It should be evident that much confusion can arise from the out-of-context use of the USA definitions of the terms EIA and EIS. In fact, it has arisen.⁽¹⁾

2.4 Purpose and Aims of EIA

As *Sadler (1996)* stated, , the substantive purposes of EIA are twofold. *First*, the immediate aim is to facilitate sound, integrated decision making in which environmental considerations are explicitly included. The EIA process does so by providing clear, well-organized information on the environmental effects, risks, and consequences of development options and proposals. *Secondly*, the EA process is usually (but not universally) directed toward achieving or supporting ultimate goals of environmental protection and sustainable development. These reference or end goals are variously phrased and framed in EIA laws and policies, as are the specific objectives to be met by the process.

Internationally, EIA is becoming a *multi-purpose* process, with increasing emphasis given to promoting long term, societal goals that reflect and express the ideals of sustainable development. These include:

- safeguarding valued ecological processes and heritage areas;
- avoiding irreversible and unacceptable loss and deterioration of natural capital;
- ensuring development is adjusted to the potentials and capacities of the resource base;
- optimizing natural resource use, conservation and management opportunities;

(1) **Ahmad, Y. J. and G. K. Sammy**; “Guidelines to environmental impact assessment in developing countries”; London, Hodder & Stoughton; 1985.

Definitions and theoretical process

- protecting human health and community well being; and
- addressing distributional concerns related to the disruption of people and traditional lifestyles.

As a widely used (though not the only) process for meeting these objectives, EIA also meets a number of supporting and secondary aims. These are considered to include the following:

- improving coordination among participating agencies and actions;
- fostering better designed and planned development projects, i.e., greener and more cost-effective;
- empowering community development and building local capacity through public participation;
- instilling environmental values and accountabilities across a range of institutions; and
- internalizing environmental costs and damages in industry consistent with the polluter pays principle. ⁽¹⁾

2.5 The EIA process

The lack of consensus on the 'best' approach to EIA is freely acknowledged. What are presented in this chapter are some of the approaches to the EIA process, which are believed to be practical, and have the potential for being cost-effective. The objective is to give the decision-maker a familiarity with the steps involved, the importance of timing of each step, and the resources required.

2.5.1 First approach ⁽²⁾

This approach presented by *Jain et al. (1981)* and modified by *John H. Baldwin (1985)*. It consists of 10 steps:

-
- (1) **Sadler, B.** ; “International Study of the Effectiveness of Environmental Assessment - FINAL REPORT, ENVIRONMENTAL ASSESSMENT IN A CHANGING WORLD: Evaluating Practice to Improve Performance”; **1996**.
- (2) **John, H. Baldwin**; “Environmental Planning and Management”; Westview press; Boulder and London; **1985**.

Definitions and theoretical process

Step 1. Identify Action or Alternatives.

All reasonable alternatives, including the "no action" alternatives, to the proposed project or activity that could have significant environmental impacts should be analyzed. Center of Environmental Quality (CEQ) requires federal agencies to prepare and publish lists of action that normally require EISs or EAs or are categorically excluded. Proposed activities and alternatives should be compared with the list to determine their status.

Step 2. Identify Activities That May Have Impacts

Once the proposed activity is clearly defined and it is determined that significant impacts may occur, agency activities should be categorized into functional areas (such as preplanning, site preparation and construction, and operation categories). For each functional category, detailed project activities should be listed. Federal agencies have lists of categories and activities for specific types of projects.

Step 3. Inventory the Affected Environment.

Initially, all existing environmental, socioeconomic, and cultural conditions in the affected area should be studied. As the assessment team becomes familiar with the project, its impacts, and the affected area, it can begin scoping the inventory of existing factors that are pertinent to the nature and degree of potential impacts. The EIS should contain only those factors significantly affected and emphasize those most seriously impacted.

Step 4. Identify Probable Categories of Impacts.

Probable significant project impacts should be assigned to appropriate categories. The most common assignments are air, land, water, ecological, socioeconomic, and cultural categories. Subcategories can then be established according to project impacts. For example, the air category can be divided into climate, air pollution, noise, and visual effects subcategories.

Step 5. Identify Appropriate Impact Indicators.

Appropriate indicators or attributes for the various categories of environmental, socioeconomic, and cultural impacts should next be developed. This is a very

important step because the indicators will be used to describe, measure, predict, and assess the significance of impacts. These attributes should accurately reflect impacts, be readily measurable and quantifiable, and be capable of comparison against some threshold or standard to determine the significance of the impact.

Step 6. Identify Environmental Goals or Limitations.

The appropriate standards, goals, rules, regulations, or scientifically developed and recommended exposure or threshold limits for each environmental attribute should be clearly defined. These will be used at a later point in the study as a base line for the analysis of impact significance. The threshold of significance for certain categories of impacts may vary widely by geographic region and/or be difficult to ascertain. For instance, at what point does urban encroachment onto agricultural lands become significant? When in doubt, keep in mind that if a controversy is likely to develop, that level of impact could be interpreted in the courts as significant .

Step 7. Predict Environmental Impacts.

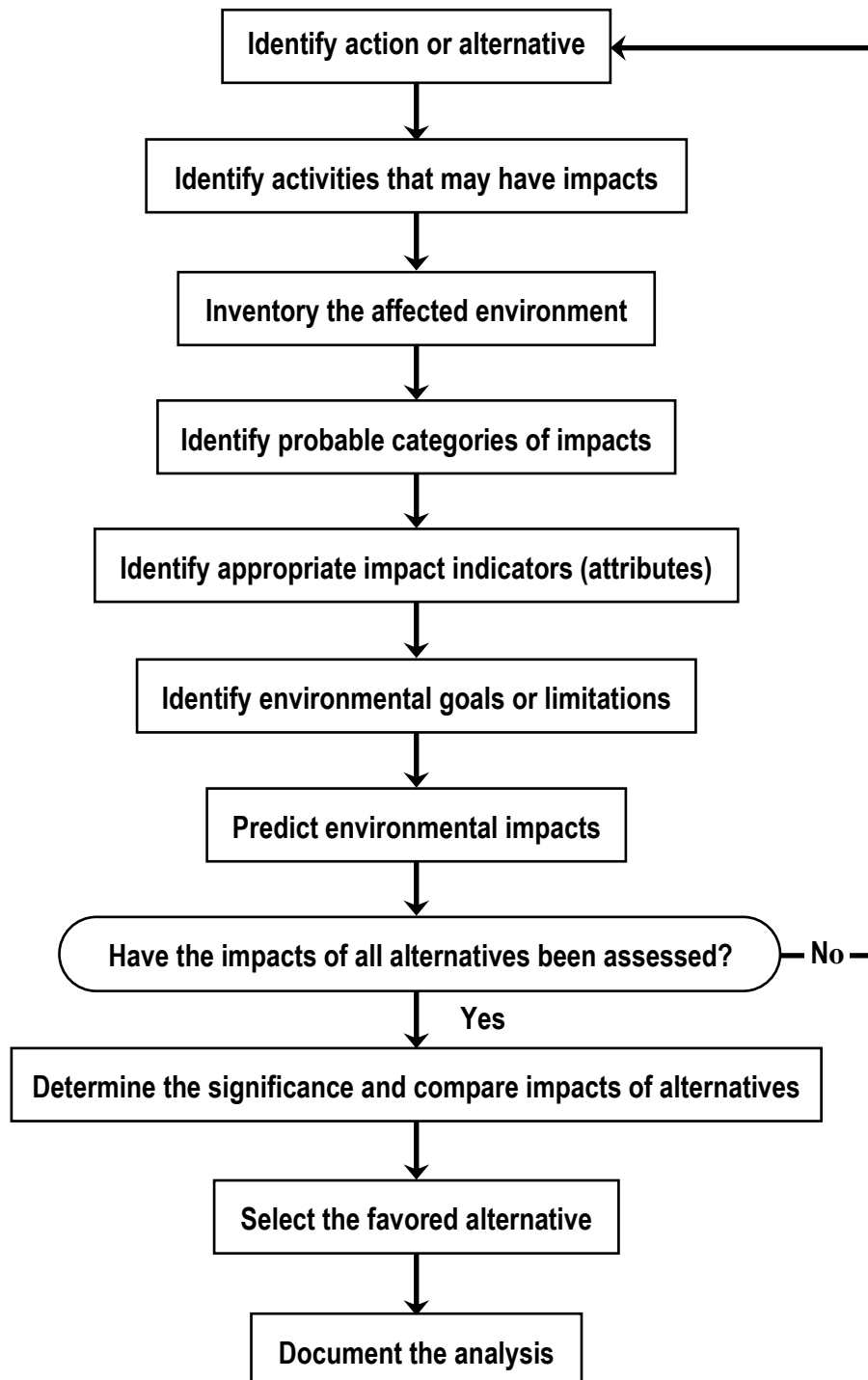
One of the most critical steps in the analysis is the prediction of the nature, probability, magnitude, duration, and affected area of the positive and negative impacts of the proposed activity. Most of this information can be obtained from an analysis of the detailed design specifications of the project, consultation with technical experts, socioeconomic surveys, site surveys, and EISs of similar projects. Special attention should be given to indirect, long-term (such as the consequent future economic growth), and cumulative or interactive impacts. In certain cases, laboratory or field experiments or computer models can be employed to ascertain the impacts of previously unstudied actions or to estimate cumulative or interactive impacts. The resulting impacts are most frequently compared with those of the "no action" alternative as a measure of the benefit of or harm caused by the proposed activity. Considerable attention should be paid to documentation of information sources.

Step 8. Determine the Significance and Compare Impacts of Alternatives.

Several methodologies have been developed to organize, present, evaluate, and compare the impacts of project activities and alternatives. It will discuss in the chapter of Methodologies and techniques of EIA.

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Figure 2.2 Procedure for Developing an Environmental Impact Analysis (modified from Jain et al., 1981).⁽¹⁾



(1) Jain, R.K., et al.; "Environmental Impact Assessment"; Academic press; NewYork; 1981.

Step 9. Select the Favored Alternative.

From comparing impacts of proposed actions and alternatives, a decision maker can weigh additional information on benefit/cost ratios, public preferences, technical difficulties, and so on, in arriving at a final decision. Great care should be exercised in documenting all decision processes and factors, especially when an alternative other than that favored is chosen.

Step 10. Document the Analysis.

The processes and results of the impact analysis should be carefully recorded in the resulting environmental document (i.e., EA, FONSI, draft or final EIS). The analytical conclusions should be presented in an overlay, matrix, or checklist to enable a reviewer to quickly comprehend the relative impacts of the proposed action and alternatives.

2.5.2 Second approach ⁽¹⁾

This particular approach was developed (by Ahmad and Sammy) on the basis of empirical evidence as collected from developing countries. The approach to be discussed here consists of nine steps:

Step 1. Preliminary activities

These include a number of first steps that must be taken, including the identification of questions that must be answered, before an EIA can start. Amongst these are actions to:

- Identify decision-maker(s)
- Select a Co-ordinator
- Decide on work allocation
- Write description of proposed action
- Review existing legislation

(1) **Ahmad, Y. J. and G. K. Sammy**; “Guidelines to environmental impact assessment in developing countries”; London, Hodder & Stoughton; **1985**.

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Identifying the appropriate decision-maker(s) is much more complex in practical life than may appear at first sight. In many countries (both developed and developing), lines of authority criss-cross and become tangled. Thus, it is very helpful to state clearly which person, or persons, or group, will have the responsibility for making intermediate and final decisions on a project or a program.

The second preliminary activity is to select a co-ordinator who will manage the environmental study on behalf of the decision-maker. In very exceptional circumstances, the decision-maker can do this management himself. In general, though, this is not the case. A co-ordinator is useful. His mission is to ensure that the study proceeds along the lines set out by the scoping exercise, and that the results generated are in a form that will be useful to the decision-maker.

A third activity is the allocation of work. This can be summarized as the simple question 'Who does what?' There are several alternatives available. In the USA, the developer conducts the assessment and the Environment Protection Agency (EPA) serves in a review and 'watchdog' capacity. This is appropriate, since the developer is the decision-maker, within the constraints of the system. The other end of the spectrum can be found in Bahrain, where an agency of the government actually conducts EIA. One objective here may be to clearly identify those policy decisions which may be made by the government and those other decisions which may be left to the developer.

Between these two models exist a large number of variations. A government may choose to employ an independent consultant (not the engineering design consultant) to conduct the whole EIA. The government may do the non-technical work themselves, and employ a consultant to do the technical calculations. Or they may assume a management role and instruct the developer what technical tasks are to be done. Whatever is decided, it is important that the allocation of work be clearly made early in the life of the project.

Another of the preliminary activities is writing a description of the proposed action. This is a bench-mark statement which will be useful in the scoping exercise and afterwards. It should be brief, certainly no more than ten pages long. It should provide an indication of the problem which the action is intended to solve as well as a list of

constraints. But most important, it should clearly specify the proposed action. For example, the action 'increase the potable water supply' is different from the action 'build a dam and water treatment plant'. In the former case, the EIA would probably include alternatives to ground water or desalination. In the latter case, only surface impounded sources would be considered. It is appropriate that the Description of the proposed Action should be written by the Co-ordinator.

A final activity which can be very useful at this stage is a review of all existing laws, regulations and ordinances which would apply to the proposed action. The idea here is to identify areas of possible conflict and avoid them wherever possible. Small items such as transfer of land ownership can balloon into major crises unless they are identified and addressed in a timely manner.

This list of preliminary activities is by no means complete. Instead, it has been limited to those which will be necessary in the majority of projects. Since these are activities which precede the rest of the EIA, it is desirable to complete them as early as possible. Ideally, they should be stated as soon as the project has been identified by the developer or the government. At the very latest, these activities should be done in parallel with the Engineering and Economic Feasibility Studies.

Step 2. Impact identification (scoping)

The concept of scoping, as a means of controlling the extent, and hence the cost, of an EIA. The process usually consists of two parts. First, an exhaustive list of all impacts, severe as well as trivial, is drawn up. Then this list is carefully examined, and a manageable number of important impacts are selected for study. The rest are discarded.

Perhaps the most efficient means of developing a checklist of impacts is by synthesis from other EIAs on similar actions. This synthesis should not be limited to similar actions in one country or region, but should include as many sources as can be obtained. The resources required for developing the list are the co-ordinator and possibly his assistants, and access to completed EIAs on similar actions. One source of information is INFOTERRA (UNEP's referral system). In addition, approaches can be made to national environmental agencies in different countries. Finally, there is a

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growing number of text-books and source-books which list potential environmental effects of different development or industrial activities.

After developing the checklist comes the task of determining which impacts should be studied in detail. Generally, four criteria should be applied:

- magnitude;
- extent;
- significance; and
- special sensitivity.

Magnitude refers to the quantum of change that will be experienced. A change of great magnitude would be, for example, the doubling of a town's population. In other words, the measured level of the environmental parameter will be twice what it was before.

The extent of an impact refers to the area which will be affected. The pollution of a whole bay would be considered extensive, whereas the pollution of a localized area of the bay would not be so rated.

The significance of an impact looks beyond the magnitude to the actual effects. Consider a species of fish, which requires a minimum of 10 parts per million (ppm) of oxygen in the water to survive. If that fish is an endangered species, or if it has economic or recreational value, then a change from 12 ppm to 9 ppm of oxygen, though not great in magnitude, is certainly significant.

The final criterion is region- and country-specific. Different regions of the globe have concerns of environmental sensitivity. In the great cities, it is air pollution. In the Sudano-Sahelian region, it is soil erosion. In South-East Asia, it is river basin management. This criterion simply asks whether any impact of a proposed action will affect an area of special sensitivity.

A first reduction of the list of all impacts is normally made by selecting only those of great magnitude, extent or significance, or which involve areas of environmental sensitivity. If necessary, further reductions can then be made.

The task of reducing the initial list is that of the co-ordinator. In this work he should liaise closely with the decision-maker, and seek assistance from experts or other

knowledgeable persons in the fields concerned. However, it should be noted that for this work, home-grown wisdom is often superior to imported expertise. The scoping of the project is best done after the engineering and economic feasibility studies have been completed, when a clear picture of the viable alternatives is available.

Step 3. Baseline study

The baseline study is simply a record of what existed in an area prior to an action. It is not an end in itself and should not be mistaken for such. Like the Description of the Proposed Action described previously, it is primarily a benchmark for the future. Thus it need neither be extensive nor all-inclusive.

In course of the scoping exercise, the several most important impacts would have been identified. Since interest would be concentrated on those impacts, it is logical to measure the baseline levels of those environmental parameters, which they will affect. Thus, the planning of the baseline survey should flow naturally from the short-list of impacts, which is the output of the scoping exercise.

The baseline survey itself will require both fieldwork and review of existing documents. The resources required will therefore be personnel with some basic training in the technical field of interest. In some cases, it will be found that there already exists a person who has devoted years to the study of the area of interest. If this is the case, then a baseline study already exists. More generally, though, it must be developed through the study of existing documents and supplemented by field surveys.

It is at the baseline study stage that the technical specialists (if any) make their first major inputs into the EIA. At the end of the scoping step, a list of impacts to be studied would have been generated. Once this is done, the appropriate persons to evaluate these impacts can be identified. It must be strongly emphasized here that the term 'appropriate persons' does not imply 'foreign experts'. In many cases, the needed resource may be available in the host country: a Conservator of Forests, a fisheries officer, an irrigation or construction engineer, etc. Once the specialists have been identified, they should be permitted to guide the activities of the baseline study, so that the data gathered could be used later on to quantify impacts.

Step 4. Impact evaluation (quantification)

The quantification of impacts is the most difficult technical aspect of an EIA. It is also the most controversial. Perhaps it would be appropriate to deal with controversy first, and the technical aspects later.

It is generally agreed that the quantitative change due to an impact should be computed wherever feasible. It is also agreed that present technology does not permit quantification of all impacts. The thorny question, therefore, is how to treat those changes which cannot be quantified. One approach would be to ignore them altogether, since they represent a considerable level of uncertainty. The other approach would be to include them in a qualitative form. There is an on-going discussion as to which approach is valid.

The problem is compounded when cost is included in the question. The cost of quantification appears to rise geometrically with the degree of accuracy required. What, then, is 'good enough' as far as EIA is concerned?

There is obviously no simple answer to this question. One approach though, could be linked up with the scoping exercise. By looking at the impacts which were ignored, it is possible to get a feel for the 'coarseness' of the EIA. One could then set the degree of accuracy for quantification accordingly. To cite an example: the pollution in an estuary can be estimated by simple formulas, or by complex computerized models. The latter generate far more exact predictions. But if it has been decided to ignore several small, non-point pollution sources, then the degree of accuracy is automatically reduced. In such circumstances, the cost of a computerized model can hardly be justified.

The point to be made here is that judicious scoping should limit both the number of impacts which are studied and the depth to which selected impacts are studied. As previously stated, the quantified impacts are predictions, not facts. Therefore, there is a degree of uncertainty inherent in the process. The objective is to reduce this uncertainty to acceptable levels, not to try to eliminate it altogether. The scoping exercise can and should address the degree of accuracy which represents an acceptable level of uncertainty in light of budgetary constraints.

The resources required for the quantification of impacts are persons competent to do the required calculations or qualitative assessments. These are the technical specialists mentioned in the Baseline Study section. Decision-makers would be well advised to resist the temptation to purchase this expertise wholesale, especially from abroad. A far better approach would be to identify an appropriate individual for each impact, and have this person report directly to the Co-ordinator. In some cases, it may be deemed advisable to have the engineering design consultant work on the quantification of impacts. When this is done, the work of impact evaluation should be clearly separated from the engineering design, so that the function of the Co-ordinator is not circumvented.

As previously noted, it will be the Co-ordinator's role to manage the work of the technical specialists. Specifically, he would be required to ensure that the work of predicting the level of impacts proceeds within the stated scope, budget and time schedule.

The timing of impact prediction (quantification) is bounded by two constraints. First, this work cannot proceed effectively until project alternatives have been defined. Second, it should be finished early enough to permit decisions to be made in a timely fashion.

Step 5. Mitigation measures

Although it is seldom possible to eliminate an adverse environmental impact altogether, it is often feasible to reduce its intensity. This reduction is referred to as a mitigation measure. Such measures may be engineering works (such as dust collectors, sludge ponds, noise mufflers, etc) or management practices (such as crop rotation, phased plant shut-downs, etc). All mitigation measures have associated costs.

In some respects, mitigation planning is a part of impact evaluation. Once applicable measures have been identified, it is necessary to compute their cost, and to requantify the level of impact, acknowledging the beneficial effect of the mitigation measure. Depending on circumstance mitigation measures might give rise to two project alternatives where only one existed before. For example, Alternative X may have a given cost and level of pollution. With certain mitigation measures, it may become

Alternative M, with higher costs and lower levels of pollution. Put the presence of Alternative M does not automatically eliminate Alternative X, and it may be desirable to include both in the final comparison of alternatives.

The same technical specialists who are involved in impact quantification would also work out potential mitigation measures. The timing would essentially be in parallel with the exercise of impact quantification. Again, the role of the Co-ordinator would be to ensure that the work is accomplished within the scope, budget and time schedules established.

Step 6. Assessment (comparison of alternatives)

The 'Assessment' step has often been labeled 'Comparison of Alternatives'. It is at this point that the technical information gained in previous steps will be pulled together. It is at this point, too, that the environmental losses and gains will be combined with the economic costs and benefits to produce a full picture for each project alternative. The intended output is a series of recommendations from which the decision-maker will choose a course of action.

In order to proceed to compare alternatives, two pieces of information on each project alternative are required. These are:

- a summary of positive and negative environmental impacts; and
- a summary of economic costs and benefits.

The former will have been generated as part of the preceding steps in the EIA. The latter may be developed as part of the EIA, or may come from a parallel economic analysis.

The simplest approach to comparing alternatives across both the economic and the environmental fronts is cost-benefit analysis. To do this, the environmental impacts must be converted into economic equivalents, and listed as costs or benefits. A cost-benefit analysis is then done for each alternative and the recommendations are made on that basis. One attraction of this approach lies in the fact that a large number of decision-makers in the developing countries are quite familiar with economic terms, but ill at ease with environmental concepts. Thus, when the entire project is reduced

to a cost-benefit analysis, the decision-maker is being addressed in a language which he understands.

A major problem with cost-benefit analysis for environmental protection is the fact that many impacts cannot easily be reduced to cash equivalents. What is the value of a beautiful sunset, or of uncrowded recreational areas, or of human life? There are procedures for placing economic values on such things, but none are without controversy. Thus, it may be preferable not to set values at all, rather than to set controversial ones.

But if cash equivalent cannot be assigned to environmental impacts, then cost-benefit analysis becomes inappropriate. How, then, can project alternatives be compared on a common basis which includes both economic and environmental inputs? This problem has been recognized in recent years, and a series of solutions have been proposed. These range from a simple ranking of alternatives, to graphical and importance-weighting techniques. Like EIA itself, these methods of comparison are still being evolved.

The primary source required in the assessment stage is a human one. Whatever method of comparison is chosen, someone will have to work through the figures and arrive at a preference ranking of alternatives. Ideally, that person should be the environmental co-ordinator. However, if a cost-benefit analysis is performed, assistance from an economist may be needed.

Step 7. Documentation

The documents which will arise out of an EIA will fall into two categories: reference documents and working documents. The former will contain a detailed record of the work done in the EIA, and are necessary for future reference. The latter are those documents which convey information for immediate action.

Reference documents are intended for use by a technical audience. This audience may include persons working on future EIAs, persons studying the subject project or program after it has been implemented, or those with some other general interest. Therefore, these documents should be sufficiently detailed to stand on their own. It is here, for example, that charts, graphs and technical calculations would be found.

Reference documents may be a series of reports, each addressing one impact, or they may be one long report containing all the information. Whichever format is used, the contents should be written by the technical specialists who have actually done the quantification of impacts. The Co-ordinator's task would be to ensure that format and presentation is consistent, so that all of the parts can be made into a coherent whole. The writing of reference documents should parallel the impact evaluation stage so that these documents are complete when the comparison of alternatives begins.

Working documents are the formal means of communication from the technologists on the one hand to the decision-maker on the other. Their primary function, therefore, is to convey clearly information from the former to the latter, so that informed and timely decisions can be taken. This function dictates the format and language of the document. It should be concise and unambiguous. Recommendations should be clearly stated, and reasons for those recommendations presented in summary form.

Since the Co-ordinator's role has been to provide the link between technologists and decision-maker it is logical that he should prepare the working document. This is particularly true if the co-ordinator has himself gone through the mechanics of comparing the alternatives. In any event, the co-ordinator's input will be vital to ensure that the working document which is produced will provide the decision-maker with clear guidance in the final choice of alternatives.

Step 8. Decision-making

A common assumption in many works on EIA is that the comparison of alternatives constitutes decision-making, and that those making this comparison assume the role of the decision-maker. This is a poor assumption. More often than not, the documentary summary of the EIA is forwarded to a decision-maker who has not been involved on a day-to-day basis with the study. This decision-maker may be one or several government officials, a manager, or a Board of Directors. In any event, decision-making becomes a separate event and should be treated as such.

Within the context of EIA, the decision-making step starts when the working document reaches the decision-maker. In this document will be found a list of project

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alternatives, with comments on the environmental and economic impacts of each. There will also be recommendations as to one or several preferred courses of action.

It is unlikely that a decision-maker would reject the technologists' recommendations to the extent of selecting an alternative which is clearly labeled 'unacceptable'. However, there will probably be several choices which are generally 'acceptable', and it is among these that the decision-maker must consider political realities along with economic and environmental information. Consider the case of a proposed industry which will discharge a certain volume of liquid waste. One alternative design will result in a level of discharge which is considered acceptable. A second, more expensive design will yield even less pollution. The cost-benefit analyses have put both alternatives on par, so the second has been recommended on environmental grounds. A decision-maker may feel justified in rejecting that recommendation, since he knows that the first, less costly alternative, is far more likely to be built. The point here is that the choice was not between 'bad' and 'good', but rather between 'good' and 'better'. And 'good' was chosen because it was more likely to be realized.

One vital necessity in the decision-making step of the EIA is timeliness. A developer needs to have a decision made in a reasonable time, so that he can know how to proceed. In general, the decision-maker can do one of three things:

- Accept one of the project alternatives;
- Request further study; or
- Reject the proposed action altogether.

If the decision-maker is to accept one of the project alternatives, then the next step would be to complete the engineering designs and proceed with the action. In such a favourable situation, delays are quite unnecessary.

If further study is requested, the decision-maker should be quite specific as to what information is being requested. Non-specific requests for further study can be construed as simply stalling actions, and will reduce the credibility of the EIA procedure. On the other hand, a specific request can usually be easily complied with, thus minimizing delays.

Finally, an outright rejection leaves the project proponent with the choice of filing an appeal or abandoning the proposed action. In order to assist him in deciding on his response, the rejection notice should clearly indicate the grounds for the decision to reject the proposed action.

Extreme delays in the decision-making process will only antagonize developers, and lend credibility to the claim that EIA is antidevelopment. To avoid this, decision-makers must make every effort to render their verdict in a timely manner.

In summary, it must be remembered that one of the primary objectives of EIA is to aid decision-making. Thus, the working document that is generated must clearly convey to the decision-maker the nature of the problem to be addressed, the alternatives which were considered, the pros and cons of each alternative, and the results of the structured comparison of alternatives. Using this tool, the decision-maker can then make an appropriate choice.

Step 9. Post audits

When a choice is made, it is assumed that the project or program will proceed. Is this the end of the EIA? One further step remains to be completed. That step is post auditing.

We have stated earlier that EIAs are based on predictions. Post audits are conducted to determine how close those predictions were to the reality. Such checking forms a valuable data-bank for those who will conduct EIAs in the future.

Because of the duration of the post-audit exercise, it is not normally possible to have it done by the same team which conducted the EIA. Instead, as a terminal activity, the co-ordinator should set up a program of environmental monitoring, and hand it over to some national agency which collects this sort of data on a routine basis. After a number of years (depending on the nature of the project or program), the actual changes in environmental quality can be compared with the predicted changes.

2.5.3 Third approach ⁽¹⁾

This approach derived by British Council/Central Environmental Agency (1993), and the process depends on 9 stages

Stage 1 : Announcement

In some systems, the first stage in the formal EIA procedure is the announcement to the submission of the project for approval. The project proponent may be required to notify just the permitting authority, or a wider audience including other agencies or interest groups and the affected public. In the latter case, announcement can initiate the process of consultation and public participation in the process.

In other regimes there is no formal requirement for project announcement. Nevertheless proponents may find it useful to initiate consultations by means of a public notice explaining the project concept, describing the EIA procedure and inviting views.

Stage 2 : Screening

The purpose of screening is to decide whether a project requires EIA or not. In some regimes there is a formal procedure for screening in which the proponent notifies the permitting authority of his intention to submit a proposal which may require EIA. The authority then reviews the proposal and decides whether or not EIA is needed. In some regimes there may also be the option of carrying out a preliminary assessment to assist in deciding whether or not full EIA is needed.

In order to carry out screening sufficient information must be provided about the proposal to allow a decision to be made on whether or not it has sufficient impact on the environment to require full EIA. This will include key information about the nature and size of the project and its location.

The screening decision may then be made either by the permitting authority, or by a committee of interested agencies. It may also involve consultation with outside

(1) **British Council/Central Environmental Agency**; “Introduction to Environmental Impact Assessment. Reference Document for EIA Workshop”; Fayoum, Egypt; **1993**.

bodies.

Stage 3 : Preliminary Assessment

If there is uncertainty about whether full EIA is needed, the EIA procedure may provide for a preliminary assessment stage. This involves an early check on the likely environmental impacts of the proposed project using rapid and often qualitative assessment techniques. Preliminary assessment may also involve consultation.

Preliminary assessment varies widely in different agencies and countries, but it usually involves the following aspects:

- identification of potential impacts through the use of identification (checklists, matrices, ...etc
- description and prediction of impacts, often through an ad hoc committee approach where experts give descriptive assessments of the importance, magnitude, benefits and significance of individual impacts; comparison is often made with similar Projects elsewhere;
- evaluation of impacts, on the basis of criteria such as the size of potential impacts, the sensitivity and importance of the affected environment, the conflict with legally established standards and norms etc.

Preliminary assessment is also used for scoping where it can provide information on the likely significant impacts of the project, the alternatives which may be available, and the views of consultants on the proposals.

Stage 4 : Scoping

Scoping is a mandatory part of EIA procedures in many regimes. Its purpose is to define the "Term of Reference" for the EIA, identifying:

- the impacts to be studied;
- alternatives to be considered;
- appropriate methods for assessment (predictive methods and evaluation criteria);
- interested parties to be consulted.

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In particular it is aimed at focusing the EIA on the key issues for decision-making. In formal scoping procedures it is usual for consultation to be an essential activity. This may involve formal inquiries and hearings or a more informal process of exchange of information between the proponent, the permitting authority and other interested parties - government agencies, interest groups and the public.

Scoping can therefore involve:

- Preparation of background information on the project;
- notification and consultation of interested parties;
- identification of project alternatives which should be considered;
- preliminary assessment of likely significant impacts;
- identification of suitable assessment methods;
- agreement on the scope and content of the EIS examined.

Scoping is an important element in the EIA process. If carried out properly, it can:

- provide the link between the permitting authority and the study group, so that the permitting authority can ensure that the study (and the EIS) addresses relevant topics and presents the results in a form that will be useful for decision-making;
- enable other interested parties to make their concerns known: permitting authority can, therefore, ensure that the study is a comprehensive examination of the alternatives and impacts that are of interest to all parties;
- establish agreement at the outset on the alternatives and issues to be examined during the study, thereby helping to reduce the possibility that the permitting authority or other parties will request further information following completion of the statement.

Stage 5 : Organizing the EIA study

Once the scope of an EIA has been defined the next step is to establish a team of specialists, qualified experts and other parties - either individuals or small teams - to carry out the necessary scientific investigations.

The organization and management of this team needs a clever manager understand

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both the legal and procedural requirements for project approval and have a clear appreciation of what information the permitting authority needs, and how the project planning and engineering design program is organized. The mainly job of the EIA manager is:

- to brief and manage the work of the specialist teams and ensure that they adopt a common approach to the assessment;
- to ensure that the specialist teams are using up-to-date information about the project at all times;
- to ensure that the information is transferred between specialist teams as necessary;
- to coordinate the flow of information between the specialist teams and the project design team, particularly with regard to recommendations on mitigation;
- to coordinate consultations with the permitting authority and outside bodies and ensure that the results of consultations are taken into account in the assessment;
- to bring the findings of the specialist studies together into a comprehensive and integrated EIS.

The key aspects of organizing the EIA studies are:

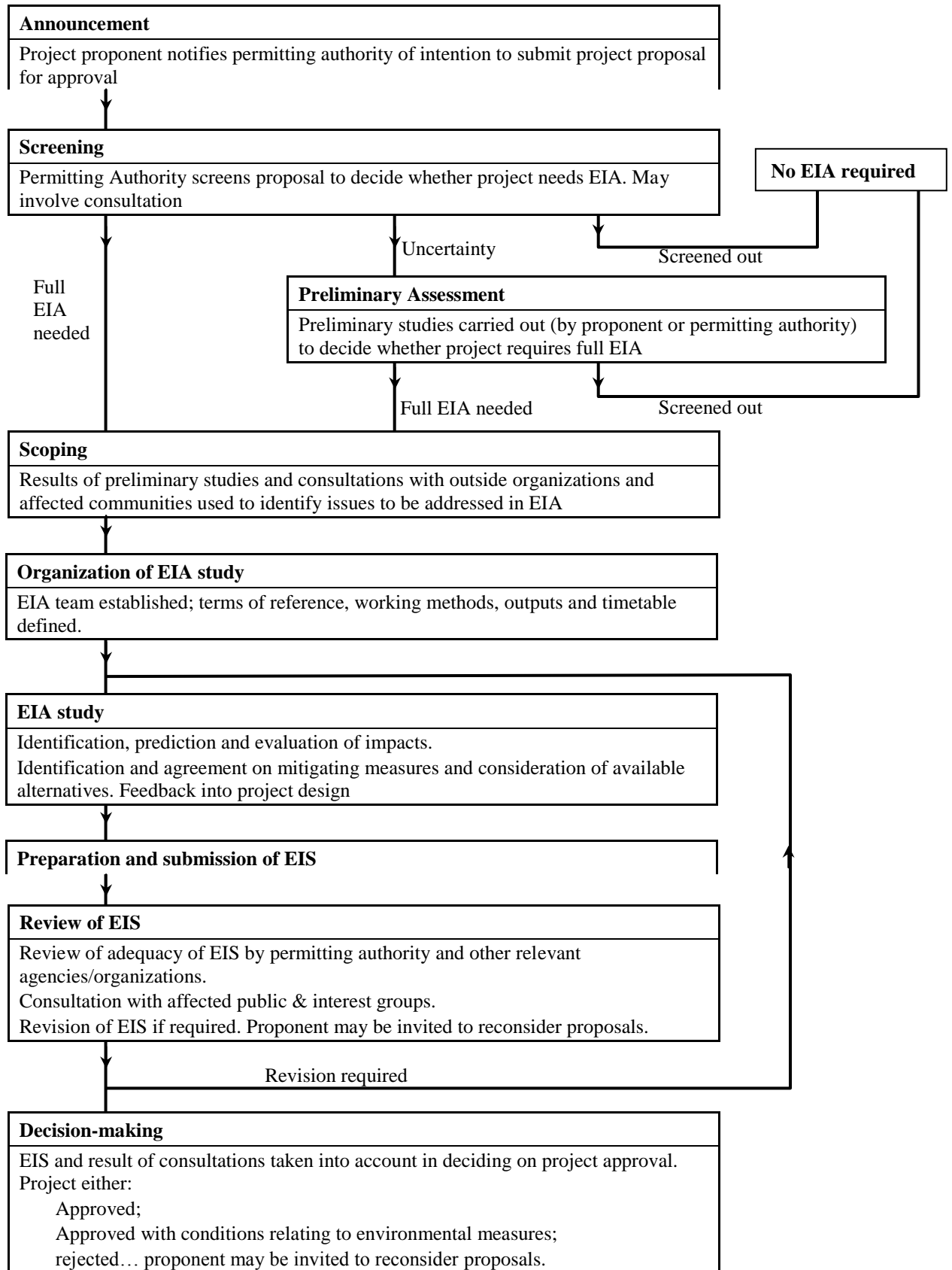
- identifying, appointing and briefing relevant specialist teams and the EIA managers;
- establishing the work program and outputs, including the EIS and earlier inputs to the project design team;
- establishing the mechanisms for interaction between the EIA team and the project team;
- establishing the program for consultations with the permitting authority and with other consultees.

Stage 6 : The EIA study

At this stage in the EIA procedure the studies are carried out which actually assess the impacts of the proposed project.

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Fig: 2.4. The EIA process as proposed by British Council/Central Environmental Agency



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The output will be the EIS which describes the impacts of the project and the measures envisaged to mitigate those impacts. If environmental inputs have been made throughout the earlier stages of project planning and design, the EIA study should take account of a whole range of measures to mitigate impacts which have been incorporated into the project design, and should report only those impacts which cannot be avoided. The permitting authority will then have to weigh up those impacts (and any environmental benefits of course) against the other costs and benefits of the project in deciding whether or not to approve it.

An EIA study is conventionally to proceed in a number of stages.

★ ***Identification of Impacts***

This involves a systematic consideration of ways in which the project can influence its environment through landtake, emissions, disturbance of communities or natural habitats, displacement of homes and communities, employment generation, health effects and so on. In EIA systems where there is a formal scoping stage identification of impacts takes place during scoping. Tools to aid identification include checklists and matrices.

★ ***Prediction***

At this stage predictions are made of the nature and extent or magnitude of the changes in the environment resulting from the project. Wherever possible impact should be described quantitatively and objectively. But this is not always possible and care should be taken to provide as full and as clear a description of what will happen as is possible. In making predictions it should be recognized that first order changes in the environment can lead on to secondary and higher order effects, and that effects of different types may combine together to affect a single receptor group.

A large number of different techniques are available for prediction including mathematical models, and physical and experimental methods. These can be used to estimate releases into the environment, the impact of these on environmental quality, and the effects of changes in quality on receptor groups and resources (people, natural habitats, fisheries, archaeology, landscape, etc). But often formal techniques are not available and it is necessary to rely on expert knowledge and judgement. In either case

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prediction draws on physical, chemical, biological, socio-economic and anthropological data, techniques and expertise.

To prevent unnecessary expense, prediction methods should be selected to suit the scope of the EIA and the importance of the impact. It will be the job of the EIA manager to ensure that the resources available are sensibly allocated to the different areas of specialist investigation.

*** Evaluation**

Once predictions have been made of the nature and extent of environmental impacts, the next stage is to evaluate these impacts. This means applying judgement to decide which impacts are important or 'significant' and therefore need to be mitigated. The significance of impacts should be judged against explicit criteria. It may be possible to derive these criteria from existing legal standards or from accepted local, national or international norms, but in many cases the EIA team may have to use its professional judgement to decide what is acceptable or not. Consultation with relevant agencies and other interested parties can be important in establishing reasonable criteria for application to the particular project.

*** Mitigation**

The final stage is then to consider how significant impacts can be mitigated. A wide range of measures may be available including changes in location, layout or design of project components, or actions related to the way in which the project is constructed or operated.

Possible mitigation measures include:

- changing project sites, routes, processes, raw materials, operating methods, disposal routes or locations, timing, or engineering designs;
- introducing pollution controls, waste treatment, monitoring, phased implementation, landscaping, personnel training, special social services or public education;
- offering (as compensation) restoration or replacement of damaged resources, money to affected persons, concessions on other issues, or off-

site programs to enhance some other aspects of the environment or quality of life for the community.

Various mitigation proposals will be made by different specialist members of the EIA team. It will be the job of the EIA manager to ensure that they are not conflicting or overlapping and to obtain agreement from the project team to their incorporation in the project proposal. When mitigation proposals are accepted by the project team they should be taken into account in the assessment. The EIS should then indicate the effect of the mitigation and any residual impacts that remain.

An effective way of presenting the overall package of mitigation measures associated with a Project is as an Environmental Action Plan. This may include design changes and technical control measures, and an integrated environmental management Plan including a Code of Practice for construction, operating practices and conditions, monitoring schemes, contingency plans, management systems and responsibilities, and, for some projects, community liaison arrangements.

Stage 7 : EIS preparation

The final stage in the EIA study will be Preparation of the EIS. This will be the document presented to provide the permitting authority with sufficient information about the project and its likely effects, to enable them to judge whether the project or development should be permitted or not. Impacts should be described, as systematically and objectively as possible and sufficient information should be provided to support any conclusions reached and identify the source of the information provided. The EIS should be written and presented in a form, which communicates effectively with its audience from permitting authority and wider audience of consultees.

Specific requirements for EIS content vary from regime to regime but it is usual for the requirements to include:

- a description of the key features of the project;
- an overview of the EIA process and how it has influenced project planning and design;

Definitions and theoretical process

- a discussion of the alternatives to the project and the reasons why the proposed scheme was selected, taking into account environmental effects;
- a description of the impacts of the project on the environment including both positive and negative effects, short term, long term, temporary and permanent effects (including construction and operation), and primary, secondary and higher order effects;
- a discussion of the measures proposed to mitigate adverse effect and enhance environmental benefits;
- an overview of methods used in the assessment and gaps or uncertainties in the information provided;
- and a non-technical summary for the lay reader.

The EIS must usually be made available to other interested parties so that they can make their views known to the permitting authority before a decision is made on the project.

Stage 8 : EIS review

In some EIA systems there is a formal stage of EIS review prior to decision- making on the project. This may involve the permitting authority or an independent committee reviewing the adequacy of the EIS and its compliance with legal requirements. If the EIS is judged to be inadequate it can be returned to the project proponent for further work before submission to the permitting authority.

Where there is no formal external review procedure, It Is nevertheless useful for an internal review to be carried out to check that the EIS is satisfactory before it is presented to the permitting authority. Early discussions with the authority on the scope and format of EIS can help in avoiding problems at this stage.

Stage 9 : Decision-making

The final stage in the EIA procedure is when the permitting authority uses the EIS in making its decision on whether or not to approve the project. As discussed before the EIA procedure may be linked into an existing permitting procedure, or a special EIA

approval procedure may be established. Alternatively the approval procedure may be internal to a government agency that is also the project proponent.

The important features of this process are that the relevant authority should take proper account of the information provided in the EIS, weighting the environmental costs and benefits against the other costs and benefits of the project. In doing this it may be required to consult with other agencies and to consider the views of other interested parties, including the affected community and wider public. When the decision is made the authority is usually required to explain the reasons why the project has been approved or rejected or why conditions have been imposed on approval, including environmental reasons.

2.5.4 Fourth Approach ⁽¹⁾

This approach of EA process is for new waste disposal or treatment facility projects. In [Figure 2.5](#) Four main stages are identified: (i) project definition, (ii) environmental impact study, (iii) decision-making, and (iv) implementation and monitoring. [Figure 2.5](#) indicates the essentially iterative nature of the process which includes two components which interlink with the main stages: (i) consideration of the need to mitigate the impacts by changes to the proposal, and (ii) consultation, both informal and formal, with interested parties. These two components provide a common thread throughout the process, allowing at any time for the assessor to revise previous judgements, measurements and decisions. The importance of maintaining the open-loop system is paramount if EA is to be seen as providing for a logical, structured, and progressive means by which environmental impact is considered.

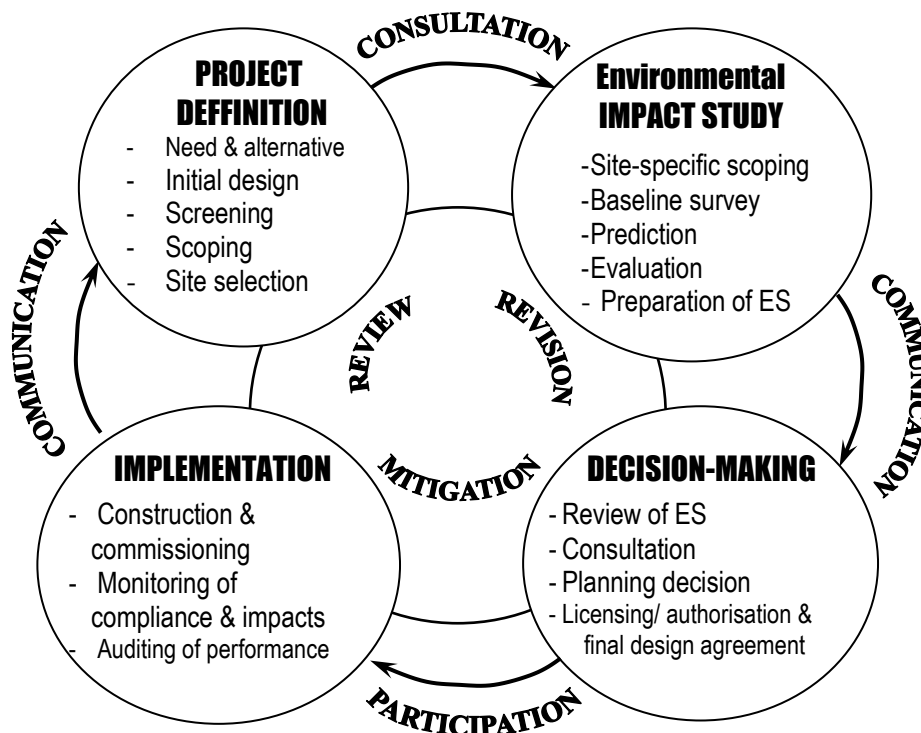
The EA process which is described in [Figure 2.5](#) goes beyond current regulatory requirements, and is presented as suggested good practice. Evidence from UK ESs is that too often EA has been regarded simply as a process of describing and justifying a project proposal for the purposes of a planning application. The EC Directive and UK Regulations have done little to discourage this limited view of the potential of EA.

(1) **Judith, Petts and Gev, Eduljee;** “[Environmental Impact Assessment for waste treatment and disposal facility](#)”; John Wiley & sons Ltd; 1994.

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Screening, or the process of determining the need for EA, can be done by reference to regulations, and official guidance, for example, on criteria and thresholds for inclusion of projects. Few countries have adopted the type of formalized and advanced screening process utilized in Canada (Anon, 1990a); however, there is considerable scope for developers and authorities to adopt a more structured approach to determining need for EA. In the UK, waste projects represent examples of projects where developers have been 'voluntarily' submitting ESs as a result of awareness of the sensitive nature of such proposals in potential host communities. In practice the adoption of the structured EA process for all projects, regardless of whether they meet threshold criteria, would be valuable.

Figure 2.5. The Environmental Assessment process as proposed by Judith Petts & Gev Eduljee.



The process as discussed before stresses the importance of the early consideration of environmental issues in project planning and the need for environmental expertise to be incorporated into the project team at its inception. The lack of any SEA provision in the UK has driven project EA for waste facilities to consider need and alternatives (disposal and treatment options, designs, engineering, sites) and in the short term this

situation is unlikely to change. Throughout we discuss other decision-making limitations in the UK process, more particularly with regard to the overlap between the planning and pollution control regimes.

The EA process, as advocated, is resource demanding, particularly in terms of management skills. Some developers will regard the advocated approach as financially demanding, and prefer a more 'low-key', restricted approach, merely meeting minimum regulatory requirements. However, experience of the progress of actual proposals relating to waste treatment and disposal facilities indicates the short-sightedness of such a view. The practice of waste management requires a consensus approach to decision-making and local communities have increasingly placed the onus upon practitioners and regulators to fully justify technical and operational proposals. Cognisance of the potential of EA to meet such information demands, should provide for more cost-effective project development, as well as enhanced environmental protection.

2.5.5 Fifth approach ⁽¹⁾

Fundamentally, this approach of the EIA process consists of seven distinct stages:

1. Screening

Screening aims to identify developments and projects that should be subject to an EIS. These days, this process is assisted by the existence of laws specifying those industries and types of developments which are likely to have an impact on the existing environment.

Screening is usually carried out by a government authority or department, e.g. Department of Planning, Lands or Housing. However, the nature of the assessment process, types of issues to be canvassed and the way in which it is conducted are not usually detailed. There is often no guarantee that all the relevant and interested authorities have been approached, or that public concerns such as short and long-term health impacts have been sought or addressed.

(1) **Diane Wiesner**; "EIA the environmental impact assessment process – WHAT IT IS and WHAT IT MEAN TO YOU". Great Britain; Prism Press; **1995**.

Table 2.2. Components of screening

- | |
|--|
| <ul style="list-style-type: none">➤ rapid assessment checklist for criteria which establish need for EIA➤ local demographic data - identify vulnerable human communities➤ local environmental data identify vulnerable ecosystems➤ assessment of potential global impact of proposals➤ rapid assessment of public interest and/or concern➤ communication networks between community and developer➤ relevant intersectoral policies |
|--|

2. Scoping

The USA National Environmental Policy Act describes scoping as the mandatory use of mediation to involve interested parties in the design of an environmental assessment. Scoping identifies the issues to be considered in depth and those to be eliminated: it allocates responsibilities for researching and preparing the evidence.

Key tasks in the scoping process include:

- identifying key stakeholders, including community groups and public instrumentalities.
- determination of the feasibility of alternatives and the need for further consideration of such alternatives.
- provision of guidelines for the proponents and specifying information about:
 - (a) goals for impact assessment and criteria for monitoring
 - (b) minimum information requirements
 - (c) nature and location of relevant existing social and health data concerning affected populations
 - (d) relevant bio-technical standards and inventories
 - (e) relevant psycho-social and health indicators
 - (f) relevant biological and social assessment methodologies
 - (g) recommended consultation strategies
 - (h) recommended post-project evaluation and monitoring protocols
 - (i) local agency requirements and policies.

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Baseline studies of the existing environment are required for inclusion in any comprehensive EIA. At the very least they should include population, housing settlement, land use, meteorological and biological surveys. There is a need for studies of social status, occupations, health, ethnicity, age and skills possessed by the affected people. It follows that people living and working in the environment need to be informed of project proposals at an early date. They need to be encouraged to cooperate at all stages in the data collection process.

3. Profiling

Profiling is the process of establishing the baseline condition of relevant parameters of an affected community so that likely impacts can be predicted and subsequently monitored. Some of this data may already have been collected during the screening and scoping process. The accurate and detailed collection of baseline data is essential to ensure that actual changes or effects resulting from a proposal can be accurately studied and quantified. A summary of the necessary baseline data is contained in Table 2.3.

Table 2.3. Baseline information (profiling)

- | |
|---|
| <ul style="list-style-type: none">• Characteristics of the existing and incoming populations of the region including size, age structure, socio-economic status and groups at risk.• Physical characteristics of the region such as frequency of atmospheric inversions, variability of river flow and orientation of prevailing winds.• Existing land uses, especially those that can be considered incompatible or inappropriate.• Current health status of the population including morbidity and mortality characteristics, known pathways for existing diseases.• Current levels of pollutants and environmental quality.• Existing data and studies concerning types of problems likely to arise from the development, such as existing criteria for air or water quality, and known relationships between removal of native vegetation and native species, pollutants and human health.• Existing standards of living of the population, especially in relation to factors such as access to water supplies, adequacy of diet and accesses to health facilities. |
|---|

Baseline information gathered should include analyses of the direct and indirect implications of a proposal. Impacts on local human, biological and wildlife

populations should then be monitored in an holistic respect. Identification of potential impacts, follow-up evaluation and monitoring and the analysis of the data which result, depend also on the existence of indicators or criteria which define the range of outcomes.

4. The Use of Indicators

Indicators become important where impacts are likely to be cumulative, complex and multifactorial. Some general principles should apply to inclusion of the following in any environmental impact statement (EIS):

1. Low impact effects develop over time, have a long latency period, are difficult to measure or are evidenced only under stress conditions, e.g. low-level exposure to potentially carcinogenic herbicides; these require inclusion.
2. The EIS must allow for baseline data which is incomplete, of limited reliability or difficult to obtain.
3. Historical data covering exposure to a wide range of criteria - even those judged "safe" today - may in future be judged detrimental. Biological markers of exposure need to be identified and monitored to indicate where more in-depth quantitative risk assessment is needed.
4. Assessment of likely exposure is the first essential step in quantitative risk assessment. In the biological and chemical field, dispersion modeling and pathway analysis will involve the chemical, ecological and geographical studies of the distribution of toxic substances in air, ground and water as well as studies of the habits and behavior of people in the vicinity. This might determine their level of exposure.

Specific health-related data include:

- morbidity, and mortality data
- birth and infant mortality rates
- specific disease rates
- epidemiological surveillance data

- indicator disease registers such as cancer and asthma
- health service utilization and
- health expenditure

5. Risk Analysis

Risk analysis is the primary tool for bringing quantitative and semi-quantitative data to bear in the decision-making processes associated with hazard identification and mitigation.

Risk assessment involves the scientific identification and quantification of environmental hazards and the relative risks of various options, based on available evidence and experience, and summarized as:

- hazard identification
- risk estimation
- risk characterization

Risk management where decision-makers and interest groups develop policy, guidelines or management procedures based on the results of risk assessment combined with feasibility, and economic and socio-political realities. These can be characterized as:

- risk communication
- setting standards
- mitigation measures

Therefore, risk analysis is the most important and time-consuming component of the EIS. Relevant scientific information not only needs to be collected but condensed into a manageable form. Unfortunately, time constraints are imposed on data collection. For any one parameter, this means that the consultant responsible reviews existing conditions in a given site, traces the history of previous changes and results, and where data is available, makes a comparison with similar sites exposed to the environmental challenges similar to those planned.

For example, a project meteorologist would be required to undertake a comprehensive survey of normal rainfall patterns, atmospheric conditions, temperature variations,

Definitions and theoretical process

wind and seasonal climate variables. Extremes such as drought and flood, thunderstorm activity, frequency and severity would be reviewed where records are available. On site recording and monitoring would provide recent substantive data to support historical observations, where appropriate, with regard to microclimatic variability associated with topographical differences over the project site.

This data would be summarized and combined with data from other specialists on the scientific consultancy panel. The membership of these panels and the weighting or priority given each member's contribution is dictated by the nature of the project.

The risk assessment process is summarized in Table 2.4

Table 2.4. Risk assessment

HAZARD IDENTIFICATION: Is there sufficient evidence to suggest that a hazard will occur?
<ul style="list-style-type: none"> – analysis of properties of the development – epidemiological evidence of risk – toxicological evidence of risk – case reports
RISKESTIMATION: What is the likely extent of risk?
<ul style="list-style-type: none"> – impact on environment – dose-response and effect relationships – population exposure and sensitivity – probability and consequences of accidental events
RISK CHARACTERISATION: Is it the best option, worth the risk?
<ul style="list-style-type: none"> – public perception of risk – risk-benefit analysis – feasibility of alternatives – social, political and cultural implications of each – acknowledge uncertainties and options – social justice and equity considerations

A further issue which arises in the assessment process is the difficulty of finding suitable analytical models which accommodate the complex environmental variables involved, together with various alternatives and their outcomes. Computers have greatly simplified and upgraded the analysis of EIS data. Sophisticated software is now tailored to specific types of EIA and determined by the nature of the project

under consideration. The quality of predictions and the range of impacts which can be simultaneously assessed minimize the potential for poor judgement and subjective bias. This places increased importance on the data collection process.

6. Implementation and Decision Making

In EIA, decision makers such as local councils, government agencies, and commercial developers are usually faced with a number of options regarding any particular proposal. Their goals will be:

- implementation of the project as proposed
- the design of measures to be incorporated into the proposals to
 1. optimize the potential benefits of the proposal and
 2. prevent or minimize undesirable effects (mitigating measures).

If objections to the original proposal warrant, the decision makers may adopt an alternative development which achieves the same basic objectives with less impact on the environment. Cost and political considerations may play a heavy role in any final decision whether or not to proceed with the project.

For urban developments in particular, choices are not always clear. The development which eventuates may be a compromise between a number of options, each with certain advantages and disadvantages. In many circumstances there are no alternatives except to proceed (with or without mitigation measures) or to abandon the project.

Table 2.5. summarizes the implementation and decision making activities phase of the EIA process.

Table 2.5. Implementation and decision making

- | |
|--|
| <ul style="list-style-type: none">▪ impact assessment must provide sufficient, valid and reliable data for decision makers▪ implementation options and decisions should be clear and give adequate opportunity for input by all stakeholders▪ dispute mediation and mechanisms for handling compensation claims should be provided for▪ enforcement mechanisms to ensure compliance with development conditions, including linkage between routine monitoring and re-registration |
|--|

7. Decision Making Processes: Toxic Waste Facility

A recent example comes from Australia, which has a growing problem in disposing of intractable toxic wastes. This can be defined as 'any waste that does not break down naturally and for which there is no environmentally acceptable means of disposal'.

The only recognized method of dealing with such wastes has been to burn it at very high temperatures. Yet questions remain regarding the health risks to workers and those living near the facilities. A number of European countries, notably France and Germany, possess commercial incinerators which accept these wastes. Australia does not have a high-temperature incinerator, and until recently sent such wastes for disposal to Wales. A proposal to build a high-temperature facility in Corowa, rural New South Wales had received government approval to proceed in 1990. The local community was advised to look forward to many new jobs and employment opportunities which indirectly would result in increased importance for their small town.

Unfortunately for the planners, the prospect of being the site of a high-temperature waste disposal facility resulted in a massive public outcry and generated considerable publicity. Eventually the project was shelved - to be sited else-where. However, local populations in alternative sites were equally vehemently opposed to the project. As a result the incinerator was abandoned. The intractable waste problem was placed in the hands of a specially convened panel. Over a two-year period, the panel was commissioned to investigate methods and ways that Australia could manage its toxic wastes into the twenty-first century.

The Independent Panel on Intractable Waste submitted its report in November 1992. The Panel found that a high-temperature incinerator was not only unpopular but expensive to build, difficult to run and could not guarantee a period of operation to justify expenses in establishment. Rather than opting for a single location and temporary storage of wastes prior to incineration, the Panel recommended a suite of smaller technologies currently under development and which permit disposal of wastes at the site where they are generated.

These recommendations acknowledge the fact that any technology appropriate for disposing of polychlorinated biphenyls (PCBs) may not be equally successful in disposing of low level nuclear wastes (radionucleotides), contaminated hospital wastes (biological) or dioxin residues in paper manufacture (organochlorines). If they are accepted by the Australian government, the responsibility lies with the government to provide adequate funding to encourage technologically innovative companies and scientists to develop these new avenues for waste disposal. Initial work has yielded some promising prospects, including a mobile unit able to handle a wide range of materials. A number of permanent and semi-permanent storage sites for toxic materials have also been designated.

In the intervening period and until the new technologies are refined, Australia must continue to export its wastes, at considerable expense, to countries with appropriate facilities to dispose of them safely .

8. Environmental Auditing

Environmental auditing measures the extent to which a project is meeting its environmental, social, economic and health goals. In other words, auditing refers to the formal means by which the performance of an environmental management program can be evaluated and adjusted.

In most cases, environmental auditing is performed to verify compliance. Increasingly, however, large corporations and smaller concerns are using auditing for public relations purposes to promote the image of the good corporate citizen. ICI, for example, conducts regular environmental audits. The most recent report, released in 1992, shows that ICI is achieving profit and growth while preserving the environment or acting to reduce, eliminate or minimize the costs and damages associated with its activities.

Environmental audit is defined by the Confederation of British Industry as 'the systematic examination of the interactions between any business operation and its surroundings'. This includes all emissions to air, land and water; legal constraints; the effects on the neighboring community, landscape and ecology; and the public's perception of the operating company in the local area.

Definitions and theoretical process

Company conducted audits usually contain actual figures and statistics which allow data to be contrasted with industry averages. This permits monitoring of progress made towards environmental targets defined for other companies with comparable operations. These benchmark comparisons add credibility to a company audit. A 'true' audit of achievements in environmental conservation also includes a complete breakdown of all hazardous waste, for example, not just data related to a single pollutant such as chloro-fluoro-carbons (CFCs) produced.

At times, and in order to limit public concern at high levels of emissions or waste produced, companies refer to the size of their operations. Reduced levels of production or 'down-sizing' of a company can often be forgotten unless emission reductions are compared with changes in productive output. It is possible that greater efficiency and lower levels of toxic emissions can be achieved at high levels of output during a manufacturing process, e.g. blast furnace in steel production.

Data also needs explanation. In *New Scientist*, 3 October 1992, pp.21-2, Pearce suggests that, while British Airways contributed but a mere 2 per cent to worldwide airline emissions of carbon dioxide and sulphur dioxide in 1991-2, its carbon monoxide emissions top 4.5 per cent and nitrogen oxide emissions are 2.5 per cent, well in excess of BA's proportion of 2 per cent passenger mileage (British Airways Environmental Report, 1992). Nor are reasons given to explain these inconsistencies.

Environmental audits also refer to company targets. These confirm environmental protection as company policy. They guarantee commitment to defined goals and enable progress towards them to be gauged. Historical data permits direct comparisons between companies on progress towards achieving these goals.

In Britain, the Chartered Association of Certified Accounts (CACA) has been working on proposals for common standards in green auditing so that outsiders can make sensible comparisons between companies. Complete inventories and statistics on a company's operations are necessary for individuals to be able to compare actual performances and the environmental targets of competing firms.

Companies differ widely in their interpretation of auditing processes. Some use auditing as an excuse to promote unpopular staff cuts and technological changes on

the factory floor, usually by reference to a commitment or a target to meeting national goals for environmental protection. For example, claims that a changed procedure may lead to reduction in greenhouse gas emissions even if it may have cost jobs, causes major disruption and restructuring of the workforce or increased costs to consumers.

Finally, data can be presented in a misleading manner and appear to view a company's performance in more positive terms than may be warranted. In 1992, British Airways reported that its aircraft emitted 11 million tones of carbon dioxide into the atmosphere. It fails to state, however, that this represents but less than 2 per cent of the total airline traffic about the globe.

2.5.6 Comparative review of theoretical EIA process

Five EIA theoretical processes represent the last twenty years have been studied, it is noticed that every process has its own steps and activities.

A comparison between these EIA processes is mandatory to identify the correspondence and variance between them. The criteria that the comparison depended on have been formulated among the steps and activities of the compared EIA processes. The activities or steps that repeated in the all five EIA processes will formulate the common EIA theoretical process. The maximum score of each criterion = 5, and the common EIA theoretical process consists of the steps which have score at least = 3

Table 2.6. shows the comparison between EIA theoretical process

2.5.7 Conclusion on EIA theoretical process

While not all EIA systems contain every element, the EIA process diffused around the world can be represented as a series of iterative steps:

- *consideration of alternative means of achieving objectives*
- *designing the selected proposal*
- *determining whether an EIA is necessary in a particular case (screening)*

Table 2.6. Comparison between EIA theoretical processes

Processes		First Approach By: Jain et al. (1981)										Second Approach By: Ahmad and Sammy (1985)										Third Approach By: British Council/Central Environmental Agency (1993)									Fourth Approach By: Judith Petts & Gev Eduljee (1994)								Fifth Approach By: Diane Wiesner (1995)								Total Repetition
		Step 1. Identify Action or Alternatives.	Step 2. Identify Activities That May Have Impacts .	Step 3. Inventory the Affected Environment .	Step 4. Identify Probable Categories of Impacts.	Step 5. Identify Appropriate Impact Indicators.	Step 6. Identify Environmental Goals or Limitations.	Step 7. Predict Environmental Impacts	Step 8. Determine the Significance Impacts	Step 9. Select the Favored Alternative.	Step 10. Document the Analysis	Step 1. Preliminary activities (Identify decision-maker(s) - Select a Co-ordinator - Decide on work allocation - Write description of proposed action - Review existing legislation)	Step 2. Impact identification (scoping)	Step 3. Baseline study	Step 4. Impact evaluation (quantification)	Step 5. Mitigation measures	Step 6. Assessment (comparison of alternatives)	Step 7. Documentation	Step 8. Decision-making	Step 9. Post audits	Stage 1 : Announcement	Stage 2 : Screening	Stage 3 : Preliminary Assessment	Stage 4 : Scoping	Stage 5 : Organizing the EIA study	Stage 6 : The EIA study (Identification of Impacts – Prediction – Evaluation – Mitigation)	Stage 7 : EIS preparation	Stage 8 : EIS review	Stage 9 : Decision-making	Step 1: Project Definition Need & alternative - Initial design – Screening – Scoping - Site selection	Step 2: Environmental Impact Study Site-specific scoping - Baseline survey – Prediction – Evaluation - Preparation of ES	Step 3: Decision-Making Review of ES – Consultation - Planning decision - Licensing/ authorisation & final design agreement	Step 4: Implementation Construction & commissioning - Monitoring of compliance & impacts - Auditing of performance	Step 1: Screening	Step 2: Scoping	Step 3: Profiling (Baseline information)	Step 4: The Use of Indicators	Step 5: Risk Analysis	Step 6: Implementation and Decision Making	Step 7: Decision Making Processes: Toxic Waste Facility	Step 8: Environmental Auditing						
Announcement																																											1				
Preliminary activities Identify the team work - Decide on work allocation																																												1			
Alternatives																																											4				
Action Design																																											4				
Screening																																											4				
Scoping																																											5				
Preparation of EIA Report	Description of Action and environment (Baseline Study)																																											4			
	Impact prediction																																											3			
	Impact Significant																																											5			
	Consultation and Participation																																											3			
Mitigation																																											3				
Review of EIA Report																																											3				
Decision Making																																											5				
Monitoring Action Impacts																																											3				
Auditing the performance of the system																																											1				

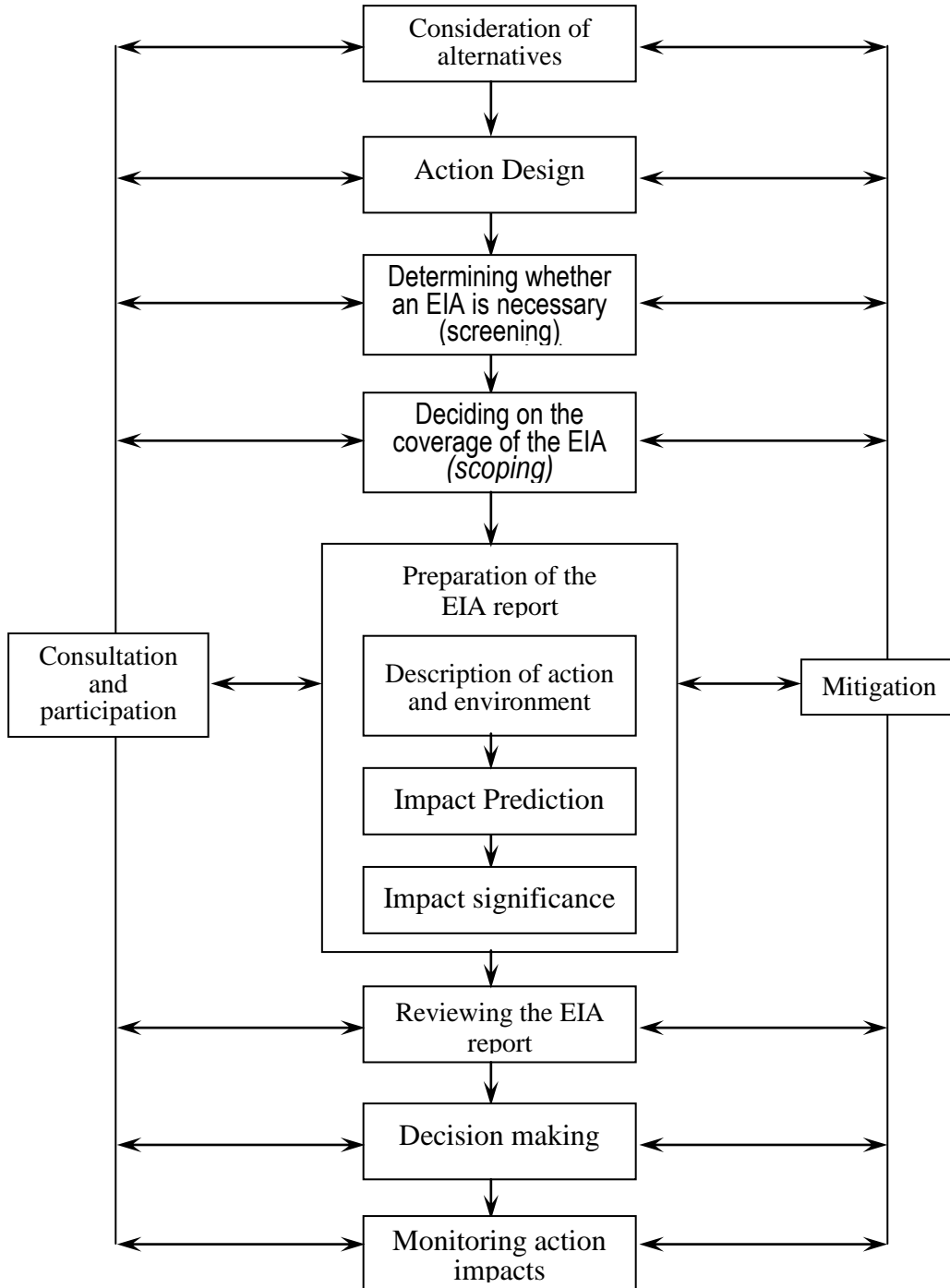
Definitions and theoretical process

- *deciding on the topics to be covered in the EIA (scoping)*
- *preparing the EIA report (i.e., inter alia, describing the proposal and the environment affected by it and assessing the magnitude and significance of impacts)*
- *reviewing the EIA report to check its adequacy.*
- *making a decision on the proposal, using the EIA report and opinions expressed about it*
- *monitoring the impacts of the proposal if it is implemented.*

As indicated by [Fig. 2.6](#), which summarizes these steps, the EIA process is cyclical. Thus, the consideration of the environmental effects of alternative means of achieving the proponent's aims and the detailed design of the action are inextricably linked. Again, the results of consultation at the scoping stage or later may require the proponent to return to the design stage to increase the mitigation of impacts. Consultation and public participation should be important inputs at each stage in the EIA process, though the people and bodies invited to comment on the proposal may vary. Equally, the mitigation of environmental impacts should take place at each step in the process.

Not every step in the EIA process shown in [Fig. 2.6](#) takes place overtly (or indeed, at all) in every EIA system. As mentioned above, scoping and project monitoring were not part of the original conception of EIA in NEPA and are still not required in many EIA systems. Indeed, there is a very considerable diversity of views about the essential elements of an effective EIA system.

Fig. 2.6 The environmental impact assessment process



CHAPTER 3

METHODS AND TECHNIQUES

CHAPTER 3

METHODS AND TECHNIQUES

3.1 Introduction

It is quite complicated to identify and evaluate the impacts of the environment brings about to development activities. The reason is that the ecological and socio-economic systems as such are complicated and the responses of these systems to human interference are diversified. Large amounts of data must be collected and analyzed, and the final results must be communicated to decision-makers and members of the public, many of whom are unlikely to be experts in the environmental sciences. It is precisely to help overcome these difficulties that "EIA methods" have been devised.

Although both "methods" and "techniques" are concerned with the implementation of EIAs, there is an important distinction between them. "**Methods**" provide structured mechanisms for the identification, collection, classification and display of environmental impact data. As for "**techniques**", on the other hand, they grant us a standardized way of describing and/or measuring the qualities of the environment and help us forecast changes that may occur to these qualities by reason of some external factors. For example, the prediction of noise levels and concentrations of air and water pollutants at sites of varying distance from a source can be under-taken using a number of predictive techniques, such as dispersion models.

There is no universally applicable method, which can be applied to all projects in all situations. When a method is being selected for a project it is not necessary to use one method only. It is often very useful to combine methods for a particular study and adapt the methods to particular circumstances.

This chapter doesn't contain a descriptive or discussion of every method but contain most of the common methods used in this field, such as index approaches, matrices, overlays, networks ...etc.

3.2 Index approaches

Already in the inception of the EIA practice, index approaches were devised. However, some of the earlier methods still attract our attention and these have also

Methods and Techniques

been subject to more and more elaboration, although some key innovations based on the formation of concepts were introduced. These methods can be divided into checklists and approaches based on multi-attribute utility theory.

3.2.1 Checklists

This checklist may be considered as a competitor to the Leopold matrix as the oldest EIA method available. It can occur in a large variety of forms, varying from a simple list of environmental factors to be considered in EIA, through different forms that provide further guidance concerning data requirements and related predictive techniques. The Following table shows an example of checklist: -

Table 3.1. environmental impact checklist ⁽¹⁾

N°	Question	Yes	No
1	<i>Characteristics of the natural environment</i>		
	Does the project site involve a unique landform or biological area, such as beaches, sand dunes, marches, tidelands, ...etc?	-	-
a	<i>Land (topography, soils, geology)</i>		
	Will the project involve construction on slopes of forty percent or greater?	-	-
	Is the project to be located in an area of soil instability (subsidence, land-slide, or severe erosion)?	-	-
	Is the project site located on or adjacent to a known earthquake fault?	-	-
b	<i>Water</i>		
	Is the proposed project located within a floodplain?	-	-
	Does the proposed project involve a natural drainage channel or streambed?	-	-
c	<i>Biota</i>		
	Are there any rare or endangered species of plant life in the project area?	-	-
	Will any nature trees be removed or relocated?	-	-
	Is the project site adjacent to, or does it include, a habitat, food source, water source, nesting place, or breeding place for a rare or endangered wildlife species?	-	-
	Could the project significantly affect Fish, wildlife, reptiles, or plant life?	-	-
	Is the project located inside or within 200 feet of a fish or wildlife refuge or reserve?	-	-
d	<i>Potential alteration of natural features</i>		
	Will the proposed project result in the removal of a natural resource for commercial purposes (including rock, sand, gravel, oil, trees, or minerals)?	-	-
	Will the project involve grading in excess of 300 cubic yards?	-	-
2	<i>Pollution (air, water, noise, land)</i>		
	Will the project create dust, fumes, smoke, or odors?	-	-
	Will the project involve the burning of any material, including brush, trees, and construction materials?	-	-
	Is the project expected to result in the generation of noise levels in excess of that currently existing in the area?	-	-

(1) **Thomas Dickert and Katherine Domeny, Eds.;** “Environmental Impact Assessment: Guidelines and Commentary”; University Extension, University of California; Berkeley; **1974.**

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N°	Question	Yes	No
	Will the project involve the application, use, or disposal of potentially hazardous materials, including pesticides, herbicides, other toxic substances, or radioactive material?	-	-
3	<i>Applicable pollution controls and standards</i>		
	Does the project require variance from established environmental standards (t.g., air quality, noise, water quality)?	-	-
	Will the proposed project require a permit or other approval from any of the following agencies?	-	-
	State water Resources Control Board	-	-
	Regional water Quality Control Board	-	-
	State Department of Public Health	-	-
	Bay Area Air Pollution Control District	-	-
	San Francisco Bay Conservation and Development Commission	-	-
	Metropolitan Transportation Commission	-	-
	U.S. Environmental Protection Agency	-	-
	County Airport Land-Use Commission	-	-
4	<i>Impact on infrastructure</i>		
a	<i>Circulation</i>		
	Is the project expected to cause noticeable increase in pedestrian traffic or a change in pedestrian patterns?	-	-
	Will the project result in noticeable changes in vehicular traffic patterns or volumes (including bicycles)?	-	-
	Will the proposed project involve the use of off-the-road vehicles of any kind (such as trail bikes)?	-	-
b	<i>Water supply and sewage disposal</i>		
	Will the project entail the acquisition of water from wells or surface sources for commercial and/or nondomestic use?	-	-
	Will septic tanks be utilized for sewage disposal?	-	-
c	<i>Demand for service from special districts and/or municipalities or county</i>		
	Will the project require the extension of existing public utility lines?		
	Will the proposed project require public services from an agency, district, or public utility that currently operating at or near capacity?	-	-
5	<i>Social effect</i>		
	Is the project apt to result in the congregating of more than 50 people on a regular basis?		
	Will the project result in the introduction of activities not currently found within the community?	-	-
6	<i>Miscellaneous</i>		
	Will the project employ equipment that could interfere with existing communication and/or defense systems?	-	-
	Is the project located within the flight path or noise impact area of an air- port?	-	-
7	<i>Land use</i>		
	Is the proposed project expected to result in other changes in land use either on or off the project site?	-	-
	Could the project serve to encourage development of presently undeveloped areas, or increases in development intensity of already developed areas (examples include the introduction of new or expanded public utilities, new industry, commercial facilities, or recreation activities)?	-	-
	Does the project involve the construction of more than twenty dwelling units?	-	-
	Is the project adjacent to or within 500 feet of an existing public facility or site for same?	-	-
	Does the project require variance from adopted community plans, policies, or goals?	-	-
	Does the project involve lands currently protected under the Williamson act or an open space easement?	-	-

N°	Question	Yes	No
8	Visual impact		
	Is the site for the proposed project adjacent to a designated scenic highway or within a scenic corridor?	-	-
	Will the project obstruct scenic views from existing residential areas, public lands, or public roads?	-	-
	Does the project involve the construction of buildings or structures in excess of 3 stories or thirty-six feet in height?	-	-
9	Sociocultural impact		
	Will the project require the relocation of people or business in order to clear the construction site?	-	-
	Does the project site involve a known historical or archeological site?	-	-

Checklists have reached the peak of their development process with the introduction of complex forms of almost mathematical attributes. According to these forms, impacts are transformed into units on a common, theoretical scale, oriented in accordance with the relative importance and eventually manipulated mathematically to form various indexes of 'total' impact. ⁽¹⁾

The launching pad from which *Mongkol (1982)* has started consists of some important characteristics of impact, which are not taken into account in EIA methods. These characteristics are impact magnitude (severity of an impact); prevalence (extent of an impact, and the network of causes and effects); duration and frequency (the time elements); risk (probability of an impact occurring); importance (significance of an impact at the time of EIA work); and mitigation (action taken to reduce or eliminate adverse impacts).

The most obvious shortcoming of *Mongkol's* is that he failed to consider 'reversibility'. However, this attempt to improve the concept-related base of scaling-weighting checklists teems with praiseworthy qualities. This manifesting variety of Environmental Evaluation System (EES) involves the use of a matrix, in order to take into consideration the functions of mitigation and modified value. Hence, they are made more flexible to cater for local conditions (Fig. 3.1).

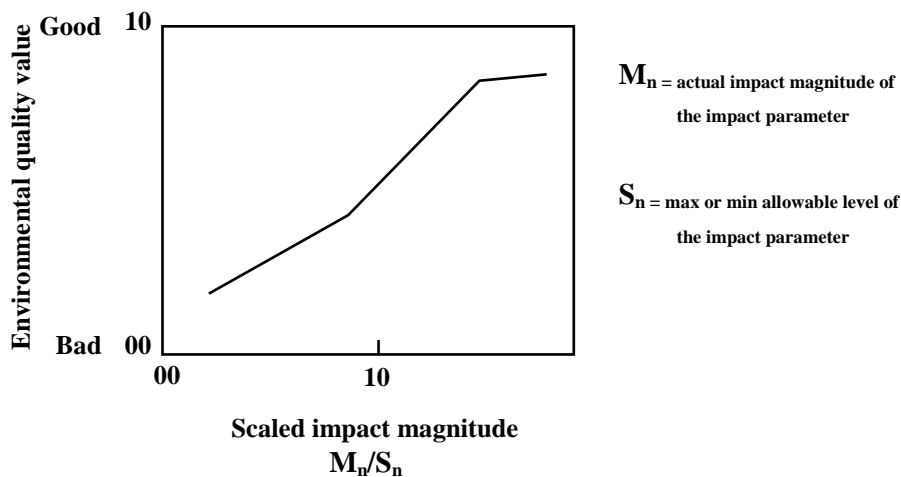
This modified value function includes the maximum and minimum levels permitted, as far as specific environmental boundaries are concerned, e.g. the levels of noise.

(1) **Bisset, R.** ; “Developments in EIA methods. In Wathern P (ed.) Environmental Impact Assessment: Theory and Practice”; Unwin Hyman, London; **1988**.

Further, *Mongkol* advocates the use of an error term to accommodate the risk of wrong decisions being taken. Finally, instead of using concepts such as 'net environmental cost' or 'net environmental benefit', *Mongkol* borrows an idea from cost-benefit analysis and uses an 'environmental benefit-cost' ratio obtained from ⁽¹⁾

$$\text{Environmental benefit-cost} = \text{beneficial impact}/\text{adverse impact}$$

Figure 3.1. Flexible composite value functions.



One of the main difficulties with scaling-weighting checklists concerns the derivation of the weights. *Sondheim* (1978) has attempted to broaden the basis of weight allocation by removing it from the experts who either develop a method or are involved directly with specific EIA studies. In the *Sondheim* method, a weighting panel is constituted for each EIA. The members of the panel, chosen by the organization responsible for the study, can be from government, industry, community organizations, interest groups and other parties affected by a proposal. Each member of the panel produces an individual weighting scheme for environmental components. These schemes are amalgamated to produce a single weighting scheme representative of the panel's views. ⁽²⁾

In 1983, *Yapjakis* succeeded in adapting the *Sondheim* method in a way that would support even a broader base for deriving weights. *Yapjakis* main concern is that large-scale projects with a transnational nature and effects would be assessed in a

(1) **Mongkol, P.** ; “A conceptual development of quantitative environmental impact assessment methodology for decision-makers”; *Journal of Environmental Management*; **1982**.

(2) **Sondheim, M. W.** ; “A comprehensive methodology for assessing environmental impact”; *Journal of Environmental Management*; **1978**.

manner acceptable to all the countries in question. A scheme for weighting impacts which includes selected nationals from academia, industry and government departments is used to produce national weights, which can be combined in a 'regional' if not 'global' manner to produce an index of 'total' project impacts. In a trial run *Yapijakis* discovered that nationals of Yugoslavia and Greece produced similar weighting schemes despite socioeconomic and political differences between the two countries.

In addition to incorporating environmental and social impacts, *Yapijakis* also included economic aspects and a new dimension which he designated as 'manageability and technology level'. This is an aspect of a project which reflects government policies and goals. If we blended all these factors together, the outcome would be the following comprehensive equation that would assist international decision making on projects with impacts surpassing the national boundaries. ⁽¹⁾

$$\text{PRO} = \text{WB}(\text{BCR}) + \text{WC}(\text{CO}) + \text{WE}(\text{EI}) + \text{WS}(\text{SI}) + \text{WM}(\text{MTL})$$

Where PRO = project alternative ranking order

BCR = project alternative benefit: cost ratio

CO = capital outlay for project alternative

EI = environmental impact (quantified) of alternative

SI = social impact (quantified) of alternative

MTL = manageability and technology level of alternative,
reflecting government policies and goals (and possibly
public participation) quantified

WB, WC, WE, WS, WM

= weight assigned to each of the above factors by
individual country

3.2.2 Multi-attribute utility theory

A tangible interest in the application of the multi-attribute utility theory has been sensed in the course of the past 15 years, as indicated by the literature on EIA

(1) **Yapijakis, C.** ; "A comprehensive methodology for project appraisal and environmental protection in multinational water resources development"; Paper presented to the symposium on Environmental Impact Assessment: Current Status and Future Prospects; **1983**.

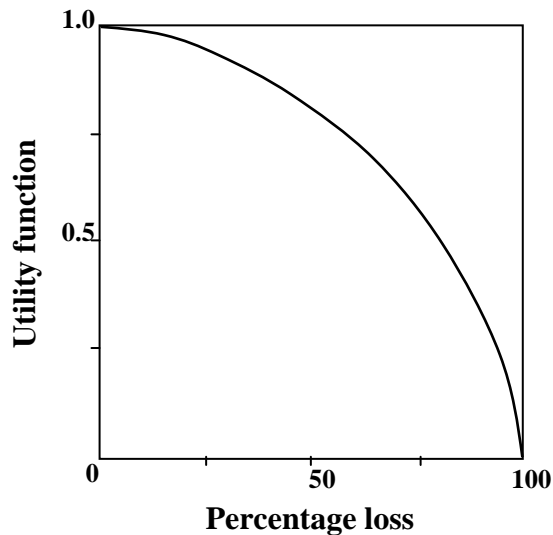
methods. Each and every published study addresses energy-related projects, particularly with site selection, however there is no good reason why this method cannot be applied to other types of projects and policies. Despite the fact that this method is being applied since 1978, interest in it seems to have increased only recently.

The method has its theoretical base in the writings of *Von Neumann & Morgenstern (1953)* and associated developments by *Keeney & Raffia (1976)*. It is a means whereby possible environmental consequences can be 'traded off'. Alternative projects can have many different environmental impacts and also exhibit different 'levels' of the same impact. For example, one alternative might increase ambient noise level by 10dB (A) whereas another might only increase it by 5dB (A). This method provides a logical basis for comparing the impacts of alternatives to aid decision-making.

More often than not, EIA Utility theory has been applied to site selection for major power stations. *Uys (1982)* has implemented this method to assess alternative energy policies for South Africa. And it can also be applied to assess the environmental impacts of alternative projects. In addition, *Collins & Glysson (1980)* used this method to assess two alternative solid waste disposal systems. The organizing principles of the multi-attribute utility framework are basically similar irrespective of the specific objectives of a particular application.

The first step is to determine environmental attributes which can be measured, for example, particulates can be measured in $\mu\text{g}/\text{m}^3$ or dissolved oxygen in mg/l. A number of such attributes which provide a comprehensive picture of likely environmental impact are selected. For each attribute different measures or 'states' may exist which have to be calculated using predictive techniques such as air pollution dispersion models. Once attribute levels have been determined the principles of this method enable their desirability or undesirability to be established.

Figure 3.2. Hypothetical utility function curve showing relationship to percentage loss in salmonid populations.



As can be seen, this operation depends on the experts' subjective opinion. However, the utility theory gives a logically steady framework, free from variation, according to which the preferred structure of experts may be established (individually or in combination) as regards the relative attributes of each different level. Systematic comparison of these levels by the decision-maker results in the formulation of utility functions (Fig. 3.2). Utility is measured on a scale of 0 to 1 where 1 is the highest utility. In the example shown in Figure 3.2 the loss of 100 per cent of salmonids leaving natal waters (due to power station impacts) would be very serious and be given a utility value of 0. An 80 per cent loss has a utility value of 0.5 .

One of the significant features of this method is its ability to deal with probability, i.e. the possibility that certain levels of environmental attributes may occur. And this aspect of utility theory is what it stands out for as opposed to all other EIA methods. Usually, the probability of an impact occurring is ignored or omitted from the structure of an EIA method. If recognized at all, it is usually relegated to a qualitative commentary.

Once utility functions have been established for individual attributes it is possible to combine them. The first step in this stage of the analysis is to calculate a scaling value (k) for each attribute. Such scaling values reflect the relative importance as perceived

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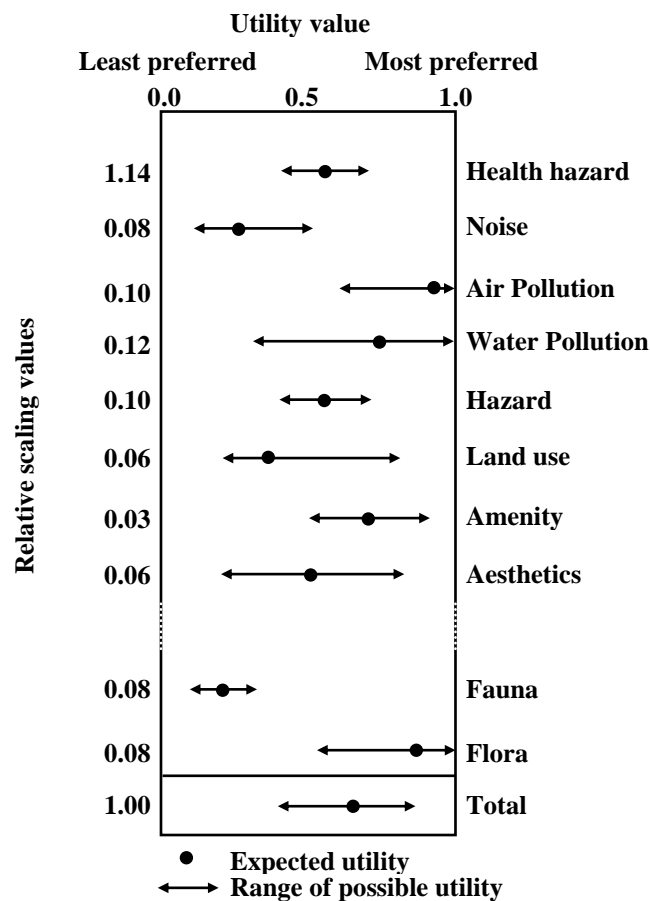
by decision makers of the different attributes. Total utility or a composite environmental quality index (EQI) can be obtained from the following equation:

$$EQI = U(x) = \sum_{i=1} k_i U_i(x_i)$$

where k_i is scaling factor of attribute x_i , and U_i is utility function. This equation assumes environmental independence between the attributes. Usually this is not the case as attributes are interrelated. A more complex formula is required to deal with this situation.

The results from an analysis can be presented as EQIs for a number of sites or alternative projects or as performance profiles (Fig. 3.3).

Figure 3.3. Performance profile for alternative proposals.



This profile shows the individual utilities of a project in relationship to ten environmental attributes. Also, it shows the composite utility over all attributes.

In order for this method to be applied successfully, one has to be very well familiar with the theoretical basis of utility theory. It is probably even more complicated than the endless variations of the scaling-weighting checklists. As in the case of scaling-weighting checklists a composite index of environmental impact is obtained. It is likely that interested members of the public and decision makers will be unable to follow the steps of the process unless they are highly numerate.

Among the pros of this method is the aspect of decision-making, the incorporation of probability, and the analysis of sensitivity. First, like all methods producing a composite index, decision making is easy as the decision is made by the method. Given the numerical utility structure, the alternative project or site with the highest utility score is the least environmentally damaging and therefore, on environmental grounds, should be chosen. Economic factors can be included into the utility approach in order to broaden the range of decision-making possibilities.

The final advantage of this method resides in its ability to show changes that would occur as a result of modifying the utility functions and probability assumptions. If the calculations have been done by computer, the effects of sensitivity analyses can be seen almost immediately. Such analyses indicate the 'robustness' of the initial results and show, which are the crucial variables that change outcomes. ⁽¹⁾

3.2.3 Comments on index methods

What the key objections to these methods are is well known to us and they are often repeated in the EIA literature. People argue, among others, that the outwardly subjectivity found in these calculations hides behind it false objectivity. Even if not hidden it is further contended that the subjective views incorporated within these methods are representative of a very restricted population, namely selected decision makers or experts. There is considerable truth in this assertion despite attempts to increase the base of subjective inputs.

(1) **Bisset, R.** ; “Developments in EIA methods. In Wathern P (ed.) Environmental Impact Assessment: Theory and Practice”; Unwin Hyman, London; **1988**.

Furthermore, it is argued that these methods are too technical and complex. As a result, public participation in EIAs and reviews of its final results is curbed. And we fully support this criticism. *Bisset (1978)*, however, has gone beyond this and argued that such methods may be devised and used for this purpose and that the aim is to inhibit wider involvement in project decision making. ⁽¹⁾

Among the main disadvantages of these methods is the way they separate the environment into isolated compartments and fragments. The scaling-weighting checklist is nothing but a list of environmental factors, changes in which (impacts) are assessed each separately. The same stricture applies to utility theory. Both methods focus on environmental features, which can be quantified, although in no case is this an absolute requirement. However, these methods are so heavily dependent on quantification that there must be a great temptation to quantify the unquantifiable, for example, in the field aesthetic.

To concentrate in these methods on single constituents of the environment would be a huge defect. Environmental systems consist of a complex web of parts, related to one another, which often contain feedback deficiencies. No matter how intricate and intellectually satisfying the mathematics involved, it is impossible to characterize 'system-level' impacts by considering changes in specific components in isolation and then aggregating the results. ⁽²⁾

3.3 Matrices

3.3.1 Interaction Matrices

The most commonly used EIA method is the matrices. Matrices can be looked at as control lists with two dimensions. On one dimension the individual characteristics of a given project are shown (proposed activities, elements of impacts, etc.), while on the other the environmental categories which may be affected by the project are listed. The effects or potential impacts are therefore individualized by a confrontation of two

(1) **Bisset, R.** ; “Quantification, Decision-making and Environmental Impact Assessment in United Kingdom”; *Journal of Environmental Management*; **1978**.

(2) **Bisset, R.** ; “Developments in EIA methods. In Wathern P (ed.) *Environmental Impact Assessment: Theory and Practice*”; Unwin Hyman, London; **1988**.

control lists. The difference between the various proposed types of matrices are to be observed mainly in variety, number and specificity of control lists, as well as in the system of evaluation of individualized impact. With regard to assessment, this ranges from the mere individualizing of impact (marked with some sort of sign, a cross, dash, asterisk, various degrees of shading, colors etc.) to a qualitative evaluation (good, moderate, sufficient, reasonable) or to a numerical evaluation which may be either absolute or relative: generally an assessment is effected regarding the result of impact (positive or negative). The numerical evaluation is often criticized, because it is after introducing criteria of objective judgment that, in reality, can never be achieved.

Among the better known examples of matrices is Leopold's matrices (*Leopold et al., 1971*). This is made up of two control lists including respectively 100 possible actions linked to the proposed project and 88 environmental components, which are susceptible to impact. The impacts to be analyzed therefore are 8800. This method requires that the intersection between each action and each environmental characteristic is diagonally barred. This having been carried out, a number (from 1 to 10) is inserted in the upper part of the barred square to indicate the size of impact. In the lower part another number (from 1 to 10) indicates the importance. ⁽¹⁾

With using matrices, it is possible for reviewers to systematically consider each feature of a proposed project in terms of possible effects on each impact measure. ⁽²⁾

Matrices are used essentially to help identifying those activities with the greatest impacts. As soon as the most harmful activities are identified, it can be determined whether the activity can be fully averted or only mitigated. Figure 3.4 presents a simplified matrix of the impacts of activities of a hypothetical project. The matrix indicates that water quality, air quality, and land use impacts are the most important, with the majority of impact occurring during the site preparation and construction phases. It must be emphasized that actual matrix analyses contain many more

(1) **Thomas H. Christensen, Raffaello C. and Rainer S.** ; “Sanitary Landfilling: Process, Technology and Environmental Impact”; academic Press; **1989**.

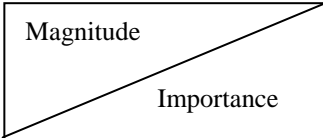
(2) **The Late James McEvoy and Tomas Dietz**; “Handbook for Environmental Planning: The Social Consequences of Environmental change”; Jone Wiley & sons, Inc; **1977**.

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categories of environmental attributes and project activities. ⁽¹⁾

Figure 3.4. A Simplified matrix Analysis.

Environmental Attribute	Project Activities				Impact on each Attribute
	Project Planning	Site Preparation	Construction	Operation	
Water Quality	0	0	0	2	110
Air Quality	0	0	0	2	88
Species Diversity	0	2	2	0	24
Land Use	1	10	3	3	88
Aesthetics	1	3	3	1	27
Impact of Each Activity	2	174	132	29	337

Key:  Total Impact of the Proposed Activity
0 = Nil ; 10 = Greater Impact or Importance

Interaction matrices have the same disadvantages as checklists. They also separate the environment into secluded compartments and obstruct any interaction between components. However, specific environmental features can be affected by a number of impacts through different ways. This kind of matrix is moreover unable to distinguish between immediate and long-term impacts, although separate matrices

(1) **John, H. Baldwin;** “Environmental Planning and Management”; Westview press; Boulder and London; 1985.

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could be prepared for each time period of interest. Furthermore, the matrix does not show the spatial and social distribution of impacts.

A useful method for aiding the comparison of alternatives is to use "Impact vs. alternatives" matrices with verbal rating of alternatives, an example of which is provided in [Figure 3.5](#).

Figure 3.5. A matrix of impacts vs

Impacts	Alternatives			Comments
	1	2	3	
Water Pollution:				
-		low	high	
-	low		medium	
-	medium	low	low	
Air Pollution:				
-			low	
-	high	low	medium	
-			low	
Ecological impacts:				
-	low	medium	Very high	
-			high	
-	medium	low	high	
Health impacts:				
-	low			
-	low	low	high	
-	low	medium	high	
Impacts on landscape:				
-	high	medium	low	
-	high			
Impacts on culture and history:				
-	medium	?	low	
-	low	medium	medium	
Social impacts:				
-	high	high	medium	
-	low	high	medium	
-	?	high	low	
Etc.				

A simplified matrix of this kind shows the principal trade-offs that the decision-makers must make. The verbal scale used should be explained and cross-references

should be given to text of the report for further information on the impacts and methods used to predict them. ⁽¹⁾

3.3.2 Chromatic Matrices

This kind of matrices uses chromatic tonalities in order to facilitate the understanding of the final results of the study.

3.3.2.1 General Description

As a reference point, the normative of the Environmental Evaluation Council (EEC) has been applied.⁽²⁾ This shed lights on the fact that information has to be provided through environmental impact assessment (EIA), but it does not indicate how the impact can be evaluated, nor how the criteria to be used to lessen negative effects (that appear at the end) is determined. Therefore, a new 'ad hoc' method has been devised, which were primarily characterized by flexibility of use, a fundamental requirement as such.

In fact, EIA may be applied with various objectives:

1. a single project or a single site;
2. more than one project but relative to only ore site; .
3. one project at different sites:
4. more than one project at more than one site;
5. a project that has already been carried out.

The chromatic matrix scheme proposed here may be used for each of the five EIA objectives. This is made possible by the presence of five matrix schemes which evidential, each for their own sector, interaction between the causes, elements of impact and environmental categories. In order to carry out a more detailed analysis of the causes of impact, several phases of the evolution of the project are characterized and linked to different types of impact with regard to duration, entity and probability of the event taking place. The phases taken into consideration are as follows:

(1) **FINNIDA**; “Guidelines for Environmental Impact Assessment in development assistance (Draft)” ; **1989**.

(2) **Environmental Evaluation Council, EEC**; “Council Directive No. 85/337”; **1985**.

- (a) temporary phase (pre-project period and construction of the installation)
- (b) phase of ordinary exercise
- (c) phase of extraordinary exercise

For each of these phases a group of five matrices may be prepared, as explained later.

Due to the difficulty people often face in determining the quantity of interaction between the various control lists each matrix includes, we used a chromatic representation to describe them rather in terms of quality. Two different chromatic scales were used to which positive or negative influences corresponded and which include four assessment levels (expressed by different tonalities). The four chromatic tonalities correspond to negligible, low, moderate or high qualitative levels.

The chromatic representation of impact consents an immediate and synthetic individualization of the critical elements of impact where action may eventually be taken.

Matrix of the Causes and Elements of Impact (Matrix A)

The first matrix of the series demonstrates the activities of the plant which are causative of the elements of impact. And because this method refers to three different phases of the project, the three relevant matrices must focus respectively on the various elements of impact for each phase. The latter were identified as those factors able to modify the state of environmental categories. The importance of the causes with regard to determination of a specific element of impact is assessed by means of different chromatic tonalities.

This First matrix (or better, this first group of matrices; enables us to individualize the environmental impact of a project or of a plant and thereby identify the need for improvements. In the case of more alternative projects to be assessed the matrix represents an efficient tool in establishing a sound background for decision-making.

Matrix of Indicators and Environmental Categories (Matrix A1)

With the environmental categories is meant these environmental components which suffer from the effects the elements of impact generate. These include not only the physical components of the environment (air, water, flora, fauna, etc.) but also the components more strictly related to human activity (public health, economic

activities, social relations, cultural values, etc.). Contrary to the elements of impact which are characteristics peculiar to the single operational phases of the plant, the environmental categories are clearly invariable.

In order to describe the state of the single environmental categories of the site (or sites) in question, it is necessary to define some relevant indicators. In fact, the definition of an informative background of the existing environmental categories constitutes one of the main phases of the procedure of impact assessment and is specifically demanded in some countries.

The assessment of environmental indicators may either have a qualitative or a quantitative nature, according to the categories being dealt with and the mathematical or direct instruments of measurement available. The chromatic tonality resulting from the intersection between an indicator and an environmental category allows the assessment both of the qualitative state of the environment and the effect of certain causes in rendering the environment more or less compatible to receiving the installation.

By means of this matrix (unique as to its independence from the activities linked to the plant) it will be possible to express a judgement of suitability of one or more sites with regard to the type of plant which is to be installed, which makes the method useful in solving the problem of the best location.

Matrix of Potential Impacts (Matrix B)

This matrix presents as control lists the elements of impact and environmental categories already defined in matrices A and A1 respectively.

From the intersection of these two lists, the potential impact manifested by the installation with regard to the environment can be singled out and therefore the B matrix is capable of globally evidentiating all problems under consideration.

In fact, if it is really necessary to assess the impact a certain installation has on various sites, the same number of matrices will be obtained.

And when a further, more thorough examination is conducted, a judgement may be passed testifying that they are acceptable. In this case, the diversity of the various B

matrices is certainly restricted to the variations in the matrix A1. This latter variation coincides with the different characteristics of the sites whilst the A matrix remains unchanged on account of its dependence on the characteristics of the installation.

Vice versa, if it should prove necessary to assess the impact of more than one installation on one single site, the resulting various B matrices will be influenced by the variation in the A matrices whilst obviously the A1 will remain unchanged.

In the case of a decision which depends on the results of consideration of more than one project based on more than one site, the number of B matrices taken into account increase considerably as they are equal to the combination of all possible cases. However, the examination of the A1 matrices alone will provide enough information in order to immediately discard those sites which are clearly unsuitable to contain a certain type of installation (e.g. a sanitary landfill), thereby allowing the examination of smaller number of B matrices.

Finally, in the case of an already existing single installation, the B matrix simply demonstrates the situation of potential impact, indicating those points towards which improvements should be directed. Concerning the other cases previously discussed, although the B matrix is capable of allowing a first judgement, the definitive choice should be made only after careful assessment of the situation in the light of the operations of limitation.

Matrix of Limiting Criteria (Matrix C)

Based on the potential negative impact individualized in matrix B, the fourth matrix of the scheme takes into account operations and measures to be adopted in order to reduce, or even eliminate (or at least mitigate) the negative impacts until it arrives at acceptable environmental levels. Their action must have an influence on the causes which greatly contribute towards the onset of negative elements of impact and therefore their singling out must include a careful evaluation of the A matrix. To this regard, two important aspects must be underlined. *Firstly*, it is necessary to have a clear picture of all possible interrelations as any one single element of impact may be influenced by more than one introduced improvement. Moreover, it must not be overlooked that these same measures may produce simultaneously positive effects on

some elements and negative side effects on others. An example could be drawn from the field of sanitary landfilling. Restricting the effect caused by the presence of leachate using a collection system and an on-site treatment process, has some undoubted positive effects. However, some negative effects may arise as well from unpleasant smells emitting from various parts of the treatment plant. Therefore, there has to be an assessment of the efficiency of measures, using the two different chromatic scales already defined.

Matrix of Residual Impacts (Matrix D)

On the grounds of the limitation measures used and of their efficiency, evaluated using the C matrix, the method provides a fifth matrix. This matrix serves the assessment of limited impact, i.e. of the residual impact once the operations of limitation have already been established to make ineffective the various causes of impact.

This matrix is entirely analogous to the B matrix used for assessment of potential impact but, diversely from the latter, the examination of this matrix allows us to express a definitive judgement on the degree of compatibility of an installation with regard to the surrounding environment. Moreover, the cross-examination of B and D matrices will consent a visible appreciation of the efficacy of limitation criteria.

This last observation shows how such a tool is most certainly appropriate in cases where EIA should require the formulation of proposed restrictive operations in order to obtain less and less residual impact: through a repetitive process, this objective could be met.

3.3.2.2 Comprehensive Scheme of the Method

Figure 3.6 shows a block scheme of the method described in the previous sections. The repetition that characterizes the scheme proves that the number of evaluations of residual impact will be the same as the outcome of the number of projects for the number of sites considered to be suitable. All these assessments will subsequently be the object of cross-analysis prior to final judgement.

Figure 3.6. Scheme of the environmental impact assessment methodology through chromatic matrices.

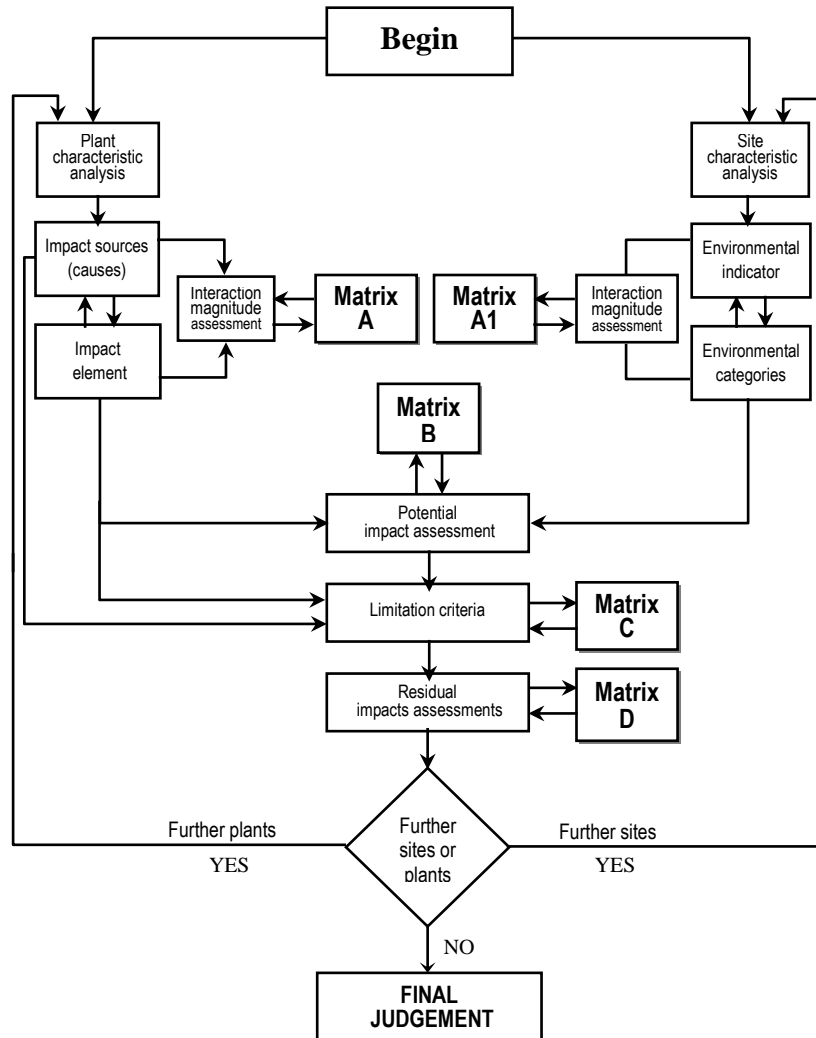
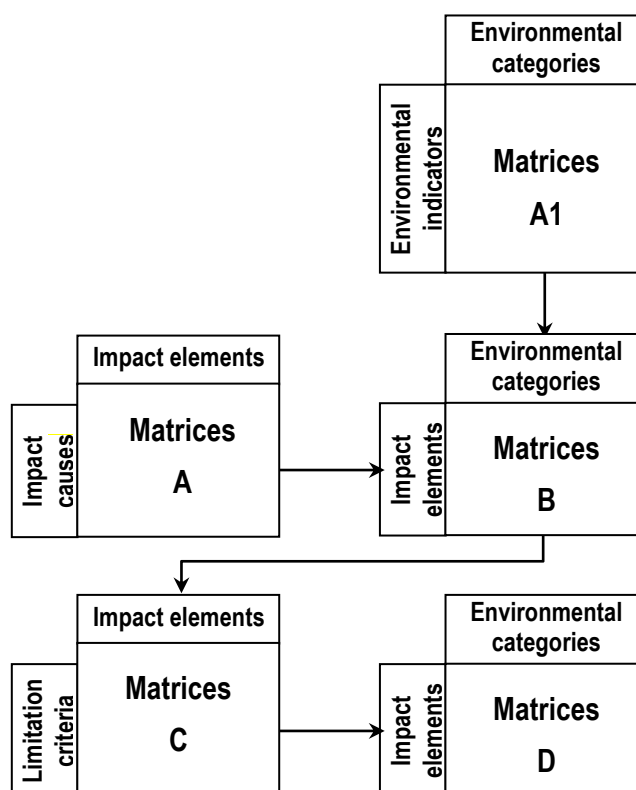


Figure 3.7 shows a global representation of the five matrices: the arrows represent the logical pattern for their use. As is plainly evident, the whole scheme will recur with each of the three phases of the installation, while permitting the particularization of residual impact both in the phases lasting for a limited time, as well as the phases of ordinary and extraordinary exercise.

Figure 3.7 General representation of chromatic matrices.



Only the person responsible for the final decision may give the correct value to the impact present in each phase; this task is not the responsibility of the person carrying out the impact study. However, once the amount of consideration that must be given to each phase is defined (taking into account politico-strategic reasoning), this method permits the amalgamation into a single series of matrices of all the various phases: obviously this will mean dealing with matrices of a higher dimension. ⁽¹⁾

3.3.2.3 Conclusion of Chromatic Matrices

The impact assessment scheme using chromatic matrix, similarly to the other matrix systems which it is derived (Leopold's matrix, Moore's matrix) must be considered exclusively as a tool for environmental impact assessment. The reason why this method is applied is to permit a cautious individualization of all elements to be considered, a rational organization of the study's findings and a synthetic and efficient

(1) **Thomas H. Christensen, Raffaello C. and Rainer S.** ; *“Sanitary Landfilling: Process, Technology and Environmental Impact”*; academic Press; 1989.

representation of the latter. The seriousness and efficacy of the assessment must on no account depend on the major or minor graphic attraction or complexity of the tool.

The proposed method is capable of solving the problem of Environmental Impact Assessment at all levels.

Considering that, among all matrices proposed, the A and A1 matrices perfectly analyze the characteristics of the project and the site. Furthermore, the use of the A1 matrix alone allows a direct scrutiny of the sites.

In addition, the assessment scheme shows the advantage of taking into consideration all phases of the life of the installation, some of which are often neglected, but still have their significance. In fact, examination of the possible risks in the extraordinary phase may represent a further element of discrimination and orientation in the choice of the type of installation.

The application proposed for sanitary landfill with individualization of the various items at the origin of impact, for the elements of impact, for environmental indicators and criteria of limitation, must not be considered to completely exhaust the problem: the specific situations, as also the technological innovations will be the best guide for the continual adaptation and improvement of the method.

In conclusion, this scheme is proposed for use at various competent levels. Imagine an official at an administrative office with no technical knowledge in the field of waste disposal, who is asked to give an opinion on an installation (focusing on political, social, economic and, above all, environmental aspects). He would, thanks to the intermediate clarity of the B and D matrices in this scheme, immediately and easily get an insight of the potential and residual impact on the environment caused by the installation.

However, if the reader of the Environmental Impact Assessment is an expert in the field, by means of examination of the entire series of matrices, he or she will find answers to the need to comprehend all interrelations and relative weights which have led to the conclusive result of the final matrix. A final aspect, but by no means the least important, is that of the possibility offered by this tool of presenting in an easy way the results of the impact study to the public.

3.4 Overlay mapping

In overlay mapping, a map is made on individual transparent overlay sheets of the physiographic, environmental and social features, and is interpreted pursuant to hindrances and opportunities. It is very important to map sensitive areas within the study area. Overlay mapping is a useful method to help in site and/or route selection and illustrating the spatial distribution of impacts.

The integrity of shading can show the degree of sensitivity to change and/or the degree of potential impacts on each feature. For example, a sensitive area could be shaded very dark and an insensitive area lightly. Also for an impact which is considered very serious, dark shading would be incorporated on the overlay sheet for this feature and the impact which is considered minimal would be given a pale shading. Placing all maps on each other and on the base map, the least sensitive spots for all individually mapped factors would be the lightest area on the map, whereas the overall impact on different areas would be shown by the relative intensity of the shading. (Figure 3.8)

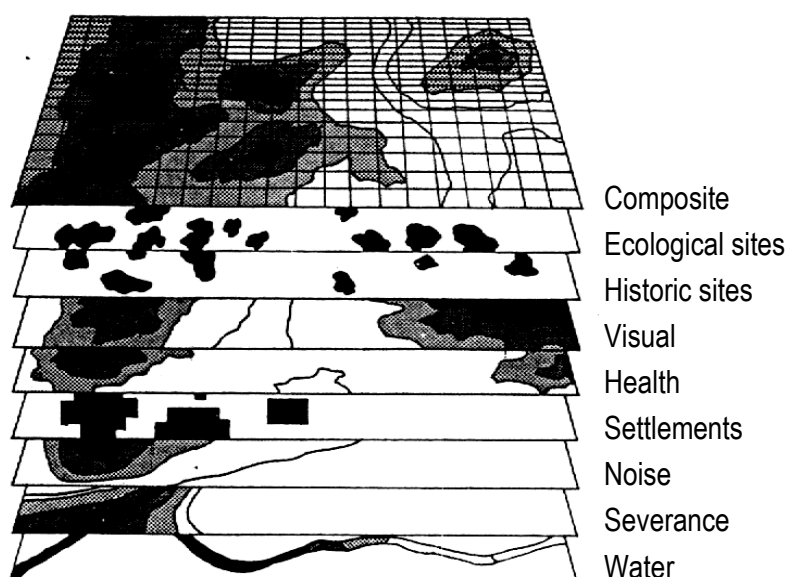
Using manual overlays there is a physical limit to the maps that can be superimposed. This means that only a limited number of impacts or factors can be considered because each of them requires a separate transparency.

The results from application of the overlay method are easily understood, and it is excellent for showing the spatial distribution of impacts. But it is less successful in dealing with other impact characteristics, such as probability, time and reversibility.

The overlay method includes two main sources of error. The *first* is that the maps give an artificial picture of the boundaries between soil and the types of vegetation. Distinct and clear-cut boundaries often do not exist, only a gradation of characteristics. *Secondly*, there is an assumption that soil and vegetation within a specific location is homogenous. Often the tract will, in reality, be heterogeneous consisting of a mixture of vegetation types, some of which may individually be of insufficient size to feature in the overlay map. If we attempt to concentrate data on a map, a not-too-little amount of detailed information may be lost in the process. ⁽¹⁾

(1) FINNIDA; “Guidelines for Environmental Impact Assessment in development assistance (Draft)” ; 1989.

Figure 3.8 The use of overlays to show environmental impacts.



Computer developments have revealed the full potential of overlay approaches. The raw data files can be manipulated, for example by changing weighting values or by aggregating types of impact in various combinations. This is impracticable with manual overlays. In addition, the data can be used with computer-aided design software to select locations with specific siting criteria such as minimum environmental impact. ⁽¹⁾

3.5 Networks

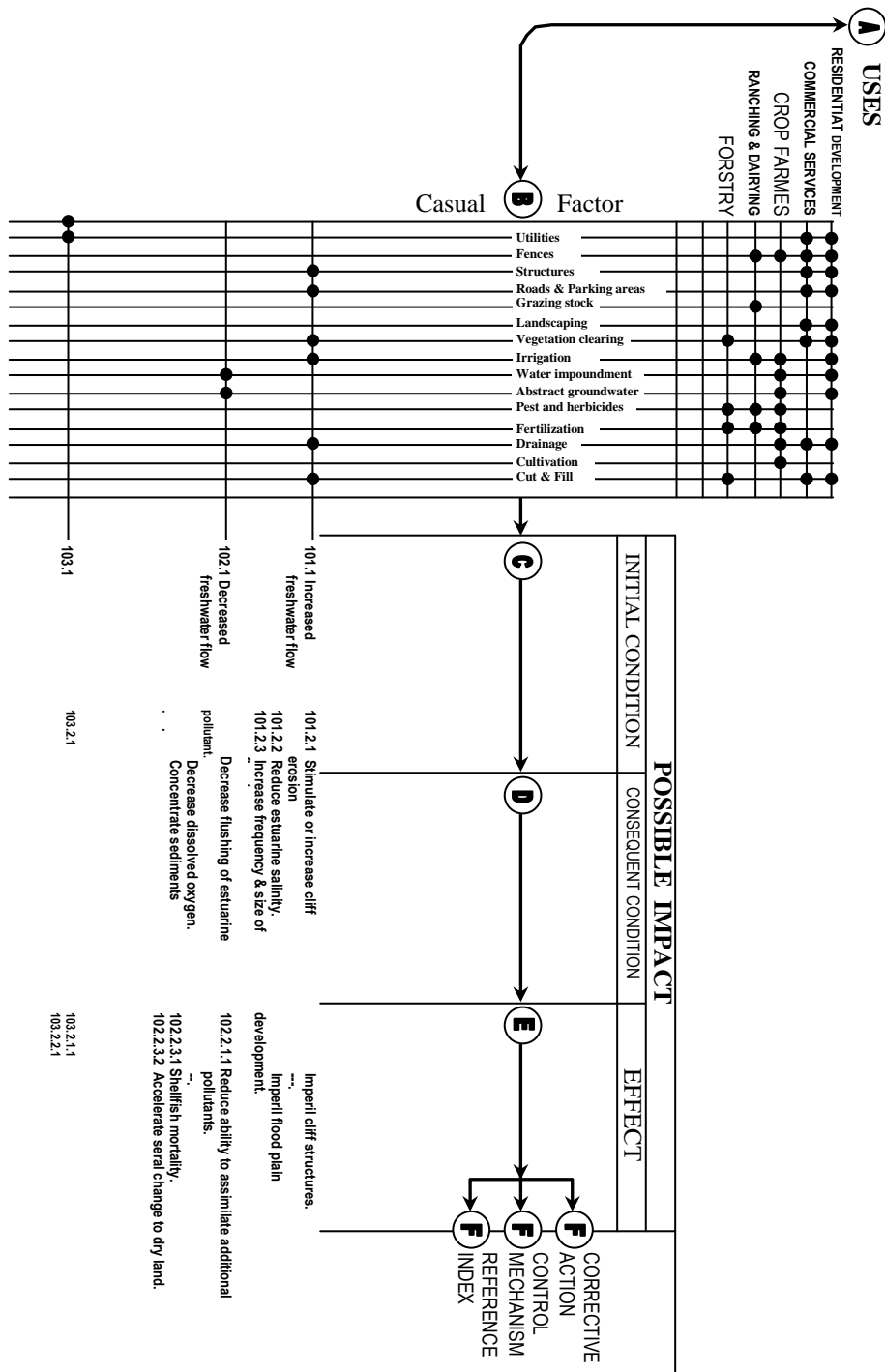
Networks can be looked at as an extension to the concept of matrices, to include the environmental sub-systems or pathways, along which the environmental effect can be recorded. Accordingly, direct and indirect effects, as well as the required linkages in the system would be better assimilated. ⁽²⁾

Sorensen (1971) developed a network of environmental impacts arising from a variety of land uses, it is aimed at assessing the effects on the environment in commensurable units (Figure 3.9).

(1) **Wathern, P. (ed.);** “Environmental Impact Assessment: Theory and Practice”; Unwin Hyman; London; 1988.

(2) **Judith, Petts and Gev, Eduljee;** “Environmental Impact Assessment for waste treatment and disposal facility”; John Wiley & sons Ltd; 1994.

Figure 3.9 The sorenson network

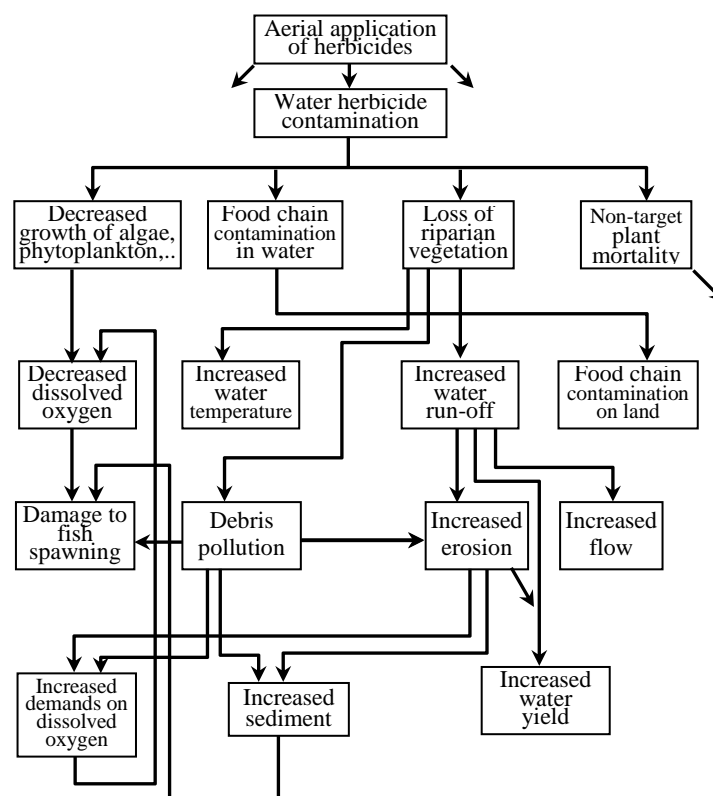


The method consists in the subdivision of the environment into four main categories: ecology, pollution, aesthetic factors, and human environment. The impact on the

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various environmental categories is described by means of parameters, each of which is given a certain value, with regard to importance, so that the overall sum is equal to 1000. Subsequently, an index of "quality of the environment" is introduced for each parameter with values ranging between, 0 and 1 which are plotted on graphs. Therefore by multiplying the index of quality by the relative weight and adding the values obtained, a numerical assessment of the impact to which each environmental category is subject can be obtained. Sorensen points out that networks are laborious to construct -and time-consuming to use manually for impact identification. ⁽¹⁾

Figure 3.10 A section of the IMPACT network



At the Pacific Southwest Forest and Range Experiment Station of the US Forest Service at Berkeley, California, work has started on networks applying computer systems. A computerized network known under the name IMPACT has been introduced with the purpose of developing forest and range land areas (Figure 3.10).

(1) Thomas H. Christensen, Raffaello C. and Rainer S. ; "Sanitary Landfilling: Process, Technology and Environmental Impact"; academic Press; 1989.

IMPACT has an extensive information base consisting of "... a single. Massive, unstructured cause-and- effect network of the social, economic and natural environmental effects of man's activities in forest and rangeland settings".⁽¹⁾

The network was developed by experts after examination of scientific and technical literature. All you need to successfully use IMPACT is to have some knowledge of the characteristics of a proposed development. The computer supplies information on the chain of effects likely to arise if a particular activity were undertaken.

Networks do not provide information on impact characteristics such as probability, importance and magnitude. There would not appear to be inherent reasons to prevent such information being provided in manual or computerized networks. However, networks tend to be used to make sure that all possible impacts are investigated.⁽²⁾

One of the major problems is the problem of how to quantitatively assess impact in a way that would allow confrontation of the effect enticed by various proposed projects through numerical values.⁽³⁾

Networks can be used easily for particular type of project but the basic problem with it, is that a great deal of information must be gathered on the environmental interactions and the impacts of a variety of projects. Different networks must be constructed for different environments.⁽⁴⁾

3.6 Systems diagrams

Systems diagrams began to appear early in the EIA literature. The theoretical basis for this method resides in the work of *Odum* in the field of ecological energetics. In fact, it was Odum who first suggested the use of these diagrams in EIA. A systems diagram consists of a chart showing environmental and sometimes socioeconomic components linked together by lines indicative of the direction and sometimes the amount of

(1) **Thor, E. C.** "IMPACT – A new Approach to Environmental Impact Assessment"; Paper presented to Society of American Foresters National Workshop; Lexington; Kentucky; **1978.**

(2) **Timothy O'Riordan and R. Kerry Tuner;** "An Annotated Reader in Environmental Planning and Management"; Pergamon Press; **1983.**

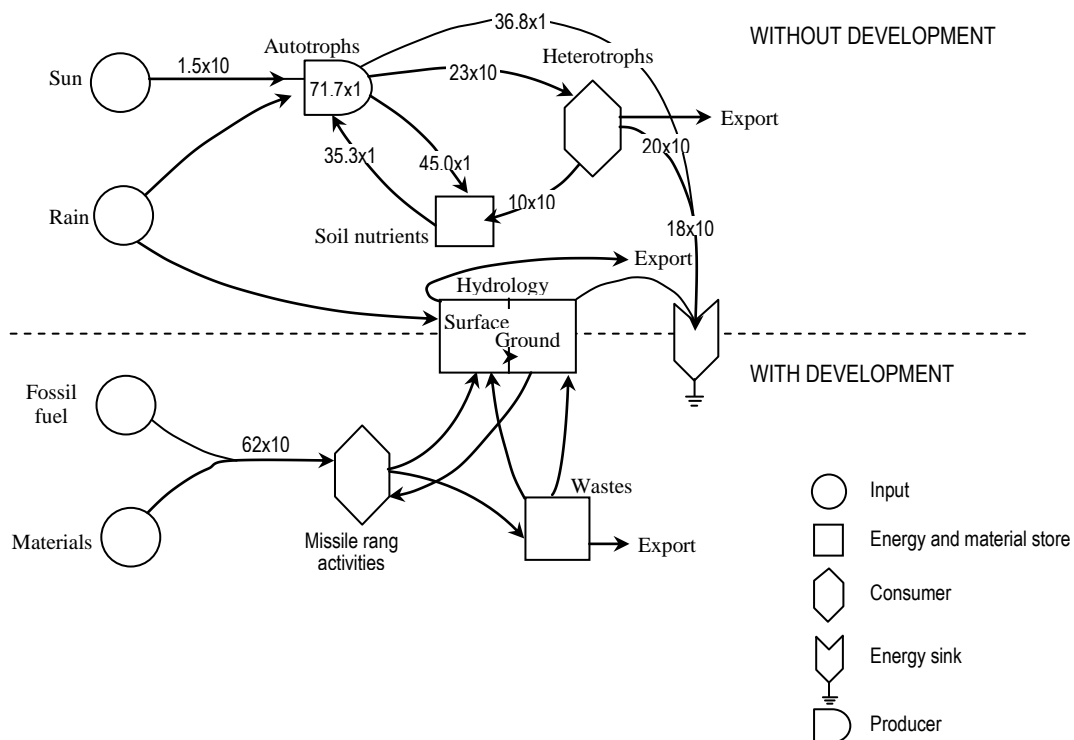
(3) **Thomas H. Christensen, Raffaello C. and Rainer S. ;** "Sanitary Landfilling: Process, Technology and Environmental Impact"; academic Press; **1989.**

(4) **FINNIDA;** "Guidelines for Environmental Impact Assessment in development assistance (Draft)" ; **1989.**

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energy flow between them. Systems diagrams are based on the assumption that energy flow and, therefore, different amounts of energy can be used as a common unit to measure the impacts of development. Consequently, systems diagrams enable comparative measurements of the magnitude of different impacts to be expressed in a common unit. Activities associated with a project likely to cause impacts may be included in the systems diagram (Figure 3.11).

Figure 3.11 Energy flow diagram for a missile site development



From among all different forms of system diagrams, the most comprehensive is probably the Activity Assessment Routine (Ecological Systems Component), devised to estimate the environmental effects of development activities on the coastal region of the state of Texas.⁽¹⁾

The ecological systems component consists of three major assessment aids, namely, ecological systems diagrams; assessment worksheets; and a series of tables and

(1) Longley, W. L. ; "An environmental impact assessment procedure emphasizing changes in the organization and function of ecological systems"; In Proceedings of the Ecological Damage Conference; Society of Petroleum Industry Biologists; Los Angeles; 1979.

matrices to help organize the judgements of those assessing a proposal and to ensure as much standardization as possible in decision making.

The first step is to pinpoint all actions related to a proposal with probable future environmental impacts, e.g. dredging. The next stage is then to identify priority environmental changes, known as Primary Ecological Alterations (PEAs). In the Activity Assessment Routine, the Texas coast is divided into seven ecosystems. Consequently, the nature of PEAs is closely associated to the site of the proposed project. PEAs are identified by those implementing the assessment and responding to a series of screening questions. Each question is related to the biological, physical, hydrological, chemical, or energy aspects of those ecosystems likely to be changed.

Once PEAs have been identified it is necessary to determine the direction of the expected ecological change, such as add or remove (vegetation), increase or decrease (bird species diversity). Having identified PEAs it is necessary to trace the consequences of these initial changes throughout the ecosystem. This is implemented by using the appropriate ecological systems diagram from among those specially constructed for the seven ecological systems. The components of the diagram are termed 'attributes' and changes in these attributes are called 'attribute alterations'. At this stage in the assessment various characteristics such as the direction, duration, magnitude and probability of occurrence of attribute alterations are determined. These are, in effect, secondary and higher order ecological impacts.

We have previously tackled the direction of energy flow between components. Now, with duration is meant the period over which an impact happens, e.g. short- or long-term, or also quantitatively (e.g. the specific number of months or years). The magnitude of a change is based on two factors. These are alterations in energy flow between ecosystem components caused by a project and the areas over which these changes occur. This approach to determining magnitude is perhaps the most questionable part of the method because it involves certain simplifying assumptions, for example, that a small ecological change over a large area is equivalent to a large ecological change within a small area. This part of the method depends on the local knowledge of the assessors and demands careful attention to be paid between the 'real' world and the conceptual world of energy diagrams. And finally, probability: it

means the likelihood of an expected impact or change in attribute. It can only be expressed qualitatively by such terms as 'certain to occur' and 'may occur'.

The most important characteristics are magnitude and duration. These are used to help determine which secondary and higher order impacts should be investigated using the relationships contained in the appropriate ecological systems diagram. To save resources, it is advocated that each attribute alteration should be screened to determine whether its consequences should be traced further. As a result of this screening only a limited number of secondary and higher order impacts are traced from the initial starting point.

As stated by most those who advocated for use in EIA, these systems' diagrams focus only on ecological impacts. Nevertheless, *Lavine et al. (1978)*, have argued that this approach can serve as a bridge between economic and environmental systems. This can be achieved by transferring all types of energy flow in the natural and man-made (economic) environments into a common unit. These can be converted into money terms by the use of known or calculated energy: money ratios for different national or regional economics.

Lavine et al. gave us a description of the use of systems diagrams. They explained how to put money values on the environmental and economic systems likely to be affected by a highway which is 133 km long, which consists of two lanes and which crosses both agricultural fields and lands with a high soil moisture.

The main impacts were air pollution from vehicle emissions, loss of organic production from alterations in the water level of the wetlands and the loss of soil to the highway and its associated borrow area. In energy terms, air pollution would cause a decrease in the capacity of the atmosphere to undertake normal energy transformations thereby decreasing its existing ability to absorb and transport gases and particles. The loss of organic production and soil regeneration would affect the ability of the environmental system to fix solar and chemical energy.

Other environmental impacts were considered insignificant, in energy terms, in the analysis. The analysis indicated that \$81.9m/year (1975 prices) would be lost from the

economy of the region due to the environmental impacts of the highway. ⁽¹⁾

3.6.1 Comments Systems diagrams

If we compare such an approach with the index methods, we conclude that the former has two main advantages.

First, systems diagrams accept the fact that environmental systems are complex, and that a change in one parameter could have multiple effects on other parameters and even on the system at large.

Secondly, this method applies energy flow measures to compare impacts. By using the standard scientific procedures, energy flow data can be obtained. And contrary to the quantitative content of index methods, this approach does not arouse any controversy or dispute.

Unfortunately, there are three major drawbacks to this method.

First, the construction of systems diagrams for particular ecosystems with associated data on energy flow can be time-consuming and expensive. Once constructed, periodic revision may be necessary to take account not only of natural variations, but also man-made perturbations.

Secondly, not all important ecological relationships can be characterized by energy flow. For example, the breeding of a rare bird may depend on the protection of a particular plant species. Removal of the plant might render the bird extinct, although no change may have occurred to the energy relationships between the bird species and the components of its environment.

Thirdly, the use of systems diagrams is, at present, confined to ecological impacts. Attempts to incorporate socioeconomic impacts are still fraught with conceptual and practical problems.

3.7 Quantitative/Index methods

Many attempts were made to introduce methods that are capable of comparing the

(1) **Bisset, R.** ; “Developments in EIA methods. In Wathern P (ed.) Environmental Impact Assessment: Theory and Practice”; Unwin Hyman, London; **1988**.

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relative importance of all impacts. This has been attained by weighting, standardizing and putting impacts together to produce a composite index for impacts either harmful, conducive to well-being or useful for other project designs. Once this has been completed, it is a simple matter to reach a decision on a project or to select the "best" option from alternatives. These methods go further than the ability of system diagrams to compare impacts in terms of their consequences for energy flow. system diagrams can only compare ecological impacts, but other impacts involving energy flow not measurable in kilocalories cannot be compared with each other or with those measured in kilocalories.

The best known quantitative/index method is the Environmental Evaluation System (EES) devised at the Battelle Laboratories of Columbus, Ohio, for the US Bureau of Land Reclamation. EES was devised for assessing water-resource developments. It consists of a checklist of seventy-four environmental, social and economic parameters can be expressed numerically and be related to the quality of the environment. ⁽¹⁾

For example, Table 3.2 displays a variety of environmental impacts associated with the drainage of the marsh, all of which are weighted according to their estimated importance from a fixed number of weighting units. The weights are determined as follows:

1. Select a group of individuals. Explain to them elaborately the concept of weighting, and the implementations of rankings. It is very important to well select the individuals. However, there is still an opportunity to repeat this test with other groups of individuals.
2. Provide the participants with a list of all pertinent categories of environmental impact (e.g. ecology and amenity). Ask each of them individually to order them according to their importance, starting with the most important one and then moving in a descending order.
3. Each individual assigns a value of 1 to the first category on his list, and then decides how much the others are worth compared to the first, expressing his

(1) **Timothy O'Riordan and R. Kerry Turner**; "An Annotated Reader in Environmental Planning and Management"; Pergamon Press; **1983**.

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- estimates as decimals between 0 and 1.
4. Within each category, the detailed impacts are ranked and given decimal values in the same way.
 5. Averages are computed over all individuals for all categories and all detailed impacts, the weights being adjusted in the cases of impacts to take account of the weights obtained for the larger categories.
 6. The group results are revealed to the individuals.
 7. The experiment is repeated with the same group of individuals.
 8. The experiment is repeated with a different group of individuals to check for reproducibility.
 9. The final weights are allocated, in proportion to the averaged scores, out of a fixed number (say 100) and standardized for comparison among different project alternatives where an array of options is being considered.

Table 3.2 Weights for environmental Impacts

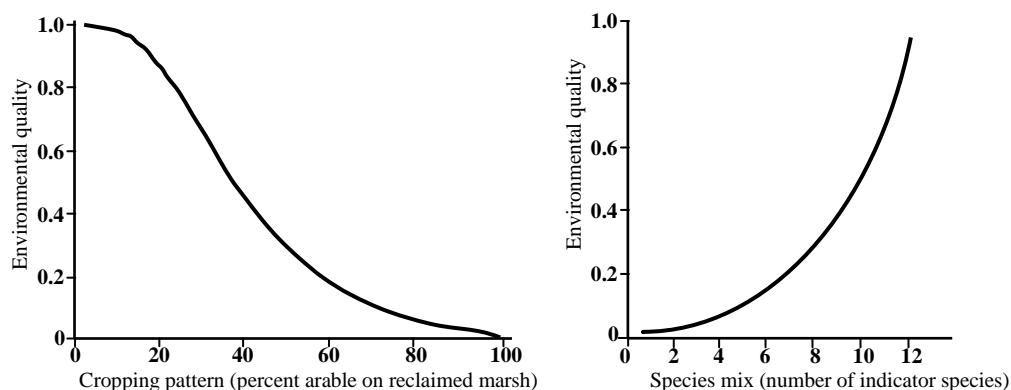
<i>Ecology</i>
common aquatic plants (4)
rare aquatic plants (12)
low nutrient level plant species mix (12)
high nutrient level plant species mix (1)
common insect species (3)
rare insect species (10)
<i>Amenity</i>
presence of marsh (14)
presence of good quality water drainage dykes (9)
presence of copses (9)
presence of livestock (7)
pastoral scene (14)
arable cropping pattern (13)
scale of landscape units (2)

All this gives us weights, but now these weights have to be related to process. Thus for each of these impacts the EIA practitioners must develop an index of

environmental quality. This is achieved as follows:

1. Get information on the relation between the environmental variable and the quality of the environment. For example, it is a generally accepted fact that the environmental quality increases the more the plant species present is diversified.
2. Draw the axes of a graph with values of the environmental variable on the horizontal axis and values of environmental quality (scaled from 0 to 1 in equal intervals) on the vertical axis.
3. Identify the environmental quality related to a certain value of the environmental variable. Mark that point on the graph. Repeat the same steps for several values of the environmental variable. After that, join the points so that they form a curve that shows the relationship between the variable and the environmental quality (Figure. 3.12).
4. Ask several different specialists or representatives of different interests society to repeat steps 1 and 3 independently, and average the curves obtain a group curve.
5. Show curves to all participants and ask for a review if there are large variations. Modify the group curve as appropriate.

Figure 3.12 Examples of environmental value functions.



6. Repeat steps 1 to 5 with a separate group of specialists, to test the reproducibility.

7. Repeat all the above steps for all selected variables.

Figure 3.12 illustrates the outcome in the case of aquatic plant species mix and the arable cropping pattern.

These two procedures may seem hard to apply besides being a waste of time, because they depend on a number of steps each of which requires an informed and conscious judgement made by a number of people. This may appear tedious but it is a necessary means of achieving a reasonable degree of consensus based on careful consideration and discussions. The crucial point to grasp is that while the weighting exercise gives a good sense of the importance of various key environmental characteristics, it is the relationship of likely impact (as indicated by the second technique and illustrated in Fig. 3.12) to these weighted environmental characteristics that provides the decision maker with a proper understanding of the socially valued implications of various courses of action. This combination is a powerful political guide for it permits a reasonably impartial assessment of both impacts and their social worth. ⁽¹⁾

3.8 Manuals

People argue that EIA is an all-embracing, lengthy assessment that exceeds the simple environment. The reason why the majority of methods were developed was to help some of the tasks involved in EIA (e.g. the identification of impacts and the presentation of results), or to assist in the assessment of certain categories of impacts, e.g. ecological impacts. Only a few methods can be used for all EIA activities and such methods (EES, etc.) have not met with unanimous approval. To help overcome some of the deficiencies, omissions and shortcomings of particular methods, considerable work has been carried out to develop comprehensive, structured approaches to EIA which act as handbooks for assessing specific developments.

Huge quantities of these manuals were produced in the US and to a lesser extent in other countries as well. Such handbooks are often called "manuals" and are mostly produced specifically to assess particular types of projects. For example, the *US Environmental protection Agency (1973)* has produced a Manual for waste-water

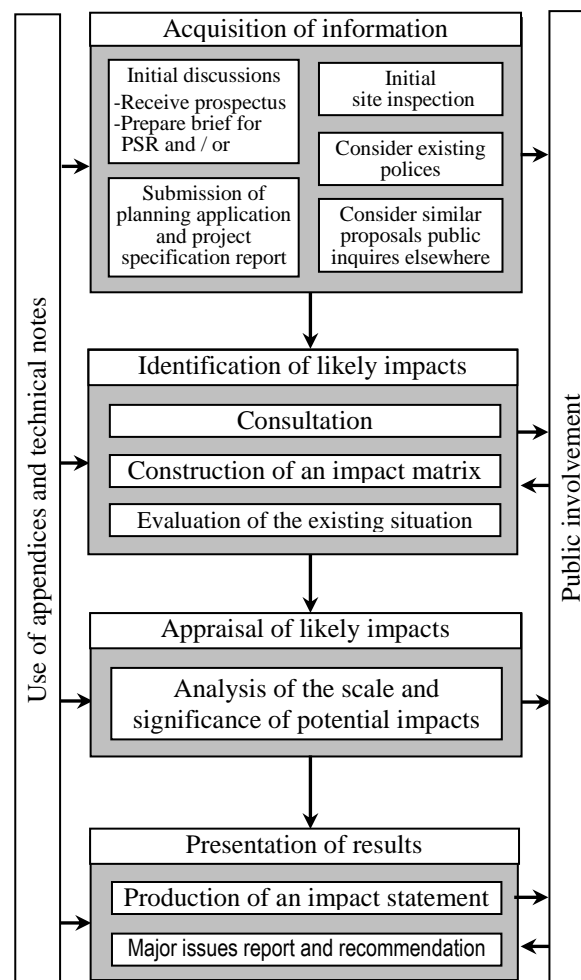
(1) **Robin Haynes**; "Environmental Science Methods"; Chapman & Hall; 1982.

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treatment plants and the *US Department of Transportation (1978)* has produced a guidebook for the assessment of airports. A Manual has also been produced to help local governments in the US to assess a variety of projects.

The utility of Manuals has been recognized outside the US. A Manual has been prepared for the assessment of major developments in the UK and for certain linear developments in British Columbia. Such Manuals contain comprehensive guidance on how to assess particular projects and on the type of data, which should be included in EISs. Often, the format and means of presenting information in EISs is suggested.

Figure 3.13 Linked Activities in the appraisal method of the Clark et al. Manual



In addition, Manuals may contain a particular type of method, such as a simple interaction matrix, to help the implementation of assessment. However, the scope of Manuals is broader than most methods. They are concerned with more than the ability

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of particular methods to carry out some EIA activities such as the ability of networks to identify impacts. Instead, they are concerned with a broader perspective and unlike methods they may contain techniques for prediction of impacts. In the EIA literature, manuals were not given much attention, due to the excessive numbers thereof in existence, in addition to the fact that many of them apply to specific projects only and cannot be generalized. Matrices, networks and other methods on the other hand can be applied to a wide variety of projects in various environmental conditions.

A Manual for the assessment of industrial development in the UK has been revised and reissued. It contains a comprehensive set of linked assessment procedures which includes an impact matrix to aid impact identification (Figure 3.13). The Manual contains technical notes giving information on the prediction of a wide variety of impacts, such as determination of noise impacts and the effects of a project on landscape. Guidance is also given on the presentation of impact data to decision-makers.

Table 3.3 A section of the Schaenman checklist (modified after Schaenman).

Environmental factors

Data required	Information sources/predictive techniques
<p><i>Air quality</i> <i>Health</i> Change in air pollution concentrations by frequency of occurrence and number of people at risk.</p> <p><i>Nuisance</i> Change in occurrence of visual (smoke, haze) or olfactory (odor) air quality nuisance, and number of people affected.</p> <p><i>Water quality</i> Changes in permissible or tolerable water uses and number of people affected -for each relevant body of water.</p> <p>Change in noise levels and frequency of occurrence and number of people bothered.</p>	<p>Current ambient concentrations, current and expected emissions, dispersion models, population maps.</p> <p>Baseline citizen survey, expected industrial processes, traffic volumes.</p> <p>Current and expected effluent, current ambient concentrations, water quality model.</p> <p>Changes in nearby traffic or other noise sources, and in noise barriers; noise propagation model or nomographs relating noise levels to traffic, barriers, etc.; baseline citizen survey of current satisfaction with noise levels.</p>

In 1976, a Manual was published by the Urban Institute of Washington. DC., which covers environmental, social and economic impacts and contains a descriptive checklist of forty-seven factors to be considered in EIA.

Information on suitable measurements and predictive techniques for each factor is provided (Table 3.3). One of the most characteristic features of this manual is its stress on relating impacts on the 47 factors to people affected. Furthermore, many people support the opinion that impacts should be considered in accordance with their differential distribution between social groups. ⁽¹⁾

3.9 Appraisal techniques

Appraisal techniques positively contribute in identifying the main impacts and highlighting significant issues of concern to the community involved. Needless to say, the stages by which weightings and environmental evaluations are calculated are in themselves highly educational. If group discussion is stimulated, this process can be of considerable value in aiding local understanding of the project and of the purpose of EIA. But the scheme is laborious, it is fairly inflexible, and it may force people who differ widely in their judgements to reach an unsatisfactory compromise.

In addition, as with all EIA techniques, when tackled for a proposal involving very complex impacts (such as a fast breeder nuclear reactor) it can become impossibly cumbersome. Also, the warnings made earlier about manipulation and the role of pseudo-science should be carefully heeded. This is particularly the case where the techniques are taken out of their political context -for example, in the analysis of a nuclear power scheme where conventional environmental impact assessment bypasses all the now familiar anti-nuclear arguments regarding proliferation of military nuclear power and the increasing role of central state control over the freedom of its citizens.

In reality, all the aforementioned techniques are nothing but systematic means to identify effects, carry out relationships to the end, order significance and evaluate results. This is the essence of EIA. It is important to recognize that EIA cannot make a decision any more than cost benefit analysis (CBA) can. These are guides, not

(1) **Timothy O'Riordan and R. Kerry Tuner**; *"An Annotated Reader in Environmental Planning and Management"*; Pergamon Press; 1983.

prescriptions, for the onus of decision must still rest with the elected representative who is democratically accountable for judging the relative merits of a case.

The elected decision-maker also has a responsibility to weigh economic costs and benefits together with environmental impact evaluations against other factors such as constituency interests, party ideological commitments and considerations of national security. Resource management is a political process and can only operate in the context of values, pressures and the constraints imposed by budgets and the law in our hypothetical case. For example, deciding whether or not to drain the marshland has nothing to do with economics, although these could well serve as a good guide.

The decision is rather based on the widely accepted and practiced set of ideas, beliefs and values relevant to the extent to which improvement of economic prosperity should be limited by the needs to safeguard the flora and fauna. The reason is that endangered biota have the right to exist. Additionally, some people at present (and possibly many people in the future) believe that man must curb his desires for wealth to ensure that the ecological balance is not damaged in a manner that can never be put to right again. But, in time, even that analysis may be economic.

If society continues thoughtlessly to plunder nature's riches, it may find itself impoverished because it may have to allocate much precious investment simply to clean up the mess it has created. The marsh that might be reclaimed provides a valuable function in trapping nutrients and sediment and absorbing floodwaters: remove it and replace it with deep drains and efficient pumps, then the nutrients and sediments will be pushed into the rivers, killing off river biota and requiring expensive dredging to be undertaken.

Ironically, too, the risk of flooding might become greater. If EIA is properly handled, it should take all these factors into consideration and show the repercussions to the public at large. Moreover, it is incumbent upon it to help finding a solution that is most cost-effective and environmentally feasible. This is because in the final analysis, cost-benefit analysis and EIA must be deployed as analytical techniques that complement one another. ⁽¹⁾

(1) **Robin Haynes**; "Environmental Science Methods"; Chapman & Hall; 1982.

3.10 Simulation modeling

The use of simulation modelling in EIA, often known under the name Adaptive Environmental Assessment and Management (AEAM), is based on the work of *Holling (1978)* and his colleagues who work with him at the Institute of Animal Resource Ecology at the University of British Columbia, Canada.

AEAM developed in response to a number of perceived weaknesses in EIA practice. *First*, EISs were becoming increasingly lengthy and unwieldy as a result of the volume of environmental data being included. It was considered that EIA was exhibiting a 'measure everything' syndrome to ensure that results could not be challenged for lacking comprehensiveness. It was furthermore felt that EISs were not very efficient in the prediction of impact. In addition, communication between the EIA personnel and the staff (and their management) who is in charge of decisions relevant to the future of projects was losing its effectiveness as well. This resulted in a reduction of the influence of EIA on decision making.

To overcome these alleged weaknesses of EIA. AEAM uses small workshops of scientists, decision-makers, and computer modelling experts to construct a simulation model of the systems likely to be affected by a development. The key component of AEAM is the workshop in which the participants have to reach consensus on the important features and relationships which characterize the systems studied.

The qualitative output from the workshop is 'translated' by modelling experts into a model consisting of quantitative relationships (as far as possible) between the selected parameters. Likely broad outcomes (impacts) resulting from the introduction of exogenous factors, such as development projects or resource management strategies, can be seen quickly by operating the model under different assumptions.

In the course of constructing the model, deficiencies in data were pinpointed. Moreover, this construction process permits appropriate research work to be conducted for the sake of data provision. Periodic workshops pave the way to further refinements in the model, but not necessarily to make it more complex, especially as additional data become accessible.

AEAM has been applied to a variety of development and management situations, for

example, an assessment of the environmental effects of the Alberta oil-sands development and an analysis of the environmental and socioeconomic consequences of different management strategies for the Nam Pong multi-purpose water project in. The ideas of AEAM were used, also, in the assessment of the main environmental, economic and social impacts likely to arise from Salto Grande dam and reservoir on the borders between Uruguay and Argentina .⁽¹⁾

3.10.1 Comments Simulation modeling

The philosophy behind AEAM has had paramount influence on both the theoretical and practical aspects of EIA. The modeling approach has obviously got to do with the interaction between environmental variables. It authorizes investigation of all parts and branches of a project or management strategy. There have been attempts to produce models with social and economic concerns. However, these have remained confined to a few parameters, e.g. per capita incomes and population growth.

There can be no doubt that the periodic use of multidisciplinary workshops containing EIA personnel and decision makers is a useful tool for restricting the scope of assessments to the key issues. However, the composition of these workshops is, of necessity, limited. The extent to which a wider involvement could be encouraged while still achieving the objectives of the workshop is debatable. Again, this is a problem shared with many other methods. This method is prone, also, to the common tendency to quantify relationships on the basis of uncertain data.

Other general remarks could be made about AEAM. If we get the chance to go through the literature authored by the supporters of this method, we would sense a tendency to belittle the model's ability to make useful predictions. Instead, it concentrates on insights into environmental problems provided by workshop discussions. Also, the ability of AEAM to encourage co-operation between EIA personnel and decision-makers and to be parsimonious in its use of baseline environmental data is stressed. These aspects are important and are a valuable contribution to EIA, but nevertheless EIA is, or ought to be, about predictions. Consequently, judgement on this facet of AEAM must await information on the

(1) **Wathern, P. (ed.);** "Environmental Impact Assessment: Theory and Practice"; Unwin Hyman; London; **1988.**

performance of the models which are already operational. It is to be hoped that such information will be forthcoming.

The literature on the application of AEAM is biased towards the management of resources, for example, forests and economically important species such as salmon. Large-scale water projects have also been assessed, but there have been few, if any, applications of AEAM to the assessment of developments such as oil refineries, power stations and pulp mills. Until such applications are reported and its utility for such projects assessed, no judgements on the wider applicability of AEAM as a generic EIA method can be made.

The ideas brought by *Holling* and his colleague in the late 1970s and early 1980s excite our minds to think again how EIAs should be best used in order to be more cost-effective, improve their predictive abilities and make the results more within the reach of to non-experts. As a result of all these concerns, there was an emphasis on the role of 'science' or the 'scientific method' in EIA. There has been a relative desire to go back to the bases of science, usually considered to be similar or identical to 'sound ecological principles'.

3.11 Sound ecological principles

There can be no doubt that EIAs still need a healthy injection of scientific rigour, particularly where impact prediction is concerned. Two studies from the UK and Canada have shown that EISs usually offer vague generalizations about possible impacts which are difficult to test in a rigorous manner. Such predictions are of little value to decision-makers because of their ambiguous nature. Also, without testable predictions it is impossible to use projects as 'natural experiments' from which environmental impact information can be obtained for future use in EIA.

In the late 1970s, a large diversified number of publications appeared, which all attempted to find a new way to improve EIA. To the work of *Holling* must be added the contribution of *Fritz et al. (1980)* from the US Fish and Wildlife Service on formulating an ecological modelling approach to EIA which has, as one of its main objectives the formulation of impact predictions as testable hypotheses.

Further important additions to this literature were made by *Doremus et al. (1978)*, *Truett (1978)*, *Ward (1978)* and *Sanders et al. (1980)*. Concern over the status of the ecological component of EIAs led to a major Canadian study to formulate 'guidelines' to improve the ecological contribution to EIA. A remarkable study that examined ways to upgrade the scientific content and methodology of environmental impact analysis has been recently conducted in the US.

All of these studies have certain opinions and recommendations in common. *First*, EISs are considered to be scientifically inadequate. *Secondly*, the ecological component is poorly handled both conceptually and in terms of analytical method. *Thirdly*, they desire the application of the classical scientific method to EIA. This includes, among others, forming a concept of the problem; setting time and spatial limits; formulating study designs. Moreover, it involves setting up control and reference monitoring stations to acquire baseline data and to test impact predictions; relevant pioneering experiments to investigate possible impacts (e.g. the impact of air pollution on a crop species); and formulating impact hypotheses and subsequent testing.

3.11.1 Comments on Ecologically Sound Principles approaches

Although the focus on raising the standards of ecological aspects of EIA is very much sought-for and commendable, we have to remember that the ambit of most EIAs far exceeds the ecological considerations. It is probably true that the ecological implications of proposals can be the most important for human welfare and environmental quality. However, there are other factors which have to be considered in an EIS, which cannot be regarded as part of the remit of ecological investigations: for example, the health effects of increased noise and air pollution and the problems caused for communities and farmers by severance,

It is observed that all what was written on the new '*scientific*' thinking so far bears a certain missionary, preaching tone that has to be tackled with a degree of caution. In addition, there are traces of a 'take-over bid' for EIA that has also got to be resisted. Nevertheless, the way forward for EIA undoubtedly remains with the application of better '*scientific*' measures and the implementation of projects as natural

experiments.⁽¹⁾

3.12 Conclusion on the EIA methods and techniques

From the previous presentation for 11 different methods of the most widespread EIA methods, it could be said that there isn't an ideal method has the ability to be used in all cases and circumstances. Actually, every method/technique from the previous methods has its own singularity (in the ability of identifying, measuring and predicting specified kinds of impacts (direct and indirect), in simplicity/complexity of use and understood, area/factors of interest,...etc.) and on the other hand every method/technique has its advantages and disadvantages, so all methods required.

Table 3.4

(1) **Bisset, R.** ; “Developments in EIA methods. In Wathern P (ed.) Environmental Impact Assessment: Theory and Practice”; Unwin Hyman, London; **1988**.

Table 3.4. comparison between EIA methods

Method/Technique	Features of interest	Advantages	Disadvantages
Checklists	<ul style="list-style-type: none"> - Different of environmental factors to be considered in EIA 	<ul style="list-style-type: none"> - Encourage a degree of standardization and comprehensiveness. - Useful for inexperienced staff. - Good in identifying what should be consider. - Good in determining the magnitude, importance, prevalence, duration and frequency, risk, and mitigation of project impact (specially in case of using scaling-weighting checklists). 	<ul style="list-style-type: none"> - Inhibit wider involvement in project decision making and restrict it on experts and decision-maker. - Depend on quantifying features without difference between quantifiable features and unquantifiable ones (such as aesthetic). - It focuses on single components of the environment without seeing the complex web of interrelated components and its effects on each other. - It is so simple that it is unlikely to use for more than very small, uncomplicated projects. - Provide little guidance on how identification of significant impacts should be carried out. - Can be used too mechanically.
Multi-attribute utility theory	<ul style="list-style-type: none"> - Energy projects and in particular site selection. 	<ul style="list-style-type: none"> - Good in the incorporation of probability and sensitivity of analysis. - The ability to show changes that would occur as a result of modifying the utility functions and probability assumptions. - Give a numerical utility structure, which indicates the different levels of impacts in numerical values. - The ability to incorporate the economic factors in the utility approach. 	<ul style="list-style-type: none"> - Need highly numerate persons from public and decision-makers to follow the steps of the process. - In many cases, it relies on the subjective opinion of experts. - It is so complex and needlessly technocratic, thereby inhibiting public participation in EIAs and review of the final results - It depends on compartmentalize and fragment the environment to many components and focuses on each component alone. - Depend on quantifying features without difference between quantifiable features and unquantifiable ones (such as aesthetic).
Matrices	<ul style="list-style-type: none"> - Different of environmental 	<ul style="list-style-type: none"> - Encourage a degree of standardization and 	<ul style="list-style-type: none"> - Provide little guidance on how identification of significant

Method/Technique	Features of interest	Advantages	Disadvantages
Matrices	factors to be considered in EIA.	comprehensiveness. - Good in identifying what should be consider. - Its results so easy to understood.	impacts should be carried out. - Can be used too mechanically- it is so easy to fill in the cells. - Don't take into account additive, synergistic or neutralizing effects and also the indirect impacts. - It depends on compartmentalize and fragment the environment to many components and focuses on each component alone. - Don't have the ability to indicate the spatial and social distribution of impacts.
Overlay mapping (using computer)	- Spatial distribution of impacts and environmental factors considered in EIA.	- Exllent in showing the spatial distribution of the environmental impacts and selecting location with specific siting criteria. - Its results so easy to understood. - The ability to store, manipulate, evaluate, and update the data easily and efficiently.	- It relies on time-consuming and expensive data collection. - It draws an artificial picture (clear-cut) of the boundaries among the environmental features, whereas it is not exist. - It depends on digital data, so a great deal of information on impacts is lost in the transformation of impacts to numbers. - The inadvertence in dealing with the impact characteristics, such as probability, time and reversibility. - Its output is, only as accurate as input and the assumptions embodied in the evaluations. - The impressive output may mask poor assumptions and/or incomplete or inaccurate date base. - It depends only on computers and technicians.
Networks	- Different of environmental factors to be considered in EIA.	- Good in identifying the complexity of the environmental sub-systems through which impacts (direct and indirect) are transmitted. - It can be used easily for particular type of project.	- Can be very large and complex. - Can be difficult to drive and use by inexperienced stuff. - Do not provide information on impact characteristics such as probability, importance and magnitude. - It obtains a quantitative assessment of impact in such a way as to allow confrontation of the effect provoked by various proposed projects by means of numerical values.

Method/Technique	Features of interest	Advantages	Disadvantages
			<ul style="list-style-type: none"> - It needs a great deal of information on the environmental interactions and the impacts of a variety of projects. - Different networks must be constructed for different environments.
System diagrams	<ul style="list-style-type: none"> - Different of environmental factors to be considered in EIA. 	<ul style="list-style-type: none"> - It acknowledge the complexity of environmental systems and that a change in one parameter can have multiple effects on other parameters and on the system as a whole. - It uses measures of energy flow to compare impacts. Energy flow data can be obtained using standard scientific procedures. 	<ul style="list-style-type: none"> - It is so expensive and time-consuming to construct systems diagrams for particular ecosystems with associated data on energy flow. Once constructed, periodic revision may be necessary to take account not only of natural variations, but also man-made perturbations. - It does not cater for ecological relations, which are not dependent on energy flows. - It is restricted to certain ecological impacts. - It is so difficult to drive and use by inexperienced staff.
Quantitative/Index methods	<ul style="list-style-type: none"> - Different of environmental factors to be considered in EIA. 	<ul style="list-style-type: none"> - The ability to provide "proof", in terms of numbers, that a particular action is better than others. - It allows wider involvement (people and public parties) in project decision making. 	<ul style="list-style-type: none"> - It is deal with environment as if it were made of discrete units. - A great deal of information on impacts is lost in the reduction of impacts to numbers. - The weighting of impacts and decisions are made by inexperienced people (these people do not represent the public). - It is tedious and time-consuming because it based on a large series of steps. - It is difficult to lay people to understand.
Manuals	<ul style="list-style-type: none"> - Different of environmental factors to be considered in EIA. 	<ul style="list-style-type: none"> - It concerned with a broader perspective and presents a comprehensive guidance on how to assess a project. - It determines the type of data, which should be included and suggest the format and means of 	<ul style="list-style-type: none"> - It is designed for the assessment of particular types of project.

Method/Technique	Features of interest	Advantages	Disadvantages
		presenting information in EISs.	
Appraisal techniques	<ul style="list-style-type: none"> - Different of environmental factors to be considered in EIA. 	<ul style="list-style-type: none"> - The ability to pinpoint major impacts and to highlight important issues which are of concern to the community involved. 	<ul style="list-style-type: none"> - It is impossibly cumbersome in dealing with the proposals involving very complex impacts such as a fast breeder nuclear reactor. - it is fairly inflexible, and it may force people who differ widely in their judgements to reach an unsatisfactory compromise
Simulation modeling	<ul style="list-style-type: none"> - Different of environmental factors to be considered in EIA. 	<ul style="list-style-type: none"> - It can be applied to developments having a large variety of environmental impacts. - It can be used to all types of projects. 	<ul style="list-style-type: none"> - It is constructed by environmental and modeling experts, and it is their assumptions that will determine the result. - It is difficult to lay people to use or understand it. - Public influence on assumption is very weak.
Sound ecological principals	<ul style="list-style-type: none"> - Different of environmental factors to be considered in EIA. 	<ul style="list-style-type: none"> - It can be applied to predictions of little value or having an ambiguous nature. - It emphasis' on improving the ecological contribution to EIA. - It depends on the formulation of impact predictions as testable hypotheses. 	<ul style="list-style-type: none"> - It is mainly concerned with ecological aspects. However, there are many other important factors, which cannot be regarded as part of the remit of ecological investigations: such as, the health effects of increased noise and air pollution...etc.

SECOND PART

PRACTICAL APPROACH

CHAPTER 4: *PRACTICAL PROCESSES*

CHAPTER 5: *COMPARATIVE REVIEW OF EIA SYSTEMS*

CHAPTER 6: *RESULTS AND RECOMMENDATIONS*

CHAPTER 4

PRACTICAL PROCESSES

CHAPTER 4

PRACTICAL EIA SYSTEMS

4.1 Introduction

In this chapter three different practical EIA systems have been selected to present three different continents in the world, three different political and economical systems, three different urbanization levels and three different ways of life, so each system must be facing different problems than the other. Those systems applied in the United States, the United Kingdom and New Zealand, in addition, the practical EIA system applied in Egypt.

Actually, these EIA systems have been selected specially for the following reasons:

1. United States of America (USA) is the first country in the world in establishing an EIA system and environmental policy (at the end of 1969), so, it is very useful for any other EIA system elsewhere to get experience from it.
2. The United Kingdom (UK) is considered one of the midtimes countries who has established an EIA system (not very early like US and not very late like Egypt and other developing countries), so the environmental problems currently facing UK are almost the same problems facing Egypt with some differences, so the comparison between them should provide a valuable insight into the remedies for problems which are already apparent.
3. New Zealand (NZ) is considered one of the most successful countries applying EIA system. It was the first introduced EIA procedures in 1974 and revolutionized in 1991 after very considerable debate. Now EIA in NZ is inextricably interwoven into regional and local authority procedures for determining various types of applications and has become an almost infinitely flexible approach.

4.2 The US federal EIA system

The main steps in the US federal EIA system are shown in [Fig. 4.1](#). A 'lead' federal agency is designated to implement the various steps in the EIA process. This agency

is usually involved in actually constructing a project or funding it, or granting a permit for it, or in proposing a program, plan or legislation. However, it relies heavily on the developer (if funding or permit-granting activities are involved) for information and upon other agencies and the public for comment.

The first step in the EIA process is the identification of the proposal leading to the action by the agency (i.e. construction of, or funding, or permit granting for a project; or proposed programs, plans or regulations). The agency will then undertake a preliminary environmental analysis to determine whether there is a need for an environmental impact statement (preparation of which can commence forthwith), whether the environmental impacts are clearly so insignificant as to permit a categorical exclusion from the EIA process (for which documentation is optional) or whether an 'environmental assessment' (EA) should be prepared so that the significance of impacts can be more clearly identified. This environmental assessment, again prepared by the agency, is, in effect, an abbreviated EIS as it covers many of the topics required in an EIS.

However, it is now subject to the same rigorous consultation provisions. Depending on the findings of the environmental assessment, an EIS may be required or, as in the vast majority of cases, the agency may decide that none is necessary. In this case, a 'finding of no significant impact' (FONSI) must be written, summarizing the reasons for this decision.

When an EIS is required, a 'notice of intent' has to be published by the agency in the Federal Register and scoping commences. Scoping is a procedure intended to bring those with different interests in the proposal (including members of the public) to an agreement about which of the environmental impacts associated with it are significant and thus require investigation.

Agency regulations may require analysis of some issues but other significant matters are agreed by consultation, and frequently at a meeting (or a series of meetings) at which the various interested parties are represented. These issues are then addressed in the draft EIS. This is written by or on behalf of the agency though the developer provides a great deal of the relevant information upon which it is based if funding or permitting is involved.

The draft EIS normally follows a set pattern dictated by the relevant agency's regulations or guidelines: it will describe the existing environment, explain what the proposed project is and analyze the effects of the project on the environment. It is these effects which constitute the substance of the draft EIS, which should not normally be more than 150 pages in length. They are generally discussed at some length and mitigation measures are usually proposed.

In accordance with the requirements of NEPA, it is usual to provide: a summary of probable adverse environmental effects which cannot be avoided; a discussion of alternatives to the action; a discussion of the relationship between local short-term uses of the environment and maintenance and enhancement of long-term productivity; and a discussion of irreversible and irretrievable commitments of resources. Most agencies follow the tighter structure specified in the regulations in organizing these discussions in their EISs.

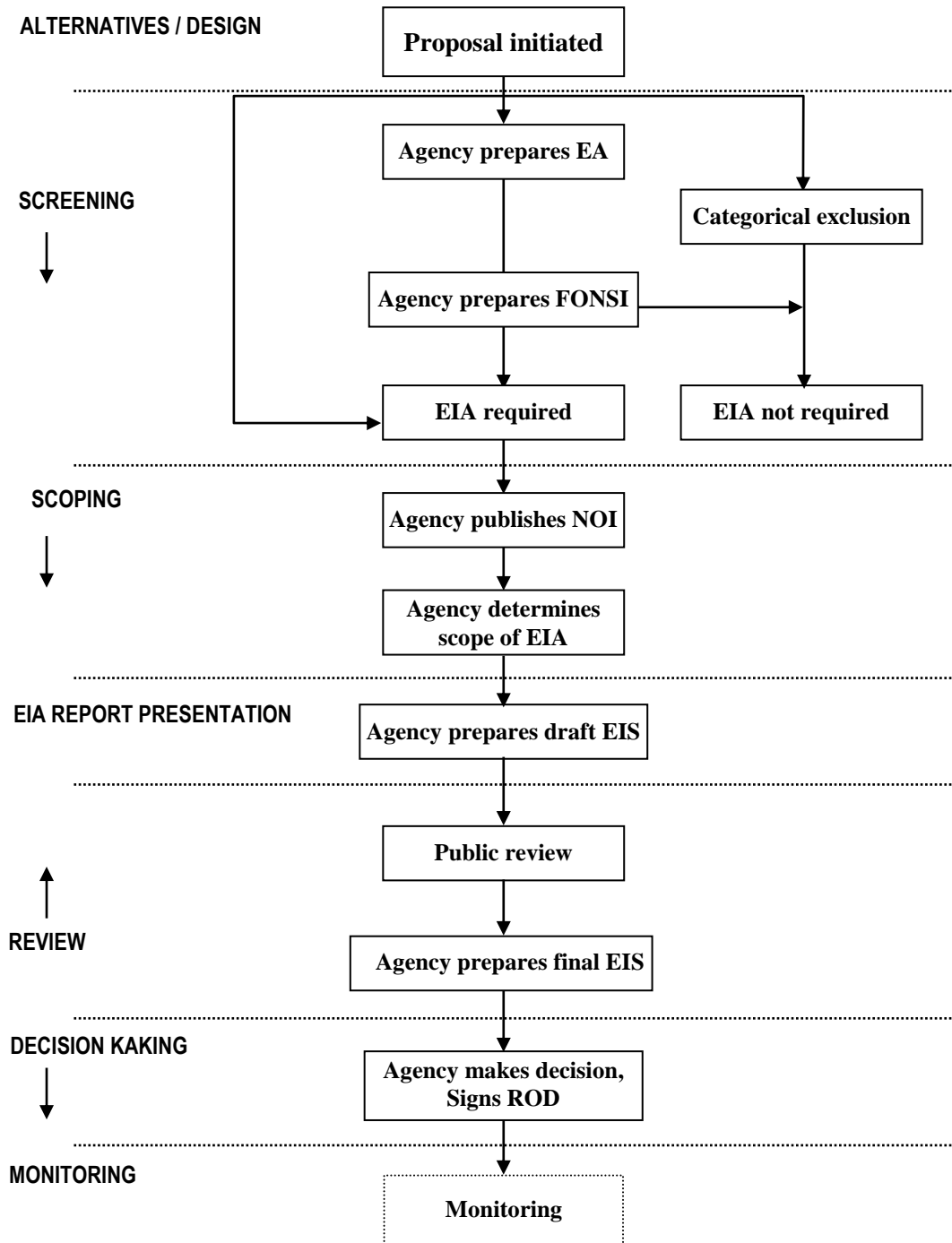
The draft EIS is sent to the Environmental Protection Agency for critical review and filing and is forwarded to all the relevant federal, state, tribal and local organizations likely to wish to comment. This review process involves reading the draft EIS and commenting both on the way the reviewing agency's interests are affected and on the content of the EIS generally (though this latter type of comment is less common than the former).

There are arrangements for local groups and for the public to participate and there has to be a minimum period for deposit of the documents of 45 days to allow this participation to take place. Once the lead agency has received the comments of the various consulted agencies and bodies it is in a position to prepare the final EIS.

The final EIS describes the modified form of the proposed action, including any changes that have been made since the draft EIS was published, and responds to the comments received from the various bodies consulted. This document usually contains quite extensive proposals for mitigation of impacts.

A 'record of decision' has also to be prepared, indicating the decision that has been made and the reasons for it.

Fig: 4.1. Main steps in the US federal EIA system



..... Optional step
 EA environmental assessment
 FONSI finding of no significant impact
 NOI notice of intend
 ROD record of decision

This is sometimes circulated for a period of time and agencies with an administrative appeals process can adopt a procedure whereby they release the final EIS and the record of decision simultaneously. Generally, however, the record of decision is issued after a 30 day waiting period following the filing of the final EIS with the Environmental Protection Agency.

There are somewhat inadequate provisions for monitoring the environmental impacts arising from an action and for ensuring that the various conditions or mitigation measures that have been included in the final EIS are implemented. This may be done in the form of conditions appended to permits that have to be obtained from the lead agency or in the form of conditions attached to grants that are made by the agency.

If the agency itself is carrying through the measures there is usually a system of inspection to ensure that the project is actually constructed as described in the final EIS (unless, of course, there are overwhelming and unforeseen reasons for change, in which case a supplementary EIS may have to be prepared).

There are provisions for 'tiering' EISs, that is, the preparation of broad program EISs followed by site-specific EISs cross-referenced to the overall document. The use of these is increasing. There are also provisions for mediation by the Council on Environmental Quality (CEQ) if EPA or other agencies such as the Department of the Interior are unable to agree that the impacts of the action are acceptable. ⁽¹⁾

4.3 The UK EIA system

For projects requiring planning permission, the Directive was given legal effect in England and Wales through the Town and Country Planning (Assessment of Environmental Effects) Regulations 1988, in Scotland through the Environmental Assessment (Scotland) Regulations 1988 and in Northern Ireland through the Planning (Assessment of Environmental Effects) Regulations (Northern Ireland) 1989.⁽²⁾

The environmental assessment (EA) regulations apply to two separate lists of projects,

(1) **Christopher Wood**; "Environmental Impact Assessment: a comparative review"; Longman Scientific & Technical; **1995**.

(2) **Jones C. E., Lee N. and Wood C. M.** ; "UK Environmental Statements 1988-1990: an Analysis"; Occasional Paper 29; Department of Planning and Landscape, University of Manchester; **1991**.

based on Annexes I and II of the Directive. It is significant that DOE (Department of Environment) adopted the term 'environmental assessment', rather than the US 'environmental impact assessment', given its earlier opposition to a formal EIA system. Whether it took the term from the name of the US preliminary (screening) document.

Advice on procedures and the implementation of the EA Planning Regulations in England and Wales is presented in DOE Circular 15/88 (Welsh Office 23/88) (DOE, 1988b) and in a Guide to the Procedures (DOE, 1989). An equivalent circular applies in Scotland (Scottish Development Department 13/88). These circulars set out indicative criteria and thresholds to help determine whether certain projects (Annex II projects) should be subject to EA.

The Planning Regulations contain provisions for LPAs (Local Planning Authority) to give a formal 'opinion' that EA is required where they are requested to do so by developers. They may also notify developers that EA is required where a planning application is submitted without an environmental statement (ES). In either event, the Regulations permit the developer to ask the relevant Secretary of State for a 'direction' that EA is, or is not, required. Certain statutory consultees (including Her Majesty's Inspectorate of Pollution) are required to provide the developer with information should it be requested. The Regulations also set down the nature of prescribed consultation and publication arrangements and extend the amount of time available to LPAs (Local Planning Authority) to reach a decision on planning applications involving EA.

The Planning Regulations implement the provisions of the European Directive almost to the letter, though there is some disagreement about whether the content requirements for environmental statements specified by the Regulations accurately reflect the Directive. The three annexes to the Directive become Schedules 1, 2 and 3. Several changes to these are made. In particular, certain projects are excluded from Schedules 1 and 2 where they are covered by other regulations (notably nuclear power stations).

Further, Schedule 3 contains a list of the mandatory information requirements, together with a list of the information set down in Annex III of the Directive which

Practical EIA process

may be provided 'by way of explanation or amplification'. An 'environmental statement' is defined by reference to Schedule 3 and 'environmental information' consists of this statement, together with the representations of consultees and members of the public about the impacts of the developments.⁽¹⁾

An outline of the main steps in the EA process for planning decisions is shown in Fig. 4.2. There are special provisions relating to developments in enterprise zones and simplified planning zones .⁽²⁾

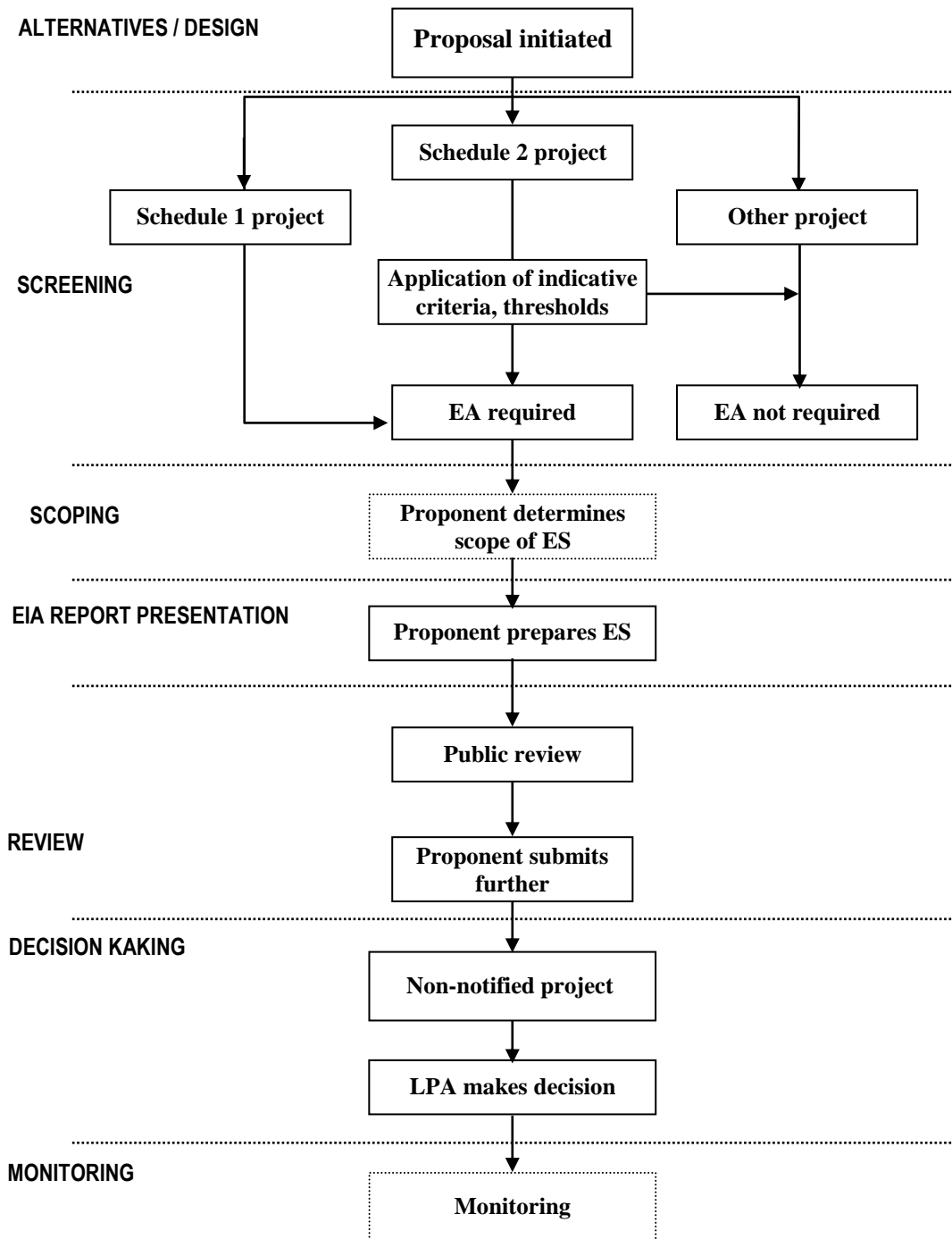
The Planning and Compensation Act 1991 contains a section which enables the Secretary of State for the Environment to require environmental assessment of planning projects. The Planning Regulations have now been extended to cover the EIA of private motorways, motorway service areas, wind generators and coast protection works.⁽³⁾

The Circular (DOE, 1988b) and the Guide (DOE, 1989) together provide detailed guidance on the operation of the procedures. The indicative criteria and thresholds to be used by LPAs in reaching a judgement about whether EA is to be required for Schedule 2 projects are contained in the advisory Circular, and not in the Regulations. The criteria (and the other advice contained in the Circular) can therefore be changed relatively easily and, in any event, do not have regulatory force. However, the Regulations provide a right of appeal against an LPA determination that EA is required.

Normal town planning appeal provisions against the non-determination of planning applications (and against planning decisions) apply and the Secretaries of State can call applications in for determination by central government. There is therefore relatively little discretion left to LPAs in determining applications to which the Regulations apply.

Fig: 4.2. Main steps in the EA process for UK planning decision

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- (1) **Wood, C. M. and McDonic, G.** ; "Environmental assessment: challenge and opportunities"; **1989**.
 - (2) **Department of the Environment**; "Environmental Assessment of Projects in Simplified Planning zones and Enterprise Zones. Circular 23/88"; HMSO, London; **1988b**
 - (3) **Department of the Environment**; "Environmental Assessment : Amendment of Regulations. Circular 23/88"; HMSO, London; **1994a**.



..... Optional step
 ES environmental statement
 LPA local planning authority

Far more projects require environmental assessment under the provisions of the Town and Country Planning Regulations than under those of all the other regulations

combined (below). These other regulations were necessary because certain types of projects listed in Annex I and Annex II of the European Directive are authorized outside the British planning system.

The arrangements relating to other regulations are broadly. The Highways (Assessment of Environmental Effects) Regulations 1988 require the Secretary of State for Transport (in England) to publish an ES for the preferred route at the time when draft orders are published. The Electricity and Pipeline Works (Assessment of Environmental Effects) Regulations 1990 require an ES to be submitted to the Secretary of State for Energy (in England) for the construction of nuclear power stations, for some other power stations and for certain overhead power lines and for many pipelines.

The Environmental Assessment (Afforestation) Regulations 1988 require the EA of afforestation projects prior to the provision of a grant in any case where, in the opinion of the Forestry Commission, the project is likely to have significant environmental effects. If no grant is applied for, there is no provision for EA. Equally, there is no requirement for the EA of the Forestry Commission's own planting projects. The United Kingdom did not include the Directive's Annex II rural land holdings restructuring projects and projects for the agricultural use of uncultivated land in any regulations, because the Government believed they were unlikely to occur in the United Kingdom in a form that would have significant environmental effects and hence require EA.⁽¹⁾

However, proposals were underway in 1994 to extend EA to these types of projects, to meet more fully the requirements of the Directive.

Improvements to existing land drainage works undertaken by drainage bodies and the National Rivers Authority do not require an express grant of planning permission but fall under the Land Drainage Improvement Works (Assessment of Environmental Effects) Regulations 1988. These require the drainage body to consider whether or not the proposed works would be likely to have significant environmental effects and

(1) **Commission of the European Communities**; “Report from the commission of the Implementation of Directive 85/337/EEC and Annex for the United Kingdom”; COM (93); Brussels; 1993

ought therefore to be the subject of an environmental statement.

There are two sets of regulations relating to ports and harbors, to reflect the existing authorization procedures. Both the Harbor works (Assessment of Environmental Effects) Regulations 1988 and the Harbor works (Assessment of Environmental Effects) (No.2) Regulations 1989 empower the Minister of Agriculture, Fisheries and Food or the Secretary of State for Transport (in England) to decide whether EA is needed.

Offshore salmon farming facilities within 2 km of the coast require a lease from the Crown Estate Commissioners. The Environmental Assessment (Salmon Farming in Marine Waters) Regulations 1988 require the Commissioners to consider an ES provided by the developer before granting a lease in circumstances where the development may have significant effects on the environment. Dredging for minerals offshore requires a dredging license from the Crown Estate Commissioners. In cases where dredging is likely to have significant environmental effects, the applicant is required to provide an ES.

The arrangements for non-planning projects in Wales are very similar to those in England, save that the Secretary of State for Wales is the responsible minister. The arrangements for Scotland are broadly similar to those for England and Wales, though there are some differences due to the different legal and administrative arrangements, which apply in Scotland. Separate provision for EA has been made in Northern Ireland, which has its own legal and administrative procedures. However, the general principles of the EA system covering the rest of the United Kingdom apply. Arrangements for the provision of ESs with private and hybrid Parliamentary bills have also been made in the United Kingdom .⁽¹⁾

Not only has the Commission of the European Communities (1993) pursued the compatibility of UK rule-making with the requirements of the Directive with some vigor but it has publicized a letter sent under the provisions of Article 169 of the Treaty of Rome querying whether seven projects.

(1) **Glasson J., Therivel R. and Chadwick A.** ; “Introduction to Environmental Impact Assessment”; UCL Press; London; **1994.**

This European intervention caused a considerable political storm, since the United Kingdom prides itself on the quality of its implementation of European directives. This misunderstanding was the only occasion to date that the subject of EIA and its integration within British decision-making procedures has reached prominence in the UK media.⁽¹⁾

4.4 The New Zealand EIA system

New Zealand has undergone a revolution in environmental management.⁽²⁾ Several government departments have been abolished or restructured, local government has been reorganized and environmental law has been reformed. The Resource Management Act 1991, which swept away numerous previous Acts, including the Town and Country Planning Act 1977, the Clean Air Act 1972 and the Water and Soil Conservation Act 1967, introduced environmental impact assessment as a central element in a decision-making process designed to achieve the goal of sustainable management). This is EIA Mark II in New Zealand, the Mark I system having been introduced in 1974. EIA is now, in principle at least, almost comprehensive and flexible in that it applies, at the appropriate level of detail, to all projects and, in addition, to policies and plans prepared under the Resource Management Act provisions.

New Zealand has a slightly larger land area than the United Kingdom but, with 3.3 million people, its population density is only 5 per cent of the UK's. New Zealand local authorities, which are generally not as well staffed as those in the United Kingdom, serve average populations about four times smaller. Under the current arrangements in New Zealand, local government carries the principal responsibility for the administration of the EIA system and, in particular, the planning departments in local authorities are responsible for dealing with proponents and making recommendations on the basis of the EIA.

New Zealand introduced its Environmental Protection and Enhancement Procedures,

(1) **Christopher Wood**; “Environmental Impact Assessment: a comparative review”; Longman Scientific & Technical; **1995**.

(2) **Wood, C. M.** ; “Antipodean environmental assessment: a New Zealand/United Kingdom comparison”; Town Planning Review; **1993a**.

partially modelled on the Canadian EIA procedure, in 1974 by means of a Cabinet minute. These evolved over the years and in the latest version of the Procedures (Ministry for the Environment –MfE, 1987) public agencies were required to undertake screening, agree project-specific scoping guidelines with the Ministry for the Environment, consult with various statutory, local and other authorities, publish an environmental impact report, submit it to a formal published 'audit' by the Parliamentary Commissioner for the Environment (an 'ombudsman' reporting not to the Government but to Parliament) and agree monitoring arrangements with MfE. This EIA process was subject to considerable public oversight but was largely discretionary and, in practice, related to only a limited number of public sector projects virtually all of which were approved.

Wells and Fookes (1988) reported that an average of three formal environmental impact reports were formally audited (reviewed) each year between 1977 and 1989 but that hundreds of impact statements of variable size, scope and quality were being produced annually for local authorities and other bodies but not being subjected to the Procedures. In principle, but not in practice, the Procedures also applied to policies. ⁽¹⁾

Wells and Fookes (1988) summarized the need for reform to produce an EIA process which was 'simple but effective, comprehensive but not complex, flexible yet consistent, authoritative yet accessible'. At the same time, wide-ranging reviews of environmental administration, in which the Minister for the Environment (later Prime Minister) took a strong personal interest, and of local government, resulted in complete reorganizations of both. The various objectives of these reorganizations included the decentralization of decision making, increased consideration of the environment at all levels of decision making, increased public involvement, and the elimination of administrative and legislative fragmentation ⁽²⁾

New Zealand now has a basic system of regional and territorial (city and district) authorities (replacing hundreds of local and special-purpose bodies), responsible for many duties formerly undertaken by central government. Environmental impact

(1) Wells, C. and Fookes, T. ; “Impact Assessment in Resource Management”; Resource Management Law Reform Working Paper 20; Ministry for the Environment; Wellington; 1988.

(2) The former reference

assessment is one of these: EIA is now inextricably interwoven into the local authority procedures for determining applications for land use and subdivision consents and for coastal, water and discharge permits under the provisions of the Resource Management Act. The Ministry for the Environment has issued a guide to the Act; a guide to scoping and several guides mentioning the environmental assessment of regional policies and plans and of district plans, a leaflet on the assessment of environmental effects and several other EIA leaflets. It has also commissioned a more general guide on EIA. ⁽¹⁾

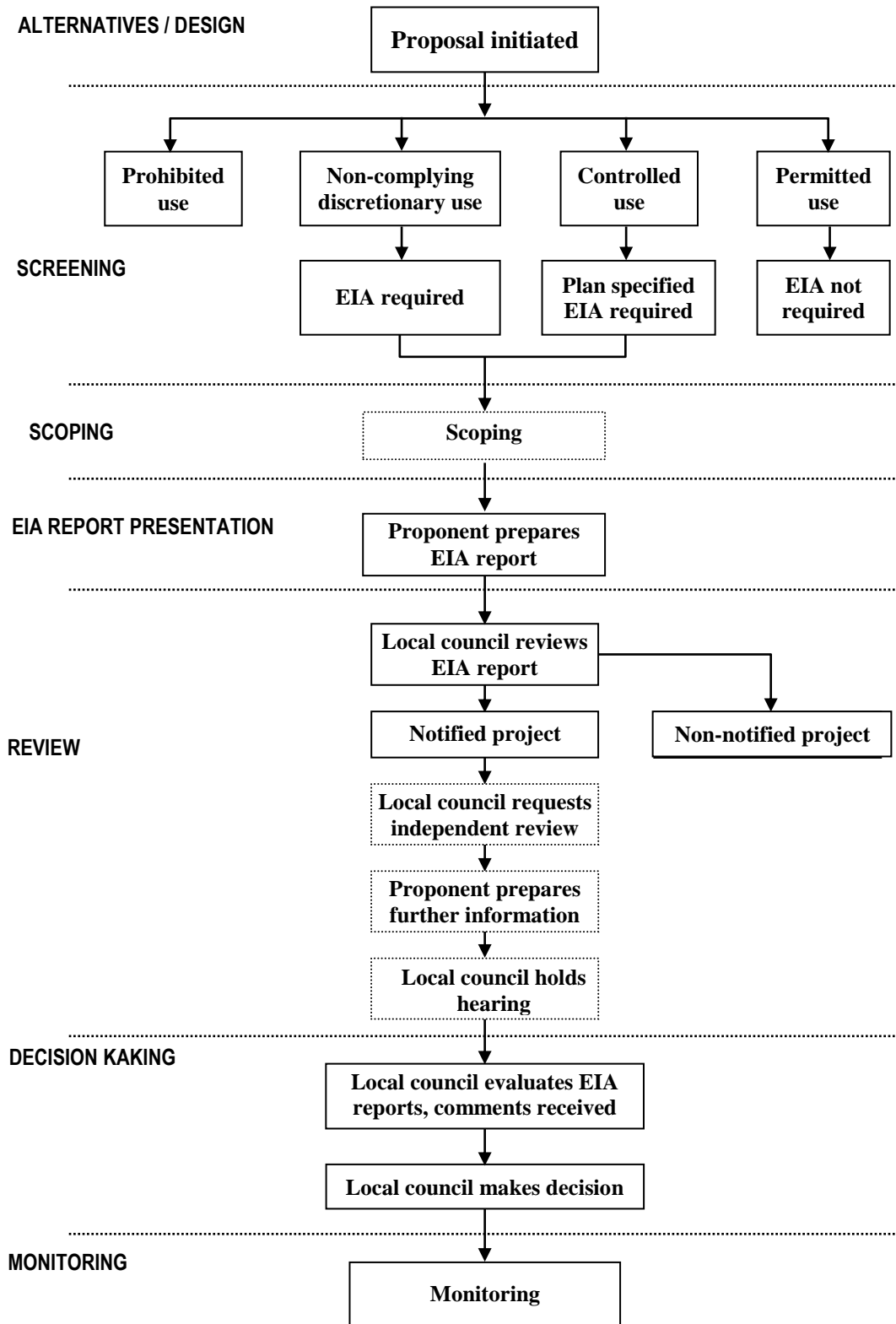
A simplified version of the main steps in the EIA system in New Zealand is shown in Fig. 4.3.

The Act makes broad provisions in relation to the EIA system and has devolved almost all responsibility for the administration of environmental impact assessment from central to local government. The Act provides the outline of the EIA process, but leaves much detail to be provided by individual regional authorities in their regional policy statements and regional coastal plans and by territorial authorities in their district plans.

The Resource Management Act contains provisions which effectively provide for a two-phase screening process and encourage scoping. It indicates the content requirements for an EIA report (which include alternatives), provides for public participation and consultation and requires that the report be considered in the decision. It also contains provisions relating to monitoring. In addition, the Act provides for public hearings into applications and for the call-in of requests for resource consents by the Minister for the Environment where issues of national significance are raised. There is a third-party right of appeal against LA decisions which are heard by a Planning Tribunal. Apart from the value of the precedents created by the Tribunal's findings, the EIA system is also subject to scrutiny by the Parliamentary Commissioner for the Environment.

(1) **Morgan, R. K. and Memon, P. A.** ; “Assessing the Environmental Effects of Major Projects: a Practical Guide”; Publication 4; Environmental Policy and Management Research Center; University of Otago; **1993**.

Fig 4.3. Main steps in the New Zealand EIA process



..... Optional step

It is too early for any review of the Resource Management Act to have been contemplated. Indeed, transitional arrangements, including the use of the Environmental Protection and Enhancement Procedures for central government projects not covered by the Act, were still in operation in 1994. At that time the Ministry of the Environment employed only a very small number of central and regional office staff on EIA. Generally, the number of central and local government officers, consultants, academics and environmental campaigners involved in EIA in New Zealand is very small (probably less than 50 full-time equivalents).

It is notable that EIA is not mentioned by name in the Resource Management Act but that the procedures and aims of EIA suffuse both its policy and plan preparation provisions and its resource consent provisions. In this sense, as in others, the highly sophisticated Resource Management Act makes a marked contribution to the advancement of sustainable development policy.⁽¹⁾

4.5 The Egyptian EIA system

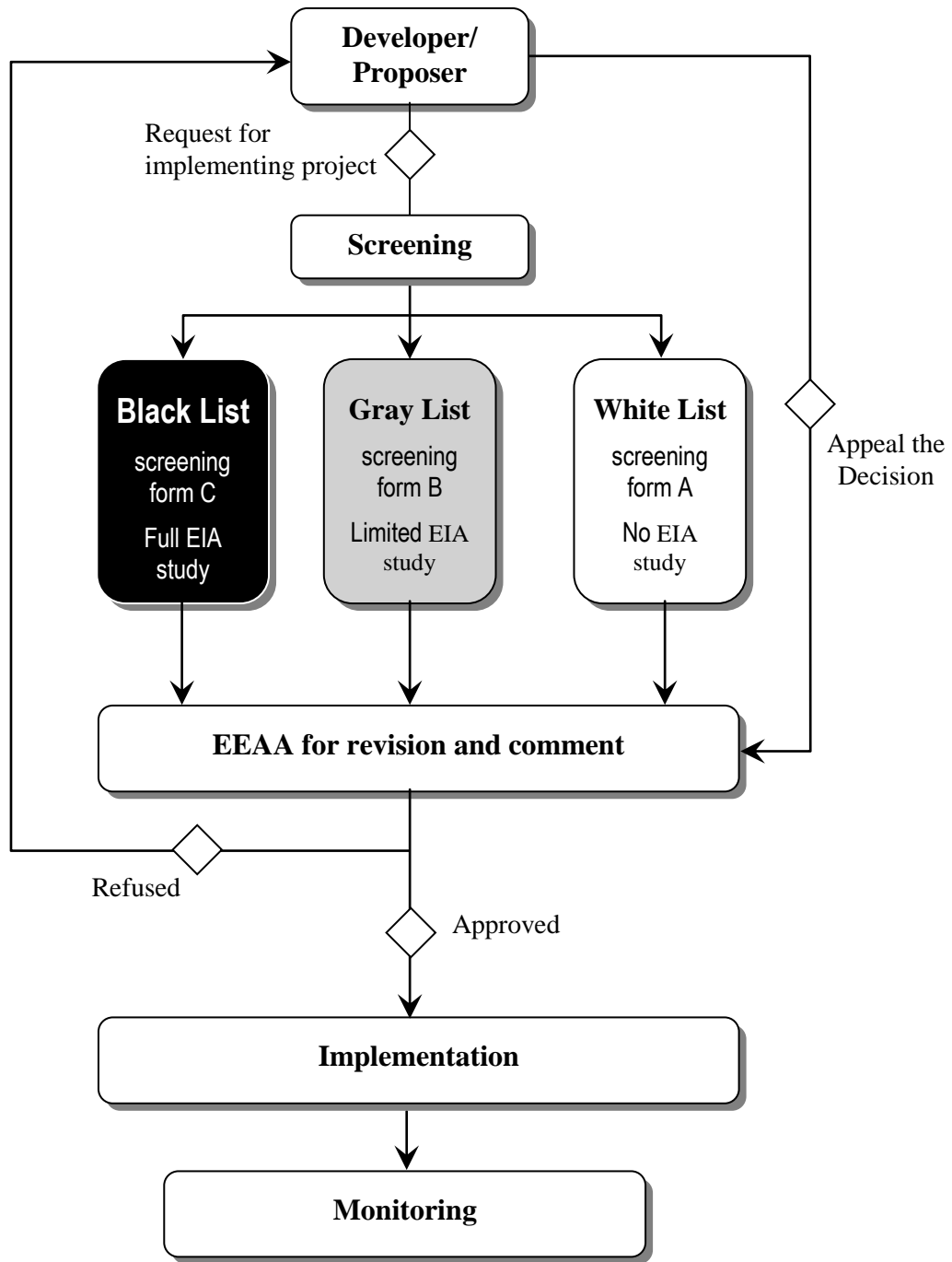
As a result of the interpretation of the issues outlined in the Environment law N^o 4 of 1994 and its executive regulations, guidance on Environmental Impact Assessment (EIA) is published by Egyptian Environmental Affairs Agency (EEAA). This guidance not only describes the background and procedures of EIA as instigated in law 4 but also includes both general and detailed (some what) guidelines and requirements. These guidelines could be enforced both at the level of ministries, agencies and the national level by the EEAA. It is mandated by the law that each of the competent authorities issue respectively its own set of guidelines for EIA preparation according to its field.

The EIA system uses a list approach that screens projects into three categories based on different levels of EIA according to severity of possible environmental impacts. The three categories are white, gray and black.

The steps in the Egyptian EIA system are shown as follows: Fig. 4.4.

(1) **Christopher Wood**; “Environmental Impact Assessment: a comparative review”; Longman Scientific & Technical; **1995**.

Fig: 4.4. The Egyptian EIA process (modified by the researcher)



White list: Includes projects with minor environmental impacts and can normally be approved on the basis of a simple Environmental Screening (like: textile factories not containing a dyeing process, leather and shoe factories).

Practical EIA process

Gray list: Includes projects which may cause important environmental impact. The applicant must carry out a more elaborate Environmental Screening (like: textile dyeing processes, sugar refineries and glass manufacturing). In some cases; a scooped EIA study of certain identified impacts/ processes may be requested.

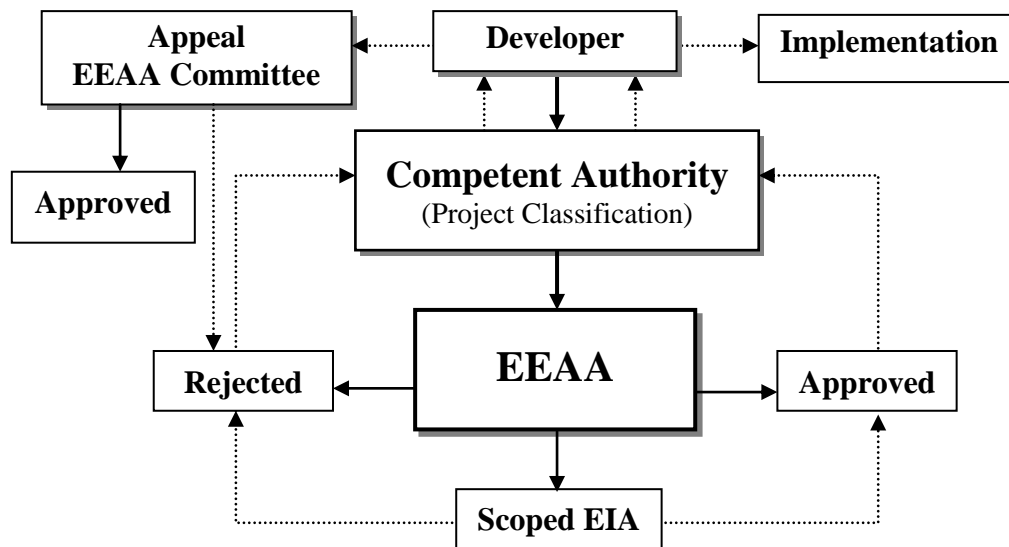
Black list: Includes projects which due to their potentially severe environmental impacts, needs a full EIA study (like: oil refineries, petrochemical production, lead factories and nuclear power stations).

1. The project proposer/ Developer, who is about to embark on a new project or is seeking to expand an existing facility, notifies the licensing authority of his intention to undertake the project. An advice is available from the Competent Administrative Authority or the (EEAA) to identify in which category the project classified, for example, in gray list projects, the developer requests an Environmental Screening (Form B) from the Competent Administrative Authority (CAA) and completes it.
2. The completed Form B is then forwarded with a letter of intent to undertake a specific project to the CAA. The CAA registers the documents and checks whether the selected category is correct and whether the information submitted complies with the required information. The CAA reviews the documents and formally submits the applicant's documents to the EEAA for review and evaluation.
3. The EEAA evaluates the documents and submits its opinions and any recommendations to the CAA within 60 days of the EEAA's official receipt of the completed documents. Failure to do so shall be considered as an approval of the assessment. The documents are registered by the EEAA together with its opinions and proposals in the EIA register at the EEAA.
4. The competent administrative authority or licensing agency records the notification and then officially informs the developer/ proposer by registered letter with acknowledgement of receipt of the evaluation result by the EEAA. The result will be one of the following determinations:

Practical EIA process

- (a) Approval with a pledge on the part of the developer/proposer to fully undertake mitigation measures as prescribed by the relevant portions of the law. This determination is tantamount to the granting of a "white list" status to the proposed project. This implies that the proposed project would be expected to have only minimal environmental impact.

Fig4.5. Diagram shows the Environmental Screening form B procedure



- (b) The requirements that the developer/proposer submit will be an initial environmental analysis form and any other forms that could potentially be required. This is a determination that the proposed project is in the "gray list" one. This implies that the proposed project is anticipated to have moderate environmental impact.

- (c) A request that a scoped (full) EIA be performed in accordance with the sectoral guidelines issued by EEAA or in accordance to specially-tailored terms of reference.

5. In cases b. and c. the competent authority or licensing agency transmits the studies and/or the forms to the EEAA for revision and comment. In this case one of the following courses of action could take place:

Practical EIA process

- (a) The project is rejected. In this case an appeal could be filled as prescribed by the executive regulations within 30 days of receipt.
- (b) The acceptance of the official notification form as submitted, or acceptance after the submission of some additional data. In the latter case the project is considered approved.

● **The case of Scoped (full) EIA**

In the case when a developer/ proposer is requested to conduct a scoped (full) EIA, the developer must submit a completed study to the CAA.

The CAA registers the study and checks whether the information included in the scoped EIA study complies with the required information according to the Terms of Reference.

The EEAA evaluates the study and submits it to the CAA, within 60 days of the EEAA's receipt of the completed documents (its opinion and any recommendations).

The CAA notifies the developer by registered letter with an acknowledgement of receipt about the final result of the evaluation. The result can be either:

- (a) An approval of the project, including possible measures to be taken to ensure protection of the environment.
- (b) A disapproval of the proposed project.

The CAA forwards a copy of the decision to the EEAA which registers it in the EIA register.

The CAA ensures implementation of the decision. The developer can appeal the decision mentioned in (b) to the Permanent Appeals Committee in writing within 30 days of receipt. ⁽¹⁾

● **Requirements of scoped EIA**

As mentioned before, and in some cases, scoped (full) EIA may take place, so EEAA identified the typical requirements of EIA report for each kind of projects (Tourism

(1) SEAM Project/ Egyptian Environmental Affairs Agency; “Guidelines: Environment Screening Form B” ; 1998.

and Urban Development, Power and Electricity, Industrial Projects, High ways, Harbors,...etc.

For example, a summary of EIA report requirements for Tourism and Urban Development will be presented as EEAA identified it:

● **Summary of Requirements** ⁽¹⁾

A. Executive summary

B. Description of proposed development.

- Objectives and Scope of the Proposal
- The Location
- Description and Layout of the Proposed Development and Associated Facilities
- Site Preparation and Construction Methods
- Other Services in the Locality (particularly for marinas, jetties and lagoons)

C. Legislative framework and consultation process .

D. Description of the existing Environment

- Prioritization of Issues and the Affected Environment
- Baseline Data and Impact Assessment
 - Land Surface Issues
 - Hydrological Issues and Water Quality
 - Waste Water and Solid Waste Management Issues
 - Air Quality Impacts
 - Noise Impacts
 - Visual Impacts
 - Flora and Fauna Issues
 - Land or Water Transport Issues

(1) SEAM Project/ Egyptian Environmental Affairs Agency; “EIA Report Guidelines: Coastal Tourism Developments”; 1999.

Practical EIA process

- Historical Issues
- Hazards Assessment
- Social and Economic Issues

E. Significant environmental impacts

F. Alternatives and Mitigation Measures

- Consideration of Alternatives
- Justification for the Preferred Alternative
- Mitigating Measures
 - Environmental Management Plan
 - Specific Mitigation Measures
 - Residual and Cumulative Impacts

G. Monitoring plan

CHAPTER 5

COMPARATIVE REVIEW OF EIA SYSTEMS

CHAPTER 5

COMPARATIVE REVIEW OF EIA SYSTEMS

5.1 Introduction

This chapter mainly interested in studying the effectiveness of the EIA systems and making a comparative review for the selected EIA systems, which have been presented in the previous chapter (The US federal EIA system, The UK EIA system, The New Zealand EIA system, The Egyptian EIA system).

The purpose of the comparative review of the selected EIA systems is to measure the overall performance of the four EIA systems and to identify where the weakness and shortcomings in each of them.

5.2 EIA system effectiveness

Much of the debate about the effectiveness of EIA systems emanates from North America. It centers not so much on whether or not EIA can be viewed as effective, but on the factors which can be advanced to explain why an EIA system is effective, on which evaluation criteria are appropriate in judging the effectiveness of EIA system and on how EIA can be improved.

While the view is not unanimous, it is accepted very widely that:

At the US federal Level, impact assessment works. We know how it works to influence project selection and design and to mitigate environmental impacts. ⁽¹⁾

CEQ (1990) concurred with this view of the effectiveness of EIA:

The act unquestionably has had a profound effect on attitudes within the federal government, and its influence outside the federal government is almost as impressive. ⁽²⁾

Taylor (1984) believed that the US EIA system worked because it was an

(1) **Wandesforde, Smith and Kerbavaz**; “The co-evaluation of politics and policy: elections, entrepreneurship and EIA in United States. In Wathern, P. (ed.) Environmental Impact Assessment: Theory and practice”; Unwin Hyman; London; **1988**.

(2) **Council on Environmental Quality**; “Environmental Quality 1989: Twentieth Annual Report”; USGPO; Washington, DC; **1990**.

Comparative review of EIA systems

administrative reform in tune with its times: supportive forces both inside and outside government worked together to ensure the effective implementation of EIA, and the changes organizational behavior associated with it. Caldwell (1989b) has accepted this view:

To the question: has EIA reformed administration, my reply is yes-but as an instrument of a public opinion demanding administrative and policy reform.

He have gone beyond that and said:

EIA will be most effective where environmental values are implicit and consensual in the national culture and are explicit in public law and policy.⁽¹⁾

It is apparent that the success of EIA depends upon a large number of factors in addition to the precise nature of the procedures in force. As Hollick (1986) has stated:

outside the USA it is commonly assumed not only that introducing procedural changes will change decision making, but also that agency procedures will change in accordance with promulgated procedures without some measure of coercion.⁽²⁾

This assumption is clearly over-optimistic.

This is not to say that EIA procedure is not important in determining effectiveness. It is clearly of crucial importance but, while it is a necessary condition for EIA success, it is not a sufficient condition. Every EIA procedure operates within a policy, political, legal and administrative context peculiar to the jurisdiction concerned. To be successful in achieving a real shift in the weight given to the environment in decisions, the EIA procedure needs to interact positively with its jurisdictional context. As in the United States, this may not happen immediately. Wandesforde Smith (1989) has summarized these points as follows:

EIA effectiveness is associated with changing political regimes and with the changing level of support for the EIA process among courts, chief executives,

(1) **Caldwell, K. L.** ; “Understanding impact analysis: technical process, administrative reform. Policy principle. In Bartlett R V (ed.) Policy through Impact Assessment”; Greenwood Press; New York, NY; **1989b.**

(2) **Hollick, M.** “Environmental impact assessment: an international evaluation”; Environmental Management; Wiley; Chichester; **1986.**

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and senior agency managers that this implies. The way an EIA process is formally structured and the way structure taps informal incentives for administrative behavior are, equally dearly, important variables.⁽¹⁾

Ortolano et al. (1987) felt that, to be effective, an EIA system needed to have a number of characteristics, including:

Utilization of proper methods in assessing impacts;

Influence of environmental information on various aspects of planning and decision making, including formulation of alternative plans, selection of a proposed plan, and mitigation of adverse impacts;

Placement of appropriate weight on environmental impacts relative to economic and technical factors.⁽²⁾

Ortolano (1993) has subsequently emphasized the need to include procedural compliance and the completeness of EIA documents among the dimensions of EIA effectiveness.⁽³⁾

Ortolano et al. (1987) believed that the effectiveness of EIA systems could be explained by reference to 'control mechanisms': intraorganizational and interorganizational processes and structures to ensure that the procedures actually worked. They advanced six types of control as causative: 'judicial; procedural; evaluative; instrumental; professional; and direct public and outside agency'. They suggested that two or more of these mechanisms usually operated simultaneously and that opportunities for public involvement played a key role in the exercise of each.

This emphasis on the role of public involvement in the success of National Environmental Policy Act (NEPA) is widespread. Fairfax and Ingram (1981) felt that:

considerable public discussion and support has come less because of its

(1) **Wandesforde, Smith, G.** ; "Environmental impact assessment, entrepreneurship, and policy change. In Bartlett, R. V. (ed.) Policy through Impact Assessment"; Greenwood Press; New York, NY; **1989**.

(2) **Ortolano L., Jenkins B., and Abracosa R. P.** ; "Speculations on when and why EIA is effective"; Environmental Impact Assessment Review; **1987**.

(3) **Ortolano, L.** ; "Controls on project proponents and environmental impact assessment effectiveness"; The Environmental Professional; **1993**.

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uniquely cogent approach to the problems of fragmented decision-making, than because of the vocal and powerful environmental constituency which came to support the legislation after a spate of expansive judicial readings of its requirements. ⁽¹⁾

CEQ (1990) has also emphasized the crucial role of external review (which it takes to mean external agency review, public participation and judicial review) in the success of EIA. ⁽²⁾

Kennedy (1988) reached the following conclusion to the question of which EIA procedures work:

Generally speaking, however, it would appear that EIA works best when it is instituted in a formal-explicit way. That is to say, it works when there is a specific legal requirement for its application, where environmental impact statement is prepared, and where authorities are accountable for taking its results into consideration in decision-making.

In addition, for EIA to be successfully integrated in the project planning process it would appear that procedures for screening, scoping, external review and public participation need to be a part of it. ⁽³⁾

5.3 Evaluation of EIA system effectiveness

There has been, as yet, no reliable quantification of the effectiveness of EIA. It may be that this is not possible. As CEQ (1990) has stated:

Because National Environmental Policy Act (NEPA) was not designed to control specific kinds or sources of pollution, its benefit to society is difficult to quantify. The act was designed primarily to institutionalize in the federal government an anticipatory concern for the quality of the human environment, that is, an attitude, a heightened state of environmental awareness that, unlike

(1) **Fairfax, S. K. and Ingram, H. M.** ; “The United States experience. In O’Riordan T. and Sewell W R D (eds) Project Appraisal and Policy Review”; Wiley; Chichester; **1981**.

(2) **Council on Environmental Quality**; “Environmental Quality 1989: Twentieth Annual Report”; USGPO; Washington, DC; **1990**.

(3) **Kennedy, W. V.** ; “Environmental impact assessment in North America, Western Europe: What has worked where, how and why?”; International Environment Reporter; **1988**.

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pollution abatement, is measurable only subjectively and qualitatively. ⁽¹⁾

Bartlett and Baber (1989) endorsed the difficulty of empirically examining the effects of EIA on decision making within organizations:

For that reason, it may be more desirable to judge the impact of impact assessment on bureaucratic decision making by examining the attitudes and opinions of those immediately responsible. ⁽²⁾

While the difficulties of reaching an objective overall judgement about any EIA system are apparent, there is a need for an evaluative framework for comparing the formal legal procedures, the arrangements for their application, and practice in their implementation in EIA systems. This evaluative framework could be provided by analyzing the extent to which various principles are met by EIA systems. Perhaps the most rigorous example of the use of this type of evaluative framework is Gibson's (1993) analysis of the Canadian federal and Ontario EIA systems on the basis of eight 'interdependent principles for the design of effective environmental assessment processes (Table 5.1). ⁽³⁾

The Canadian Environmental Assessment Research Council (1988) advanced the following criteria for evaluating EIA:

An EIA may be considered effective if, for example:

- Information generated in the EIA contributed to decision making
- Predictions of the effectiveness of impact management measures were accurate, and
- proposed mitigatory and compensatory measures achieved approved management objectives.

(1) **Kennedy, W. V.** ; "Environmental impact assessment in North America, Western Europe: What has worked where, how and why?"; International Environment Reporter; **1988**.

(2) **Bartlett, R. V. and Baber, W. F.** ; "Bureaucracy or analysis: implications of impact assessment for public administration. In Bartlett R V (ed.) Policy Through Impact Assessment"; Greenwood Press; New york, NY; **1989**.

(3) **Gibson, R. B.** ; "Environmental Assessment Design: lessons from the Canadian experience"; The Environmental Professional 15:12-24; **1993**.

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Table: 5.1 Eight basic principles for evaluating EIA processes

1. An effective environmental assessment process must encourage an integrated approach to the broad range of environmental considerations and be dedicated to achieving and maintaining local, national and global sustainability.
2. Assessment requirements must apply clearly and automatically to planning and decision making on all undertakings that may have environmentally significant effects and implications for sustainability within or outside the legislating jurisdiction.
3. Environmental assessment decision making must be aimed at identifying best options, rather than merely acceptable proposal. It must therefore require critical examination of purposes and comparative evaluation of alternatives.
4. Assessment requirements must be established in law and must be specific, mandatory and enforceable.
5. Assessment work and decision making must be open, participative and fair.
6. Terms and conditions of approvals must be enforceable, and approvals must be followed by monitoring of effects and enforcement of compliance in implementation.
7. The environmental assessment process must be designed to facilitate efficient implementation.
8. The process must include provisions for linking assessment work into a larger regime including the setting of overall biophysical and socio-economic objectives and the management and regulation of existing as well as proposed new activities.

Efficiency criteria are satisfied if, for example:

- EIA decisions are timely relative to economic and other factors that determine project decisions, and
- costs of conducting EIA and managing inputs during project implementation can be determined and are reasonable.

Fairness criteria are satisfied if, for example:

- All interested parties (stakeholders) have equal opportunity to influence the decision before it is made, and
- People directly affected by projects have equal access to compensation. ⁽¹⁾

While many of these criteria relate to an individual EIA rather than to EIA systems they are nevertheless helpful in deriving a set of evaluation criteria for a comparative review.

Evaluation criteria are, in effect, shorthand versions of principles for EIA and,

(1) **Canadian Environmental Assessment Research Council; “Evaluating Environmental Impact Assessment: an Action Prospectus”; CEARC, Hull; Quebec; 1988.**

carefully articulated, have considerable advantages in terms of brevity and clarity.

Table 5.2 presents a set of evaluation criteria which are based upon the representation of the stages in the EIA process shown in Fig. 2.6, the aims of EIA, and the various evaluation frameworks discussed above. The focus of the criteria is on the requirements and operation of the EIA process. Only the penultimate criterion involves an overall evaluation of the EIA system. For the reasons outlined above, this relies mainly on the opinions of those involved in the EIA process. These criteria can be employed to judge the effectiveness of any EIA system. Such a comparative review provides the basis for suggesting how the effectiveness of EIA can be improved, a goal which is attracting considerable interest. ⁽¹⁾

5.4 Comparative review of EIA systems

Because every EIA system is unique and each is the product of a particular set of legal, administrative and political circumstance, the examination of several EIA systems comparatively by analyzing each element in the EIA process should achieve three objectives. *The first* is explanatory. By placing the EIA process and the stages in EIA procedures in their international context, it should be possible to explain their nature much more clearly than by studying the system to a single jurisdiction. *Second*, analysis across EIA systems provides a means of better understanding practice in any particular jurisdiction. It is known that some EIA systems work better than others and step-by-step comparative analysis may help to throw more light on the factors which are essential to the success of EIA processes. *The third* objective stems from the first two. As Lundquist (1978) has stated:

comparative studies of national approaches to solving environmental problems have often led to valuable and practical suggestions to improve the effectiveness of the national processes examined. ⁽²⁾

If this comparative review leads to one such suggestion it will have been successful.

(1) **Sadler, B.** ; “International Study of the Effectiveness of Environmental Assessment: Proposed Framework”; Federal environmental Assessment Review Office; Hull; Quebec; **1994**.

(2) **Lundquist, L. J.** ; “The comparative study of environmental politics: from garbage to gold?”; International Journal of Environmental studies 12:89-97; **1978**.

Table: 5.2 EIA system evaluation criteria

1.	Is the EIA system based on clear and specific legal provisions?
2.	Must the relevant environmental impacts of all significant actions be assessed?
3.	Must evidence of the consideration, by the proponent, of the environmental impacts of reasonable alternative actions be demonstrated in the EIA process?
4.	Must screening of actions for environmental significance take place?
5.	Must scoping of the environmental impacts of actions take place and specific guidelines be produced?
6.	Must EIA reports meet prescribed content requirements and do checks to prevent the release of inadequate EIA reports exist?
7.	Must EIA reports publicly reviewed and the proponent respond to the points raised?
8.	Must the findings of the EIA report and the review be a central determinant of the decision on the action?
9.	Must monitoring of action impacts be undertaken and is it linked to the earlier stages of the EIA process?
10.	Must the mitigation of action impacts be considered at the various stage of the EIA process?
11.	Must consultation and participation take place prior to, and following, EIA report publication?
12.	Must the EIA system be monitored and, if necessary, be amended to incorporate feedback from experience?
13.	Are the financial costs and time requirements of the EIA system acceptable to those involved and are they believed to be outweighed by discernible environmental benefits?

5.5 Criterion 1: Legal basis of EIA systems

5.5.1 Introduction

It is now generally accepted that EIA Systems should be based upon clear specific legal provisions. The next section of this chapter explains the reasons for advancing this as an evaluation criterion for EIA systems.

5.5.2 The legal basis of EIA systems

Following the passage of the National Environmental Policy Act 1969 in the United States (NEPA), it was not uncommon for governments in other countries to maintain that the main principles of EIA were already provided by their existing legislation. The United Kingdom, for example, argued for many years that the principal elements of EIA were satisfactorily furnished by the existing town and country planning system. It is; of course, true that many excellent EIA studies have been carried out in the United Kingdom and elsewhere without the framework of a formal EIA system. Kennedy (1988) has categorized this type of approach as 'informal-implicit' In it, EIA is adapted to meet the needs of particular situations, an EIA report as such may not be prepared and authorities are not accountable for taking EIA into consideration in decision making.

In the formal-explicit approach, on the other hand, EIA requirements are codified in legislation or regulations, an EIA report must be prepared and authorities are accountable for considering EIA .

A further relevant issue in EIA is the question of how far the detailed operation of the EIA process should be prescribed in laws and regulations, and how much it should be left to the discretion of the relevant authorities. The advantages of a legally specified EIA system may be summarized as: permanence and evidence of commitment; avoidance of uncertainty; provision of a firm basis for public participation; and enforcement of acceptance of EIA⁽¹⁾

On the other hand, the advantages of a largely discretionary EIA system, only the

(1) **Buckley, R.** ; “Environmental Planning legislation: court back-up better than Ministerial discretion”; Environmental and Planning Law Journal; **1991b**.

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broad details of which are enshrined in law or regulation are: the desirability of voluntary compliance; the avoidance of judicial involvement; and the retention of discretion. ⁽¹⁾

A further issue is whether the EIA system should be independent of existing decision-making procedures or whether it should be integrated into them. NEPA introduced a completely new procedure which cut across existing decision making. This, not surprisingly, led to confusion and delay in the early years, to considerable duplication of control and to a desire by other countries to avoid similar problems. This has been exacerbated by a desire to avoid both litigation and the loss of control and power over decisions to external agencies. The advantage of separation is the creation of a fresh approach which emphasizes the importance of EIA, something which may not be apparent where EIA is integrated into existing procedures if prevailing attitudes among practitioners and decision-makers are not modified.

There is always a danger that, unless the various steps in the EIA process are mandatory, there will be some proponents, consultants, consultees or authorities who will fail, in certain circumstances, to discharge their responsibilities fully. For this reason, each step in the EIA process needs to be specified sufficiently in a law or in a binding regulation to provide a measure of certainty to the participants in the EIA process. The finer points involved in each stage of the process need not be spelled out in law provided that appropriate additional guidance is made available.

It is important to emphasize that flexibility is necessary to ensure that the EIA system is focused on the desired outcome of EIA, environmentally sensitive decisions, rather than on ensuring that all the procedural formalities have been completed. ⁽²⁾

It is important that a clear outline of all the procedures involved in the EIA process be available so that proponents, developers, consultees, the public (and the relevant authorities) can gain an overview of the whole process. This outline should include the time allocated to each stage in the process.

(1) **Fowler**; "Legislative bases of environmental impact assessment"; Environmental and Planning Law Journal; **1985**.

(2) **Wood, C. M.** ; "Environmental impact assessment in Victoria: Australian discretion rules EA"; Journal of Environmental Management; **1993b**.

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The various criteria for analyzing the legal basis of EIA systems are summarized in Table 5.3. These requirements are used in conjunction with the central criterion to assist in the review of the legal basis of each of the four EIA systems, which follows.

Table 5.3. Evaluation criteria for the legal basis of EIA systems

Is the EIA system based on clear and specific legal provisions?
Is each step in the EIA process clearly specified in law or regulation?
Are the legal provisions sufficiently unambiguous in application?
Is there a degree of discretion in the provisions, which is acceptable to the participants in the EIA process?
Are the EIA requirements clearly differentiated from other legal provisions?
Is each step in the EIA process enforceable through the courts or by other means?
Are time limits for the various steps in the EIA process specified?
Does a clear outline of procedures and time limits exist for the EIA system as a whole?

5.5.2.1 United States of America

The US Federal EIA system is based upon the broad provisions of legislation - the National Environmental Policy Act 1969 - the brevity of which is matched by its ambiguity. The various requirements of the Act have been clarified over the years by both the courts and the Council on Environmental Quality (CEQ) Regulations, themselves based upon legal rulings.

Further guidance has been issued by CEQ to clarify matters not covered fully in the Regulations. While the substantive intent of NEPA, to change the nature of federal decision making, has been gradually whittled away over the years to become a largely procedural requirement, the legal basis of the US EIA system is clearly specified by it. The detailed steps in the process are specified in the Regulations, which are widely regarded as providing a model basis for an EIA system, being comprehensive, specific, clear and surprisingly readable.

There is reasonable agreement by proponents, practitioners and environmental groups that the Regulations leave an appropriate degree of discretion for the EIA process to be applied to the activities of the very wide range of federal agencies affected by NEPA. Generally, the various agencies have issued guidelines or regulations to apply

Comparative review of EIA systems

the CEQ Regulations specifically to their own activities and the Environmental Protection Agency (EPA, 1993) has published a sourcebook for the environmental assessment process which includes a set of computer discs.

The Regulations contain provisions relating to the time limits for consultation and participation. They also provide that, subject to certain limitations, the agency must set time limits if an applicant for the proposed action requests them. ⁽¹⁾

The EIA requirements are clearly differentiated from other legal provisions. Indeed, this separation caused animosity, confusion and delay in the early years when NEPA was applied retrospectively to projects which were already under construction. ⁽²⁾

5.5.2.2 United Kingdom

The regulations incorporating environmental assessment (EA) into the town and country planning system were made under the European Communities Act, the provisions of which do not permit the requirements of the European Directive on environmental assessment (or of any other directive) to be exceeded. However, the Planning and Compensation Act 1991 allows the Secretary of State for the Environment to require EA for projects needing planning permission other than those listed in the Directive and this power has now been exercised.

The Town and Country Planning (Assessment of Environmental Effects) Regulations implement the provisions of the European Directive almost to the letter, though there is some disagreement about whether the content requirements for environmental statements specified by the Regulations accurately reflect the Directive.

The Regulations, which were laid before Parliament prior to coming into effect on 15 July 1988, provide the legal basis for each of the steps shown in Fig. 4.2. Not only are all the main steps covered by the Regulations but time limits are specified for each of them. No mention is made in the Regulations of either scoping or monitoring.

The Regulations have not proved to be unambiguous. For example, the definition of certain types of project (for instance, urban development projects, fish farms) has

(1) **Yost, N. C.** ; “Streamlining NEPA – an environmental success story”; Boston College Environmental Affairs Law Review; **1981**.

(2) **Mandelker, D. R.** “Environmental policy: the next generation”; Town Planning Review; **1993a**.

proved uncertain. These ambiguities have almost all stemmed directly from the wording in the European Directive on EIA. Though EIA in the United Kingdom is largely integrated into the town and country planning system, the requirements are clearly distinct from those for normal planning applications, for example, in relation to timescales. The degree of discretion provided by the Regulations appears to be broadly acceptable to most of the main participants.

The Regulations provide the developer with a right of appeal against a local planning authority (LPA) determination that EA is required. As the EA system is integrated into town planning procedures, normal appeal provisions against the non-determination of planning applications (and against planning decisions) apply and the Secretaries of State can call applications in for determination by central government. In principle, therefore, there is strong central control over the freedom of LPAs to determine applications to which the Regulations apply. While there is no third party right of administrative appeal in the British planning system, access to the courts is possible where the EIA requirements have not been properly discharged. In practice, there have been very few such cases to date.

Circular 15/88 (Department of the Environment - DOE, 1988a) and the *Guide to the Procedures* (DOE, 1989) together provide clear and detailed guidance on the operation of the procedures. The indicative criteria and thresholds to be used by LPAs in reaching a judgement about whether EA is to be required for Schedule 1 projects are contained in the advisory Circular, and not in the Regulations. The criteria (and the other advice contained in the Circular) can therefore be changed relatively easily and, in any event, do not have regulatory force.

It is apparent that the Regulations and accompanying guidance contain provisions which clearly and specifically define the basis of the EA system integrated into British planning procedures.

5.5.2.3 New Zealand

The Resource Management Act 1991 contains almost all the legal provisions relating to the New Zealand EIA system.

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New Zealand's environmental protection measures and, accordingly, it runs to nearly 400 pages in length. The EIA provisions constitute only a small part of the total (around 20 of the over 400 sections) and are closely integrated with other resource planning provisions.

The term EIA is not used in the Act, which uses phrases such as 'an assessment of any actual or potential effects ... on the environment' to describe EIA. No phrase is used to describe the EIA report in the Act, despite the fact that New Zealand had 15 years' experience of environmental impact reports. Dixon (1993b) believed the authors of the Act replaced the term 'impact' by 'effect' to signify 'a fresh approach to EIA as all proposals and plans now come under this scrutiny'. ⁽¹⁾

The Act provides a broad indication of the projects to be assessed: land use and subdivision consents, discharge, water abstraction and coastal permits unless exempted by local authorities in their plans and policies. The Act encourages scoping and provides an indication of the contents of an EIA report which can be modified by regional and territorial (city and district) authorities in their policy statements and plans. Time limits are imposed upon these authorities to process applications once they have sufficient information. The results of public participation and consultation on the basis of the EIA report, and the report itself, must be considered in the decision. The Act further provides for monitoring of the impacts of approved proposals. In short, the Resource Management Act provides a clear framework for EIA in New Zealand but deliberately leaves very considerable latitude to local authorities to determine their own specific EIA requirements. ⁽²⁾

The legal provisions are far from unambiguous. For example, since all resource consent applications, large or small, are controlled under the provisions of the Act, there is ample scope for discretion in the interpretation of terms such as 'major', 'minor, and 'significant', about which no further advice has been issued by the Ministry for the Environment. Montz and Dixon (1993) suggested that the way in

(1) **Dixon**; "The integration of EIA and planning in New Zealand: changing process and practice"; Journal of Environmental Planning and Management; **1993b**.

(2) **Morgan, R. K. and Memon, P. A.** ; "Assessing the Environmental Effects of Major Projects: a Practical Guide"; Publication 4; Environmental Policy and Management Research Center; University of Otago; **1993**.

which such terms were interpreted by planners when applications were received would be important in the successful implementation of EIA. ⁽¹⁾

The provisions of the Act are enforceable by third party appeal to the Planning Tribunal and, on points of law, beyond the Tribunal to the courts. The Tribunal consists of a judge assisted by a small number of part-time members, whose judgements form the basis of planning law in New Zealand. Clearly, the decisions of the Planning Tribunal will help to provide clarification and legal precedents. The independent Parliamentary Commissioner for the Environment can involve herself or himself in a limited number of EIA issues where this is thought likely to provide useful results.

5.5.2.4 Egypt

Measures concerning the assessment of the environmental impact of projects are stipulated in the Law of Environment No.4 of 1994 and the executive regulations issued by Decree No. 338 of 1995. The Law states that new establishments or projects as well as expansions or renovations of existing establishments must be subject to an EIA before a permit is issued.

The Executive Regulations to Law No.4 identify the projects which must be subject to an EIA. The developer/investor of such a project must submit an application with a letter of intent and environmental impact of the project to the competent administrative authority (CAA). All projects including the EIA studies must be reviewed by the CAA and evaluated by the EEAA.

The system divides projects into 3 groups which require different levels of EIA according to the severity of possible environmental impacts. The groups are. (*White projects*: includes projects with minor environmental impacts and can normally be approved on the basis of a simple Environmental Screening (Form A). *Gray projects*: includes projects which may cause important environmental impact. The applicant must carry out a more elaborate Environmental Screening (Form B). For some cases a scoped EIA study of certain identified impacts/ processes may be requested. *Black*

(1) **Montz, B. E. and Dixon, J. E.** ; “From law to practice: EIA in New Zealand”; Environmental Impact Assessment Review; 1993.

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projects: This class includes projects which due to their potentially severe environmental impacts need a full EIA study.

The owner of the project may appeal the decision of the authorities in writing to a Permanent Appeals Committee in a period of 30 days; however, the classification according to environmental impacts of the projects (white, gray or black) cannot be appealed. Representatives of EEAA, the competent administrative authority, or the licensing authority, and the owner of the project, or his representative with an official power of attorney, will be members of the Committee together with three independent experts. The committee will be chaired by a Counselor from the State Council. ⁽¹⁾

5.5.3 Summary of the legal bases of EIA systems

Table 5.4 shows a summary of the extent to which the four EIA systems are based on definite legal provisions. All four systems meet the criterion.

However, the US, provide a general outline and rely on detailed regulations for their implementation and the UK EIA system is based almost entirely on regulation, supported by non-statutory guidance.

The New Zealand legislation relating to EIA is extraordinarily brief, has not been supported by regulations, and does not even mention the term 'EIA'. In Egypt, the legal basis of EIA is mandatory under the law of environment (4 of 1994) and its executive regulations (338of 1995).

Two of the four EIA systems include procedures which are quite separate from other authorization systems. In the United Kingdom and New Zealand, on the other hand, EIA procedures (while identifiable legally) are firmly integrated into other types of consent procedure. It is not surprising that the legal requirements for EIA in these two countries are expressed much more briefly than in the acts and regulations specifying the EIA systems in the other two jurisdictions. Anyway, by putting into consideration that there is no central body responsible for EIA in pre mentioned countries (such as Egypt) and that there is a very little possibility of appeal to the courts than there in the United States.

(1) **Egyptian Environmental Affairs Agency, EEAA; “Environmental Impact Assessment In Egypt- An Overview”; 1997.**

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Table 5.4 The legal basis of the EIA systems

Criterion 1: Is the EIA system based on clear and specific legal provisions?

Jurisdiction	Criterion met?	Comment
United States	Yes	National Environmental Policy Act and Regulations clearly define separate EIA system.
United Kingdom	Yes	Regulations specifically implement European Directive on EIA. EIA integrated within town and country planning system, administered by local planning authorities (LPAs).
New Zealand	Yes	Act provides clear broad framework for EIA but allows local authorities very considerable discretion in operation.
Egypt	Yes	EIA system integrated within the law of environment, administrated mainly by EEAA in associating with the competent administrative authority.

5.6 Criterion 2: Coverage of EIA Systems

5.6.1 Introduction

The coverage of EIA Systems is related to the range of actions and range of impacts subjected to EIA and regarded as relevant. While it is generally accepted that the impacts of all environmentally significant new projects should be subject to EIA, there is little unanimity about the extension of EIA to higher tier sections such as programs, plans and policies or about the definition of the word 'environment', so this section discusses this item.

5.6.2 Coverage of actions and impacts

The National Environmental Policy Act 1969 (NEPA) applies to public actions by the federal government. These actions include the granting of permits for private actions. 'Actions' also include the making of plans and the enactment of legislation but one of the main intentions of the Act was clearly to ensure that the projects initiated by federal government were environmentally acceptable. In practice, the overwhelming emphasis of NEPA application has been upon projects, many of them public. From the start, the word environment was defined to include social and economic impacts, as well as physical environmental impacts (e.g. pollution, effects on ecology, etc.). The coverage of previous EIA systems almost didn't follow the precedent set by NEPA.

It is clearly important that no significant types of project, whether public or private, should be exempt from EIA unless there is an overwhelming reason for this (for example, national security considerations). This has, in practice, taken place in a number of countries on occasion. There may be certain classes of project which, though their environmental impacts are significant, are normally exempt from EIA. For example, the construction of city tower (high-rise) blocks and the conversion of natural areas to intensive agriculture have frequently escaped EIA in many countries.

It is also important that the impacts arising at different stages of the project are assessed. Thus, impacts arising at exploration, construction, operation, modification and decommissioning stages should be considered. Further, impacts under both normal operating and potential accident conditions need to be evaluated.

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The argument that the EIA of, say, the construction of a road, takes place too late in the decision-making process to influence crucial choices between different types of transport system and hence their environmental impacts is well established. ⁽¹⁾

The same argument applies to projects such as housing schemes where the cumulative impacts of many projects can only be adequately covered at the plan-making stage. ⁽²⁾

The need for EIA at strategic level, i.e. at program, plan and policy tiers, is widely accepted but few jurisdictions have implemented effective strategic environmental assessment (SEA) provisions, though many permit at least some SEA to take place. The infrequent use of SEA provisions in many jurisdictions may be a result of both perceived methodological difficulties and reluctance to cede power over decision making.

The definition of 'environment' in EIA has been treated differently in different jurisdictions. The European Directive on EIA eschews consideration of social and economic impacts whereas the EIA systems in many parts of the world, including many developing countries, evaluate impacts other than those upon the physical environment. It is inevitable that in any reasonably democratic decision-making procedure economic and social factors will strongly influence the outcome as a result of the political process.

In the last analysis, the issue of whether or not EIA covers impacts other than those on the physical environment is probably not crucial, especially as the distinction between them is often a narrow one in practice. It is, however, important that all impacts on the physical environment are encompassed by the EIA system. Thus, impacts on the various environmental media (e.g. the air), on living receptors (e.g. people, plants) and on the built environment (e.g. buildings) should be considered. Further, indirect impacts arising from other types of induced activity (e.g. ancillary service development) and the interrelatedness of environmental impacts (e.g. emissions of sulfur dioxide affecting the acidity of freshwater) and cumulative impacts need to be

(1) **Therivel R., Wilson E., Thompson S., Heaney D. and Prichard;** “Strategic Environmental Assessment”; Earthscan; London; **1992**.

(2) **Wood, C. M. ;** “EIA in plan-making. In Wathern P. Environmental Impact Assessment: Theory and Practice”; Unwin Hyman; London; **1988**.

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assessed. The danger of double-counting impacts should be constantly guarded against. ⁽¹⁾

The various criteria which can be used in considering the coverage of EIA systems are summarized in Table 5.5. These are used to assist in the review of the coverage of each of the four EIA systems which follows.

Table:5.5. evaluation criteria for the coverage of actions and impacts

Must the relevant environmental impacts of all significant actions be assessed?
--

Does the EIA system apply to all public and private environmentally significant projects?

Are the provisions applied in practice to all the actions covered in principle?

Are all significant environmental impacts covered by the EIA system?
--

5.6.2.1 United States of America

The National Environmental Policy Act 1969 is only applicable to federal actions, but not to state actions nor to most private projects except in cases of needing a federal permit. Section 102(2)(C) of NEPA states that all agencies of federal government must:

... include in every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment, a detailed statement...

The meaning of each phrase has been picked over by countless court deliberations. Bass and Herson (1993) state that actions typically consist of:

- Adoption of official policies, rules and regulations
- Adoption of plans
- Adoption of program[s]
- Approval of specific projects, including private undertakings approved by agency permit or regulatory decision. ⁽¹⁾

(1) **Cocklin C., Paker S. and Hay**; “Notes on cumulative environmental change: concepts and issues”; Journal of Environmental Management; **1992**.

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Examples of activities which may be subject to NEPA include discharges to wetlands and federal land management activities such as mining, oil and gas development, highway and airport construction, port development and navigation projects, timber harvesting, etc.

The very large number of environmental assessments prepared each year bears eloquent testimony to the fact that NEPA is somewhat broader in application than it might at first appear. While there continue to be legal arguments about whether an environmental assessment (EA) is required in particular cases, or whether an environmental impact statement ((EIS) rather than an EA should be prepared in certain circumstances, it appears to be true that the EIA provisions enshrined in NEPA are generally applied in practice to almost all the actions to which it is addressed.

If there has been an area of under-application it has been in relation to programs, plans and policies. NEPA was always intended to permit strategic environmental assessment but, until relatively recently, EIA was largely confined to projects. However, while many programs and plans are now being subjected to NEPA, the EIA of policies and legislative proposals appears still to be a relatively neglected area.

The types of environmental impacts covered by NEPA are broad. The impacts, which should be included in an EIS, have been summarized by Bass and Herson (1993) as:

- Direct effects
- Indirect effects
 - Reasonably foreseeable consequences
 - Growth-inducing effects
 - Changes in land use patterns, population density, or growth rate
- Cumulative effects
- Conflicts with land use plans, policies, or controls
- Other types of effects
 - Unavoidable effects

(1) **Bass, R. E. and Herson, A. I.** ; “Mastering NEPA: a Step-by-Step Approach”; Solano Press; Point Arena; CA; **1993**.

- The relationship between short-term uses of the environment versus long-term productivity
- Irreversible or irretrievable commitments of resources
- Energy requirements and conservation potential
- Natural or depletable resource requirements
- Effect on urban quality
- Effect on historical and cultural quality
- Socioeconomic and market effects. ⁽¹⁾

In practice, as a result of numerous legal challenges, these types of impact are generally covered where they are likely to be significant. A 1994 executive order on environmental justice (No.12898) requires the coverage of environmental effects, including human health, economic and social effects of federal actions, including effects on minority and low-income communities, in EISs. Recently, there has been debate about how the coverage of issues such as acid precipitation, global climate change and global loss of biodiversity should be included in EISs.

To summarize, the federal EIA system is partial in its application to environmentally significant actions but comprehensive in its coverage of federal actions and environmental impacts. It is thus, perhaps, typical of the fragmentation of US environmental policy which it was designed to address.

5.6.2.2 United Kingdom

Environmental assessment (EA) applies to all projects listed in the European Directive on EIA, subject to the use of screening criteria, no matter under which legislation they fall. This list is lengthy but not comprehensive. As mentioned before, EA has been incorporated into the town and country planning system (and other statutory procedures) by means of regulations made under the European Communities Act which do not allow the requirements of the Directive to be exceeded. However, the Planning and Compensation Act 1991 allows the Secretary of State for the Environment to require EA of other planning projects.

(2) **Bass, R. E. and Herson, A. I.** ; “Mastering NEPA: a Step-by-Step Approach”; Solano Press; Point Arena; CA; **1993**.

The UK EIA system is not confined to projects approved under the town and country planning procedures. Together with the other project approval systems into which EIA requirements have been integrated, the Planning Regulations provide for the assessment of most types of project. Exceptions relate to certain types of agricultural project, including some afforestation schemes, and to classified defense projects. Formal arrangements have been put in place for the EIA of projects approved by specific act of Parliament.

Nearly all types of public and private projects are thus subject to assessment. However, whether a particular project is assessed depends upon the screening criteria and thresholds which apply to the project type. It also depends on the application of those criteria by local planning authorities (LPAs).

The UK Planning Regulations and other EIA regulations do not apply to programs, plans and policies. As in the European Directive, the Regulations define the word 'environment' to mean the physical environment: human beings, flora, fauna, soil, water, climate, the landscape, the interaction between any of these, material assets, and the cultural heritage. The social and economic environment is not overtly included in this definition. It is, however, open to LPAs to consider these matters in reaching a planning decision if they choose to do so. The definition of effects adopted in the United Kingdom includes both direct and indirect effects, but while 'secondary, cumulative, short-, medium-, and long-term, permanent and temporary, positive and negative effects' may be described in an environmental statement, this is not mandatory.

In summary, the coverage of environmentally significant types of projects requiring planning permission is, in principle, comprehensive but the mandatory coverage of types of environmental impacts cannot be regarded as complete.

5.6.2.3 New Zealand

The Resource Management Act 1991 covers local government actions comprehensively. It applies not only to projects but also to policies and plans proposed under the provisions of the Act. The Act applies to almost every proposed project, as nearly all projects require resource consent in New Zealand. The EIA

provisions thus apply to land use and subdivision consents (which used to be dealt with under the Town and Country Planning Act) and to discharge, water abstraction and coastal permits (which were previously dealt with under a variety of legislative provisions). Some central government projects with major environmental effects are still dealt with under the Environmental Protection and Enhancement Procedures where they fall outside the provisions of the Act.

The extent to which the Act applies in practice to consents with minor environmental effects depends largely on the screening procedures adopted by local councils. These procedures include the designation of certain types of development as permitted uses (thus not requiring EIA) and as controlled uses (thus requiring a limited form of EIA). They also include the identification of persons likely to be affected by the proposed development who should be informed about it.

The definition of the term 'environment' adopted is also very broad as it includes 'ecosystems and their constituent parts, including people and communities; and all natural and physical resources; and amenity values' together with relevant 'social, economic, aesthetic and cultural conditions'. EIA in New Zealand thus encompasses social impact assessment.

Finally, the word 'effect' is also given a broad meaning in Section 3 of the Act and includes: positive or adverse, temporary or permanent, past, present or future and cumulative effects regardless of their scale, intensity, duration or frequency. It also includes risk. Cocklin et al. (1992) believed that the Act, by encouraging the territorial authorities to integrate EIA within the plan-making process, provides the basis for effective cumulative effects assessment, something which has previously been lacking in New Zealand, as elsewhere. ⁽¹⁾

5.6.2.4 Egypt

Actually, Law No 4/1994 and its executive regulations covers all actions comprehensively. It applies to the new projects/ establishments and to the expansions or renovations of existing projects/ establishments in all of Egypt, but the law did not

(1) **Cocklin C., Paker S. and Hay;** “Notes on cumulative environmental change: concepts and issues”; Journal of Environmental Management; **1992**.

mention any thing if these projects are governmental or related to the national security, and in this case, are these projects have to present an EIA study or not? and how? and what about the big national projects currently implemented in Egypt, did they present EIA or not? and why? and what about their impacts in future? and how it will be assessed in that time? and how much it cost?

Law No 4/1994 and its executive regulations defined the 'environment' in three main items '*physical environment, biological environment and social and cultural environment*', each item includes many sub-points and these points differs according to the type of the project.

Generally, in most cases the *physical environment* includes: geology, topography, land-use, soil, landform, climate (rain-wind-humidity ...etc), water, air quality, pollution sources (air-water-soil-noise), shoreline characteristics, hydrology of water and floods.

biological environment includes: flora, fauna, natural sensitive environments, rare creatures and creatures which have a commercial importance.

Social and cultural environment includes: near settlements, land-use, planned development activities, society structure, population, employment, income distribution, services, recreation, public health, the local residents and their own lands and the high historical and cultural value places .All of these points of course have not to be existed in every project

The definition of effects adopted in Law 4/1994 includes both positive and negative, direct and indirect, secondary, cumulative, short-, medium-, and long-term, permanent and temporary effects.

5.6.3 Summary of the coverage of the EIA systems

The coverage of the four EIA systems is shown in Table 5.6. The coverage of impacts and projects in the EIA system in New Zealand is, at least in principle, comprehensive. However, those in the United States, the United Kingdom and Egypt only partially meet the threshold.

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Table 5.6 The coverage of the EIA systems

Criterion 2: Must the relevant environmental impacts of all significant actions be assessed?

Jurisdiction	Criterion met?	Comment
United States	Impacts: Yes Actions: No	Applies only to federal, not state or most private, projects: comprehensive coverage of impacts of significant federal actions (including some non-project actions).
United Kingdom	Impacts: No Actions: Yes	Comprehensive coverage of projects approved under town and country planning process. Some discretion in impact coverage.
New Zealand	Yes	Act provides for all local authority approved policies, plans and projects to be subject to EIA covering physical environment, social and economic impacts.
Egypt	Impacts: Yes Actions: No	Almost a comprehensive coverage of impacts (economic impacts have not enough taken place). Private projects only have to be present EIA, but policies, plans and national governmental projects have not.

5.7 Criterion 3: Consideration of alternatives in EIA Systems

5.7.1 Introduction

The consideration of alternatives has been described as 'the heart of the environmental impact statement in the US'. It has also proved to be a contentious area in EIA. It is, for example, not a mandatory requirement of the European EIA Directive that alternatives to the proposed project be considered in the EIA report. This section discusses why the treatment of alternatives in EIA is important.

5.7.2 Consideration of alternatives in EIA Systems

The proponent of an action has a set of objectives to be accomplished, which can usually be satisfied in a number of alternative methods, each of them has different impacts upon the environment. The choice of an alternative that minimizes the environmental impact of the action should be an important determinant of any decision to proceed.

In that design stage, and before any commitment to any specific action has been made, that it is easiest and cheapest to choose the alternative which best lessen the environmental impacts of an action. Later in the EIA process it may be necessary to consider another alternative if unforeseen impacts are predicted to arise from that chosen. In order for choices between alternatives to be made, the designer needs to have access to environmental expertise and/or to simple evaluative tools. ⁽¹⁾

For example, regular meetings between designers and environmental professionals together with a specific, if brief, evaluation of the impacts of different alternatives can assist in making environmentally appropriate choices. Easy-to-use, if unsophisticated, methods such as shadows to show the effects of noise from roads in alternative locations can be employed helpfully at this very early stage. Informal consultations with decision-makers, environmental authorities and representatives of the communities affected may be very helpful but, because of their potential sensitivity at

(1) **Brown, A. L.** ; “Beyond EIA – incorporating environment into the engineering design process”; Paper to National Conference on Environmental Engineering; Gold Coast, Queensland, Australia; 1992.

such an early stage in the siting process, need to be handled with great care. ⁽¹⁾

Once the decisions regarding broad approach and location have been made, more detailed design of the action can take place. Here, where more resources are committed to the action, it is equally important that the avoidance and/or mitigation of environmental impacts continues to be considered. The same techniques of meetings with environmental professionals, specific evaluation and, if appropriate, consultation, together with the use of simple assessment methods, apply as the range of design alternatives narrows and the preferred design emerges. This step in the EIA process, which involves more detailed environmental evaluation is much easier both to accomplish and to demonstrate if the environmental impacts of alternative ways of achieving aims and of alternative locations have been evaluated earlier.

It is, of course, all too easy to profess that a thorough evaluation of the environmental effects of alternatives has been carried out and that the environmental consequences of the detailed design have been fully considered when the reality is different. However, in practice, it is very difficult to assert that the environment has been fully considered in detailed design if the alternative chosen for further elaboration is manifestly more damaging to the environment than some of those rejected. It is for this reason that the analysis of alternatives is so important in the EIA process.

The Council on Environmental Quality surveyed federal agencies in the United States in 1991 to determine how extensively alternatives were actually considered and to what extent this consideration was influencing decisions. The outcome was interesting:

The results of the survey indicated that when alternatives are not fully considered in the NEPA process, litigation is more likely, and agencies are less likely to achieve the original goals of the project in an efficient, economical manner. ⁽²⁾

(1) **Lee, N.** ; “Environmental Impact Assessment: a Training Guide”; Department of planning and landscape; University of Manchester; **1989**.

(2) **Bear, D. and Blaug, E.** ; “Recent EIA developments in United States of America”; EIA Center, Department of Planning and Landscape, University of Manchester; **1991**.

While many proponents will be as good as their word in considering alternatives, the public nature of the EIA process requires that the environmental evaluations undertaken at the alternatives/design stage be shown and explained in documentary form. Analysis of alternatives should not only be done but be seen to be done.

One method of providing an early check that the environmental effects of alternatives really have been fully considered is their inclusion in preliminary documents produced prior to the EIA report (e.g. in the notice of intent in the United States). Such documentation should show clear evidence of the mitigation/avoidance of environmental impacts in the initial action designs.

For the reasons stated above, this evidence will usually be in the form of an evaluation of the environmental consequences of the alternatives considered. If such evidence is not forthcoming, the proponent can be encouraged to return to this evaluation and, if necessary, to redesign the proposal before too many resources are expended. If documentation does not have to be produced until the scoping stage, or even later in the EIA process, the proponent's commitment to the design will be greater and the chance of cost-effective amelioration may be reduced.

While less satisfactory than the early submission of public documentation, any requirement to discuss the action with the decision-making and/or environmental authorities prior to submission of the EIA report (e.g. at the scoping stage or, preferably, at the screening stage of the EIA process) will involve the inspection of design documents. This will provide an opportunity to check that the most environmentally appropriate alternative and design meeting the proponent's aims has been chosen and, if it has not, to require that further iteration of the design process takes place.

As a final vital check that the environmental consequences of alternative approaches, locations and designs to meet the proponent's aims have been considered, the EIA report should contain evidence to this effect. If the documentation proves to be inadequate it may be possible for the proponent to supply supplementary information but in some instances reconsideration of the proposal may be necessary.

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A choice will need to be made regarding alternatives to be detailed in the EIA report (and other documentation) since the range of possible alternatives to an action may be legion. This choice is usually made on a case-by-case basis, the standard test being that of reasonableness. In the United States, non-feasible, remote or speculative alternatives need not be analyzed but sufficient information to permit a reasoned choice of alternatives so far as environmental aspects are concerned, including the no-action alternative, must be provided. ⁽¹⁾

The existence of published advice on the treatment of the environmental impacts of alternatives in the EIA process will be beneficial not only to developers but to consultants, decision-making authorities, environmental authorities, consultees and the public. The various criteria which can be used in evaluating the treatment of alternatives are summarized in Table 5.7. These criteria are employed to assist in the analysis of the treatment of alternatives in each of the four EIA systems which follow.

Table 5.7. Evaluation criteria for the consideration of alternatives in action design

Must evidence of the consideration, by the proponent, of the environmental impacts of reasonable alternative actions be demonstrated in the EIA process?
Must clear evidence of the consideration of the environmental impacts of alternatives be apparent in preliminary EIA documentation?
Must the realistic consideration of the impacts of reasonable alternatives, including the no-action alternative, be evident in the EIA report? Does published guidance on the treatment of the impacts of reasonable alternatives exist?
Does the treatment of alternatives take place effectively and efficiently?

5.7.2.1 United States of America

The treatment of alternatives lies at the heart of the US EIA system. The National Environmental Policy Act 1969 (NEPA) specifically refers to the coverage of alternatives to the proposed action. This is evident throughout the EIA process, commencing with the environmental assessment (EA).

(1) **Fogleman, V. M.** ; “Guide to the National Environment Policy Act: Interpretations, Applications and Compliance”; Quorum; New York. NY; **1990**.

In practice, EAs frequently considerably exceed 15 pages in length but often include adequate discussion of the environmental impacts of both the proposal and of the alternatives to it.

The evaluation of alternatives in the environmental impact statement (EIS) is governed by the so-called 'rule of reason' under which an EIS must consider, analyze and compare a reasonable range of options that could accomplish the agency's objectives. An explanation of why alternatives were eliminated should be included. The Regulations state that the range of alternatives to be considered should include:

- alternative ways of meeting the objective
- the no-action alternative
- alternatives outside the lead agency's jurisdiction.

The Regulations further require that rigorous evaluation and comparison are required, that the preferred alternative must be identified and that measures to mitigate the environmental impacts of alternatives must be described. Further, the environmentally preferable alternative must be identified in the record of decision for a proposal.

The Regulations, together with the treatment of alternatives in NEPA provide guidance on the consideration of reasonable alternatives. However, considerable scope for uncertainty remains, given the infinite number of alternatives to an action which may be feasible.

The Council on Environmental Quality is right to claim that the treatment of alternatives is 'the heart of the environmental impact statement'. There can be no doubt that the US EIA process requires the demonstration, by the proponent, that the environmental impacts of alternative actions have been considered.

5.7.2.2 United Kingdom

The desirability of the integration of environmental factors in the choice of alternative and in initial design is a fundamental reason for making the proponent responsible for producing the EIA report in the United Kingdom. As the Department of the Environment (DOE) has put it:

From the developer's point of view, the preparation of an environmental statement in parallel with project design provides a useful framework within which environmental considerations and design development can interact. Environmental analysis may indicate ways in which the project can be modified to anticipate possible adverse effects. ⁽¹⁾

Since preliminary EIA documentation does not have to be submitted to the local planning authority (LPA) or to any environmental authority, and since discussion between the proponent and these bodies is not required in the UK EIA system, the environmental statement (ES) provides the only formal check on the treatment of alternatives.

It is, therefore, perhaps surprising that the UK Planning Regulations do not require that alternatives must be discussed in the ES. In this, and in their permissive approach to the treatment of alternatives, they reflect the European Directive on EIA.

Alternatives are also included in the checklist of matters to be considered for inclusion in an ES in the DOE Guide to the UK EIA process. It is suggested here that the 'main alternative sites and processes considered, where appropriate, and reasons for final choice' may be relevant. ⁽²⁾

5.7.2.3 New Zealand

The consideration of alternatives in the EIA report is expected in New Zealand. The Fourth Schedule to the Resource Management Act requires proponents of proposals likely to have a significant impact to provide information on 'any possible alternative locations or methods for undertaking the activity'. In addition, where the discharge of a pollutant is involved, the proponent must describe 'any possible alternative methods of discharge, including discharge into any other receiving environment'. This emphasis on the best practicable environmental option is interesting, since the Act provides probably the first instance of the integration of legislative provisions for EIA and for achieving this option anywhere in the world.

(1) **Department of the Environment**; "Environmental Assessment: a Guide to the Procedures"; HMSO, London; **1989**.

(2) The former reference.

Where a project is deemed by the local council to have major effects and is notified, the council may require an explanation of any possible alternative locations or methods for undertaking the activity and the applicant's reasons for making the proposed choice.

This provision clearly invites councils to ensure that alternatives are fully explored. It is noteworthy, however, that the no-action alternative is not specifically mentioned.

The Act states only that information on alternatives and on other matters in the Fourth Schedule should be included 'subject to the provisions of any policy statement or plan'. However, since the Act states that the assessment 'shall be prepared in accordance with the Fourth Schedule' it is apparent that a proponent ought to provide this information where an EIA report is required unless the local or regional council has provided a different specification. It is, of course, open to regional and district councils to include more stringent requirements relating to the treatment of alternatives in their policy statements or plans.

There is no published guidance on the treatment of the impacts of alternatives in the New Zealand EIA system. Indeed, it is notable that none of the guidance commissioned or published by the Ministry for the Environment stresses alternatives. It is thus apparent that the treatment of alternatives has not been given priority in the implementation of the New Zealand EIA system.⁽¹⁾ This is reflected in practice: alternatives have not generally been treated satisfactorily in EIA reports, with the exception of those dealing with new road proposals.

5.7.2.4 Egypt

In according to the Law No 4/1994, the consideration of alternatives in the EIA report is essential. Law No 4/1994 and its executive regulations require proponents of proposals likely to have a significant impact to provide information on 'any possible alternative locations, designs, fuel, raw materials, technology, construction methods and phases for undertaking the activity', also the alternatives include implementation

(1) **Morgan, R. K. and Memon, P. A.** ; “Assessing the Environmental Effects of Major Projects: a Practical Guide”; Publication 4; Environmental Policy and Management Research Center; University of Otago; **1993**

and maintenance systems.

Law No 4/1994 and its executive regulation state that the range of alternatives to be considered should include:

- the no-action alternative
- alternative ways of meeting the objective of the project with the preservation of the environment.
- alternatives of the location and access to the project in order to minimize the environmental impacts to acceptable level.
- alternatives of the designs and construction methods.

Alternatives must be compared according to their environmental impacts, total investments, implementation and maintenance costs, suitability of the local existing circumstances and accessibility for monitoring the results.

The likely impacts should be identified clearly (Irreversible, irretrievable and mitigable). Costs and benefits of each alternative should be outlined, as possible, including the expected costs for mitigation, as possible. The reasons of the preferred alternative must be demonstrated.

In practice the consideration of alternatives does not take place in EIA reports in Egypt. Egyptian Red Sea Coastal and Marine Resources Management Project (1998) mentioned that one of the main shortcomings in all EIA studies for touristic projects (about 300 project presented to Touristic Development Agency, Red Sea Governorate and Egyptian Environmental Affairs Agency) is neglecting of identifying the alternatives for both the planning and project components, and considering that the project primal planning so as to be a true and the best without discussing the reasons for selecting it as the proffered alternative.⁽¹⁾

5.7.3 Summary of the consideration of alternatives in the EIA

The consideration of alternatives in the four EIA systems is shown in Table 5.8. It can be seen that the 'alternatives' criterion is met in the United States and New Zealand. It is, nonetheless, true that the treatment of alternatives in these jurisdictions often leaves a great deal to be desired. If practice in the United States is at the leading edge,

(1) **Egyptian Red Sea Coastal and Marine Resources Management Project; “Environmental Impact Assessment. Basis and Procedures Guidelines for Coastal Projects in Red Sea”; 1998.**

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practice in the treatment of alternatives in New Zealand is frequently unsatisfactory.

The treatment of alternatives in Egypt is exist in law but practically not exist.

Table 5.8 The consideration of alternatives in the EIA systems

Criterion 3: Must evidence of the consideration, by the proponent, of the environmental impacts of reasonable alternative actions be demonstrated in the EIA process?

<i>Jurisdiction</i>	<i>Criterion met?</i>	<i>Comment</i>
United States	Yes	Treatment of alternatives required in almost every environmental assessment and lies at 'heart of environmental impact statement' (EIS).
United Kingdom	No	No regulatory requirement. Regulations permit consideration of alternatives and guidance advises it. Practice varies.
New Zealand	yes	EIA report should contain discussion of alternative locations and methods. Practice is often weak.
Egypt	No	EIA report should contain discussion of alternative designs, fuel, raw materials, technology, construction methods and phases. Practically alternatives in all the above items are not exist.

United Kingdom does not always require the treatment of alternatives in EIA reports. The consideration of alternatives is, in effect, discretionary in Britain and the official guidance strongly advises that alternatives be described in environmental statements. In practice, some UK ESs contain adequate discussion of a reasonable range of alternatives to the proposed action but this is totally absent from others.

Practice in relation to the treatment of the 'no-action' alternative and the environmentally preferable alternative could undoubtedly be improved in all the jurisdictions to enable a better informed comparison to be made with the proposed action and hence to assist in reducing the severity of its environmental impacts.

5.8 Criterion 4: Screening of actions

5.8.1 Introduction

The determination of whether or not an EIA report is to be prepared for a particular action normally hinges upon the question of the significance of its environmental impacts. Two broad approaches to the establishment of significance may be identified in EIA systems:

- the compilation of lists of actions and of thresholds and criteria to determine which should be assessed
- the establishment of a procedure for the discretionary determination of which actions should be assessed.

In practice, most EIA systems adopt a hybrid approach involving lists, thresholds and the use of discretion. In some, different types of EIA (with different documentary and participation requirements) are employed for actions with different levels of significance.

This section discusses the issue of significance of impacts of actions and puts forward several evaluation criteria intended to assist in the analysis of EIA systems

5.8.2 Treatment of the screening of significant actions in EIA Systems

It is clearly important that some form of screening takes place in any EIA system. Without it, large numbers of actions would be assessed unnecessarily and/or actions with significant adverse impacts would not be assessed. The question of significance has created difficulty in the United States from the outset and has been the most frequent cause of litigation on EIA over the years. The US courts have generally ruled that an environmental impact statement was necessary when significant effects were present and where its preparation was reasonable under the circumstances. This type of legal test could, at least in principle, be applied in other jurisdictions. Interestingly, the courts in the United States have rejected specific size or monetary factors as a guide to determining the significance of an action. The Council on Environmental Quality Regulations set forth ten general criteria for the determination of significance on a case-by-case basis (Table 5.9). These 'intensity' issues are to be

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applied within the societal and environmental 'context' in which the action would occur. Some of these issues have been adopted or changed by other jurisdictions.

As mentioned before, the European Directive on EIA lists a limited number of Annex I projects for which assessment is mandatory (save in very exceptional circumstances). It then goes on to specify other (Annex II) projects for which criteria and thresholds may be applied to determine whether or not they should be assessed. These criteria should reflect the nature, size and location of the proposal.

In practice, there is a variety of procedures for screening actions which mix the approaches described and which permit different levels of scrutiny and of consultation and participation. Whichever approach is adopted, it is clearly important that, if screening is to be operated effectively, the proponent should be required to submit information to assist the decision-maker and/or the relevant environmental authorities in determining whether EIA is necessary in any particular case.

Table 5.9. US Council on Environmental Quality significance criteria⁽¹⁾

- | |
|---|
| <ol style="list-style-type: none">1. Is the impact adverse or beneficial?2. Does the action affect public health or safety?3. Is the action located in a unique geographic area?4. Are the effects likely to be highly controversial?5. Does the proposed action pose highly uncertain or unique or unknown risks?6. Does the action establish a precedent for future actions with significant effects, or represent a decision in principle about future considerations?7. Is the action related to other activities with individually insignificant but cumulatively significant impacts?8. To what degree may the action affect designated or listed and protected sites?9. To what degree may the action adversely affect endangered or threatened species and habitats?10. Could the action contravene other environmental legislation? |
|---|

Since proponents require as much certainty as possible in determining whether assessment is likely to be required, clear and detailed information about actions, criteria, thresholds and screening procedures generally should be available. Such

(1) **Land Use Consultants**; “Unpublished table”; LUC, London; **1992**.

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guidance is helpful not only to the proponent but to all the other participants in the EIA process.

To instill confidence in the screening process, an identifiable decision should be made by a publicly accountable body and the reasons for making it should be on the public record. Further involvement by the public and by environmental authorities would require a formal period of public participation and, beyond that, a third party right of appeal against screening decisions. This would obviously include the right of the proponent to appeal.

The criteria which can be advanced to analyze the treatment of screening are summarized in Table 5.10.

Table 5.10. Evaluation criteria for the screening of actions

Must screening of actions for environmental significance take place?
Is there a legal test of whether the action is likely to affect the environment significantly?
Is there a clear specification of the type of action to be subject to EIA?
Do clear criteria/thresholds exist (e.g. size, location)?
Do different types of EIA exist for different types of actions?
Must documentation be submitted by the proponent to assist in screening?
Is information about actions, criteria, thresholds and screening procedures readily accessible?
Is the screening decision made by a publicly accountable body?
Does consultation and participation take place during screening?
Is there a right of appeal against screening decisions?
Does screening function effectively and efficiently?

5.8.2.1 United States of America

There is no formal legal test in the US EIA system of whether the proposed action is likely to affect the environment significantly. Nor is there a set of criteria or thresholds in existence which permit precision in determining whether an environmental impact statement (EIS) must be prepared. Rather, a three-step process applies under the provisions of (NEPA):

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1. Determine whether NEPA applies to the proposed action (includes determination of whether action is 'categorically excluded').
2. State if the propounded action may 'significantly affect the quality of the human environment' (usually involves preparation of an environmental assessment - EA).
3. Prepare an EIS if significant impacts are anticipated.

In practice, the EA is bypassed for certain types of proposed actions for which agencies have published EIS criteria in their own NEPA regulations.

The EA is a supposedly concise public document which is intended to serve three purposes:

- provide sufficient evidence and analysis to determine whether an EIS is required
- support an agency's compliance with NEPA when no EIS is required
- facilitate preparation of an EIS when one is required.

It must discuss the need for the proposed action, reasonable alternatives, the probable environmental impacts, and the agencies and persons consulted. Agencies must provide notice of the availability of EAs. Scoping of EAs is not a requirement but is undertaken by some agencies. Other federal agencies and the public are supposed to be involved in the preparation of the EA.

The decision to proceed to an EIS or to prepare a finding of no significant impact (FONSI) is taken by the lead agency. This public document must succinctly state the reasons for deciding that the action will not have significant effects on the human environment and summarize or attach the EA. Many federal agencies are now preparing mitigated FONSI, i.e. reducing all the significant impacts of the proposed action to less than significant levels. Although the different federal agencies have different rules about consultation and public participation there have been many legal challenges to EAs and FONSI, indicating considerable dissatisfaction with the screening process.

Some EAs are undoubtedly EISs in disguise, perhaps to try to avoid the public scrutiny and possible delay involved in EIS preparation. Despite the length of EAs (exceed the recommended 15 pages) the majority of federal agencies do not, in

practice, involve the public Generally, this indicates serious shortcomings in the US EIA system. ⁽¹⁾

5.8.2.2 United Kingdom

As described before, the UK planning regulations contain two lists of projects. For Schedule 1 projects (for example, oil refineries, large power stations, and toxic waste disposal sites), for which environmental assessment (EA) is mandatory, it is normally clear whether a particular project requires EA. For the longer list of Schedule 2 projects, whether a project will require an EA depends on the likely significance of its environmental effects. These, in turn, will depend on the nature and scale of the project, the location and the complexity or adversity of effects.⁽²⁾ Because these criteria are necessarily general, the UK advisory Circular sets out quantified thresholds and indicative criteria for different categories of Schedule 2 projects. ⁽³⁾

The UK system is binary: either a project is subject to EA or it is not. There is no provision for 'simplified' EA, though, inevitably, the environmental statements for certain projects (especially those with potentially complex impacts such as toxic waste incinerators) tend to present a much fuller treatment than those for others (e.g. afforestation projects). Many minor developments which fail to be approved by local planning authorities (LPAs) within the town and country planning system are not, of course, subject to EA.

Where there is any doubt about the need for EA, the developer is advised to consult the LPA, which is an elected body, to obtain an informal view or a formal 'opinion'. The LPA may, in turn, refer to the statutory consultees for advice (DOE, 1988a). Where a formal opinion is sought by the proponent, information about the nature, purpose and possible effects of the proposal on the environment must be provided. If the LPA, on receipt of this information or of a planning application unaccompanied

(1) **Blaug, E. A.** ; “Use of the environmental assessment by federal agencies in NEPA implementation”; The Environmental Professional; **1993**.

(2) **Department of the Environment**; “Environmental Assessment: a Guide to the Procedures”; HMSO, London; **1989**.

(3) **Department of the Environment**; “Environmental Assessment. Circular 15/88”; HMSO, London; **1988a**.

by an environmental statement (ES), determines that one is required, there is provision for the developer to appeal to the Secretary of State for the Environment against this screening decision.

The Secretaries of State can issue a 'direction' that an EA be undertaken and submitted to the LPA even in the absence of an appeal by the developer. Public pressure or the opinion of statutory consultees could thus succeed (no doubt on very rare occasions) at central government level in obtaining EA, even if it fails to convince the LPA of the need. There is, however, no formal third party right of appeal against screening decisions. The types of projects potentially subject to EA, the criteria and thresholds and the procedures to be followed are clearly set out in the Planning Regulations. ⁽¹⁾

The formal procedures for obtaining opinions and directions have been used very little in practice. Of a sample of 24 ESs received by LPAs, just over half were initiated by a request from the LPA, with just under a third being volunteered by the developer without previously notifying the LPA. Statutory consultees were sometimes involved in the screening process but the public did not participate.

There was widespread agreement among the 36 LPAs questioned that further guidance (including examples) was needed on how to define 'significant environmental effect' for Schedule 2 projects. The interpretation of the criteria in the Circular by LPAs tended to vary and several were thought to be ambiguous. ⁽²⁾

Overall, it can be seen that, while screening of environmentally significant actions does take place, practice is variable and is not always effective.

5.8.2.3 New Zealand

Since, in principle, EIA applies to all resource consent applications, screening is obviously very important in eliminating minor or irrelevant projects from further consideration. The Resource Management Act 1991 delegates this task, like most other EIA responsibilities, to the regional and district authorities. Not only does the

(1) **Department of the Environment**; “Environmental Assessment : Amendment of Regulations. Circular 23/88”; HMSO, London; **1994a**.

(2) **Wood, C. M. and Jones, C. E.** ; “Monitoring Environmental Assessment and Planning”; Department of the Environment; HMSO; London; **1991**.

Ministry for the Environment have no direct role in screening but also it has not issued specific guidance on screening or recommended screening criteria. [Figure 4.3](#) shows that various options exist at the initial screening stage, and indicates the two-phase nature of screening.

The role of mandatory regional policy statements and plans and district plans (which must accord with regional policy statements and plans) in setting out the criteria for determining whether resource consents require EIA in New Zealand is crucial. In particular, rules may be included in district plans which prohibit certain uses and permit others without the need for resource consent. Similarly, controlled uses, and the nature of any assessment required for these, can be specified. Finally, non-complying and discretionary uses, for which EIA is always required, can be set down in rules. By defining the nature of uses, the limits on the size of controlled uses or permitted uses and/or the nature of their effects, district plans effectively provide the means of screening projects subject to EIA. However, many minor projects requiring regional consents will still require EIA if they are not controlled or permitted uses.

All applicants for discretionary or non-conforming uses are required to complete a prescribed form and attach an assessment of the environmental impacts of their proposal to the Act, however minor. The relevant plans are likely to specify more restricted EIA requirements in the case of controlled activities. This type of arrangement continues practice under the previous requirements when large numbers of informal EIA reports were submitted.

Local authorities (usually districts) may require more EIA information when the proposal is notified. The decision on whether to notify the application is taken by the local council on the basis of the EIA report submitted. If it determines that the project is likely to have major effects it is effectively making a screening decision and requiring a fuller EIA of the application.

There is no provision for different types of EIA report. Rather, the Resource Management Act 1991 specifies that any assessment:

shall be in such detail as corresponds with the scale and significance of the actual or potential effects that the activity may have on the environment

The New Zealand EIA system relies on the judgement of the region or district in determining whether EIA is necessary for non-complying, discretionary uses on the one hand and for controlled uses on the other. There is public participation and consultation in the preparation of policy statements and plans (and thus in determining the project EIA criteria employed). People likely to be affected by a proposed activity have to give their written consent before non-notification is permitted (i.e. they are involved, to some extent, in project screening decisions). There is a right of appeal to the Planning Tribunal on screening as on other issues.

As Morgan (1988) has pointed out, 'there is a danger that different authorities will adopt different screening criteria, leading to differences in the treatment of similar projects'.⁽¹⁾ This is particularly true during the transitional period before policies and plans are fully in place. Morgan (1993) has indicated that, in practice, there are considerable variations in the provision of guidance to applicants by councils and in local authority screening decisions. Many councils appear to have found considerable difficulty in establishing screening procedures.⁽²⁾

5.8.2.4 Egypt

The EIA system in Egypt uses a list approach that screens projects into three lists based on different levels of EIA according to severity of possible environmental impacts. Particular kinds of activities have been classified under each list. The three lists are white, gray and black.⁽³⁾

White list includes establishments/ projects with minor environmental impacts and can normally be approved on the basis of a simple Environmental Screening (Form A).

Gray list includes establishments/ projects which may cause important environmental impact. The applicant must carry out a more elaborate Environmental Screening

(1) **Morgan, R. K.** ; "Reshaping environmental impact assessment in New Zealand"; Environmental Impact Assessment Review; **1988**.

(2) **Morgan, R. K.** ; "An evaluation of progress with implementing the environmental assessment requirements of the Resource Management Act"; International Proceeding of Association for Impact Assessment Conference; Shanghai; IAIA; Belhaven; NC; **1993**.

(3) **SEAM Project/ Egyptian Environmental Affairs Agency**; "Guidelines: Environment Screening Form B"; **1998**.

(Form B). For some cases a scoped EIA study of certain identified impacts/processes may be requested.

Black list includes establishments/ projects which due to their potentially severe environmental impacts need a full EIA study. ⁽¹⁾

When the proponent/developer apply his project, the Competent Administrative Authority and/or the (EEAA) searches in the lists to identify in which list the project classified. The result expected from the screening is one of the following determinations:

- (a) *Approval with a pledge on the part of the developer/proposer to fully undertake mitigation measures as prescribed by the relevant portions of the law. This determination is tantamount to the granting of a "white list" status to the proposed project. This implies that the proposed project would be expected to have only minimal environmental impact.*
- (b) *The requirement that the developer/proposer submits an initial environmental analysis form and whatever other forms that could potentially be required. This is a determination that the proposed project is a "gray list" one. This implies that the proposed project is anticipated to have moderate environmental impact.*
- (c) *A request that a scoped (full) EIA be performed in accordance with the sectoral guidelines issued by EEAA or in accordance to specially-tailored terms of reference.* ⁽²⁾

5.8.3 Summary of the treatment of screening in the EIA Systems

Table 5.11 summarizes the treatment of screening in the four EIA systems. It is inconceivable that any EIA system could be operated without some form of screening, so it is not surprising that all systems are adjudged to meet the screening criterion. The EIA systems use a variety of approaches, criteria and thresholds for screening.

It is notable that jurisdictions make use of more than one type of EIA document. In

(1) **Egyptian Environmental Affairs Agency, EEAA;** “Environmental Impact Assessment In Egypt-An Overview”; **1997.**

(2) **M. Walid, Gamaleldin;** “Economic Aspects of Environmental Impact Assessment: The Case of the Arab Republic of Egypt”; **1995.**

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the United States the environmental assessment is nominally a screening document but, in practice, it is an EIA report in its own right for thousands of projects each year. Screening in New Zealand results in EIA reports of varying length and complexity. Screening in Egypt classified in three lists (each one includes particular actions) having three different screening forms.

Table 5.11 The treatment of screening in the EIA Systems

Criterion 4: Must screening of actions for environmental significance take place?

Jurisdiction	Criterion met?	Comment
United States	Yes	Use of categorical exclusions, inclusion criteria, and (rarely, in practice) environmental assessments to determine significance of impacts.
United Kingdom	Yes	Use of lists of projects, indicative criteria and thresholds in screening by LPAs varies.
New Zealand	Yes	Local authorities must specify types of, and criteria for, actions subject to EIA in their policies and plans.
Egypt	Yes	Use of lists of projects (rarely, in practice) environmental assessments uses to determine significance of impacts.

5.9 Criterion 5: Scoping of impacts

5.9.1 Introduction

Scoping is the name applied to the process of determining the range of issues to be addressed in the EIA report and for identifying the significant issues related to a proposed action.⁽¹⁾

Scoping was not an original requirement of the US National Environmental Policy Act (NEPA) but was added in 1978 in response to the encyclopedic nature of many environmental impact statements (EISs). Scoping was intended to ensure that more focused EISs were prepared and, incidentally, has assisted in increasing coordination between proponents in the EIA process and in the agreeing of action-specific timetables. It has proved to be a successful innovation. As Bear (1989) has stated: '*A well designed scoping process can have an extremely positive ripple effect throughout the rest of the NEPA process.*'

While there is no provision for scoping in the European Directive on EIA, many other jurisdictions have adopted scoping procedures. This section describes approaches to scoping and suggests criteria for use in the evaluation of EIA systems. These criteria are then utilized in the review of the EIA systems in the United States, the United Kingdom, New Zealand and Egypt.

5.9.2 Determination of the scope of the EIA report

Scoping is intended to focus the EIA on the most important issues, while ensuring that indirect and secondary effects are not overlooked and eliminating irrelevant impacts. In many older EIA systems it is a requirement that the public participate in scoping so that proponents and decision-makers are made aware of public concerns early in the EIA process. Consultation of environmental authorities can also reveal useful insights and, further, may ensure that coordination between them is more likely. Scoping has been defined as '*determining key concerns through open communication at an early enough stage to influence the planning*'.⁽²⁾

(1) **Bear, D.;** "NEPA at 19: a primer on an 'old' law with solutions to new problems"; Environmental Law Reporter; **1989**.

(2) **Ministry for the Environment;** "Scoping of Environmental Effects: a Guide to Scoping and Public Review Methods in Environmental Assessment"; MfE; Wellington; **1992**.

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Scoping is part of a cyclical process. There are several steps involved, one representation of which is shown in Table 5.12. An important starting point is the preliminary identification of impacts. Generally, reference should be made to published guidance documents, whether of a general or generic (i.e. concerned with the specific type of action) nature or to previously prepared action-specific guidelines or EIA reports. These last may be helpful either because they relate to actions similar to that proposed or to actions in locations similar to that proposed. Such guidance or guidelines will normally furnish a checklist of impacts to be considered.

Other systematic methods of ensuring comprehensiveness in the identification of impacts are the use of matrices or flow diagrams. The set of impacts identified as a result of using these approaches will include many which are irrelevant or insignificant and may still exclude some which are potentially important. Consultation with decision-making and environmental authorities, with interest groups such as local voluntary conservation groups, and with the local community should assist in ensuring that all potentially significant impacts are identified. This scoping process may or may not include meetings. However, public meetings are the best way of ensuring open dialogue about the significance of impacts but questionnaires, surveys and, in certain cases, the support of community-led scoping can be helpful. ⁽¹⁾

Table 5.12 Steps to be considered in scoping

- | |
|--|
| <ol style="list-style-type: none">1. Develop a communications plan (decide who to talk to and when).2. Assemble information that will be the starting point of discussion.3. Make the information available to those whose views are to be obtained.4. Find out what issues people are concerned about. (Make a long list.)5. Look at the issues from a technical or scientific perspective in preparation for further study.6. Organize information according to issues including grouping, combining and setting priorities (make the long list into a shorter list).7. Develop a strategy for addressing and resolving each key issue, including information requirements and terms of reference for further studies. |
|--|

(1) **Beanlands, G.** ; “Scoping methods and baseline studies in EIA. In Wathern P. (ed.) Environmental Impact Assessment: Theory and Practice”; Unwin Human; London; **1988**.

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Like screening decisions, scoping decisions frequently hinge on the issue of significance. In the last analysis these decisions often have to be made by individuals with the appropriate levels of knowledge and expertise who are able to say from past experience: what significant effects are likely to arise; how they are likely to impact on the environment; and what steps might be taken to deal with them. Different mechanisms are used in different jurisdictions to ensure that the skills of such individuals are brought to bear on the action in question. These vary from the use of appropriate consultants by the proponent, through informal and formal consultations of 'interested parties at all levels of government, and all interested private citizens and organizations', to the use of specialist panels and of representative consultation committees.

The preparation of action-specific scoping guidelines may not be a formal requirement in some jurisdictions, whereas in others the proponent will be required to prepare and publicize such guidelines and, in yet others, the decision-making body or environmental authority may be responsible for their preparation. ⁽¹⁾

The most basic means of ensuring that some form of scoping takes place is to require the proponent to consult the decision-maker and/or environmental authorities prior to submission of the EIA report. Such consultation provides an opportunity for the opinions of the relevant authorities about the scope of the EIA to be expressed. So that consultation is not only required but is seen to take place, some record of the discussion should be available for public inspection. This record should, preferably, demonstrate that the various relevant authorities have indeed expressed their views about the scope of the EIA and that these views have been considered by the proponent.

Whether or not such consultation takes place, the proponent may be required to address a general or generic set of impacts in the EIA. That such a requirement has been met can easily be demonstrated in the EIA report. Clearly, the use of guidance specific to the type of action proposed is likely to be more helpful than the use of guidance equally applicable to all types of action or to certain classes of action. (The

(1) Ministry of Housing, Physical Planning and Environment; "Scoping and Guidelines"; 1981.

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consideration of a general set of impacts, provided it is reasonably comprehensive is, nevertheless, very considerably preferable to the absence of any such requirement.) It is now generally accepted that the preparation of action-specific (rather than generic or general) guidelines by either the proponent or by the decision-making or environmental authorities renders the EIA process markedly more effective. A danger in such an approach, particularly where public consultation takes place, is that irrelevant impacts will be incorporated in the guidelines. Some mechanism for eliminating such impacts, and hence permitting the EIA to focus on the relevant issues, is necessary. Such a mechanism needs to be seen to be operated equitably.

The scoping stage in the EIA process will clearly be discharged best if guidance on scoping procedures and methods is available to the proponent and to the other participants. In the original American terminology, public participation is a necessary element of 'scoping', but this is not a requirement in all jurisdictions. There is, none the less, considerable unanimity of view that scoping is most effective where public participation and consultation are undertaken. Clearly, there should be a public record of the outcome of scoping in this case. A further check that participation is effective in influencing the scope of EIA would be a third party right of appeal against scoping decisions.

Table 5.13. Evaluation criteria for the scoping of Impacts

Must scoping of the environmental impacts of actions take place and specific guidelines be produced?

Must the proponent consult the environmental authority early in the EIA process?
--

Is scoping mandatory in each case?

Must a general or generic set of impacts be addressed in the EIA?

Must action-specific scoping guidelines be prepared?
--

Are irrelevant impacts screened out?

Does published guidance on scoping procedures and methods exist?
--

is consultation and participation required in scoping?
--

Is there a right of appeal against scoping decisions?

Does scoping function efficiently and effectively?
--

Whatever scoping procedure and level of participation is adopted, it is obviously necessary that it works effectively and efficiently. Table 5.13. summarizes this, and the other criteria which can be employed to review the treatment of scoping. These criteria for ways of establishing the coverage of the EIA for a particular proposal are now utilized in analyzing the scoping process in each of the four EIA systems.

5.9.2.1 United States of America

The National Environmental Policy Act 1969 (NEPA) requires a formal scoping process for each EIS. The first formal step in EIS preparation is the publication of a notice of intent which must contain a description of the agency's proposed scoping process, including any scoping meetings (which are recommended but are not a requirement of the Regulations). The open scoping process is intended to obtain the views of other agencies and the public regarding the scope of the EIS. The Regulations state that the objectives of scoping include:

- determining which significant issues should be analyzed in depth in the EIS
- identifying and eliminating issues which are insignificant or which have been dealt with elsewhere
- allocating responsibilities among agencies
- identifying relevant environmental review procedures, documents and consultation requirements
- setting page and time limits.

There is no prescribed list of impacts which must be incorporated in EISs beyond the specification that direct, indirect, 'connected', 'similar' and cumulative' actions must be taken into account, together with a consideration of options and mitigation measures.

(1)

A record of the scoping process must be kept since the Regulations state that draft EISs 'shall be prepared in accordance with the scope decided upon in the scoping process'. The Council on Environmental Quality (1981) has issued guidance on scoping which not only advocates the use of public meetings and other methods of ensuring participation but suggests that a scoping report be prepared. This should be a

(1) **Bass, R. E. and Herson, A. I.** ; “Mastering NEPA: a Step-by-Step Approach”; Solano Press; Point Arena; CA; **1993.**

register of the decisions made during the scoping stage and consists of a summary of the matters to be assessed in the EIS and of the perspectives of those involved in the scoping process. ⁽¹⁾

There is no formal right of appeal against scoping decisions but it is customary for additional impacts to be addressed in the draft EIS if it later becomes apparent that they are likely to be significant. On the whole, the formalized scoping process works well, providing an agreed list of contents to be covered in the draft EIS. There is, however, a tendency to include impacts of questionable significance, rather than to exclude them, partly because of the fear of legal challenge. Further, while some public scoping meetings are very well attended, others fail to attract a single participant. Notwithstanding its shortcomings, scoping is generally regarded as a valuable addition to the EIS preparation process in the United States and is also sometimes used in connection with the preparation of environmental assessments.

5.9.2.2 United Kingdom

There is no formal requirement for the proponent to consult the local planning authority (LPA) prior to submission of the EIA report, or to undertake any form of scoping, in the United Kingdom. However, the Department of the Environment (DOE) has strongly advised developers to consult LPAs about the coverage of environmental statements (ESs): 'developers and authorities should discuss the scope of an environmental statement before its preparation is begun'. Consultation of statutory consultees and, in some instances, of the public during scoping is also recommended:

While developers are under no obligation to publicize their proposals before submitting a planning application, consultation with local amenity groups and with the general public can be useful in identifying key environmental issues, and may put the developer in a better position to modify the project in ways which would mitigate adverse effects and recognize local environmental

(1) **The Council on Environmental Quality**; "Memorandum: Scoping Guidance"; CEQ; Washington, DC; **1981**.

concerns.⁽¹⁾

The 'specified information', or the statutory minimum content of an ES, consists of a description of the environment and the project, the data necessary to identify and assess the main effects, a description of the likely significant effects, a description of mitigation measures, and a nontechnical summary.

The Regulations also indicate the additional information which may be provided 'by way of explanation or amplification of any specified information'. This includes, as well as a discussion of alternatives, the likely significant secondary, cumulative, short-, medium- and long-term, permanent, temporary, positive and negative effects of the proposal, the forecasting methods used and an explanation of the difficulties encountered.

The UK Guide to the Procedures contains a six page checklist of issues that might need to be covered by an ES, including the risk of accidents.⁽²⁾ Like the supplementary information listed in Schedule 3 to the Planning Regulations this checklist has no statutory standing. No generic sets of impacts for particular types of projects have been issued by DOE.

In a study of a sample of 24 cases where ESs were submitted, almost two-thirds of developers or their consultants undertook early voluntary consultations with the LPA. LPAs were generally able to influence the scope of the ES during these discussions. Discussions with the statutory consultees, other bodies or the public, prior to submission of the ES, took place less frequently (in about one-third of cases). Where they did occur, developers and consultants found them to be of great value.

The statutory consultees believed they were able to influence the scope of the ES in about one-fifth of the cases by suggestions to the LPA, and in rather more cases by suggestions to the developer. They mostly felt that the notice taken of their suggestions by both the LPA and the developer/ consultant was considerable. On the other hand, suggestions by voluntary groups to either the LPA or the

(1) **Department of the Environment**; "Environmental Assessment: a Guide to the Procedures"; HMSO, London; **1989**.

(2) The former reference.

developer/consultant were thought by those groups to have virtually no influence on the scope of the ES. ⁽¹⁾

5.9.2.3 New Zealand

The Resource Management Act not only specifies that the details of any assessment should correspond to the scale of the effects of the action but that it must be prepared in accordance with the Fourth Schedule. The Fourth Schedule was a late addition to the Act, inserted following pressure from environmental groups and the Parliamentary Commissioner for the Environment, who were concerned that too much discretion in establishing assessment procedures was being left to local authorities.

It is intended to bring together the requirements of the Act relating to the contents of an assessment of effects in the form of a checklist. Anxiety has been expressed that some local authorities may use the Fourth Schedule as an inflexible listing of required information, rather than as a guide to obtaining information about relevant significant impacts. ⁽²⁾

While the Fourth Schedule is intended to provide a guide as to which information might be furnished by a developer in each case, it is notable that the requirements include the treatment of alternatives, the risk of accidents and monitoring, together with a strong suggestion that early consultation should take place. Scoping is not mandatory. This omission is surprising in view of the role of scoping in the Environmental Protection and Enhancement Procedures (Ministry for the Environment, the stressing of scoping in recent guidance and the published guidance devoted to scoping. ⁽³⁾ For notified projects the local council may require an explanation of (ii) the consultation undertaken by the applicant'. In effect an applicant is being instructed that it would be unwise to neglect consultation about the proposal and the scoping of its effects.

(1) **Wood, C. M. and Jones, C. E.** ; “Monitoring Environmental Assessment and Planning”; Department of the Environment; HMSO; London; **1991**.

(2) **Hughes, H. R.** ; “The Resource Management Act: new responsibilities for the young and not-so-young planners”; Paper to New Zealand Planning Institute Seminar; Napier; **1992** .

(3) **Ministry for the Environment**; “Scoping of Environmental Effects: a Guide to Scoping and Public Review Methods in Environmental Assessment”; MfE; Wellington; **1992**.

It would be almost impossible for the consent authority to take appropriate account of Maori interests, as required by the Act without early consultation with Maori representatives (i.e. scoping).⁽¹⁾

Plans may give guidance as to scoping and consultation requirements.⁽²⁾ Consultation and participation is therefore not obligatory in EIA report preparation, nor is the preparation of scoping guidelines (despite the experience of scoping gained over the years for larger projects in New Zealand), but it is very strongly recommended. Morgan (1993) has reported mixed experience with scoping. Some councils have given a clear invitation to applicants to discuss proposed actions with them, whereas others have left applicants to make the initial approach or relied upon the content requirements in the Fourth Schedule. As in other jurisdictions, applicants and local authorities have generally found early discussions to be very helpful.⁽³⁾

5.9.2.4 Egypt

Under the compliance of Law No 4/1994, there is no requirement for a formal scoping in EIA system in Egypt, but EEAA (1999) has published an EIA guidelines for industrial estates development and mentioned that:

Scoping is the identification of those matters which need to be covered in the EIA. Not all issues will be equally important for all proposals and the EIA process must focus its attention on the key issues of concern. Scoping should result in:

- *A list of all issues with preliminary estimate of the relative significance of their impacts,*
- *Identification and prioritization of the key issues and who these are to be assessed,*

(1) **Hughes, H. R.** ; “The Resource Management Act: new responsibilities for the young and not-so-young planners”; Paper to New Zealand Planning Institute Seminar; Napier; **1992** .

(2) **Ministry for the Environment**; “Assessment of Environmental Effects”; MfE, Wellington; **1991**.

(3) **Morgan, R. K.** ; “An evaluation of progress with implementing the environmental assessment requirements of the Resource Management Act”; International Proceeding of Association for Impact Assessment Conference; Shanghai; IAIA; Belhaven; NC; **1993**.

- *An explanation as to why other issues are considered to be less important.* ⁽¹⁾

Since Law No 4/1994 has passed, Egyptian Environmental Affairs Agency (EEAA) or any other Agency in Egypt has not addressed any general or generic set of impacts, or prepared any action-specific scoping guidelines or published any guidance on scoping methods and procedures.

Finally, although scoping is a very useful tool in EIA system, in Egypt there is not any formal requirement for the proponent/developer to undertake any form of scoping.

5.9.3 Summary of the treatment of scoping in the EIA systems

The treatment of scoping in the four jurisdictions varies, with two of the EIA systems meeting the evaluation criterion (Table 5.14). Scoping is a formal requirement for full EIA reports in the United States. It is not a formal requirement in New Zealand', scoping is very strongly encouraged in the Resource Management Act' 1991 and local authorities can set up their own scoping procedures. In each of these jurisdictions, scoping involves the preparation of action-specific guidelines and must incorporate some environmental agency and public participation.

United Kingdom makes no reference to scoping in its legal provisions, though even here scoping is strongly advised. In practice, scoping in the form of discussion between the Proponent and the LPA frequently takes place though records of these discussions are often not made public. Consultation of environmental authorities and the public in the United Kingdom during scoping is less common.

Egypt makes no reference to scoping in its legal provisions. Egypt has not prepared any action-specific scoping guidelines or published any guidance on scoping procedures.

It is now widely accepted that scoping helps to ensure that the relevant environmental impacts are covered in EIA reports (if not that scoping helps to eliminate irrelevant impacts).

(1) **SEAM Project/ Egyptian Environmental Affairs Agency ; “Environmental Impact Assessment: Guidelines for Industrial Estates Development”; 1999.**

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It has also been found in the more mature EIA systems that scoping ensures that the various parties can participate early in the EIA process. It can therefore only be a matter of time before New Zealand (which already has considerable experience of scoping for many projects from its Mark I EIA system) and the United Kingdom (which, although its EIA system is relatively new, also has some experience of scoping) adopt formal requirements for scoping in EIA

Table 5.14 The treatment of scoping in the EIA systems

critterion 5: Must scoping of the environmental impacts of actions take place and specific guidelines be produced?

Jurisdiction	Criterion met?	Comment
United States	Yes	Public scoping is used to produce specific guidelines for EISs. Scoping is sometimes used in environmental assessments.
United Kingdom	No	Not a statutory requirement but strongly advised. Frequently takes place but practice varies.
New Zealand	Partially	Scoping is not obligatory, but is very strongly encouraged in Act. Practice varies.
Egypt	No	Not a statutory requirement

5.10 Criterion 6: EIA report preparation

5.10.1 Introduction

If the treatment of the environmental impacts of alternatives is at the heart of the environmental impact statement, the EIA report is itself at the heart of the EIA process. There can be no meaningful EIA without the preparation of a report documenting the findings relating to the predicted impacts of the proposal upon the environment. Despite an enormous literature on EIA methods, very few jurisdictions specify how the findings presented in EIA reports should be derived. They do, however, normally specify the minimum content of the EIA report and frequently indicate procedures, which must be followed in the preparation of the report.

This section is concerned with ensuring that content requirements for EIA reports are achieved in EIA systems and then discusses EIA report preparation requirements and puts forward a set of evaluation criteria. These criteria are then used to assist in the review of EIA report preparation procedures and practice in the United States, the United Kingdom, and New Zealand Egypt.

5.10.2 Content of EIA reports

Virtually every EIA system possesses a requirement that EIA reports must describe the proposed actions and the environment affected, forecast the significant impacts likely to result from the implementation of the action, and present a non-technical summary. They also generally provide that EIA reports contain other material, such as treatment of alternatives and mitigation measures. The preparation of this information requires the use of a wide variety of methods and techniques.

The EIA process is cyclical and the nature of the action is continually refined as its design progresses. Design work is costly and there is therefore a temptation for the proponent to prepare EIA reports on the basis of designs which are insufficiently detailed to allow forecasts to be prepared with accuracy. The decision-making and environmental authorities, however, should be seeking a realistic estimate of impacts which may necessitate more detailed design (and more expense) than the proponent originally contemplated. Whatever degree of detail is finally determined to be

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appropriate, the EIA report represents no more than a record of the impacts forecast to arise from the project as developed at a particular point in time, like a photograph.

Different impacts may arise at different points in the life cycle of an action (e.g. in the case of a mineral project: exploration, construction, operation, modification, decommissioning and restoration) and each needs to be described

Table 5.15. A checklist for project description ⁽¹⁾

<input type="checkbox"/> NATURE AND PURPOSE OF THE DEVELOPMENT
<input type="checkbox"/> Function of the proposal, with economic and operational context <input type="checkbox"/> Demand and need for the development (if appropriate) <input type="checkbox"/> Alternatives considered (if appropriate)
<input type="checkbox"/> CHARACTERISTICS OF THE PROPOSED SITE
<input type="checkbox"/> Location – Size - Summary of topography, landscape & natural or manmade features
<input type="checkbox"/> CHARACTERISTICS OF THE PROPOSED DEVELOPMENT
<input type="checkbox"/> Size - Site layout – Shape – Character - Landscape proposals (including grading) <input type="checkbox"/> Car parking - Entrances and exits - Access to public transport <input type="checkbox"/> Provision for pedestrians and cyclists - Provision for utilities <input type="checkbox"/> Any other relevant information (including emissions to air, water and land)
<input type="checkbox"/> PHASING OF THE DEVELOPMENT
<u>Construction phase</u> <input type="checkbox"/> Nature and phasing of construction <input type="checkbox"/> Frequency, duration and location of intrusive operations <input type="checkbox"/> Timing, location and extent of mitigation measures <input type="checkbox"/> Use and transport of raw materials <input type="checkbox"/> Number of workers or visitors <u>Operational phase</u> <input type="checkbox"/> Processes, raw materials <input type="checkbox"/> Emissions (air, water, noise, vibration, lighting, etc.) <input type="checkbox"/> Number of employees or other users <input type="checkbox"/> Traffic generation <u>Likely expansion or secondary development</u> <input type="checkbox"/> To be covered so far as the effects of such development can be anticipated at the time the ES is prepared

(1) **Department of the Environment**; “Guide on Preparing Environmental Statement for Planning Projects”; Consultation Draft; DOE; London; **1994b**.

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Various checklists designed to assist in project description have been advanced (e.g. that in table 5.15). Such information can be provided in a variety of forms: written text, tables, process diagrams, flow charts, maps, sketches, photomontage, etc. It can be obtained by utilizing design data, published emission data (e.g. for air pollutants), published accident data, advice from expert authorities (e.g. air pollution controllers), consultancy advice, EIA reports for similar proposals and visits to the sites of similar projects.

Only by carefully and systematically describing the initial or 'baseline' environmental conditions is it possible to present an accurate and convincing picture of the likely effects that the development will have on its environment. It is very important to devote sufficient effort to this part of the EIA process, as the accuracy and plausibility of much of the remainder of the EIA report depend upon it. Wherever possible, existing data should be utilized to indicate the principal physical features (e.g. geology), existing and proposed land use; the main air, water and land quality characteristics, existing vegetation and wildlife and existing land use and other policies, plans and standards for the area. ⁽¹⁾

The timeframe and possibility of occurrence of projections should also be stated. ⁽²⁾

Such data will often be held by various environmental authorities and need to be readily available to proponents.

Additional information may need to be gathered by observation and measurement but its purpose and the need for it should be very carefully considered. In addition to having a clear objective in EIA report preparation, any specific pre-project baseline studies should also provide the basis for post-project monitoring. ⁽³⁾ Data on the existing environment should, of course, be collected early enough to use it as an input into the design process. Only information directly relevant to the forecasting of impacts should be included in the EIA report and, even then, much of it may be most

(1) **Lee, N.** ; “Environmental Impact Assessment: a Training Guide”; Department of planning and landscape; University of Manchester; **1989**.

(2) **Tomlinson, P. and Atkinson, S. F.** ; “Environmental audits: a literature review” Environmental monitoring and Assessment; **1987b**..

(3) **Beanlands, G.** ; “Scoping methods and baseline studies in EIA. In Wathern P. (ed.) Environmental Impact Assessment: Theory and Practice”; Unwin Human; London; **1988**.

appropriately presented in the form of appendices.

Information on the likely magnitude of the impacts of the proposed action on the environment should be presented in the EIA report in as precise, objective and value-free manner as possible. Clearly, it is necessary to distinguish between the nature, extent and magnitude of an impact (e.g. forecast dust levels will vary with distance from the source and disappear when emissions cease). The forecasts of impact magnitude also need to take full account of forecast changes in baseline conditions in the absence of the action and of the effect of mitigation measures. ⁽¹⁾

Forecasting (or prediction) techniques include formal mathematical models, physical models, laboratory models, computer simulation, analogy with similar projects, photo-montage, etc. In general, the simplest and least data-demanding forecasting techniques should be employed. In order to permit external verification and auditing the limitations of the data and methods employed, together with the confidence which can be placed in the forecasts generated should be stated. Uncertainty in these forecasts arises not only from the probabilistic nature of many impacts but from inaccurate information from subsequent changes to the design of the project and from simplifications inherent in models and errors in their use ⁽²⁾ Such uncertainty may be very important in decision making especially where a choice has to be made between closely matched alternatives.

Whereas forecasting the magnitude of impacts is a matter of determining the quantitative effects, the significance of an impact is a matter requiring value judgement. Determining the magnitude of an impact may provide some indication of its possible significance, but there is not necessarily a direct relationship between the two factors. ⁽³⁾

Numerous methods of dealing with the significance of impacts have been identified.

(1) **Beanlands, G. E. and Duinker, P. N.** “An Ecological Framework of Environmental Impact Assessment in Canada”; Federal Environmental Assessment Review Office; Hull; Quebec; **1983**.

(2) **Ministry of Housing, Physical Planning and Environment;** “Handling Uncertainty in Environmental Impact Assessment”; MER Series 18; MHPPE (VROM); The Hague; **1985**.

(3) **Hyman, E. L. and Stiftel, B. ;** “Combining Facts and values in Environmental Impact Assessment: Theories and Techniques”; Westview Press; Boulder, CO; **1988**.

Some formal methods have incorporated scoring and weighting in which an attempt has been made to quantify significance and these have rightly been criticized for internalizing value judgements. ⁽¹⁾

The non-technical summary is frequently used to disseminate the findings of the EIA report to the general public at low cost. Since it is often the only document to be examined and since it is frequently read separately from the EIA report, it is important that it should be clear, concise, objective and well written. The summary should accurately reflect the text of the EIA report and present the main conclusions about alternatives, mitigation, etc., and explain how they were reached. A summary table setting out the main forecast impacts and the significance is often a valuable means of detailing many of the main findings of the EIA report.

Thus the Department of the Environment (DOE, 1994b) advocates assessing the geographical level of importance of the issue considered (international, national, regional or county-wide, district-wide and local), then the significance of the impact (major, minor and not significant) and finally the nature of the impact (adverse/beneficial, cumulative, short/long term, permanent/temporary, reversible/irreversible, and direct/indirect). DOE suggests that this information, together with an estimate of uncertainty, should be summarized in a table.

The non-technical summary is better prepared by assembling summaries of the various sections of the EIA report as they are written and then editing them into a consistent whole rather than hurriedly as the final step in EIA report preparation. While public relations and document design expertise may be helpful in the production of the summary, any tendency to distort the document by failing to reflect the presentation in the main EIA report should be resisted.

5.10.3 Preparation of EIA reports

While different EIA systems have different EIA report content requirements, it is clearly important that such provisions be specified precisely. It is also important that procedures be put in place so that proponents can gain access to information about the

(1) **Bisset, R.** ; “Developments in EIA methods. In Wathern P (ed.) Environmental Impact Assessment: Theory and Practice”; Unwin Hyman, London; **1988**.

environment (and the action) held by decision making and environmental authorities. A further requirement, given the need for checks and balances in any system driven by the proponent (especially where the proponent is responsible for EIA report preparation) is that checks to reduce the likelihood of inadequate or biased EIA reports exist.

It is ironical, given the volume of literature on EIA methods that few jurisdictions specify the methods or techniques to be employed in EIA report preparation.

Various methods of checking the content of the EIA report before it is published exist. Perhaps the simplest involves review by the responsible authority before approval to release the EIA report is given. This type of check exists in most Australian EIA systems. Another is the swift review of form and content used by the US Environmental Protection Agency prior to formally acknowledging receipt. A further approach is to involve a consultative group in the preparation of the various parts of the EIA report and to reach agreement on content section by section as in Victoria. ⁽¹⁾

Some jurisdictions, however, rely on the diffusion of best practice and sanctions later in the EIA process (e.g. preparation and submission of further information) as checks on the quality of EIA reports. This is the situation in the United Kingdom. It is clear that diffusion of best practice will be much speedier where adequate checks on EIA report quality exist.

Many EIA reports are prepared, in whole or in part, by consultants. Needless to say, the standard of competence among consultancies varies and, especially where EIA has been introduced only recently, some may lack the appropriate range of professional skills. While, over time, reputations for competence in EIA report preparation will be established, there is a constant danger of consultancies being selected by price or suffering from bias unless some form of accreditation of EIA consultants or code of practice is introduced. Some jurisdictions have formally introduced such requirements. Elsewhere, several professional associations have either set up voluntary accreditation schemes or are actively considering doing so. In others, voluntary codes of practice are in operation or under consideration. There are non-

(1) **Wood, C. M.** ; “Environmental impact assessment in Victoria: Australian discretion rules EA”; Journal of Environmental Management; **1993b**.

mandatory registration schemes in existence in the United Kingdom.

A more radical approach to quality assurance in EIA report preparation is to require that it be prepared not by the proponent but by the decision-maker or the lead agency. This is the original NEPA model for permit applications to federal agencies but it takes its most developed form in California. Here, the relevant agency often asks for tenders for environmental impact report preparation from an approved list of consultants. While the proponent pays, the client is the relevant agency.

As at the other stages in the EIA process, the existence of clear and readily accessible guidelines on EIA report preparation, content and form is advantageous. Not only is such guidance helpful to proponents and consultants in preparing the EIA report, but it is helpful to decision-making authorities, environmental authorities, interest groups and the public in reviewing EIA reports.

Table 5.16. Evaluation criteria for the preparation of EIA reports

Must EIA reports meet prescribed content requirements and do checks to prevent the release of inadequate EIA reports exist?
Must EIA reports describe actions, environments affected, forecast impacts, indicate significance and contain a non-technical summary?
Must information held by the relevant authorities about the environment or type of action be made available to the proponent?
Does published guidance on EIA report preparation exist?
Must specified EIA methods or techniques be employed?
Does accreditation of EIA consultants exist?
Do checks on the content, form, objectivity and accuracy of the information presented occur before publication of the EIA report?
Is consultation and participation required in EIA report preparation?
Does EIA report preparation function efficiently and effectively?

Again, as at other stages in the EIA process, the involvement of consultees and the public in EIA report preparation will lead to improved quality or at least to improved acceptability. This criterion and others which can be advanced to assist in the analysis of the treatment of EIA report preparation in EIA systems are summarized in [Table 5.16](#). The various criteria are used in the review of EIA report preparation in each of

the four EIA systems which now follows.

5.10.3.1 United States of America

The required contents of an EIS, which are specified in the Council on Environmental Quality's (CEQ's) National Environmental Policy Act (NEPA) Regulations can be summarized as follows:

- cover sheet
- summary (not normally exceeding 15 pages in length)
- table of contents
- statement of purpose and need
- alternatives, including the proposed action
- affected environment
- environmental consequences, including mitigation measures
- list of preparers
- list of agencies and organizations consulted
- list of all federal permits
- appendices
- index.

The environmental consequences section of an EIS is intended to form the scientific and analytical basis for the comparison of alternatives. The discussion of environmental consequences must include the environmental effects of the alternatives, including ecological, aesthetic, historical, cultural, economic, social and health impacts.⁽¹⁾ Conflicts between the proposed action and any relevant land use plans, policies and controls for the area must be included as 'environmental effects'.

An EIS may contain appendices which present relevant background material of an analytical nature but the total length of an EIS should not exceed 150 pages or, in the case of an unusually complex proposal, 300 pages. In practice, these page limits are frequently exceeded. There is no accreditation of EIA consultants but, while consultants are increasingly employed, many federal agencies possess sufficient competent in-house staff to prepare EISs. It is not uncommon for a 'draft' draft EIS to be prepared, prior to publication of the document, for internal review purposes. This

(1) **Bass, R. E. and Herson, A. I.** ; “Mastering NEPA: a Step-by-Step Approach”; Solano Press; Point Arena; CA; **1993**.

preliminary EIS may occasionally be circulated to a limited number of consultees (including the Environmental Protection Agency). The draft EIS is, certainly, subject to official consultee and public analysis before the final EIS is prepared.

The final EIS should include all the substantive comments on the draft EIS (or summaries of them). It must also include responses to the comments received during the review of the draft EIS. The final EIS may contain modified proposed actions or alternatives, it may develop and evaluate new alternatives, it may supplement, improve or modify analyses, include any necessary corrections or contain an explanation of why no further response is necessary.

The advice on EIS preparation contained in the Regulations requires the documents to be analytical (and not encyclopedic), to focus on significant impacts, to emphasize alternatives, to avoid post hoc rationalization, to be interdisciplinary (i.e. to ensure the integrated use of the natural sciences, social sciences, and the design arts), to be concise, to be written in plain language and to use appropriate graphics. There is no requirement to use specified EIA methods or techniques.

5.10.3.2 United Kingdom

There is no prescribed form of an environmental statement (ES), except that it must contain a description of the environment and the project, the data necessary to identify and assess the main effects, 'a description of the likely significant effects, direct and indirect, on the environment of the development', a description of mitigation measures and a non-technical summary.

While the developer is responsible for the content of the ES finally submitted and for the assessment methods employed, the Regulations enable the developer to collect relevant existing information from the statutory consultees who are under a duty to provide it. Where a local planning authority (LPA) is informed in writing that an ES is in preparation, it must notify the statutory consultees so that they can be ready to provide the developer with information if requested to do so.

Neither the Department of the Environment (DOE) Circular on EIA (DOE, 1988a) nor the Guide to the Procedures (DOE, 1989) specifies EIA methods or techniques. The Guide does, however, advocate a flexible approach, adjusted to individual

circumstances:

The assessment techniques used, and the degree of detail in which any particular subject is treated in an environmental statement, will depend on the character of the proposal, the environment which it is likely to affect, and the information available. While a careful study of the proposed location will generally be needed (including environmental survey information), original scientific research will not normally be necessary.⁽¹⁾

There is no formal check on the content, form and accuracy of the EIA report prior to its release because, as mentioned before, there is no requirement for the proponent to consult the relevant authorities prior to submission of the EIA report, though this is strongly advised. There is no formal accreditation of EIA consultants in the United Kingdom, though the Institute of Environmental Assessment operates a voluntary scheme. Neither the DOE Circular nor the DOE Guide provides detailed guidance on EIA preparation.

A manual on the EIA of major developments was commissioned by the UK Government some years ago. . This is now dated and is to be replaced by more general guidance on ES preparation a draft version of which was released for consultation in 1994.⁽²⁾ As mentioned before, several other guides on EA, which include some advice on ES preparation, have been published.

5.10.3.3 New Zealand

As mentioned before, it is apparent that the document reporting on the assessment of effects (which is, confusingly, not named in the Resource Management Act) may vary in length from half a page to hundreds of pages, depending on the circumstances.

The contents of the document are outlined in the Fourth Schedule to the Act. It is perhaps surprising that the Act is silent on the need for a non-technical summary (a requirement in almost every other EIA system). Provision of such a summary is,

(1) **Department of the Environment;** “Environmental Assessment: a Guide to the Procedures”; HMSO, London; **1989.**

(2) **Her Majesty's Government;** “This Common Inheritance: Britain's Environmental Strategy”; HMSO, London; **1990.**

however, suggested by the Ministry for the Environment in its advice on scoping. ⁽¹⁾

The Ministry for the Environment (MfE) has suggested that the assessment information to be provided should be indicated clearly in regional or district plans and that further help can be obtained by discussing the proposal with councils to gain their initial reaction.

Because, in many situations, the level of expected impact will be low and the mitigation measures easily defined, the guidance suggests that the applicant should be able to furnish the necessary information. However, where the proposal may have 'significant effects on the environment' applicants may decide they need 'professional advice and hire consultants to undertake the assessment' for them. ⁽²⁾ (There is no accreditation of EIA consultants in New Zealand.)

These cases, which should generally be flagged in the regional or district plan, will usually trigger the requirement that they be notified and that information on alternatives and consultation be provided. It is clearly in a developer's interests to provide such information at the outset, to avoid the delays involved in furnishing it upon request once the competent authority has received the application.

There is now guidance available to applicants on the preparation of EIA reports in the form of a 'practical guide', a scoping guide and various pamphlets. ⁽³⁾ However, although methodologies such as checklists, matrices and evaluation systems are described in the 'practical guide', none is specifically recommended. In addition, several seminars and workshops for practitioners have been organized, with MfE providing advice in the form of papers at many of them.

The need for guidance to developers (especially of small-scale projects where the retention of consultants is unjustified) on how an EIA report should be prepared has been pressing as regional policy statements and plans and district plans were still in

(1) **Ministry for the Environment**; "Scoping of Environmental Effects: a Guide to Scoping and Public Review Methods in Environmental Assessment"; MfE; Wellington; **1992**.

(2) **Ministry for the Environment**; "Assessment of Environmental Effects"; MfE, Wellington; **1991**.

(3) **Morgan, R. K. and Memon, P. A.** ; "Assessing the Environmental Effects of Major Projects: a Practical Guide"; Publication 4; Environmental Policy and Management Research Center; University of Otago; **1993**.

the very early stages of preparation in mid-1994.

In addition to a hypothetical gold mine assessment presented as an example of how to undertake an EIA (Morgan and Memon, 1993), MfE (1992a) has issued a fictional case study to provide brief model advice to developers in their approach to the assessment of the environmental effects of a tourism development. Such guidance is very important, given that there are no formal requirements for environmental information to be made available to the applicant or for any check to be made on the quality of the EIA report before it is made public.

However, given the discretion that local councils have in specifying EIA requirements, applicants will face severe difficulties until the relevant policies and plans provide the necessary indication as to the appropriate content of EIA reports. Dixon (1993b) noted that, in practice, the lack of EIA expertise among both local authority staff and applicants has caused considerable difficulties and that the Act's requirements, for example in relation to cumulative impact assessment, are not being met.⁽¹⁾

Morgan (1993) reported that applicants needed project-specific advice in undertaking their assessments, and that this was seldom being provided by councils.⁽²⁾

5.10.3.4 Egypt

Law No 4/1994 forced developers, which their projects may have environmental impacts to present an EIA report, that report should be brief and concentrated on significant Environmental points, also the report should be concentrated on the results and recommendations of the study strengthening by summaries of the data collected and references used in the study. The details data and unpublished documents of references used in the assessment may be unavailable and should be presented in a separate appendices.

(1) **Dixon**; “The integration of EIA and planning in New Zealand: changing process and practice”; Journal of Environmental Planning and Management; **1993b**.

(2) **Morgan, R. K.** ; “An evaluation of progress with implementing the environmental assessment requirements of the Resource Management Act”; International Proceeding of Association for Impact Assessment Conference; Shanghai; IAIA; Belhaven; NC; **1993**.

The required contents of an EIA report, which are specified in Law No 4/1994 and its executive regulations can be summarized as follows:

- Executive summary
- Legislative and administrative framework
- Description of the proposed development
- Description of the existing environment
- Significant Environmental impacts
- Alternatives analysis
- mitigation measures
- Monitoring
- Public Participation (Governmental Agencies, People, Non-governmental Agencies (NGO's))
- Non-technical summary
- References
- Appendices
 - list of preparers
 - record the contacts with other agencies and organizations
 - data on unpublished Documents of references

The Competent Administrative Authority (CAA) has the responsibility to make the formal check on the content, form and accuracy of the EIA report prior to its submission to EEAA for review.

5.10.4 Summary of treatment of EIA report preparation in the EIA systems

The performance of the four systems against the EIA report content criterion is shown in Table 5.17. While, in practice, their performance varies substantially within as well as between jurisdictions, the United States and Egypt meet the criterion. United Kingdom ESs must meet the content requirements specified in the Planning Regulations but no checks are made to prevent the release of inadequate EIA reports. The EIA system in New Zealand contains no formal provision as to the content of EIA reports, nor are checks made on their content prior to release.

Comparative review of EIA systems

It is probably no coincidence that neither the United Kingdom, the New Zealand nor Egypt EIA system requires compulsory scoping. Scoping guidelines provide a useful set of criteria against which to judge the coverage of an EIA report and they are frequently utilized in the US for this purpose. However, the checks probably have more to do, with the cooperation which scoping engenders between the proponent and environmental and decision-making authorities. Such checks sometimes take place informally in both the United Kingdom and New Zealand but the major impediment to the release of inadequate EIA reports in both these countries is the lack of experience of many local authorities.

Table 5.17. The treatment of EIA report preparation in the EIA systems

Criterion 6: Must EIA reports meet prescribed content requirements and do checks to prevent the release of inadequate EIA reports exist?

Jurisdiction	Criterion met?	Comment
United States	Yes	Draft EISs are subject to formal checks on required contents prior to publication.
United Kingdom	Content: yes Checks: no	Regulations prescribe content but no formal requirement for proponent to consult or for checks on environmental statement (ES) prior to release.
New Zealand	No	Act provides strong guidance as to content but no checks on adequacy of EIA reports before release exist.
Egypt	Yes	Regulations prescribe content, and EIAs are subject to formal checks firstly by CAA and finally reviewed by EEAA.

More formal checks on EIA quality in the United Kingdom and New Zealand may come either from the adoption of scoping or from the acquisition of experience.

5.11 Criterion 7: EIA report review

5.11.1 Introduction

If there is only one point in an EIA process where formal consultation and participation take place it is during the review of the EIA report. Indeed, in some jurisdictions 'public review' is virtually synonymous with public participation. This is not to say that all jurisdictions provide for public participation once the EIA report has been prepared. The public review of EIA reports provides an invaluable check on their quality, especially where such checks have not been applied earlier in the EIA process. This section advances a set of evaluation criteria for the treatment of the review of EIA reports in EIA systems. These criteria are then employed in the analysis of EIA report review procedures in the United States, the United Kingdom, New Zealand and Egypt

5.11.2 Review of EIA reports

The formal review of EIA reports is handled differently in different EIA systems. In the US model, for example, the draft environmental impact statement (EIS) is used as the basis for consultation and participation and is duly succeeded by a final EIS. The power to require a supplementary EIS also exists. The Environmental Protection Agency reviews all EISs and publishes its opinions about both the adequacy of the EIS and the environmental impact of the proposed action using a rather general set of criteria (below). This 'EIA report-review-further EIA report' pattern has been emulated in other EIA systems where the comments by consultees and the public are published as part of the review process.

In yet other systems, no formal provision exists for the proponent to respond to public comment in this way (e.g. in the United Kingdom).

Clearly, while the treatment of EIA review varies in different jurisdictions, the fundamental requirement of this stage in the EIA process is that those bodies with responsibilities and expertise, and the public, should be able to comment upon the EIA report and the action it describes. This stage exists in almost every EIA process. Such comments should, of course, be considered by the decisionmaking /environmental authorities before any decision on the action is made.

Comparative review of EIA systems

One of the most difficult areas in the review of EIA reports, as in the preparation of EIA reports, is ensuring objectivity since the organization charged with responsibility for formal review (if any) may have a vested interest in the decision about the proposal. There are various methods of ensuring objectivity, including the use of review criteria, the accreditation of EIA report review consultants, the setting up of an independent review body, the publication of the results of the review and the involvement of consultees and the public. There is probably no substitute for utilizing the services of skilled professionals in the review process, whether within the decision-making/environmental authorities, within retained consultancies, or within consultee organizations, including public interest groups.

The existence of criteria can provide a useful focus for the review of EIA reports. Action-specific scoping guidelines, where they are prepared, provide a valuable checklist for review. Another checklist is normally provided by the set of statutory requirements for EIA reports contained in legislation or regulations. Very few jurisdictions, however, have as yet published formal criteria to assist in the review of EIA reports. Government-commissioned advice containing review criteria has, however, been issued in New Zealand and has been promised in the United Kingdom (below).

The appointment of an independent panel selected from acknowledged experts in the field to review EIA reports has two advantages. First, it should provide a means of reducing any bias in the relevant authority's decision on the action. Second, it should ensure that the quality of EIA reports improves over time, since its opinions, whether adverse or positive, should be both public and influential.

In order that a review of the EIA report may be seen to have taken place, the outcome should be made public. This is most clearly seen to be the case where a formal review is published. In addition, the comments arising from reviews of the EIA report by the consultees and by the public (correspondence, notes of telephone conversations, minutes of meetings, etc.) should be placed in the public domain (either by publication - with or without editing - or by allowing access to the decision-making authority's files).

Comparative review of EIA systems

As at the other stages of the EIA process, the existence of published advice on the procedures employed in either formal or informal EIA review and on the methods which may be used in reviewing EIA reports is invaluable not only to those engaged in EIA review (the decision-making and environmental authorities, consultees and the public) but to those in EIA report preparation. Such guidance might include a checklist or a set of review criteria .

It is, of course, important that the review stage of the EIA process is carried out effectively and efficiently. In other words, the EIA report should be thoroughly reviewed by an appropriate range of participants and further information should be provided without undue demands upon resources or time. Balances are needed to ensure that requests for further information are both coordinated, reasonable and not deliberately used as a delaying tactic. In the following, the criteria used in evaluating the treatment of EIA report review in EIA systems are summarized in Table 5.18.

Table 5.18. Evaluation criteria for the review of EIA reports

Must EIA reports be publicly reviewed and the proponent respond to the points raised?
Must a review of the EIA report take place?
Do checks on the objectivity of the EIA report review exist?
Do review criteria to determine EIA report adequacy exist?
Does an independent review body with appropriate expertise exist?
Must the findings of the EIA report review be published?
Can the proponent be asked for more information following review?
Must a draft and final EIA report be prepared?
Does published guidance on EIA review procedures and methods exist?
Is consultation and participation required in EIA report review?
Is consultation and participation required where further information is submitted?
Is there a right of appeal against review decisions?
Does EIA report review function effectively and efficiently?

5.11.2.1 United States of America

There are comprehensive arrangements under the National Environmental Policy Act for the review of draft EISs. The lead agency must circulate the draft EIS for review to prescribed agencies. Not only must agencies with any jurisdiction over, or special expertise with regard to, the proposal comment but other federal, state, tribal and local agencies and the public must also be invited to comment. Generally, 45 days are allowed for comment on a draft EIS.

It is customary for consultees and the public to check the draft EIS against the scoping report (which is often summarised in the EIS). In addition, the Environmental Protection Agency (EPA) employs review criteria. EPA also conducts detailed reviews of final EISs, especially where significant issues are raised at the draft EIS stage. For projects that it rates as environmentally unsatisfactory, EPA may refer the issue to the Council on Environmental Quality (CEQ). In addition, EPA will informally review environmental assessments that it receives if so requested by a lead agency. It also informally reviews 'draft' draft and final EISs if requested.

There is no formal general guidance on EIS review but EPA (1984) has issued policy guidance concerning the quality of the draft EIS and the acceptability of the proposed action. There have been some criticisms of lack of consistency in review findings from the different EPA regional offices but EPA records an improvement in EIS quality between its published review of the draft and its unpublished review of the final document.

Generally, although there have been some criticisms of the time taken for EIS review, the process seems to work reasonably efficiently and there is no doubt that it is effective in ensuring that the concerns of the various relevant agencies and, perhaps to a lesser extent, the public are met.

5.11.2.2 United Kingdom

There is a requirement for the environmental statement (ES) to be made available for consultative and public review in the United Kingdom, but not for the preparation of any formal review report by the local planning authority (LPA) as a separate stage in the EIA process. The LPA review of the EIA report is normally in two stages: an early

Comparative review of EIA systems

evaluation of the environmental statement (ES) to see whether more information should be requested and a fuller review once the results of consultation and participation have been received. This latter stage is normally completed immediately prior to decision making. The responses from consultees and public participants, together with the LPA's own review, are usually open to public inspection, thus ensuring that some element of objectivity is seen to apply.

LPAs review ESs without the benefit of formal review criteria or of any specialized review body. They are able to use Schedule 3 to the Planning Regulations and the list in the official Guide to the Procedures (Department of the Environment (DOE) 1989) as checklists. The LPA may commission consultants to review the ES but there is no provision to charge the costs to the developer. There is, as mentioned before, some voluntary accreditation of EIA consultants. The Institute of Environmental Assessment is not only involved in this process but provides an ES review service to LPAs .

As a result of its own review and the responses from statutory consultees and the public, LPAs may request further information (for example, on how certain objections are to be overcome). However, DOE has indicated that this should be the exception, not the rule: 'the use of these powers should not normally be necessary, especially if the parties have worked together during the preparation of the environmental statement'.⁽¹⁾ The Planning Regulations impose a time limit upon LPAs to process the review phase of the EIA process, and there is no mechanism for 'stopping the clock' while further information (including any corrections) is provided. Such information must be made available to the consultees and the public for further comment.

Should proponents choose to do so, they can decline to provide the information requested and subsequently appeal to the Secretary of State for non-determination of the planning application. However, this is frequently a lengthy process. There is no provision for the proponent to prepare a formal response to comments, for example, in the form of a final EIA report.

(1) **Department of the Environment;** "Environmental Assessment: a Guide to the Procedures"; HMSO, London; 1989.

There is currently less guidance about how LPAs should review ESs than there is about how developers should prepare them, but advice on the review of ESs is to be published. ⁽¹⁾ A planning application accompanied by an ES must be advertised and copies of the ES must be made available to the public (for inspection and for sale) and to a set of statutory consultees. If further information is required by the LPA, this too must be made available for consultation and participation. ⁽²⁾

There is some evidence that the quality of ESs may be improving. Lee and Brown (1992) reported that the quality of samples of the approximately 300 ESs now being prepared annually varied depending on the regulations under which they are prepared, the length of the ES, the size of the project, the experience of the developer and whether a consultant was used. About 40 per cent of 1990/91 ESs were still considered unsatisfactory, however. While subsequent work indicates that some further improvement has probably occurred, there remains considerable scope for an increase in ES quality in the United Kingdom. ⁽³⁾

5.11.2.3 New Zealand

The review stage in the New Zealand EIA process serves two purposes. *The first* is to review the information provided by the developer to determine its adequacy and to permit the decision on the action to proceed. *The second* is to act as a second screening stage, in which case further information is usually requested from the developer. In effect, this provides for a two-tier EIA system in which the initial EIA report is used to determine whether the project is likely to have significant effects. If the developer can mitigate the effects of the project so that residuals are only minor, and to the satisfaction of those affected, the local authorities need not notify the proposal and the further EIA information requirements will not be triggered.

The first step is to review the submitted EIA report to determine whether more information is required. If it is, the developer must provide it. The New Zealand Resource Management Act imposes time limits upon councils to process applications once they have sufficient information.

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- (1) **Her Majesty's Government;** "This Common Inheritance: Britain's Environmental Strategy"; HMSO, London; **1990**.
 - (2) **Department of the Environment;** "Guide on Preparing Environmental Statement for Planning Projects"; Consultation Draft; DOE; London; **1994b**.
 - (3) **Lee, N. and Brown, D. ;** "Quality control in environmental assessment"; Project Appraisal; **1992**.

Having reviewed the initial EIA report and any further information, the local authority then determines whether the development is likely to have significant effects or not (in consultation with the people affected by the proposal). If the effects are judged to be significant, the application will be notified publicly and certain consultees will be informed. In this case the local authority may request further information on alternatives and on the consultation undertaken by the applicant (if this has not already been provided by the developer), and/or commission an independent review of the EIA report .

EIA materials are made available to the public for inspection. All submissions by organizations and by members of the public must be copied to the developer and the council has the power to ask the developer to explain how these are to be dealt with. The Act provides that, if submissions requesting a public hearing at which opinions and objections can be expressed are received, one should be held by the council before any decision is reached. (There are also provisions for prehearing meetings to resolve conflicts.) The Parliamentary Commissioner for the Environment retains the right to intervene in EIA cases, but does not possess the resources for such intervention to be other than exceptional.

All the costs incurred by the local authority (LA) in dealing with the application (including staff and hearing costs) can be recouped from the applicant. The ability in New Zealand to recruit consultants to review EIA reports without time or financial costs to the LA is clearly likely to help in ensuring that the review is adequate. This power is supported by a provision for further information to be required of the developer at any time prior to the hearing .There is some advice on review procedures.⁽¹⁾

Morgan and Memon (1993) have suggested that, rather than relying solely on the checklist provided by the Fourth Schedule to the Resource Management Act, local authorities should include the points listed in Table 5.19, in evaluating the proponent's EIA report.⁽²⁾

(1) **Ministry for the Environment**; “Scoping of Environmental Effects: a Guide to Scoping and Public Review Methods in Environmental Assessment”; MfE; Wellington; **1992**.

(2) **Morgan, R. K. and Memon, P. A.** ; “Assessing the Environmental Effects of Major Projects: a Practical Guide”; Publication 4; Environmental Policy and Management Research Center; University of Otago; **1993**.

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Table 5.19. Checklist for evaluating New Zealand EIA reports ⁽¹⁾

1. If a brief or framework for the EIA was agreed upon by the proponents and the consent granting authority, has the impact assessment team followed the agreed format in a satisfactory way?
2. Did the impact assessors consult the local communities and have they, in their study, shown evidence of having taken note of the community attitudes and feelings?
3. Is the nature of the proposed project clearly described? In particular, are the key processes likely to interact with the environment identified and explained?
4. Is there evidence of a rational, coordinated approach to reviewing the potential effects of the proposed project on the environment?
5. Are there obvious gaps in the coverage of the study? Are social impacts included? Are long term as well as short term effects considered? Are indirect effects as well as direct effects considered?
6. Have the assessors made predictions about possible impacts? Are the predictions based on sound methods and data? Do they indicate the probability of an impact occurring, and its likely severity or magnitude? Do they identify beneficial effects as well as adverse effects?
7. To what extent have cumulative impacts been addressed? [that is potential impacts from the proposed project, which might be small in themselves, but which might add to existing impacts from activities already operating in the local area and thereby bring about unacceptable environmental consequences].
8. Have the impact assessors examined environmental impacts that might arise as a result of abnormal operating conditions (such as the implications of accidental fires, or particular natural hazards)?
9. Have the impact assessors handled the information about predictions in a reasonably balanced and objective manner? Do they attempt to impose their own assessment of the social (or political) significance of the possible effects?
10. What steps have been taken to determine the views of the affected communities (at the local, regional or national scale) concerning the social significance of the predicted impacts?
11. What suggestions are made for mitigating adverse predicted effects? Have the predicted impacts been clearly stated, separate from the proposed mitigation measures? Have the consequences for the environment, of implementing the mitigation measures, been clearly stated?
12. What form of monitoring program is proposed, and are key indicator variables identified for future monitoring?
13. Has the impact assessment team produced a summary document outlining the potential effects, both beneficial and adverse, on the environment? Can members of the local community understand the information? Is the material presented in a neutral way, without apparent favor to the proposal? Is technical information easily available to those people or organizations wishing to follow up on specific points?

(1) **Morgan, R. K. and Memon, P. A.** ; “Assessing the Environmental Effects of Major Projects: a Practical Guide”; Publication 4; Environmental Policy and Management Research Center; University of Otago; **1993**.

In practice, it appears that local authorities are suffering from a distinct lack of expertise in reviewing EIA reports and that, unsurprisingly, practice is very variable, with marked problems in meeting deadlines at regional council level. ⁽¹⁾

Some district councils appear to be depending on the professionalism of the applicant's consultants for quality assurance, while others may be relying on public hearings for evaluation. There appears to be growing use of pre-hearing meetings and combined hearings between regional and district councils into all the consents required. Perhaps because of the risk of antagonizing developers (who must pay for them), few independent reviews of EIA reports have been commissioned. There remains a clear need for the development of review methods and criteria, to be utilized on receipt of the EIA report, to improve practice. ⁽²⁾

5.11.2.4 Egypt

There are comprehensive arrangements under Law No 4/1994 for the review of EIAs. The Competent Administrative Authority has the responsibility to receive the EIA study from the developer and checks whether the selected category/list (white-gray-black) is correct and whether the information submitted complies with the required information. The CAA reviews the documents and formally submits the applicant's documents to the EEAA for review and evaluation.

The EEAA evaluates the documents and submits its opinions and any recommendations to the CAA within 60 days of the EEAA's official receipt of the completed documents, and in according to the Law, the CAA should notifies the developer with the result which can be either:

- An approval of the project including possible measures to be taken to ensure the protection of the environment.
- Disapproval of the project.
- A formal request to complete a scoped EIA study for certain impacts

(1) **Morgan, R. K.** ; “An evaluation of progress with implementing the environmental assessment requirements of the Resource Management Act”; International Proceeding of Association for Impact Assessment Conference; Shanghai; IAIA; Belhaven; NC; **1993**.

(2) **Dixon**; “The integration of EIA and planning in New Zealand: changing process and practice”; Journal of Environmental Planning and Management; **1993b**.

or processes of the project. In this case the developer must submit a completed study to the CAA for checking information included complies with the required information, and reviewing by EEAA (it takes another 60 days). In some cases this circulation may be repeated 3 or 4 times in the same project so as to the project takes about 1.5:2.0 years to obtain the approval.

In according to the Law, the CAA should notifies the developer with the result which can be either: An approval of the project including possible measures to be taken to ensure the protection of the environment or disapproval of the project.

The developer can appeal the decision to the Permanent Appeals Committee.

In accordance to the Law 4/1994 both consultation and participation take place in reviewing EIA studies, but in practice the consultation have been limited to the registered consultees in EEAA, and there is no public involvement, and no publication for the findings of the reviewed EIA reports.

Finally, the reviewing process in Egypt takes a lot of time (60 days in each review and some projects may need more than one review).

5.11.3 Summary of the treatment of EIA report review

United Kingdom does not fully meet the EIA report review criterion, as shown in Table 5.20. Even in the United Kingdom it is not the public review of EIA reports which is missing but the duty on the proponent to respond formally to the points raised. Also Egypt does not fully meet the EIA report review criterion because of the very limited consultancy involvement and no public participation in the review of EIA reports.

In practice, the proponent usually provides further information if it is requested by the local planning authority (and such information must be made available for a further period of consultation and participation).

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Table 5.20. The treatment of EIA report review in the EIA systems

Criterion 7: Must EIA reports be publicly reviewed and the proponents respond to the points raised?

Jurisdiction	Criterion met?	Comment
United States	Yes	Lead agency must respond to agency and public comments on published draft EIS in final EIS.
United Kingdom	Review: Yes Response: No	LPA may request further information and proponents usually provide it. Proponents under no duty to respond to comments.
New Zealand	Yes	Local authority power to commission independent review of public EIA report at developer's expense and to demand more information for notified projects
Egypt	Partially	EEAA reviews the EIA reports with a very limited consultancy involvement and no public participation

5.12 Criterion 8: Decision making

5.12.1 Introduction

Decision making takes place throughout the EIA process. Many decisions are made by the proponent (e.g. choices between various alternatives). Others may be made jointly by the proponent and the decision-making and environmental authorities (e.g. screening and scoping decisions). However, the main decision in the EIA process, whether or not to allow the proposal to proceed is always taken in the public domain. While the decision-making body may have given previous indications of the likely outcome of this decision, it is normally taken by a government agency, following consultation and public participation. The typical decision taken at this stage in the EIA process is not usually a choice between alternatives, but a seemingly simpler choice between authorization and refusal.

This section presents a discussion of the decision-making stage in the EIA process. It presents a set of criteria for the evaluation of decision making in EIA Systems. These criteria are then used to assist in the review of decision-making procedures and practice in the United States, the United Kingdom, New Zealand and Egypt.

5.12.2 Making decisions about actions

There is considerable literature about decision-making methods and their use in EIA.' While the use of quantified decision-making methods has been roundly criticized on a number of occasions, much effort continues to be devoted to them. One reason for this, as Bisset (1988) stated, is that such methods are often devised and used by engineers and others whose training emphasizes the use of quantified methods. Another:

is the desire of many decision makers to be faced with an easy decision, especially when comparing a complex variety of impacts from a number of alternatives. ⁽¹⁾

(1) **Bisset, R.** ; “Developments in EIA methods. In Wathern P (ed.) Environmental Impact Assessment: Theory and Practice”; Unwin Hyman, London; **1988**.

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Much of the literature on quantified decision making (and especially about subjective weighting) has indeed focused on the choice between alternative proposals, rather than on the more usual choice about whether to approve or refuse a proposal.

In practice, decisions on proposals subject to EIA, whether they are yes/no decisions or involve choice between alternatives are frequently made incrementally and often in the cyclical manner characteristic of the EIA process.⁽¹⁾

Thus, it may become apparent at the design stage of the process that certain impacts are likely to be unacceptable, leading to withdrawal or to redesign. Equally, the weight and force of objections raised to the proposal during review may lead to the proponent modifying the action further. Decision making is seldom straightforward and is dependent not only upon the merits of the proposal but on political circumstances. The environmental impact of the proposal will usually be only one of the factors to be considered by the decision-makers.

The making of any decision will involve a large number of trade-offs in the information base: between simplification and the complexity; between the urgency of the decision and the need for further information; between facts and values; between forecasts and evaluation; and between certainty and uncertainty. The people making a decision on a proposal involving EIA will frequently be elected central, state or local government politicians. They will seldom have time to read the EIA report and other EIA documentation and will therefore be dependent upon their officials for some form of summary evaluation of the earlier stages of the EIA process.

This evaluation, which will often be very brief, will typically summarize the objectives of the proposal, any alternative to it, its principal positive and negative impacts and their significance, the mitigation measures proposed, the principal representations about the proposal and how objections have been met. Compatibility with relevant policies is usually discussed but formal decision-making methods are seldom employed. The evaluation is bound to subsume some element of decision making and may well contain recommendations.

(1) **Lawrence, D. P.** ; “Designing and adopting the EIA Planning process”; The Environmental Professional; 1994.

However, while the use of quantified decision-making methods may be helpful in reaching a consensus among similarly trained professionals, their use in public decision making is regarded with suspicion and is discouraged by politicians. The furthest most politically accountable decision-makers would wish formal evaluation to proceed is the preparation of a summary set of quantitative forecast impacts, together with a separate set of adjectival indications of their significance.

Other, non-environmental objectives and political factors may well outweigh the findings of the 'technical' evaluation in the interactions between elected or appointed representatives from which the decision emerges. These are likely to be trade-offs between environmental and other factors. It is likely, given the positive benefits that most proposals confer (e.g. employment), that the decision-makers will seek to approve the action, unless there are politically overwhelming reasons to refuse it, but to negotiate increases in benefits and further mitigation of its negative impacts.

The original intention of EIA was that environmental considerations should be given greater weight in the design of proposals and in the decisions taken upon them. EIA was intended to constrain, but not to control discussions. Accordingly, most jurisdictions forbid the taking of a decision on the action until an EIA report has been prepared and subjected to review. This is a fundamental requirement of any EIA system.

If the decision on the action is to reflect meaningfully the EIA process, it should be possible to require modifications, to impose conditions or, in the last analysis, to refuse permission for the proposal to proceed. Clearly, the power of refusal is very important in ensuring that the aims of EIA are met. Refusal is the ultimate sanction on the proponent. This discretionary decision (i.e. where the decision-maker possesses the discretion to refuse, rather than the power only to set performance conditions which must be met) usually falls to the authority responsible for land use control.⁽¹⁾

Other bodies will obviously also be involved in decision making, but they do not usually possess the power of refusal (for example, air pollution control authorities must grant permits provided emission and/or ambient air quality standards are met).

(1) Wood, C. M. ; *“Planning Pollution Prevention”*; Heinemann Newnes; Oxford; 1989.

Any conditions imposed upon the approval should be phrased to take account of: (a) the forecasts made in the EIA report (to help to ensure that the commitments made in that document are implemented) and (b) the uncertainty in the forecasts upon which the decision is based (to ensure that the conditions are realistic).

For the decision on the proposal to be seen to be fair it is obviously preferable that it should, in general, be made by a body other than the proponent. Further, any summary evaluation prepared for the decision-makers by their advisers (e.g. the British report to the local authority planning committee) should be made public.

Without such a check, it would be too easy to meet procedural EIA requirements relating to preparation of the EIA report and review without meeting the substantive obligation to consider the outcome of these procedures in reaching a decision. An additional, and even more important check, is that the decision, the reasons for it and the conditions attached to it, should be published. It is obviously desirable, if the extent to which the EIA process is actually taken into account in decision making is to be clear, that their reasons for making the decision include an explanation of how the EIA report and review influenced the decision. This is provided for in many EIA systems (for example, in the United States procedures).

As at other stages of the EIA process, advice on the factors to be considered by decision-makers in reaching their decision is a valuable way of ensuring that procedures are complied with and that environmental factors are given appropriate weight. Such advice could provide guidance on whether or not certain impacts were likely to be environmentally acceptable. For example, a jurisdiction might well indicate that noise levels above a certain level would not be tolerated and that the proposal should either be modified or refused.

Some jurisdictions allow for consultation and participation once the evaluation has been prepared for the decision-makers but before any decision has been reached. This is clearly not possible where no separation of the steps in decision making takes place. However, the provision of a public right of appeal against the decision can increase public confidence in the EIA process. Such an appeal could either be administrative (e.g. to a tribunal, as in New Zealand) or to the courts, as in the United States.

Table 5.21 Evaluation criteria for decision making

Must the findings of the EIA report and the review be a central determinant of the decision on the action?

- | |
|--|
| Must the decision be postponed until the EIA report has been prepared and reviewed?
Can permission be refused, conditions be imposed or modifications be demanded at the decision stage?
Is the decision made by a body other than the proponent?
Is any summary evaluation prepared prior to decision making made public?
Are the decisions, the reasons for it, and the conditions attached published?
Must these reasons include an explanation of how the EIA report and review influenced the decision?
Does published guidance on the factors to be considered in the decision exist?
Is consultation and participation required in decision making?
Is there a right of appeal against decisions?
Does decision making function effectively and efficiently? |
|--|

The possibility of a proponent eluding these various checks exists (though the more there are, the more difficult evasion becomes). It is, therefore, important that practice in decision making reflects the results of the EIA report and review in practice, i.e. that it is effective. If practice does not appear to be influenced by the EIA process, the implication must be that additional checks and balances are required, even though this will probably conflict with the criterion of efficiency. The various criteria for the evaluation of decision making are summarized in Table 5.21. These criteria are employed in the review of decision making in each of the four EIA systems below.

The chance of a proponent eluding these various checks stands (even if the more there are, the more difficult evasion becomes). It is, therefore, important that practice in decision making reflects the results of the EIA report and review in practice, i.e. that it is effective. If practice does not appear to be influenced by the EIA process, the implication must be that additional checks and balances are required, even though this will probably conflict with the criterion of efficiency. The different kinds for the evaluation of decision making are summarized in Table 5.21. These issues are used in the checking of decision making in each of the four EIA systems under.

5.12.2.1 United States of America

No federal decision on a proposed action can be made until 30 days after the Environmental Protection Agency (EPA) has published a notice that the final environmental impact statement (EIS) has been filed. This is an important provision but perhaps symptomatic of the National Environmental Policy Act (NEPA), which contains no absolute requirement to protect the environment. The lead agency has the power to refuse consent on the basis of the EIS (i.e. to choose the no action alternative) but no other agency can override it. It is likely only to refuse consent in responding to an application for a permit or for funding. NEPA does require that federal agencies disclose the environmental effects of their actions and identify alternatives and mitigation measures. Agencies may not select an alternative unless it has been discussed and evaluated in the final EIS, but they are not required to adopt the environmentally preferred alternative.

While the lead agency, in its role as proponent, will clearly wish to implement the proposed action, other agencies may, and do, voice objections. These may lead to the abandonment of the proposal or, in rare cases, to a referral to the Council on Environmental Quality (CEQ). The referral process is intended to resolve interagency disagreements. Although a CEQ decision is not binding, agencies usually abide by its recommendations and disagreements have generally been effectively resolved by the referral process.⁽¹⁾

The threat of referral is often sufficient to bring environmental concessions from the lead agency, since CEQ may submit its recommendation to the President for action, elevating the issue to a level that would embarrass a lead agency. This referral process, based upon the impacts of the action, is thus a substantive element in the EIA process that has been criticized as being essentially procedural.

At the time of its decision, following the preparation of the final EIS, the federal agency must prepare a record of decision (ROD). This is a written public record which was introduced only in 1978 with the intention of ensuring that the EIS actually influences agency decisions. It must contain:

(1) **Rand, S. D. and Tawater, M. S.** ; “Environmental Referral and the Council on Environmental Quality”; Environmental Law Institute; Washington, DC; 1986.

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- a statement explaining the decision
- an explanation of the alternatives considered and those that are environmentally preferable
- the social, economic and environmental factors considered by the agency in making its decision
- an explanation of the mitigation measures adopted and, if all practicable mitigation measures were not adopted, an explanation of why not
- a summary of the monitoring and enforcement program which must be adopted to ensure that any mitigation measures are implemented .

Agencies, in making their decisions, must balance the relevant environmental and other factors, as in other jurisdictions. In practice, the EIS frequently influences the decision, though often not as a direct result of the information it contains. As Hyman and Stiftel (1988) put it:

while decision makers generally have not turned to EISs in the expected ways - for specific data, evidence or policy implications -[EISs have] succeeded in jarring the consciousness of many decision makers and administrators.⁽¹⁾

NEPA, the CEQ regulations and the agency's own regulations provide the necessary guidance and the environmental review procedure leading to the decision is open to appeal in the courts. However, providing the appropriate procedures have been followed, to ensure that the agency has genuinely considered the environmental consequences of the action, including the making public of the final FIS and the ROD, the courts have not attempted to contradict agency decisions.⁽²⁾

5.12.2.2 United Kingdom

The local planning authority (LPA) is required to have regard to the 'environmental information' (the environmental statement ES - and the various submissions by statutory consultees and the public) in making its decision, which cannot be reached before this environmental information has been considered. As with any other

(1) **Hyman, E. L. and Stiftel, B.** ; “Combining Facts and values in Environmental Impact Assessment: Theories and Techniques”; Westview Press; Boulder, CO; **1988**.

(2) **Mandelker, D. R.** ; “NEPA Law and Litigation”; Clark Boardman Callaghan; Deerfield; IL (2nd edition); **1993b**.

planning application, the LPA may refuse permission or grant it with or without conditions. In reaching this decision, the LPA attempts to weigh all the planning advantages and disadvantages: the environmental impacts of the proposal are only one factor in the decision.

Planning permission is the only genuinely discretionary consent in the United Kingdom: other consents relating to, for example, pollution control are virtually always granted, providing the appropriate conditions are met.⁽¹⁾

LPAs can determine their own applications (a very small proportion of ESs) but must use the same procedures as for ESs prepared by external proponents.

It is normal practice for planning officers to prepare a report (to the planning committee) on applications to be determined by the LPA. This report should summarize the salient parts of the EIA process, including the ES, the comments received during consultation and participation, and the officers' own evaluation. This evaluation report is a public document.

The planning decision, and the conditions attached to it, are published in the planning register that every LPA is required to maintain. If the application is refused, reasons must be given. If, however, it is approved, there is no requirement to provide reasons. While there is no formal specification of what areas the reasons for refusal should cover, it would be expected that the results of the EIA process would be relevant and should therefore be detailed. It is mandatory that the LPA states in writing that the environmental information has been taken into account in reaching the decision.⁽²⁾

Very little guidance on decision making exists in the United Kingdom. Basically, LPAs are required to make development control decisions in accord with the development plan 'unless material considerations indicate otherwise'.⁽³⁾

In addition, the LPA is 'of course required to have regard to the environmental statement, as well as to other material considerations'.⁽¹⁾ Nevertheless, the adherence

(1) Wood, C. M. ; “Planning Pollution Prevention”; Heinemann Newnes; Oxford; 1989.

(2) Department of the Environment; “Guide on Preparing Environmental Statement for Planning Projects”; Consultation Draft; DOE; London; 1994b.

(3) Department of the Environment; “Development Plans and Regional Planning Guidance. Planning Policy Guidance (PPG)12”; HMSO, London; 1992.

of new sources to pollution standards is a relevant matter for LPAs to consider in reaching decisions, as are other criteria of environmental acceptability. Although failure to meet such criteria would be a valid reason for refusal, there is no prohibition on the grant of planning permission if the EIA process reveals that the proposal does not meet them.

There is no consultation and participation requirement during the decision-making process, though members of the public are often permitted to address the LPA elected representatives while the decision is being discussed. The public has no right of administrative appeal against the decision, unlike the developer. Planning appeals are normally heard at public inquiries conducted by the Planning Inspectorate. Inspectors frequently make recommendations about decisions to the Secretary of State for the Environment, usually based on similar criteria to those employed by the LPA. While such appeal decisions provide important precedents, they do not have legal force (there are restricted rights of further appeal to the courts).

It may be that some LPAs regard environmental assessment (EA) as controversial and prefer to leave final decisions on applications accompanied by ESs to the Secretaries of State on appeal. However, there is little empirical evidence about the weight given to EA in decision making, though it is known that some decisions have had little regard to EA findings. There is no reliable evidence to date that public inquiry findings have been influenced by EA practice, or vice versa. It must be concluded that, while the environmental information is a material consideration in planning decisions, it is not yet a central determinant in many of them.

5.12.2.3 New Zealand

Environmental impact assessment should be central to decision making in New Zealand because the Resource Management Act 1991 requires both plans and consent decisions to avoid, remedy or mitigate any adverse effects of activities on the environment. Section 104 of the Act specifically states that the consent authority must have regard to the provisions of relevant policies and plans and of any EIA report

(1) **Department of the Environment**; *“Environmental Assessment: a Guide to the Procedures”*; HMSO, London; **1989**.

when considering an application for a resource consent. The EIA report (and the various submissions made) is intended to be central to the decisions since 'the consent authority shall have regard to any actual and potential effects of allowing the activity'.

It is customary for the local council members to make the decision, on the basis of an evaluation report and recommendations prepared by officers. The decision must be taken within 15 working days of the hearing, if one is held. The applicant, or any person who has made a written submission about the application, can appeal against the consent authority's decision to the Planning Tribunal. The Tribunal has not hesitated to comment on the deficiencies of the documentation furnished in the past and it is expected that it will continue to provide a check on the quality of EIA reports in the future.

The results of appeal decisions by the Planning Tribunal are likely to prove influential in the development of practice, as a result of specific guidance furnished by them. Rather as in the United Kingdom, there are powers for the Minister for the Environment to call in applications of national significance for decision in New Zealand. However, unlike in the United Kingdom, it is intended that these powers should be employed only exceptionally.

In practice, decision making does not appear to be meeting the aims of the Act. Dixon (1993b) pointed out that very few checks exist on whether the EIA is actually considered when the decision is made and that there is a considerable danger of the parochialism of past practices continuing under the far more sophisticated Resource Management Act.⁽¹⁾ There is no need, in the New Zealand EIA system, to produce the equivalent of a US record of decision. Morgan (1993) stated that elected politicians in regional and territorial authorities tend not to be aware of (or sympathetic to) the basic principles of the new Act and thus not to appreciate that EIA is intended to influence decision making.⁽²⁾

(1) **Dixon;** "The integration of EIA and planning in New Zealand: changing process and practice"; Journal of Environmental Planning and Management; **1993b**.

(2) **Morgan, R. K. ;** "An evaluation of progress with implementing the environmental assessment requirements of the Resource Management Act"; International Proceeding of Association for Impact Assessment Conference; Shanghai; IAIA; Belhaven; NC; **1993**.

5.12.2.4 Egypt

According to the Law of Environment, no decision on a proposed action can be made until 60 days after the Egyptian Environmental Affairs Agency (EEAA) has received the EIA report officially, and the proposed action couldn't be implemented without approval. The Competent Authorities have the power to refuse the proposal on the basis of the EIA. The right of appeal against the decision is permitted to the proponent.

There is no published guidance on the factors to be considered in the decision and no summary evaluation prepared prior to decision making and no publishing to the decision or reasons for it.

In practice, many projects were implemented before they have approval on their EIA study. In a sample of 300 cases of EIA study for touristic projects presented to EEAA and other Competent Authorities (from 1995 to 1999), In nearly 36 cases approved (some of them takes about 1.5 : 2 years to obtain the approval) and the others still under reviewing, while virtually in nearly 250 cases have been implemented without approval.⁽¹⁾

According to the Law, governmental agencies like persons required to present EIA for their projects. In practice, they are not required to adopt the environmentally preferred alternative (if alternatives exist) and many of them (may be all of them) implemented their projects without having any approval on the EIA study (if they already have an EIA study). The national projects currently implemented (Toshka and New Valley – North west Suze Gulf – East PortSaid – South Egypt Development ...etc) didn't make EIA study and didn't choose the environmentally preferred alternative.

5.12.3 Summary of decision making in the EIA systems

Appropriately, the decision about whether to give a 'yes' or a 'no' to the EIA systems according to whether or not they meet the decision-making criterion is a delicate one. All the four systems could have been stated to meet it partially.

(1) **Touristic Development Agency and EEAA; Oral discussions with Managers of Environmental Management and Monitoring; 2000.**

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The criterion states that the EIA report and the comments upon it must be 'a' (not 'the') central determinant of the decision. EIA was never intended to provide the sole basis for decision making . However, to meet the criterion, an EIA system needs to demonstrate not only that the decision should be influenced by the EIA but that, in practice, the EIA report actually influences the decision and is not just 'boiler-plate' paper. (Table 5.22)

The United States of America, the United Kingdom, New Zealand and Egypt use differing mechanisms for ensuring that the EIA is considered. In practice, however, it is still common practice for decision-makers to circumvent these EIA mechanisms where this is convenient.

Table 5.22. The treatment of decision making in the EIA systems

Criterion 8: Must the findings of the EIA report and the review be a central determinant of the decision on the action?

Jurisdiction	Criterion met?	Comment
United States	No	Explanation of decision and disclosure of environmental effects mandatory. in practice, EIS often influences decision.
United Kingdom	No	Environmental information is a material consideration but not necessarily a central determinant. Practice varies.
New Zealand	No	Act makes EIA central to decision but, in practice, EIA is often not given appropriate weight.
Egypt	No	Law makes EIA central to decision but, in practice EIA takes too long time, and governmental agencies overpass it

The trick in the four jurisdictions is to ensure that EIA remains, or becomes, a central determinant of decisions in practice as well as in theory.

5.13 Criterion 9: Monitoring and auditing of actions

5.13.1 Introduction

There are numerous definitions of monitoring and auditing in EIA. This section is concerned with three types of monitoring and auditing. It presents a set of criteria for analyzing the treatment of action monitoring in EIA systems. These criteria are then used to assist in the review of the monitoring of actions in the EIA systems in the United States, the United Kingdom, New Zealand and Egypt.

5.13.2 Monitoring and auditing of action impacts

As mentioned before, the EIA report is no more than a record, or 'photograph' of the forecast impacts of the action as it is designed at a particular point in time. Further design work will take place once approval of the action has been granted (again on the basis of information available at a particular point in time) and this may well lead to modifications. Further, since even the best design may need to be altered to meet unexpected problems encountered during construction, further modifications may well take place during the process of implementing the action. With the best will in the world, therefore, the implemented action may well differ from that envisaged when the EIA report was prepared. If the proponent's intentions fall short of this, a significant 'implementation gap' may occur.

The necessity of maintaining surveillance of, and control over, the implementation of actions has tended to be a somewhat neglected area in EIA. Inadequate checks have been applied in many jurisdictions to ensure that developers negotiated any necessary changes with the appropriate authorities and thus that implementation did not result in significant unanticipated impacts. ⁽¹⁾

'Implementation monitoring' involves checking that the action (normally a project) has been implemented (constructed) in accordance with the approval, that mitigation measures (e.g. sound-proofing) correspond with those required and that conditions imposed upon the action (e.g. noise emission limits) have been met. Such checking

(1) **Sadler, B.** ; "The evaluation of assessment: post-EIS research and process development. In Wathern, P. (ed.) Environmental Impact Assessment: Theory and Practice"; Unwin Hyman; London; **1988**.

may involve physical inspection (e.g. of building location, wall construction or waste storage/disposal) or measurement (e.g. of noise emissions) using various types of instrument, together with the application of professional judgement. This type of monitoring can be carried out either by the decision-making or environmental authorities or by the proponent (with appropriate checks and balances) or, as is frequently the case, may be divided between them.

Implementation monitoring frequently takes place under the provision of more than one set of legislative requirements (e.g. land use planning, building approval or pollution control procedures). Any necessary action to enforce compliance with the terms of the approval may be taken under powers other than the legal underpinning of the EIA system. Implementation monitoring is therefore essentially reactive, its principal purpose being to ensure that the action adheres to the conditions of its approval.⁽¹⁾

'Impact monitoring' involves measurement of the environmental impacts (e.g. on ambient noise levels or upon a species of bird) that have occurred as a result of implementing the action. A variety of measurement techniques is likely to be needed, coupled with the exercise of expert opinion. This type of monitoring serves two purposes:

1. Where monitoring of the environment reveals unexpected or unacceptable impacts (e.g. elevated noise levels at night) further design changes (e.g. baffling) or management measures (e.g. ensuring closure of doors and other openings) may be necessary. The monitoring results may indicate that the approval conditions (e.g. on noise emissions) have been breached. Even where this is not the case, voluntary action by the proponent may take place or action may be required under the provisions of other legislation.
2. Impact monitoring can provide useful feedback for the assessment of other similar actions by helping to ensure that relevant areas of concern are identified. It can also assist in indicating where existing environmental knowledge is deficient and thus where further research may be needed to improve environmental management practice.

(1) Tomlinson, P. and Atkinson, S. F.; "Environmental audits: proposed terminology"; Environmental monitoring and Assessment; 1987a.

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In most EIA systems *impact monitoring* is carried out by some combination of the developer and the environmental authorities, though this is increasingly becoming a responsibility of the proponent. As with implementation monitoring, impact monitoring may be covered by a variety of legislation and there may be little coordination between, or compilation of, measurements. In some EIA systems, the proponent is required to specify proposed implementation and impact monitoring proposals in the EIA report (e.g. in New Zealand where an environmental management program may be required).

'Impact auditing' involves comparison between the results of implementation and impact monitoring and the forecasts and commitments made earlier in the EIA process (and especially in the EIA report). It is also frequently referred to as 'post-auditing'. The principal purpose of impact auditing is to enable the effectiveness of particular forecasting techniques to be tested and thus to improve future practice (e.g. by reducing the uncertainty in impact prediction). A secondary purpose is in the management of the impacts of the action concerned (see below). ⁽¹⁾

Since the conditions applied at the decision-making stage should reflect the outcome of the earlier stages of the EIA process, implementation monitoring should be designed to permit auditing of the proponent's commitments in the EIA report and any subsequent documentation. The same is obviously true of impact monitoring.

Auditing may be carried out by the decision-making or environmental authorities, by the proponent (possibly as part of internal auditing procedures). Few EIA systems require impact auditing, as opposed to implementation or impact monitoring, for particular actions. This is clearly a matter of concern, and follows from the orientation of most EIA systems to project authorization, rather than to the management of project impacts. ⁽²⁾

In granting approvals, it will not always be possible to impose conditions to cover every eventuality and environmental impacts may arise which are uncontrolled. If

(1) **Bisset, R. and Tomlinson, P.** ; "Monitoring and Auditing of impacts. In Wathern P. Environmental Impact Assessment: Theory and Practice"; Unwin Human, London; **1988**.

(2) **Tomlinson, P. and Atkinson, S. F.** ; "Environmental audits: a literature review" Environmental monitoring and Assessment; **1987b**.

forecasts about these impacts have been included in the EIA report (for example, forecasts about the general appearance, landscaping of a project), the proponent may be obliged to fulfil the undertakings made, for fear that a public commitment will be seen not to have been honored. A requirement upon the proponent to produce impact auditing reports after a certain number of years (say, two and five years), subject to checks by the environmental authorities, would be invaluable in meeting both the purposes of such auditing.

First, impact auditing, in which the EIA report and subsequent documentation provide the basic point of reference, would generate a body of experience about the results of auditing in EIA systems. This would not only assist in the development of forecasting and monitoring methodology but would provide public reassurance about impact management. As Buckley (1991a) has stated, *'impact audits provide a means for both industry and government to demonstrate their competence in environmental management to the public'*.⁽¹⁾

Second, the achievement of satisfactory auditing results could provide the basis of agreement between the environmental authorities and the proponent to terminate impact monitoring programs (e.g. on certain air or water quality parameters) though implementation monitoring would need to continue.

By far the largest proportion of the literature on EIA monitoring and auditing concerns impact auditing. The main conclusions may be summarized as follows:

- There appear to be no standardized audit methodologies.
- Monitoring needs to be considered and designed very early in the EIA process.
- Monitoring requires coordination, information management and resources.
- Post-EIA report design changes invalidate many forecasts.
- Many EIA reports contain very few forecasts.
- Many EIA report forecasts are vague and qualitative.
- Monitoring has often been inadequate for auditing purposes.
- Only a minority of EIA forecasts have proved accurate or almost accurate.

(1) **Buckley, R.** ; “Auditing the precision and accuracy of environmental impact predictions in Australia”; Environmental monitoring and Assessment; **1991a**.

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- Few EIA report forecasts have proved totally inaccurate. Few unanticipated impacts have been detected.
- There is little evidence of systematic bias in forecasts.

There is disagreement about the role of hypotheses in impact auditing. Many, especially those with an ecological background, have argued that EIA report forecasts should be framed as falsifiable hypotheses to facilitate auditing. Others have opined that, while precision is desirable where it is feasible and appropriate, the value of EIA report impact forecasts does not depend of their strict auditability. Given that the purpose of EIA is to ensure that appropriate mitigation measures are utilized to minimize the impacts of approved actions, the crucial question becomes 'did it result in appropriate management action being taken?'⁽¹⁾

As at the other stages of the EIA process, the availability of clear guidance on the procedures and techniques of action implementation monitoring, impact monitoring and impact auditing will be helpful to proponents, the decision-making and environmental authorities, consultees and the public.

The publication of monitoring results is clearly a necessary check on the operation of monitoring procedures. Such information is frequently currently available from a variety of sources but is often difficult to obtain and is seldom collated. The availability of all the relevant monitoring data at a single location would be a significant advance on most current EIA procedures. As mentioned above, the publication of the results of audits would be a considerable step forward. Sadler (1988) supported the use of publishing auditing results because public participation 'drives many innovations in EIA practice'.⁽²⁾

Finally, it is important that, as at the other stages of the EIA process, monitoring should function effectively (i.e. that it should provide relevant information about implementation and impacts, linked to the earlier stages of the EIA process) and efficiently (e.g. that needless monitoring is not undertaken). This and the other

(1) **Bailey, J. M. and Hobbs, V.** ; “A proposed framework and database for EIA auditing”; Journal of Environmental Management; **1990**.

(2) **Sadler, B.** ; “The evaluation of assessment: post-EIS research and process development. In Wathern, P. (ed.) Environmental Impact Assessment: Theory and Practice”; Unwin Hyman; London; **1988**.

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requirements for action impact monitoring and auditing discussed above are summarized in Table 5.23.

Table 5.23. Evaluation criteria for the monitoring and auditing of action impacts

Must monitoring of action impacts be undertaken and is it linked to the earlier stages of the EIA process?

Must monitoring of the implementation of the action take place?

Must the monitoring of action impacts take place?

Is such monitoring linked to the earlier stages of the EIA process?

Must action monitoring arrangements be specified in the EIA report?

Can the proponent be required to take ameliorative action if monitoring demonstrates the need for it?

Must the results of such monitoring be compared with the predictions in the EIA report?

Does published guidance on monitoring and auditing action implementation and impacts exist?

Must monitoring and auditing results be published?
--

Is there a public right of appeal if monitoring and auditing results are unsatisfactory?
--

Does action monitoring function effectively and efficiently?
--

5.13.2.1 United States of America

The National Environmental Policy Act 1969 is silent on the issue of monitoring. However, as mentioned before, the Regulations require that a 'monitoring and enforcement program shall be adopted and summarized [in the record of decision] where applicable for any mitigation'. The Council on Environmental Quality (CEQ) has made it clear that:

the terms of a Record of Decision are enforceable by agencies and private parties. A Record of Decision can be used to compel compliance with or execution of the mitigation measures identified therein.

Monitoring is, however, essentially discretionary. As the Regulations state, 'Agencies may provide for monitoring to assure that their decisions are carried out and should do so in important cases'. The Regulations require some implementation monitoring, since they specify that the lead agency must, upon request, inform other agencies on

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progress in carrying out certain mitigation measures adopted. Further, it must make available to the public the results of relevant monitoring. If the monitoring requirements are specified in the record of decision, the lead agency is obliged to implement them.

In practice, despite these somewhat ambiguous requirements, monitoring is generally perceived as a weak link in the US EIA system.⁽¹⁾

For example, Blaug (1993) found that monitoring of conditions in FONSI's was only required by half the federal agencies.⁽²⁾ Clark (1993) has stated that, in practice, many agencies fail to monitor the environmental impacts arising from projects.⁽³⁾

In general, monitoring is not given high priority and some monitoring commitments are not honored because of budgetary constraints or communication lapses. However, monitoring practice varies very substantially.

Culhane et al.'s (1987) auditing work remains the only major US study comparing the accuracy of predictions with monitored results. They found that:

Despite some general cynicism about the veracity of government promises, agency managers prove to be quite responsible in carrying out promised mitigation.⁽⁴⁾

Dickerson and Montgomery (1993), in surveying other post-auditing studies and their own work, concluded that the NEPA process is reasonably effective in producing useful predictions of impact but that there is scope for considerable improvement.⁽⁵⁾

(1) **Reed, R. M. and Cannon, J. B.** “Introduction to the NEPA process. In Hildebrand, S. G. and Cannon, J. B. (EDS) Environmental Analysis: NEPA Experience”; Lewis; Boca Raton; FL; **1993**.

(2) **Blaug, E. A.** ; “Use of the environmental assessment by federal agencies in NEPA implementation”; The Environmental Professional; **1993**.

(3) **Clark;** “The National Environmental Policy Act and the role of the President’s Council on Environmental Quality”; The Environmental Professional; **1993**.

(4) **Culhane P. J., Friesema H. P. and Beecher J. A.** ; “Forecasts and Environmental Decision Making: the Content and Predictive Accuracy of Environmental Impact Statements”; Westview Press; Boulder, CO; **1987**.

(5) **Dickerson, W. and Montgomery, J.** ; “Substantive scientific and technical guidance for NEPA analysis: pitfalls in the real world”; The Environmental Professional; **1993**.

5.13.2.2 United Kingdom

The Planning Regulations and other regulations implementing its provisions in the United Kingdom are silent on the question of monitoring. This is not to say that monitoring, especially implementation monitoring, does not take place. It is customary for local planning authorities (LPAs) to impose planning conditions on permissions and for compliance with these to be checked to a greater or lesser extent. Such conditions may include emission standards (especially relating to noise), and may sometimes require the proponent to monitor these. It has been more usual for local authorities to undertake implementation monitoring, however. Similarly, the monitoring of conditions on air pollution, water pollution or solid waste disposal permits granted under the pollution control legislation tends to have been carried out by the environmental authorities.

LPAs and the pollution control authorities may also impose conditions requiring impact monitoring (especially in relation to ambient pollution levels) which may be carried out by the LPA/environmental authorities or by the proponent. However, impact monitoring is by no means a general requirement for projects approved under the Planning Regulations, being confined to major developments like power stations or waste disposal operations. There is no formal linkage between either implementation or impact monitoring and the earlier stages of the EIA process. Audits are not a requirement, though voluntary proponent auditing is increasing in importance.

Where the proponent is shown to be in breach of the conditions on the planning approval or a pollution control permit, enforcement action can be taken. However, monitoring is split between agencies administering separate legislation and enforcement of both planning and pollution control conditions has left much to be desired in the past.

The existing guidance on EIA in the United Kingdom, including the checklist of matters to be considered for inclusion in the environmental statement in the Guide to the Procedures, makes no reference to the monitoring of implemented project impacts. The requirements relating to the publication of monitoring results vary in the United Kingdom. However, there is no regulatory mechanism for bringing together the monitoring results arising from different legislative requirements. Indeed, LPAs are

discouraged from imposing conditions which may overlap with the requirements of other environmental control authorities. ⁽¹⁾

There is no formal right of appeal if monitoring reveals unsatisfactory omissions or impacts but monitoring results can be used to bring pressure to bear on proponents and/or environmental authorities.

5.13.2.3 New Zealand

The Resource Management Act 1991 makes both general and specific reference to monitoring. Every local authority in New Zealand is required to 'gather such information, and undertake or commission such research, as is necessary to carry out effectively its functions under this Act'. Each local authority must also monitor the exercise of the resource consents that have effect in its area. The Fourth Schedule specifies that the EIA report should contain proposals for impact monitoring where the scale and significance of impacts require it. This provides the opportunity for a strong linkage between assessment and monitoring.

Despite the specification of monitoring requirements in the Act, it is unclear whether the aim of the monitoring provisions is enforcement or EIA system enhancement, for which predictions need to be checked against actual impacts to test their accuracy and the extent to which cumulative impacts are occurring. Because of this lack of specificity, and because monitoring falls to regional, city and district authorities, Montz and Dixon (1993) stated that there are likely to be variations in the extent to which the monitoring provisions are implemented. ⁽²⁾

No guidance on monitoring has been issued in New Zealand and the recently published practical guide makes very little reference to monitoring. Where monitoring does take place, the results are normally made public. ⁽³⁾

(1) **Wood, C. M.** ; “Planning Pollution Prevention”; Heinemann Newnes; Oxford; **1989**.

(2) **Montz, B. E. and Dixon, J. E.** ; “From law to practice: EIA in New Zealand”; Environmental Impact Assessment Review; **1993**.

(3) **Morgan, R. K. and Memon, P. A.** ; “Assessing the Environmental Effects of Major Projects: a Practical Guide”; Publication 4; Environmental Policy and Management Research Center; University of Otago; **1993**.

However, as Dixon (1993b) indicated, local authorities have few funds available for monitoring and have not developed monitoring systems or appropriate methods.⁽¹⁾

Morgan (1993) confirmed that, notwithstanding the legal requirement to monitor, practice in enforcement and monitoring is very poor, with reliance on public complaint to indicate problems. It appears that there is considerable scope for improvement in monitoring practice in New Zealand.⁽²⁾

5.13.2.4 Egypt

According to the Executive Regulations of Law 4/1994 (Item18) the necessity of maintaining surveillance of, and control over, the implementation of actions has tended to be a somewhat important area in EIA. So, environmental and competent authorities in Egypt undertake annually *Implementation monitoring* for checking if the actions /projects have been implemented in accordance to the approval. These checks may involve physical inspection (e.g. of wall construction or waste storage/disposal) or measurement (e.g. of noise emissions) using the various types of instrument. In case of existence of environmental trespasses, EEAA informs the Competent Administrative Authority in order to commission the developer to quickly correct these trespasses. After 60 days if the developer couldn't correct the trespasses, EEAA and Competent Administrative Authority will make a decision of these:

- Close the establishment
- Stop the trespass activity
- Judgment challenge of recompense for the treatment of trespasses.

Baker (2000), in her analysis of monitoring compliance, has stated that:

Because inspection agencies are poorly stuffed and equipped, there is too little inspection of facilities. Establishing inspectorates with clear responsibility and technical and financial resources is key to effective

(1) **Dixon, J.** ; “The integration of EIA and planning in New Zealand: changing process and practice”; Journal of Environmental Management; **1993b**.

(2) **Morgan, R. K.** ; “An evaluation of progress with implementing the environmental assessment requirements of the Resource Management Act”; International Proceeding of Association for Impact Assessment Conference; Shanghai; IAIA; Belhaven; NC; **1993**

implementation of environmental policy in Egypt.⁽¹⁾

In fact monitoring in Egypt is too weak because of:

- There are no available types of instruments for measuring both the quantity and intensity of impacts, and the environmental inspector (the person who has the responsibility of monitoring) depends on his sense in checking the actions/projects.
- The environmental inspectors (the person who has the responsibility of monitoring) is not qualified technically and hasn't enough experimental experience.
- There is no published guidance on how to make a monitoring for actions/projects and main factors should be involved.
- The reaction taken against the trespasses takes too long time.⁽²⁾

5.13.3 Summary of the action monitoring and auditing in the EIA systems

Table 5.24. demonstrates that none of the EIA systems fully meets the impact monitoring evaluation criterion. Monitoring is an acknowledged weakness of the US EIA system and there is no provision for monitoring in the UK EIA system (though monitoring can be accomplished under other legislative means). The New Zealand Resource Management Act imposes a general duty upon local authorities to monitor project impacts but this is infrequently undertaken and there is no linkage to the earlier stages of the EIA process in these essentially discretionary monitoring requirements. Also Law of environment in Egypt imposes a general duty upon EEAA and the Competent Administrative Authority to monitor project impacts but in practice the level of performance is very weak and there is no linkage to the earlier stages of the EIA process

(1) **Baker, S.** ; “Environmental Management in Egypt: Towards a Unified Capacity Development Approach”; Paper presented to the Regional Arab Conference ‘Environmental Balance and Sustainable Urban Development’; Cairo, Egypt; **2000.**

(2) **Touristic Development Agency and EEAA**; Oral discussions with Managers of Environmental Management and Monitoring; **2000.**

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Table 5.24. The treatment of action monitoring and auditing in the EIA systems

Criterion 9: Must monitoring of action impacts be undertaken and is it linked to the earlier stages of the EIA process?

Jurisdiction	Criterion met?	Comment
United States	No	Monitoring essentially discretionary but some requirements where mitigation measures specified in record of decision. Practice often weak.
United Kingdom	No	No provision for monitoring. Uncoordinated implementation monitoring takes place under planning and other legislation unrelated to earlier stages in EIA process.
New Zealand	No	Duty of local authorities to monitor impacts of projects in Act often not complied with.
Egypt	No	Law imposes monitoring, but the practice very weak and its results are not accurate and takes too long time.

5.14 Criterion 10: Mitigation of impacts

5.14.1 Introduction

If the consideration of alternatives lies at the heart of the environmental impact statement then the mitigation of environmental impacts is the principal aim of the EIA process. In practice the consideration of alternatives is intertwined with the consideration of mitigation measures. The main purpose of EIA is, in essence, to allow the proposed development to proceed, while reducing its impacts to an acceptable level. The secondary purpose of EIA is to prevent unsuitable development by demonstrating that certain impacts cannot be mitigated to the point of acceptability. This section explains why the mitigation of environmental impacts is important and advances several evaluation criteria to assist in the review of this element of EIA systems.

5.14.2 Mitigation of impacts within the EIA process

Mitigation, or amelioration, of the severity of impacts arising from an action can take a variety of forms. The Department of the Environment (1994b) classifies mitigation measures into *avoidance* (using an alternative approach to eliminate an impact), *reduction* (lessening the severity of an impact) and *remedy* (which may involve some enhancement or compensation).⁽¹⁾

Examples of mitigation measures may include process alterations to reduce emissions, altering pollution control equipment to render it more effective, adjusting the hours of operation of a plant, changing site layout to reduce visual, noise or air pollution impacts, the requirement of fencing and walls, the amendment of vehicular access arrangements, the provision of mounding and planting, the creation of replacement habitat, and many⁽²⁾

(1) **Department of the Environment**; “Guide on Preparing Environmental Statement for Planning Projects”; Consultation Draft; DOE; London; **1994b**.

(2) **Glasson J., Therivel R. and Chadwick A.** ; “Introduction to Environmental Impact Assessment”; UCL Press; London; **1994**.

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Indeed the whole range of land use planning, pollution and other controls and measures should be considered during the EIA process to ensure that suitable mitigation measures are adopted.

Mitigation is iterative: different measures may be proposed at the various stages of the EIA process. For example, the results of the review of the EIA report, and of the consultees' and public's comments upon it, may yield proposals for mitigation additional to (or different from) those proposed in the EIA report itself.

The adoption of some mitigation measures may involve considerable costs, though other effective mitigated measures may cost very little (e.g. alteration of road access, alternative material storage arrangements). There will normally come a point at which the developer may withdraw a proposed development because the additional costs associated with mitigation measures are deemed to be too high.⁽¹⁾

On the other hand, the decision-making authority may ask whether mitigation of the impacts of a proposal is enough to achieve sustainability. In other words, it may be that the authorities will seek either no deterioration of the environment, or a net improvement of the environment through offsets or compensation (as in US air pollution control), rather than merely a reduction of (or a remedy for) impacts. In these circumstances, it may be necessary to consider radical alternatives to the proposal.

Mitigation measures can themselves have impacts which need to be identified, predicted and evaluated. For example, the use of earth mounding to provide noise baffles or to screen development from public view can create unnatural landforms which are themselves visually obtrusive.

Not only may there be a comparison of the benefits of mitigation but there may also need to be a trade-off between the mitigation of different impacts. Where these relate to pollution, the best practicable environmental option needs to be sought.⁽²⁾

(1) **Wood, C. M.** ; “Planning Pollution Prevention”; Heinemann Newnes; Oxford; **1989**.

(2) **Royal Commission on Environmental Pollution**; “Twelfth Report: Best Practicable Environmental Option”; HMSO; London; **1988**.

Consultation and participation are so important in the EIA process. Consultees and the public can provide invaluable assistance not only in suggesting mitigation measures, but in determining which residual impacts are tolerable and which cannot be countenanced.

Thus, in the United States, and in many other jurisdictions where widespread opportunities for public participation exist, a very high proportion (over 95 per cent) of actions which reach the 'final' EIA report stage are approved, but nearly all of these are substantially modified to mitigate impacts during the successive stages of the EIA process. On the other hand, in the United Kingdom, where 40 per cent of a sample of 20 applications were refused, the mitigation of impacts would appear not to be assuming the importance attached to it in more mature EIA systems, perhaps as a consequence of the relatively limited opportunities for formal public involvement in the EIA process.

Clearly, financial compensation or remuneration in kind have a role to play in gaining public acceptance of unmitigated environmental impacts. Though such payments may be controversial, and though there may be considerable problems in determining who should receive payments, the use of compensatory measures can help to resolve disputes and achieve the aims of EIA. Several instances of the use of financial compensation exist in siting decisions involving EIA in the United States, New Zealand and Australia. In the United Kingdom, compensation is often achieved through the use of 'planning gain', which may involve the provision of community facilities.

As mentioned before, preliminary documentation produced during the early stages of the EIA process should show clear evidence of the mitigation/avoidance of environmental impacts in the initial action designs. Similarly, documentation prepared for screening and scoping purposes should also address the question of mitigation of impacts.

Clearly, details of mitigation should be set down in the EIA report. The EIA report should provide a record of all the mitigated measures and modifications suggested or accepted by the proponent. Lee and Colley (1992) have suggested that EIA reports should deal fully with the scope and effectiveness of mitigation measures:

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All significant adverse impacts should be considered for mitigation. Evidence should be presented to show that proposed mitigation measures will be effective when implemented. ⁽¹⁾

Mitigation should therefore continue to be considered during the review and revision of EIA reports, during decision making and during the monitoring stages of the EIA process. The use of carefully worded conditions to any approval is frequently used to codify the set of designs and mitigation measures approved at the decision-making stage. These conditions need to be monitored and enforced to ensure that mitigation remains effective. However, some flexibility is needed to ensure that, on the one hand, unexpected impacts are mitigated and that, on the other hand, unnecessarily expensive mitigated measures can be amended. The use of a negotiated environmental management plan with appropriate monitoring and opportunities for modification of monitoring arrangements is obviously desirable. ⁽²⁾

As at other stages of the EIA process, the existence of published advice on mitigation and modification of actions to render them environmentally more acceptable will be helpful to developers, consultants, environmental and decision-making bodies and the public.

Finally, the mitigation of action impacts should take place effectively (i.e. mitigated measures should actually ameliorate impacts) and efficiently (i.e. they should not involve the expenditure of unnecessary time, manpower or financial resources). Clearly, the earlier in the EIA process that the mitigation proposals are made, the more effective and efficient they are likely to be, since they will be progressively refined during the consideration of the proposal. This and the other criteria for reviewing the treatment of mitigation measures in EIA systems are summarized in Table 5.25. These criteria are now employed to help to analyze the procedures for mitigation in each of the four EIA systems.

(1) **Lee, N. and Colley, R.** “Reviewing the Quality of Environmental Statements”; Occasional Paper 24; Department of Planning and Landscape; University of Manchester (2nd edition); **1992**.

(2) **Wood, C. M. and Bailey, J.** ; “Predominance and independence in environmental impact assessment: the Western Australia model”; Environmental Impact Assessment Review; **1994**.

Table 5.25. Evaluation criteria for the mitigation of impacts

Must the mitigation of action impacts be considered at the various stages of the EIA process?
Must clear evidence of the mitigation/avoidance of environmental impacts be apparent in the action designs in preliminary EIA documentation?
Must details of mitigation and its implementation be set down in the EIA report?
Must evidence of the consideration of mitigation be presented during screening, during scoping, during EIA report review and revision, during decision making and during monitoring?
Does published guidance on mitigation and modification exist? Does the mitigation of action impacts take place effectively and efficiently?

5.14.2.1 United States of America

Although the treatment of alternatives is the 'heart of the environmental impact statement' (EIS) in the United States, mitigation of environmental impacts is probably the most important outcome of the American EIA process. (The abandonment of unsatisfactory proposals is rare.) Mitigation certainly pervades the US EIA system and most proposals are heavily modified by the end of the EIA process.

Mitigation is, of course, the central determinant of one outcome of screening, the mitigated finding of no significant impact (FONSI). Following the preparation of an environmental assessment (EA) a mitigated FONSI may be prepared where the potentially significant environmental effects of a proposal can be rendered acceptable by the adoption of appropriate mitigation measures. The courts have ruled that mitigated FONSI are legally adequate where, *inter alia*, the agency can convincingly show that its mitigation measures will reduce all the significant environmental impacts identified in the EA to less-than-significant levels.⁽¹⁾

(1) Bass, R. E. and Herson, A. I. ; “Mastering NEPA: a Step-by-Step Approach”; Solano Press; Point Arena; CA; 1993.

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In practice, there is heavy reliance on mitigation measures to justify EAs and FONSIIs, showing that environmental considerations are increasingly being integrated early in the decision-making process. ⁽¹⁾

Mitigation measures must be considered during scoping and summarized in the scoping report. Both draft and final EISs must contain a discussion of appropriate mitigation measures. The Council on Environmental Quality (CEQ) Regulations specify that mitigation must involve avoiding, minimizing, rectifying, reducing or compensating for significant environmental effects. The inference is that mitigation measures which are not specific and tangible (for example, proposals to consult, to conduct further studies or to monitor) will not generally solve the environmental problems identified.

All relevant, reasonable mitigation measures that could improve the action must be identified in the EIS, even if they are outside the jurisdiction of the lead agency. However, the lead agency is not obliged to commit itself to implementing the mitigation measures identified in the EIS unless its own EIA regulations require their adoption.

Those mitigation measures adopted by the lead agency must be specified in the record of decision (ROD), together with a monitoring and enforcement program for each measure. As stated before, a ROD can be used to compel compliance with, or execution of, the mitigation measures contained in it. While these powers are valuable, the lead agency can easily circumvent them by failing to adopt relevant mitigation measures. Indeed the implementation of mitigation measures, like monitoring, is a weakness of the US EIA system.

The Environmental Protection Agency (EPA) conducted a study in 1987 which showed that, using the definition of adequacy in the Regulations (above), the effectiveness of the mitigation measures in about 20 per cent of the EISs that it reviewed was. Even where mitigation measures are specified in EISs and RODs, implementation may be unsatisfactory because of budgetary constraints or failure to inform relevant personnel or to incorporate measures in construction contracts.

(1) **Blaug, E. A.** ; “Use of the environmental assessment by federal agencies in NEPA implementation”; The Environmental Professional; **1993**.

However, the effective implementation of mitigation measures is gradually improving as public concern and knowledge grow.

5.14.2.2 United Kingdom

The UK Planning Regulations require that the environmental statement contains, where significant effects are anticipated, 'a description of the measures envisaged in order to avoid, reduce or remedy those effects'. The checklist in the Guide (Department of the Environment - DOE, 1989) covers site planning, technical, aesthetic and ecological measures and an assessment of their likely effectiveness.

There are no formal requirements for the treatment of mitigation measures at other stages in the EIA process, though it is customary for local planning authorities to impose conditions designed to mitigate impacts, or to require a legal planning agreement for this purpose, when granting planning permission. Apart from the Guide (DOE, 1989) there is no other published guidance on mitigation and modification

In a sample of 24 environmental statements, local planning authorities felt that the descriptions of measures to mitigate adverse environmental effects were broadly satisfactory in nearly two-thirds of the statements. In nearly two-thirds of the 24 cases studied, the proposal was modified as a result of suggestions made during the EA process. More than two-thirds of these alterations occurred following the submission of the planning application and ES but earlier changes were also felt to be significant.

Developers and consultants believed that perhaps half of these modifications arose directly from the EA process, but that the other half would probably have been made in the course of normal discussions about the proposed development. Two-thirds of the changes made to the proposals in response to suggestions resulted from those put forward by the LPA, rather than by the statutory consultees and the public. However, LPA consultations with statutory bodies and the public were felt to have been significant in influencing more than half of these LPA suggestions. ⁽¹⁾

It is apparent that while the scope for mitigation of project impacts to take place throughout the UK EIA process exists and that, in practice, this occurs in many cases,

(1) Wood, C. M. and Jones, C. E. ; "Monitoring Environmental Assessment and Planning"; Department of the Environment; HMSO; London; 1991..

there is considerable room for an increase in the effectiveness with which mitigation measures are employed, especially early in the EIA process. If mitigation were given greater weight in the UK EIA process, it would be expected that more planning applications would be withdrawn voluntarily and that a greater proportion of appropriately mitigated actions would be approved. The incorporation of mitigation measures into planning obligations and planning conditions would also be expected.

5.14.2.3 New Zealand

The duty to mitigate the environmental impacts of activities is one of the main aims of the Resource Management Act 1991. The Act requires an application to contain an assessment of effects 'and the ways in which any adverse effects may be mitigated'. The Fourth Schedule specifies that 'a description of the mitigation measures' to prevent or reduce impacts should be included in the EIA report.

There are no other specific requirements relating to mitigation in the Act beyond the general criteria contained in the Act relating to conditions, and no guidance relating to amelioration of impacts has been issued. This is somewhat surprising since the Environmental Protection and Enhancement Procedures (EPEP) lay great stress on mitigation measures and considerable expertise exists in New Zealand (though EPEP mitigation recommendations have often been ignored).

The principal method of ensuring that mitigation is actually working in practice (i.e. that local authority conditions on any permission specify mitigation measures derived from the EIA process) is public scrutiny of the implementation of conditions attached to resource consents and permits and the right to appeal to the Planning Tribunal.

In practice, the inexperience of developers and local authorities means that the treatment of mitigation in EIA varies very considerably in New Zealand. There are, undoubtedly, examples of good practice but too often mitigation measures have been belatedly conceived, ill-considered, or unimplemented.

5.14.2.4 Egypt

According to the Law of environment, Mitigation is mandatory in EIA in Egypt, and it considers as a one point of the main six points in EIA screening form (B) for assessing Grey List projects. Mitigation may be prepared where the potentially significant environmental effects of a proposal can be rendered acceptable by the adoption of appropriate mitigation measures.

In the context of the weakness in the whole EIA process in Egypt, there is no guidance on mitigation and the Law didn't mention any thing about how could the developer or his consultant make the mitigation, how much details should be presented in mitigation and in which stage should the mitigation be done.

Because of the professionals' dearth in reviewing the EIA studies, many projects approved while their mitigation measures not on the acceptable level of clarity and details. In a sample of about 300 EIA study for touristic projects, the officials in EEAA and Touristic Development Agency felt that the descriptions of measures to mitigate adverse environmental effects were very shallow in almost the whole sample.⁽¹⁾

Egyptian Red Sea Coastal and Marine Resources Management Project (1998) mentioned that one of the main shortcomings in all EIA studies for touristic projects presented to Touristic Development Agency, Red Sea Governorate and Egyptian Environmental Affairs Agency, is the treatment of the mitigation measures because it is very general and not specified nor accurate.⁽²⁾

5.14.3 Summary of mitigation in the EIA systems

Unsurprisingly, Table 5.26 shows that three of the four EIA systems meets the mitigation criterion. 'Unsurprisingly' because mitigation is the principal aim of the EIA process. However, the length to which mitigation is taken in the EIA systems varies and the emphasis on the implementation of mitigation measures also differs both between and within jurisdictions.

(1) **Touristic Development Agency and EEAA; Oral discussions with Managers of Environmental Management and Monitoring; 2000.**

(2) **Egyptian Red Sea Coastal and Marine Resources Management Project; “Environmental Impact Assessment. Basis and Procedures Guidelines for Coastal Projects in Red Sea”; 1998.**

Table 5.26. The treatment of mitigation in the EIA systems

Criterion 10: Must the mitigation of action impacts be considered at the various stages of the EIA process?

Jurisdiction	Criterion met?	Comment
United States	Yes	Formal requirement to incorporate mitigation measures in record of decision. Effectiveness of implementation varies, but is improving.
United Kingdom	Yes	ES must cover mitigation and LPAs impose conditions upon permissions to mitigate impacts. Practice varies at various stages in EIA process.
New Zealand	Yes	Mitigation of environmental impacts is one of the main purposes of Act. Practice varies at various stages in EIA process.
Egypt	No	Mitigation of environmental impacts is one of the main points in screening form (B). In practice it exist outwardly but very weak (almost has not any effect)

It is probable that, as concern over the sustainability of development grows, more emphasis will be placed on the avoidance of impacts by the consideration of alternative approaches. It is likely that increasing attention will be paid to the notion of 'no net deterioration' or 'net amelioration' of the environment. This will affect not only the choice of alternatives and mitigation measures (e.g. the establishment of a new and larger recreational open space as compensation for the loss of, or damage to, the original space) but also the implementation of these measures.

It is apparent that there is considerable scope for improving the implementation of mitigation measures in all four jurisdictions. This is bound up with impact and implementation monitoring, where practice also needs to be improved. It is probable that the greatest single contribution to increasing sustainability which EIA could deliver (beyond the termination of environmentally unsatisfactory actions) is a major improvement in the nature of mitigation measures and their implementation.

5.15 Criterion 11: Consultation and participation

5.15.1 Introduction

As stated before, consultation and participation are integral to environmental impact assessment: EIA is not EIA without consultation and public participation. Almost all EIA systems provide for consultation and participation after publication of the EIA report prior to the decision on the action. However, many jurisdictions either require or encourage consultation and participation at earlier stages of the EIA process, for example during scoping. Indeed, there appears to be a growing consensus that increased consultation and participation, using one or more of the large number of means of participation which exist can produce significant benefits for the proponents of actions and for those affected.

This section presents an examination of the role of consultation and participation in the EIA process. It then advances a set of evaluation criteria for the treatment of consultation and participation within EIA.

5.15.2 Consultation and participation within the EIA process

The New Zealand Ministry for the Environment (1992) has identified the aims of early consultation and participation in the EIA process (identification and mitigation of impacts; prevention of environmentally unacceptable development) succinctly:

[An] application preceded by a program of community involvement where concerns are identified and addressed may result in few or no objections. It may also result in substantial project modifications or abandonment if no other accommodation can be reached.⁽¹⁾

These aims have been echoed in the United States and in Australia (Australia and New Zealand Environment and Conservation Council - ANZECC, 1991). The principles for public involvement in EIA have been nicely summarized by ANZECC (Table 5.27). As Sheate (1991) has stated:

(1) **Ministry for the Environment**; “Scoping of Environmental Effects: a Guide to Scoping and Public Review Methods in Environmental Assessment”; MfE; Wellington; 1992.

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By involving the public as early as possible issues may be identified which 'experts' might not have considered important, but which could prove to have a degree of importance out of all proportion to the magnitude of the impact. ⁽¹⁾

There are several different types of public participation. These can be distinguished by the nature of the relationship between the public and the decision-making body or the proponent.⁽²⁾ These relationships range from the provision of information, through a range of types of consultation to direct public control.

Table 5.27. EIA public participation principles ⁽³⁾

- (a) Participate in the evaluation of proposals through offering advice, expressing opinions, providing local knowledge, proposing alternatives and commenting on how a proposal might be changed to better protect the environment.
- (b) Become involved in the early stages of the process as that is the most effective and efficient time to raise concerns. Participate in associated and earlier policy, planning and program activities as appropriate, since these influence the development and evaluation of proposals.
- (c) Become informed and involved in the administration and outcomes of the environmental impact assessment process, including:
 - assessment reports of the assessing authority
 - policies determined, approvals given and conditions set
 - monitoring and compliance audit activities
 - environmental advice and reasons for acceptance or rejection by decision-makers.
- (d) Take a responsible approach to opportunities for public participation in the EIA process, including the seeking out of objective information about issues of concern.

In addition to the various means of eliciting responses from consultees and the public during the EIA process (below) the use of mediation or environmental dispute

(1) **Sheate, W. R.** ; “Public Participation: the key to effective environmental assessment”; Environmental Policy and Law; **1991**.

(2) **Wathern, P. (ed.)**; “Environmental Impact Assessment: Theory and Practice”; Unwin Hyman; London; **1988**.

(3) **Australian and New Zealand Environment and Conservation Council**; “A National Approach to Environmental Impact Assessment in Australia”; ANZECC, Canberra, Australia; **1991**.

resolution in certain circumstances has been suggested, particularly in the United States. Mediation involves the assistance of a mediator in negotiations between the parties in a dispute over a new development and requires a willingness to compromise and utilize environmental mitigation. While it is not easy to state precisely when and if mediation will help negotiations towards completion, there appear to be four prerequisites to its success: a stalemate, or the recognition that stalemate is inevitable; voluntary participation; some room for flexibility; and a means of implementing agreements.⁽¹⁾ However, these prerequisites appear to apply in only a small minority of siting decisions involving EIA.

Jeffery (1987) saw little use for mediation and negotiation in EIA, except during scoping. In particular, he did not consider mediation to be suitable for the use of public hearings in arriving at decisions.⁽²⁾

In many jurisdictions, such as the United Kingdom, there is often only one major siting decision and stalemates seldom apply. In these circumstances, the local planning authority often acts as mediator and negotiations are used to reduce the adverse effects of proposed developments. The same role is often played by inspectors at public inquiries. Buckley (1991b) was also wary of the use of mediation in environmental dispute resolutions:

[Environmental dispute resolution approaches] will not be able to substitute for planning and impact assessment legislation which provides for formal public information and participation at several stages, and third party recourse to the courts if planning agencies fail to discharge their responsibilities adequately.⁽³⁾

Consultation and participation can be employed at every stage in the EIA process. While the involvement of agencies and the public in the very early consideration of alternatives and of preliminary design of the proposed action is not usually feasible,

(1) **Bingham, G.** ; “Resolving Environmental Disputes: a Decade of Experience”; Conservation and Foundation, Washington, DC; **1986**.

(2) **Jeffery, M. I.** ; “Accommodating negotiation in environmental impact assessment and project approval processes”; Environmental and Planning Law Journal; **1987**.

(3) **Buckley, R.** ; “Environmental Planning legislation: court back-up better than Ministerial discretion”; Environmental and Planning Law Journal; **1991b**.

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consultation and participation in screening can normally be organized without great difficulty. ⁽¹⁾

Consultation and participation in scoping are commonplace in many EIA systems, and are a requirement in, for example, the United States. Similarly, the involvement of consultees and the public in EIA report preparation should lead to improved quality, or at least to improved acceptability.

As mentioned above, almost all jurisdictions provide for consultation and participation during the review process. In a fully participative EIA system, these rights should also extend to the review of further information submitted by the proponent, to any evaluation report relating to the action prepared and to the making of the decision. Finally, the ability to comment upon monitoring results is a necessary check on the operation of monitoring procedures.

Consultation and participation can only be effective if copies of EIA documents are made public at each stage of the EIA process (e.g. at the scoping stage as well as on completion of the EIA report). Such documents need to be made readily available at a number of locations convenient to those most likely to be affected by the proposal concerned. The documents also need to be accessible in the sense of being clear and comprehensible. This is especially true of the non-technical summary of the EIA report. ⁽²⁾

Equity demands that copies of EIA documents can be obtained and/or purchased at a reasonable price for detailed perusal. In the United States such documents are generally free of charge whereas a substantial charge may sometimes be made in other jurisdictions.

Proponents have, in the past, frequently invoked confidentiality and secrecy as reasons for not making information about a proposed action available to the public. Many EIA systems expressly permit restrictions on the availability of information where the case for withholding it can be demonstrated. In general, these restrictions

(1) **Wood, C. M. and Bailey, J.** ; “Predominance and independence in environmental impact assessment: the Western Australia model”; Environmental Impact Assessment Review; **1994**.

(2) **Sheate, W. R.** ; “Public Participation: the key to effective environmental assessment”; Environmental Policy and Law; **1991**.

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are seldom invoked in most jurisdictions though instances of national security or commercial sensitivity do sometimes arise.

There exists a large number of consultation and participation methods, each with its own advantages and disadvantages. Examples include:

- questionnaires and surveys
- advertisements
- leafleting
- use of media
- displays
- exhibitions
- telephone 'hot lines'
- open houses
- personal contact
- community liaison staff
- community advisory committees
- group presentations
- workshops
- public meetings
- public inquiries.

The choice of method should clearly be appropriate to the stage of the EIA process at which it is employed. For example, while a public inquiry may well be appropriate immediately prior to decision making, it is very unlikely to be appropriate at the screening stage.⁽¹⁾ In practice, most jurisdictions leave considerable discretion to decision-takers and proponents in their choice of consultation and participation methods.

Intervenor funding is often difficult to arrange and control, but access to such funding can beneficially affect the outcome of the EIA process by making participation more effective. Without financial assistance, local groups may feel at a great disadvantage relative to the proponent at all stages in the EIA process. . However, Canadian experience, among others, has shown that when funding has been made available to help participants prepare for public hearings they have frequently made well conceived and constructive contributions which have led to greater consensus about

(1) **Glasson J., Therivel R. and Chadwick A.** ; “Introduction to Environmental Impact Assessment”; UCL Press; London; **1994.**

the environmental consequences of the proposed action. ⁽¹⁾

As well as the public, various consultees will have valuable contributions to make at the different stages in the EIA process. While it is usual to consult the bodies which are thought likely to provide useful information on an *ad hoc* basis, there are advantages in specifying a list of consultees who must be consulted at the various stages of the EIA process by the proponent and/or the decision-maker.

It is clearly equitable that neighboring authorities, states and countries be consulted where proposals are made which could affect their environments. Many EIA systems make specific provision for such consultation and the 1991 Espoo Convention on Transboundary Impacts has led to an increase in these. Environmental disputes may, of course, still arise but are considerably reduced by transboundary consultation.

As at other stages of the EIA process, the availability of clear guidance on the procedures and techniques for consultation and participation will be helpful to proponents, the decision-making and environmental authorities, consultees and the public.

The publication of the results of consultation and participation is clearly a necessary check on their use in the EIA process. There should be a right to inspect both public and consultee submissions and the use made of them by the responsible agencies.

It is clear that the role of public involvement in the success of the US National Environmental Policy Act in influencing decisions on actions owes much to two factors: *the first* is the right to participate and to gain access to relevant documentation, including that relating to participation; *the second* is the public right of appeal to the courts over EIA decisions.

Other jurisdictions provide opportunities for appeal against the various decisions made during the EIA process.

(1) **Lynn, S. and Wathern, P.** ; “Intervenor funding in the environmental assessment process in Canada”; Project Appraisal; **1991**.

Table 5.28. Evaluation criteria for consultation and participation

Must consultation and participation take place prior to, and following, EIA report publication?
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Must consultation and participation take place prior to scoping, during scoping, during EIA report preparation, during review and following revision, during decision making and during monitoring?

Are copies of EIA documents made public at each stage of the EIA process?

Can copies of EIA documents be obtained/purchased at a reasonable price?
--

Do confidentiality/secretcy restrictions inhibit consultation and participation?
--

Are consultation and participation methods appropriate to the stage of the EIA process at which they are employed?
--

Is funding of public participants provided for?

Are obligatory consultees specified at various stages in the EIA process?

Must adjoining authorities/states/countries be consulted?

Does published guidance on consultation and participation exist?
--

Must the results of consultation and participation be published?
--

Do rights of appeal exist at the various stages of the EIA process?

Does consultation and participation function efficiently and effectively?

Clearly, while such appeal rights should make the EIA process more effective by influencing decisions taken at different stages in the process they need to be tempered by the need to make it efficient. A balance has to be struck between the positive benefits of consultation and participation in ameliorating the impacts of actions and in reaching consensus on environmental outcomes and the financial and time costs involved. Since the expenditure of time, rather than money, often appears to be the principal criticism of those EIA systems with extensive consultation and participation requirements, such a balance could imply limiting the amount of time taken to complete each stage in the EIA process while providing adequate information and the opportunity for appeals to be dealt with effectively.

The various criteria for the evaluation of consultation and participation provisions within the EIA process are listed in [Table 5.28](#). These criteria are used to assist in the analysis of consultation and participation procedures in each of the four EIA systems which now follow.

5.15.2.1 United States of America

Consultation and participation have been the driving force in the evolution of EIA in the United States. The National Environmental Policy Act 1969 (NEPA) requires that relevant federal agencies be consulted during the preparation of the environmental impact statement (EIS) and that the public be involved. The Council on Environmental Quality (CEQ) Regulations specifies that agencies must:

- (a) Make diligent efforts to involve the public in preparing and implementing their NEPA procedures.
- (b) Provide public notice of NEPA-related hearings, public meetings, and the availability of environmental documents so as to inform those persons or agencies who may be interested or affected.

The Regulations make provision for agency consultation and public participation at the following stages of the EIA process:

- in screening (preparation of, and comment upon, the environmental assessment, and comment upon the finding of no significant impact)
- in publication of notice of intent
- in scoping
- in preparation of, and comment upon, the draft EIS
- in preparation of the final EIS
- on the record of decision
- on monitoring results following implementation.

Participation takes a variety of forms, from the making public of documents, to the circulation of documents, to meetings and hearings. EIA documents must be made available to the public either free of charge or for not more than the cost of photocopying. In cases where there is substantial controversy or interest, or where another agency with jurisdiction over the action requests it, a public hearing on the draft EIS must be held. In any event, the lead agency must consult other agencies with jurisdiction or special expertise.

NEPA has no enforcement mechanism specified in statute and CEQ and the Environmental Protection Agency have no enforcement authority. This is why public

access to the NEPA process is so crucial. There are opportunities for recourse to the courts at various stages in the EIA process and interest groups, private citizens, state and local agencies and businesses have taken advantage of these by filing thousands of lawsuits, at great expense. The courts have always required good-faith efforts to comply with NEPA's full disclosure provisions. As Bass and Herson (1993) have pointed out, the Supreme Court has consistently supported the federal agency in each of the 12 cases it has heard. It has also held that NEPA is essentially procedural (notwithstanding the CEQ referral process) and that agencies have no substantive duty under NEPA to protect the environment. ⁽¹⁾

In practice, there are significant weaknesses in participation in the preparation of environmental assessments. Blaug (1993) reported that there was public involvement in less than half of the environmental assessment cases examined, despite the requirements of the Regulations ⁽²⁾

EISs are made widely accessible for inspection. There is virtually no funding for participants in the EIA process. There appear to have been very few difficulties relating to commercial confidentiality but a limited number of EISs, prepared for actions involving national security have not been made available to the public. ⁽³⁾

The response of the public is variable: some actions result in vociferous objections and well-attended meetings, but others elicit no public interest at all. This may depend partially on the nature of the action, and partially on the participation methods employed. On the other hand, agency consultation results in full and informed comments on the draft EIS from the relevant federal, state, tribal and local agencies, which must be made public.

(1) **Bass, R. E. and Herson, A. I.** ; “Mastering NEPA: a Step-by-Step Approach”; Solano Press; Point Arena; CA; **1993**.

(2) **Blaug, E. A.** ; “Use of the environmental assessment by federal agencies in NEPA implementation”; The Environmental Professional; **1993**.

(3) **Fogleman, V. M.** ; “Guide to the National Environment Policy Act: Interpretations, Applications and Compliance”; Quorum; New York. NY; **1990**.

5.15.2.2 United Kingdom

The use of consultation and participation is officially encouraged throughout the environmental assessment process in the United Kingdom. Consultation can, and sometimes does, take place at the screening stage and, if a formal opinion is requested of the local planning authority (LPA), the material provided by the developer is made public and representations can be made about the need for environmental assessment (EA).

Consultation often takes place at the scoping stage and the provision of information by the statutory consultees frequently occurs during the preparation of the environmental statement (ES). However, it is only once the ES has been submitted that the LPA must consult. Prior to this, public participation takes place only in a minority of cases.

The LPA is required to forward, or arrange for the forwarding of, copies of the ES to the statutory consultees and to take their comments, together with those of the public, into account before reaching a decision.

Consultees must be allowed 14 days to comment, and the public has 21 days. Where additional information is provided by the developer following a request by the LPA, this too must be circulated to consultees and the public. As mentioned in before, there is no formal consultation and participation requirement during the LPA decision-making process, though lobbying and, sometimes, the right to address LPA decision-makers while the decision is being discussed, are permitted. There is, of course; a right of the public and consultees to be heard at public inquiries. Similarly, there exists no public right to participation in the monitoring of implemented projects

As mentioned before, local planning authorities are required to keep planning registers and there is a public right to inspect many of the documents prepared during the EIA process, by visiting the local authority offices. Advertisements and site notices must be placed where environmental assessment is required. The environmental statement must not only be made readily accessible to the public, but available for purchase at a 'reasonable' charge. On the whole, purchase prices of ESs in the United Kingdom are indeed reasonable (many being free of charge) but a

minority are expensive.⁽¹⁾

Issues of confidentiality and secrecy have seldom arisen in relation to the EIA process in the United Kingdom.

No requirements as to consultation and participation methods are laid down in the Regulations, beyond those relating to the availability of environmental statements. However, it is suggested that:

The authority and the developer may wish to consider the need for further publicity at this stage, for example, publication of further details of the project in a local newspaper, or an exhibition.⁽²⁾

Similarly, there is no provision for the funding of public participants in the EIA process. Apart from the usual statutory consultees for planning applications, the Countryside Commission, English Nature and, for certain developments, Her Majesty's Inspectorate of Pollution must be consulted where an ES is received in England. As required by the European Directive, adjoining member states must be consulted by the British Government where a project is likely to have significant effects on their environment though this has seldom occurred. Consultation of neighboring local authorities is at the discretion of the LPA.

There is no published guidance on consultation and participation beyond that in the Circular (DOE, 1988a) and the Guide (DOE, 1989). While there is no separate publication of the results of consultation and participation, it is normally possible to inspect both the responses and their analysis at the offices of the LPA.

Although the developer has rights of appeal against the LPA's screening decisions and against its decision on the planning application no similar right of appeal by statutory consultees or by the public exists at these or any other stages in the EIA process.

In one-third of a sample of 24 cases, the distribution of the ES to the statutory consultees was undertaken, following prior arrangement, by the LPA. In just under a

(1) **Jones C. E., Lee N. and Wood C. M.** ; “UK Environmental Statements 1988-1990: an Analysis” ; Occasional Paper 29; Department of Planning and Landscape, University of Manchester; **1991**.

(2) **Department of the Environment**; “Environmental Assessment: a Guide to the Procedures”; HMSO, London; **1989**.

further third of the cases the developer or consultant sent a copy of the ES directly to the statutory consultees, and the LPA was informed of this action in all but one case.

The consultation process, by both the LPA and the developers and consultants, included a variety of bodies additional to (and often instead of) the statutory consultees, such as the National Rivers Authority, the Health and Safety Executive and the water companies.

In one-quarter of the cases the Countryside Commission was not consulted at all and did not receive a copy of the ES. Some breaches in the statutory procedure therefore took place. In over two-thirds of cases the consultations with the statutory consultees and the public based upon the ES were thought to have been helpful to the LPA. ⁽¹⁾

To summarize, consultation and participation is not a requirement of the UK EIA system prior to the submission of the ES, though it frequently occurs informally as well as formally subsequent to submission. Practice varies substantially and there is clearly scope for consultation and participation to become more effective, especially in relation to the largely marginal role played by the general public in the EA process.

5.15.2.3 New Zealand

The Resource Management Act 1991 contains several provisions relating to public participation. The Fourth Schedule specifies that the proponent should include a list of affected or interested persons, the consultation undertaken and any response to the views of those consulted.

As mentioned before, where an application is found to have major effects and is notified by the local council, in consultation with the people affected by the proposal, the developer can be asked to provide an explanation of 'the consultation undertaken by the applicant'.

Consultation and negotiation with affected parties is not new in New Zealand but the Act makes it necessary for the developer to include a description of discussions and their outcome in the EIA report, since the local council can insist on this. Consultation

(1) Wood, C. M. and Jones, C. E. ; “Monitoring Environmental Assessment and Planning”; Department of the Environment; HMSO; London; 1991.

and participation prior to EIA report submission is thus not mandatory but is very strongly advised.

Local authorities are required to make EIA documentation available to the general public where projects are notified (though there are no provisions relating to purchase of EIA reports). Certain consultees must be informed of the existence of the EIA report. There exists the right for the applicant or an objector to insist that a public hearing be held.

There is no funding of public participants in the EIA process. There is, however, a valuable official guidance document on public participation.⁽¹⁾

As Dixon (1993b) has pointed out, the role of the public is crucial in ensuring that the EIA system functions effectively.⁽²⁾

Morgan (1993) supported this view and suggested that non-technical summaries need to be made available and that the accessibility of EIA documentation ought to be improved. He discerned real shortcomings in the involvement of the public, and reported that councils rarely consult the public early enough in the process and often fail to encourage applicants to consult the public. Their publicity for applications often neglects to mention that environmental information is available for examination. Many EIAs were found to be overly technical and Morgan felt that guidance on EIA needed to be specifically targeted at the public.⁽³⁾

It is apparent that, in practice, the public participation provisions of the Act are not being implemented enthusiastically. It is expected that, with experience and with the precedents created by the Planning Tribunal practice will improve.

(1) **Ministry for the Environment**; “Scoping of Environmental Effects: a Guide to Scoping and Public Review Methods in Environmental Assessment”; MfE; Wellington; **1992**.

(2) **Dixon**; “The integration of EIA and planning in New Zealand: changing process and practice”; Journal of Environmental Planning and Management; **1993b**.

(3) **Morgan, R. K.** ; “An evaluation of progress with implementing the environmental assessment requirements of the Resource Management Act”; International Proceeding of Association for Impact Assessment Conference; Shanghai; IAIA; Belhaven; NC; **1993**.

5.15.2.4 Egypt

Consultation and participation considered as the engine in the evolution of EIA in any country. The Law of Environment (1994) requires that relevant governmental and Non-governmental agencies be consulted during the preparation of the environmental impact assessment and that the public be involved.

The Law of Environment (1994) and its executive regulations didn't mention in which step does the Consultation and participation take place and how could the participation be done (by making public of documents or by meetings and hearings or by any other way) and there is no guidance on consultation and participation to clarify these detailed points, but EEAA (1999) has published an EIA guidelines for industrial estates development and mentioned that:

Each step in EIA process requires appropriate consultation with all those with an interest in the proposal, including the regulatory authorities and the wider community in the local area, to ensure that relevant views are taken into account. Consultation should be initiated at the scoping stage of the EIA.⁽¹⁾

EEAA (1999) also stated that:

Appropriate environmental advice should be sought from the start of planning for a development. As planning proceeds it will generally be necessary to bring more specialized people in to deal with particular issues...The EIA should be prepared by a team of consultants with sufficient expertise to cover all environmental aspects of the proposal...

Egyptian Red Sea Coastal and Marine Resources Management Project (1998) mentioned that many EIA studies for touristic projects presented to Touristic Development Agency, Red Sea Governorate and Egyptian Environmental Affairs Agency have treated the consultation and participation with a very little concern.⁽²⁾

Baker (2000) mentioned in her study 'Environmental Management in Egypt' that:

(1) **SEAM Project/ Egyptian Environmental Affairs Agency** ; "Environmental Impact Assessment: Guidelines for Industrial Estates Development"; **1999**.

(1) **Egyptian Red Sea Coastal and Marine Resources Management Project**; "Environmental Impact Assessment. Basis and Procedures Guidelines for Coastal Projects in Red Sea"; **1998**.

...there is a need to strengthen the link between Urban Planning and environmental regulations and to allow for public participation in the approval of new project...⁽¹⁾

In practice, there is no public participation in the preparation of environmental impact assessment in Egypt. The Officials in EEAA and Touristic Development Agency said that there is a unique case (only one case among 300 cases of EIA study) in public participation in Egypt. In this case the developer was constrained by an international agency funded his project.

5.15.3 Summary of the consultation and participation in the EIA systems

Table 5.29 masks some significant variations in consultation and participation between and within countries.

The weakest requirements for pre-EIA report participation are those in the United Kingdom which, with New Zealand, is the only EIA system not formally to require scoping. While some consultation takes place in the United Kingdom on an informal basis prior to the ES, the involvement of the public is relatively rare.

In New Zealand, the local authorities have the power to demand that consultation and participation take place prior to submission of EIA reports for notified projects. In Egypt the Law supports consultation and participation but in practice consultation takes place, and participation is not exist.

(2) **Baker, S.** ; “Environmental Management in Egypt: Towards a Unified Capacity Development Approach”; Paper presented to the Regional Arab Conference ‘Environmental Balance and Sustainable Urban Development’; Cairo, Egypt; **2000**.

Table 5.29. The treatment of consultation and participation in the EIA systems

Criterion 11: Must consultation and participation take place prior to, and following, EIA report publication?

Jurisdiction	Criterion met?	Comment
United States	Yes	Consultation and participation take place at several stages in EIS preparation.
United Kingdom	Partially	Some voluntary consultation and participation takes place following ES release.
New Zealand	Partially	Duty to consult following EIA report publication, local council strongly recommended to require developer to consult earlier.
Egypt	Partially	Consultation takes place but participation not exist

In the United States there is full provision for early participation and consultation in the preparation of the main EIA report (the EIS and the EIR respectively) but provisions relating to public involvement in the preparation of environmental assessments in the United States are often not observed, and almost do not exist .

5.16 Criterion 12: Monitoring of EIA Systems

5.16.1 Introduction

In addition to the monitoring and auditing of impact actions it increasingly being recognized that some structure of EIA system monitoring is needed. ⁽¹⁾ The principal purposes of EIA system monitoring are the diffusion of EIA practice and the amendment of the EIA system to incorporate feedback from experience and remedy any weaknesses identified. However, the degree of detail of the records kept on the numbers of EIA reports produced, types of projects assessed, decisions reached, numbers of implemented projects, availability of documents, etc., may vary. This section outlines the issues to be covered in the monitoring of EIA systems and puts forward a set of evaluation criteria for EIA system monitoring.

5.16.2 EIA system monitoring

There are numerous elements of any EIA system which can be monitored with a view to diffusion of best EIA practice and amendment of the system to incorporate feedback from experience. However, the diffusion of best practice does not depend only upon EIA system monitoring but also upon such matters as the provision of published guidance and of training and the undertaking of research.

In any EIA system, a definitive record of the number of EIA reports undertaken should be maintained and made public. This record should relate both to total numbers of EIA reports and to EIA reports for different types of action. Clearly, sufficient details relating to the precise title of each document, its length, its date, its price, where it may be inspected or obtained and any other relevant matters should be made available. Such records are available in many EIA systems.

Where formal reviews of EIA reports are undertaken a record of these and the results obtained should be kept and made public. In addition, the existence of other EIA documents such as scoping reports should be recorded. Similar details to those listed for EIA reports should be maintained for this other EIA documentation generated

(1) **Canadian Environmental Assessment Research Council; “Evaluating Environmental Impact Assessment: an Action Prospectus”; CEARC, Hull; Quebec; 1988.**

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within the EIA system. Practice in the maintenance of such records tends to vary from one EIA system to another.

Ideally, all EIA reports and other EIA documents should be publicly available at one or more central locations during reasonable hours. Collections of EIA reports provide an invaluable source of information to those engaged in preparing such documents, to those responsible for reviewing them, to those likely to be consulted, to the public and to those undertaking research. In practice, such documents may be consulted in many EIA systems, with varying degrees of difficulty.

There are considerable difficulties in obtaining accurate information about the financial costs involved in undertaking EIA. However, while the costs of EIA report preparation may be difficult to distinguish from other activities associated with the action some information about expenditure incurred in preparing and processing EIA documents in every EIA system should be obtained, perhaps on a sample basis, and centrally recorded. Details about numbers of staff involved in EIA, as well as about consultancy costs and any fee payments should be maintained and made public. As with other aspects of EIA system monitoring, such information is easier to collect if a single agency is responsible and practice varies accordingly.

Similar information should be collected and maintained in relation to the time required to undertake EIA. Data obtained should include the amount of time needed to process each EIA report once it has been received. As elsewhere in the EIA process, there are numerous measurement difficulties but reasonably reliable records, possibly on a sample basis, can be kept if the will to do so exists. ⁽¹⁾

Experience of specific EIAs may reveal that changes in practice or procedure within the EIA system need to be made. Provision for effective feedback should therefore exist. This may take the form of practice advice notes, circulars, regulations, training, amendment of project-specific or generic guidelines or other means. Clearly such feedback tends to be most effective where only a limited number of responsible authorities are involved in the EIA process and practice varies between jurisdictions.

(1) **Hart, S. L.** ; “The costs of environmental review: assessment methods and trends. In Hart S L, Enk G A and Hornick W F (eds) *Improving Impact Assessment: Increasing the Relevance and Utilization of Scientific and Technical Information*”; Westview Press; Boulder CO; 1984.

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More generally, reviews of any EIA system should be carried out from time to time and any necessary changes to the system implemented. The better the EIA system monitoring information obtained, the easier such a review will be. As with other elements of the EIA process, the role of consultation and participation in reviews of the EIA system is important and should be adequately provided for. Most jurisdictions have carried out reviews of their EIA systems from time to time and most would probably wish to implement further modifications at any specific time.

Table 5.30. Evaluation criteria for EIA system monitoring

Must the EIA system be monitored and, if necessary, be amended to incorporate feedback from experience?
Is a record of EIA reports for various types of action kept and made public?
Are records of other EIA documents kept and made public?
Are EIA reports and other EIA documents publicly available at one or more locations?
Are records of the financial costs of EIA kept and made public?
Is information on the time required for EIA collected and made public?
Are the lessons from specific EIAs fed back into the system?
Have reviews of the EIA system been carried out and changes made?
Is consultation and participation required in EIA system review?
Does the monitoring of the EIA system function efficiently and effectively?

Finally, and again in common with other elements of the EIA system, the monitoring of the EIA system should be effective (i.e. lead to achievement of its goals) and efficient (i.e. not consume disproportionate financial, managerial or time resources). This and the other criteria discussed above are summarized in Table 5.30. The various evaluation criteria are used in the comparative review of EIA system monitoring which now follows.

5.16.2.1 United States of America

The Council on Environmental Quality (CEQ) was created by the National Environmental Policy Act (NEPA) and given the responsibility for environmental policy development and the duty to review and appraise federal agency compliance

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with NEPA. Part of this CEQ oversight involves the preparation of annual reports which summarize the trends in the implementation of NEPA (numbers of statements, numbers of court cases, significant developments, etc.). The annual reports of CEQ provide an invaluable picture of the operation of NEPA over the years (and of environmental trends in the United States generally).

Since the Environmental Protection Agency (EPA) must notify each draft and final environmental impact statement (EIS) in the Federal Register, listings of all EISs can readily be obtained from the EPA, if necessary broken down by type of action and/or by agency and geographical location. Copies of EISs must be filed by EPA. EPA only maintains a library of EISs in hard copy form for two years. However, EISs are available for inspection or loan at the library of Northwestern University, Illinois. Each year EISs are copied on to microfiche by a commercial agency (Cambridge Scientific Abstracts) from whom copies may be purchased. Monthly and annual catalogues are prepared and copies of both the catalogues and of the microfiches may be perused at the EPA Library in Washington, DC.

There is no central record of other NEPA documents (e.g. environmental assessments, findings of no significant impact, records of decision) but each of the agencies maintains at least some statistics on these documents. Copies of other NEPA documents are not kept centrally or filed on a long-term basis by the relevant agencies. No regular records of the financial costs or time requirements of EIA are maintained.

A number of federal reviews of the operation of the whole EIA system have been carried out, most notably those leading to the 1978 Regulations and that initiated during the early Reagan years. There have also been federally funded reviews of parts of the EIA system. In addition, federal agencies have conducted reviews of their own NEPA procedures and fed lessons from specific EIAs (perhaps as a result of court cases) back into their systems. These reviews have generally involved extensive consultation. Further, there have been numerous academic reviews of the US EIA system, especially as it has come of age.⁽¹⁾

(1) **Hildebrand, S. G. and Cannon, J. B.** ; *“Environmental Analysis: the NEPA Experience”*; Lewis; Boca Raton, FL; 1993.

5.16.2.2 United Kingdom

There is no single official comprehensive listing of all the environmental statements (ESs) which have been published in the United Kingdom. The Planning Regulations for England and Wales and for Scotland require local planning authorities to send three copies of any ES to the appropriate government department when it is received. On the basis of this information, the Department of the Environment (DOE) regularly prepares lists of ESs prepared under the Planning Regulations which are published in the *Journal of Planning and Environment Law*. Information about the name of the local planning authority (LPA), about the nature of the development and about the category of project within Schedule I or 2 to the Regulations is provided. Because of non-compliance, or late compliance, with the requirement for LPAs to send copies of ESs to central government, these lists tend to be incomplete or not up to date. Nevertheless, the monitoring situation with regard to planning ESs is much better than for projects approved under other regulations. ⁽¹⁾

The Circular (DOE, 1988a) requests LPAs to notify the Secretary of State about various decisions relating to EA prior to submission of the ES. Summaries of opinions, notifications and directions are also published in the *Journal of Planning and Environment Law*. The published information is generally regarded as valuable by LPAs and others, although it is not without weaknesses. ⁽²⁾

There is no monitoring of public inquiry decisions on planning appeals or call-in cases involving EA. This is unhelpful, since such decisions provide important precedents, even though they do not have legal force.

There is no single repository of ESs for all types of projects for the whole United Kingdom. English ESs prepared under the Planning Regulations may be inspected at the Library of the Department of the Environment in London but the collection is far from complete as ESs may still be in use within DOE. Other collections such as those at the EIA Centre, Manchester University, at the Institute of Environmental Assessment and at Oxford Brookes University, are also incomplete. No record of the

(1) **Jones C. E., Lee N. and Wood C. M.** ; “UK Environmental Statements 1988-1990: an Analysis” ; Occasional Paper 29; Department of Planning and Landscape, University of Manchester; **1991**.

(2) **Wood, C. M. and Jones, C. E.** ; “Monitoring Environmental Assessment and Planning”; Department of the Environment; HMSO; London; **1991**.

monetary costs and time required for EIA are kept though some information on these topics was collected for a sample of ESs.

Inevitably, as experience has been gained with EIA, practice has improved and minor modifications have been made to the operation of the EIA system by DOE. These have mostly related to discussions regarding screening. DOE also commissioned a monitoring review of the operation of the EIA system.⁽¹⁾

As a result of experience and the recommendations arising from the review, guidance additional to that provided by the Circular (DOE, 1988a) and the Guide (DOE, 1989) was commissioned. Changes to the Planning Regulations were made which extended the scope of EA to various other projects and changed a number of procedures relating, for example, to consultation and participation where further documentation is required by the LPA. The proposed changes arising from the review were circulated for comment, but there was no participation in the review itself (though some consultation took place).

In brief, while the only formal requirement for EIA system monitoring involves the provision of copies of ESs for central government, lists of ESs exist, some monitoring of the system takes place, a review of the EIA system has been undertaken and amendments have been made.

5.16.2.3 New Zealand

The Ministry for the Environment is required to monitor the effect and implementation of the Resource Management Act 1991. There is, however, no duty to review the operation of the Act in a specified number of years. Nor does the Act contain any specific monitoring requirements, such as a duty to collect documentation at a central point of reference, or to record EIA reports. Morgan (1993) has stressed the need for a register of EIA documents to assist in diffusion of best practice, scoping and other EIA activities.⁽²⁾

This lack of provision for recording and collection is perhaps surprising since a copy

(1) **Wood, C. M. and Jones, C. E.** ; “Monitoring Environmental Assessment and Planning”; Department of the Environment; HMSO; London; **1991**.

(2) **Morgan, R. K.** ; “An evaluation of progress with implementing the environmental assessment requirements of the Resource Management Act”; International Proceeding of Association for Impact Assessment Conference; Shanghai; IAIA; Belhaven; NC; **1993**.

of each environmental impact report and the corresponding audit prepared under the Environmental Protection and Enhancement Procedures is housed in the library of the Ministry for the Environment (MfE). However, the Ministry for the Environment continues to play an informal but important role in the dissemination of information about EIA. This type of information exchange is common in New Zealand where professional networks tend to be small.

The Parliamentary Commissioner for the Environment also helps to ensure that lessons learned from specific EIAs are fed back into the system since its reports are published and disseminated. It is likely, however, that the major element in EIA system development will be the decisions of the Planning Tribunal which are widely read by environmental professionals. Some information on the EIA system is available within universities and consultancies but no data on the costs and duration of EIAs appear to be collected.

Some monitoring of the EIA system is taking place independently. In particular, Morgan's (1993) study of the operation of Resource Management Act EIA procedures throws light on current practice. Unsurprisingly, he reported that procedures for major developments are operating as before with the retention of consultants and the preparation of professional EIA reports. However, smaller proposals are creating difficulties since large numbers of very short EIA reports are being prepared by inexperienced applicants and reviewed by inexperienced and overwhelmed council officials. Many of these EIA reports will probably not be required once screening criteria are set down in operative regional and (especially) district plans.

5.16.2.4 Egypt

The Egyptian Environmental Affairs Agency (EEAA) was created by the Law of Environmental (No 4/1994) and given the responsibility for environmental policy development and the duty to review and appraise the EIA studies. EEAA oversight involves the preparation of a register includes copy of the data forms presented by developers (these forms contain all the data and information on the project which helps in the EIA) and the results of the EIA and also, any other comments of EEAA.

Actually, not only there is no publication of these registers or any of its components but also there is no publication of any information on the EIA reports or other documents, and there is no way for any person to obtain any information about a specified EIA study.

Financial costs of EIA haven't been recorded by EEAA or any other relevant agencies, hence it is too difficult to obtain accurate information about this topic.

There are no reviews of the operation of the whole EIA system have been carried out and no one (governmental agencies-consultants) intended to do that, or to feed lessons from specific EIA's back into the system .

5.16.3 Summary of the treatment of system monitoring in the EIA systems

The EIA system in the United States meets the EIA system monitoring criterion (Table 5.31). The EIA systems in the United Kingdom, New Zealand and Egypt are adjudged not to meet it.

It is probably no coincidence that the EIA systems which are monitored all possess a single body with overall responsibility for EIA and have a legal duty to review or oversee the EIA system. The US EIA system does not possess a legally imposed quinquennial review requirement though it does demand an annual report on the operation of the system.

It is the major task of the Council on Environmental Quality to oversee the US EIA system but it has recently had to make do with far fewer staff resources than it needs to undertake its oversight role effectively. Fortunately, the Environmental Protection Agency has the resources necessary to undertake the EIA system monitoring function in the United States.

The United Kingdom, New Zealand and Egypt requirements do not include a formal duty to review or monitor the EIA systems and the jurisdictions do not allocate sufficient resources to the central bodies responsible for EIA to permit effective system monitoring to take place. The first steps in improving EIA system monitoring are clearly to make it a legal requirement and to provide the resources available to undertake it.

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Table 5.31. The treatment of system monitoring in the EIA systems

Criterion 12: Must the EIA system be monitored and, if necessary, be amended to incorporate feedback from experience?

Jurisdiction	Criterion met?	Comment
United States	Yes	Council on Environmental Quality charged with general oversight of EIA implementation. Numerous reviews undertaken and amendments made.
United Kingdom	No	No formal general requirement to monitor but some records published. EIA system review undertaken, and changes made to improve operation.
New Zealand	No	Duty to monitor operation of Act as a whole but not to collect data, review or amend EIA system.
Egypt	No	No formal general requirement to review and monitor the whole EIA system and no records published

5.17 Criterion 13: Costs and benefits of EIA Systems

5.17.1 Introduction

As mentioned before, there has been, as yet, no reliable quantification of the effectiveness of EIA, and it may be that it can only be measured subjectively and qualitatively by examining the attitudes and opinions of those involved. While the existence of firm justification remains scarce, the continued diffusion of EIA requirements around the world demonstrates the prevailing belief that EIA is an effective and efficient environmental management tool. This section discusses the various ways of attempting to evaluate the costs and benefits of EIA systems, relying mainly upon the opinions of the participants in the EIA process. A set of evaluation criteria for the costs and benefits of EIA systems is put forward.

5.17.2 Costs and benefits of EIA Systems

For a variety of reasons, the costs of EIA systems are difficult to distinguish from other costs incurred in obtaining approvals. The chief reason, however, is the integration of EIA into decision-making processes. As Hart (1984) has stated:

The costs associated with [EIA] activities become harder to identify as environmental considerations are better integrated into planning and decision making. Thus, a 'successful' EIS program is defined, in part, by its inability to be evaluated accurately in terms of economic efficiency.

Hart (1984) distinguishes four principal elements of the cost of the EIA process:

- document preparation, review, circulation, and administration of the law costs*
- delay (inflation and foregone opportunity) costs*
- uncertainty costs (due to risk of failure)*
- mitigation costs (which increase or may be decreased).⁽¹⁾*

(1) **Hart, S. L.** ; “The costs of environmental review: assessment methods and trends. In Hart S L, Enk G A and Hornick W F (eds) *Improving Impact Assessment: Increasing the Relevance and Utilization of Scientific and Technical Information*”; Westview Press; Boulder CO; 1984.

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While the costs of program administration and document preparation, circulation and review are not easy to calculate, they are less difficult than those associated with delay, uncertainty and mitigation.

Apart from the costs involved in preparing the EIA documentation, the proponent may have to pay a fee to the decision-making authority for EIA report review (as in the United States) or may have to pay the authority's review consultants (as in New Zealand). Decision-making authorities may have to maintain a specialist EIA staff unit, or to shift time and resources from other activities. Similarly, consultee organizations and the public will have to expend resources if they are to participate effectively. While the additional costs attributable to EIA are not known, it is widely held that the 'costs of environmental review are generally insignificant when compared to other accepted planning, design and regulatory costs'.⁽¹⁾

Costs of EIA as a proportion of total project costs generally appear to range from about 0.1 to 1 per cent, with 0.5 per cent being a commonly quoted figure.⁽²⁾

In some instances, as in a study of the costs of the EIA of wastewater treatment facilities carried out by the US Environmental Protection Agency, it has been claimed that the benefits of EIA included 'cost-savings that were the result of project changes prompted by the EIS process'.⁽³⁾

Closely allied to the question of cost is that of delay. Most EIA systems specify the times within which the various stages of the EIA process should be completed. There may be lengthy periods for public participation at several stages in the EIA process (as in the United States) as well as a specified period during which the decision, based upon the EIA report, should be made (as in the United Kingdom).

(1) **Hart, S. L.** ; "The costs of environmental review: assessment methods and trends. In Hart S L, Enk G A and Hornick W F (eds) *Improving Impact Assessment: Increasing the Relevance and Utilization of Scientific and Technical Information*"; Westview Press; Boulder CO; **1984**.

(2) **Hollick, M.** "Environmental impact assessment: an international evaluation"; Environmental Management; Wiley; Chichester; **1986**.

(3) **Council on Environmental Quality**; "Environmental Quality 1989: Twentieth Annual Report"; USGPO; Washington, DC; **1990**.

The time taken by the decision-making authorities frequently exceeds that specified (although this is frequently because of inadequacies in the information provided by proponents) and this is a source of major complaint by proponents.

Delays have been a constant source of complaint since the US National Environmental Policy Act came into effect. However, many developers have built considerable lead-times into their project planning procedures to accommodate the EIA process. Others submit 'draft' EIA reports for informal scrutiny and amendment before formal submission to try to avoid the problems of delay caused by complying with later requests for further information. While proponents have complained of delay in EIA procedures, they have frequently not implemented approvals promptly once they have been granted.

Nevertheless, despite the absence of reliable information about expenditures, delays remain a recurring source of anxiety in many jurisdictions. One method of overcoming these problems is the agreement of an action-specific timetable between the proponent and the decision-making authority which allows for the submission of further information only under specified circumstances.

EIA is intended to improve the quality of decisions having environmental implications by amending the behavior of proponents, consultants, consultees, the public and the decision-making authorities. Examples of such changes in behavior include an increase in public participation in decision making and increased coordination between the authorities responsible for environmental protection. It is generally accepted that such changes take time but that they have taken place in the more mature EIA systems.

The crucial question in relation to the efficacy of EIA is whether the quality of decisions has actually increased and whether they have become more acceptable as a consequence of its use. Examples of the effectiveness of EIA would include the increased use of modification or mitigation, the use of more stringent conditions upon permissions and the refusal of proposals which might previously have been approved.

Once again, it is very difficult to obtain concrete evidence of such changes, though the US Environmental Protection Agency study mentioned above, as well as

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demonstrating cost savings and improved opportunities for public participation in the decision-making process, showed that EIA 'was effective in (1) causing major changes in projects, (2) providing more protection for the environment'.⁽¹⁾

It is, therefore, generally necessary to rely on participants' opinions about the effectiveness of EIA systems in improving the environmental quality of decision making. Since it should be the aim of any EIA system not only to minimize costs but to maximize environmental benefits, a final question about the effectiveness of EIA must be posed: is there any evidence that EIA has led to any improvement in the quality of the environment generally?

Since EIA is only one of an array of environmental management measures, it is extremely difficult to distinguish its effect from those of other anticipatory controls, pollution controls, environmental standards, environmental designations, etc.

Table 5.32. Evaluation criteria for the costs and benefits of EIA Systems

Are the financial costs and time requirements of the EIA system acceptable to those involved and are they believed to be outweighed by discernible environmental benefits?

Do the financial costs of the EIA process to proponents, consultees, the public and the decision-making authorities exceed those which would have been incurred in any event?

Do the times required to complete the various stages of the EIA process exceed those specified?

Do the participants in the EIA process believe that it has altered the behavior of proponents consultants, consultees, the public and the decision-making authorities?
--

Do the participants in the EIA process believe that the environmental quality and acceptability of decisions are improved by it?
--

Does empirical evidence exist that the EIA process has significantly altered the outcome of decisions?
--

It is, therefore, doubtful whether evidence of general environmental improvement attributable to EIA (as opposed to anecdotal evidence of the effectiveness of EIA in improving, or preventing the deterioration of, a particular local environment) can ever

(1) **Council on Environmental Quality**; "Environmental Quality 1989:Twentieth Annual Report"; USGPO; Washington, DC; 1990.

be adduced. This does not mean that this ultimate criterion should not be advanced as a yardstick, simply that it is likely to remain theoretical. It has therefore not been included with the other criteria summarized in Table 5.32. These criteria are now employed to analyze the costs and benefits of each of the four EIA systems.

5.17.2.1 United States of America

The costs of EIA in the United States are substantial, and most exceed those that would have been incurred had the National Environmental Policy Act 1969 (NEPA) never been passed. Despite the fact that some (EISs) cost hundreds of thousands (and occasionally millions) of dollars, the cost of EIA is generally seen as 'part of the cost of doing business'. This, perhaps, is why authoritative EIA costs are so elusive: they may be inextricably tied to other related costs.

While the Council on Environmental Quality (CEQ) has only a very small staff, total employment in EIA must run to several thousands in the United States. The Environmental Protection Agency alone employs several hundred personnel to meet its EIA commitments.

Generally, EIAs take longer to complete than the times specified in the Regulations. However, many EIAs take no more than 12-18 months, though occasional cases may take 30 months from initiation to the record of decision.

The participants in the EIA process have adapted to these times, but proponents still resent unexpected delays. The participants in the EIA process firmly believe that their own behavior and that of others has been affected by the EIA process. There have been numerous independent confirmations of these changes of behavior.

The participants in the EIA process also believe that both the environmental quality and the acceptability of decisions have been improved by NEPA, though few are entirely satisfied with the process or the product. . In particular, it is widely felt that projects are now much better designed and impacts better mitigated than was previously the case and that certain projects have been abandoned as a result of EIA.⁽¹⁾

(1) **Dickerson, W. and Montgomery, J. ; “Substantive scientific and technical guidance for NEPA analysis: pitfalls in the real world”; The Environmental Professional; 1993.**

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The various participants in the EIA process have always supported it when its future was threatened. Despite this almost universal view, it is not possible to produce unambiguous evidence that the EIA process has significantly altered the outcome of decisions.

EIA has been in being for a quarter of a century and parallel changes in environmental management have made it impossible to unravel the effect of EIA from all the other factors determining the outcome of decisions. In the last analysis, as explained before, the opinions of the participants in the EIA process are probably the only measure of success or failure.

Bear (1988) found very little empirical evidence of the effect of EIA on decision making. She cited reduced EIA litigation as one indicator of success, but this is, at best, ambiguous.⁽¹⁾

Clark (1993) was remarkably frank about CEQ's view of the success and failures of EIA:

Certainly, many environmental impact statements (EISs) are too long, take too long to prepare, cost too much, and many times do little to protect the environment. Some EISs are prepared to justify decisions already made, many agencies fail to monitor during and after the project, some agencies do not provide adequate public involvement, and few agencies assess the cumulative effects of an action.⁽²⁾

Others have criticized weaknesses in the treatment of cumulative impacts, biological diversity and global climate change in EIA.⁽³⁾

Yost (1990) believed that the EIA provisions in NEPA are successful because they are essentially procedural, but that the Supreme Court has undone the promise of NEPA.⁽⁴⁾

(1) **Bear, D.** ; “Does NEPA make a difference?” ; *EPA Journal*; **1988**.

(2) **Clark;** “The National Environmental Policy Act and the role of the President’s Council on Environmental Quality”; *The Environmental Professional*; **1993**.

(3) **Hildebrand, S. G. and Cannon, J. B.** ; “Environmental Analysis: the NEPA Experience”; Lewis; Boca Raton, FL; **1993**.

(4) **Yost, N. C.** ; “NEPA’s promise partially fulfilled”; *Environmental Law*; **1990**.

Caldwell (1989b) argued that, while environmentally destructive projects are still being proposed, NEPA 'has worked to reduce the extent of officially sponsored environmental damage'. This view is almost unanimous: the benefits of EIA in the United States are generally perceived considerably to outweigh its costs. ⁽¹⁾

5.17.2.2 United Kingdom

Under the Planning Regulations, most of the cost of environmental assessment (EA) is borne by the developer and by local planning authorities (LPAs). Of a sample of 24 cases, just under half of the developers prepared the environmental statement (ES) themselves, although some used consultants for specific aspects (e.g. noise, ecology).

Consultants were used in the remainder of cases and most appeared to charge £10,000-£50,000 for their services. Nearly two-thirds of developers felt that consultants would have been employed in the absence of EA, but not necessarily to the same extent. Overall, nearly two-thirds of developers felt that EA had caused a slight increase in their costs of obtaining planning permission. One-fifth of LPAs used consultants to evaluate the ES, their costs ranging from less than £1000 to over £20,000 in addition to staff time. ⁽²⁾

The Regulations extend the time allowed to the LPA to reach a decision from 8 weeks to 16 weeks. Of the 20 applications in the sample where a decision is known to have been reached, one-half were decided in less than the required 4 months, one-fifth took 4-6 months, one-tenth 6-8 months and one-fifth 8-10 months. Just over half of the planning officers questioned were of the opinion that EA had made no difference to the time taken to decide planning applications. However, two-thirds of the developers and half of the consultants thought that EA had caused a delay to the decision time.

There is little evidence, to date, that EIA has significantly altered the outcome of decisions. However, in general, it is believed that the benefits of EIA in the United Kingdom outweigh its costs. If EIA has not yet greatly increased public participation

(1) **Caldwell, K. L.** ; “Understanding impact analysis: technical process, administrative reform. Policy principle. In Bartlett R V (ed.) Policy through Impact Assessment”; Greenwood Press; New York, NY; **1989b**.

(2) **Wood, C. M. and Jones, C. E.** ; “Monitoring Environmental Assessment and Planning”; Department of the Environment; HMSO; London; **1991**.

it does appear to have led to an increase in coordination between the relevant agencies. Most of the participants in the 24 cases studied, particularly LPAs and developers, expressed the opinion that EA was a worthwhile and helpful procedure which made a positive contribution to informed decision making in the planning system. Further, several of these participants remarked that practice in EA was improving.⁽¹⁾

5.17.2.3 New Zealand

It is fortunate, given the level of inexperience in the operation of New Zealand's new EIA system, that there is virtual unanimity among environmentalists, business, government, local councils and academics about the merits of EIA.⁽²⁾

Morgan (1993) reported similarly positive attitudes towards environmental assessment (EA), despite problems with the numerous requirements of the Resource Management Act 1991 (RMA):

interviewees were almost unanimous in their support for EA and the principles in the RMA on which EA is built. It is seen as an essential part of an integrated approach to planning natural resources and managing the environment in New Zealand. Consequently, most councils seem to be tackling the EA issue in a positive, supportive manner, rather than resisting it.⁽³⁾

It is apparent that most participants in the EIA process believe that the benefits of EIA outweigh the costs. While there is little empirical evidence available about the financial costs of EIA, experience with the Environmental Protection and Enhancement Procedures indicates that they are significant.

(1) **Wood, C. M. and Jones, C. E.** ; “Monitoring Environmental Assessment and Planning”; Department of the Environment; HMSO; London; **1991**.

(2) **Wood, C. M.** ; “Antipodean environmental assessment: a New Zealand/United Kingdom comparison”; Town Planning Review; **1993a**.

(3) **Morgan, R. K.** ; “An evaluation of progress with implementing the environmental assessment requirements of the Resource Management Act”; International Proceeding of Association for Impact Assessment Conference; Shanghai; IAIA; Belhaven; NC; **1993**.

Equally, Morgan (1993) has reported that regional councils have had considerable difficulties in meeting the detailed time constraints imposed by the Act.⁽¹⁾

It is perhaps too early to comment definitively on behavioral changes brought about by the new all-pervasive EIA system but it is apparent that the attitude of many local council officials and elected members to EIA shows considerable scope for further development.⁽²⁾ It is widely believed in New Zealand that the Mark I EIA system did alter the outcome of many decisions and the hope now is that the much more widely applicable Mark II EIA system will do the same.

5.17.2.4 Egypt

There is no doubt that the substantial sums of money in the EIA process considerable exceed those which would have been expended on proposals in any event. It is appear that the costs of EIA in Egypt are borne by the developer but in fact also the government (EEAA) bears part of them. The developer pays the consultees, who prepare the EIA study for him and the government (EEAA) pays their consultants associated in reviewing the EIA studies. There have been some significant complaints about the cost of EIA.

Law 4/1994 represents a real advance in government's authority to use economic instrument and EEAA is currently addressing the potential use of taxes, user charges, and licensing and entrance fees to generate revenue.⁽³⁾

Law 4/1994 identified 60 days to EEAA to review and make a decision on the EIA study (the 60 days counted from EEAA receipt the study from the administrative/licensing authority). Generally, EIAs take longer to complete than the times specified in the Law. However, many EIAs take no more than 4-6 months, though occasional cases may take 2 years. The proponents resent unexpected delays although in many cases the proponents themselves are one of the main reasons of the delay.

(1) **Morgan, R. K.** ; “An evaluation of progress with implementing the environmental assessment requirements of the Resource Management Act”; International Proceeding of Association for Impact Assessment Conference; Shanghai; IAIA; Belhaven; NC; **1993**..

(2) **Dixon**; “The integration of EIA and planning in New Zealand: changing process and practice”; Journal of Environmental Planning and Management; **1993b**.

(3) **Danida**; “Economic Instruments Study in Egypt”; **1995**.

The participants in the EIA process don't believe that the EIA process has affected their own behavior or that of others. Not all of the participants in the EIA process believe that both the environmental quality and the acceptability of decisions have been improved by EEAA. However, Cabinet of Ministers in Egypt has stated that:

... Egypt adopts an environmental policy that supports sustainable development programs taking environmental consideration in perspective... ⁽¹⁾

It is impossible to produce clear evidence that the EIA process has significantly altered the outcome of decisions, but at least there is an outset sense that projects are now much better designed and impacts may be better mitigated.

5.17.3 Summary of the costs and benefits of the EIA systems

In United States, United Kingdom and New Zealand, there is an unanimity of view that the EIA benefits outweigh their costs but in Egypt it is defer some what, the developers complain the financial and time costs and there is only outset sense that projects are environmentally improving (Table 5.33). It is nevertheless quite clear, from the criticisms of the four EIA systems that the effectiveness of EIA can be substantially improved.

It is noticeable that complaints about delays in project approvals as a result of EIA were most vociferous in the United States and Egypt, while complaints about delay are probably least in the UK and New Zealand EIA systems, they do occur in these jurisdictions.

It is clear that delay is the major criticism in most EIA systems. Delay is the main reason why some members of the development industry do not share the general view about the net benefits of EIA. The most significant advance towards the unanimous acceptability of EIA could be made by reducing the delays engendered by it and by explaining fully that these delays are generally attributable much more to proponents than they are to EIA agencies. Needless to say, such efficiency gains must not be made at the expense of EIA effectiveness.

(1) Arab republic of Egypt, Cabinet of Ministers; *Egypt and the 21st Century*; 1997.

Table 5.33. The costs and benefits of the EIA systems

Criterion 13: Are the financial costs and time requirements of the EIA systems acceptable to those involved and are they believed to be outweighed by discernible environmental benefits?

Jurisdiction	Criterion met?	Comment
United States	Yes	Virtually unanimous view by proponents, consultees and the public that benefits of EIA exceed its substantial time and other costs.
United Kingdom	Yes	Consensus (but not unanimity) as to utility of EA in improving project mitigation measures.
New Zealand	Yes	Virtual unanimity of view that benefits of EIA system outweighs costs but considerable unfamiliarity remains.
Egypt	Partially	Developers complain the financial and time costs. there is an outset sense that projects are environmentally improving

CHAPTER 6

RESULTS AND RECOMMENDATIONS

CHAPTER 6

RESULTS AND RECOMMENDATIONS**6.1 Introduction**

As mentioned in the previous chapter, several attempts to develop EIA have taken place. These attempts may be summarized as follows:

- Increasing emphasis on the relationship of EIA to its broader decision-making and environmental management context
- Increasing codification of EIA requirements
- Increasing adoption of additional EIA requirements
- Increasing emphasis on maximizing the benefits and minimizing the costs of EIA

These development attempts are evident in each of the four EIA systems reviewed.

This chapter summarizes the overall performance of the four EIA systems according to the comparison results (presented in the previous chapter) versus the evaluation criteria listed in [Table 5.2](#). To make the results of comparison more easy to recognize , these results will be presented in digital form, consequently, every evaluation criterion will be weighted relatively to the other criterions according to its importance to strengthen the EIA system. Total score of all criterions is 200 points and the strength of system determined by the role “the higher the score, the stronger the system”. [Table 6.1](#)

Several suggestions for improving various EIA systems by overcoming the shortcomings identified are advanced. These suggestions derive directly from the comparative review of the EIA systems and provide one of the principal justifications for such a study.

6.2 United States of America

The US EIA system meets 10 of the 13 evaluation criteria and partially meets another 1 evaluation criteria (155 point score). The main shortcomings of the system relate to *its coverage (which is confined to federal actions), to lack of centrality to decision-*

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making (notwithstanding the requirement to publish a record of decision) and to the mitigation and monitoring of impacts.

Table: 6.1 The overall performance of the EIA systems

<i>Evaluation criterion</i>	Total criterion Weight	<i>jurisdictions</i>			
		<i>United States</i>	<i>United Kingdom</i>	<i>New Zealand</i>	<i>Egypt</i>
1. Legal basis	20	17	16	16	11
2. Coverage	15	8	8	13	5
3. Alternative in design	10	8	8	8	0
4. Screening	20	18	18	18	14
5. Scoping	20	18	4	10	3
6. Content of EIA report	15	14	7	4	7
7. Review of EIA report	15	14	7	14	6
8. Decision making	15	5	5	5	3
9. Impact monitoring	15	5	5	5	4
10. Mitigation	20	18	18	18	3
11. Consultation and Participation	10	9	6	6	4
12. System monitoring	15	13	4	4	2
13. Costs and benefits	10	8	8	8	4
Total	200	155	108	129	66

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Other weaknesses relate to *the lack of oversight of environmental assessments, to lengthy descriptive and derivative environmental impact statements (which neglect the treatment of cumulative impacts) and to the court-driven procedural nature of the system.*

Because the system is operated by federal agencies, the general level of expertise is high but there is still a perceived need for training and guidance. The roles of the Council on Environmental Quality, of the Environmental Protection Agency (EPA) and of public interest groups in maintaining and refining the system and in ensuring that federal agencies perform are pivotal.

Broadening the coverage of NEPA to cover other actions would provoke a constitutional outcry. *Increasing the centrality of EIA to the decision-making process could be achieved by amending NEPA to require that an action could only be taken if all feasible mitigation measures were included in the proposal.* Such a solution could be applied following both EIS and a finding of no significant impact (FONSI). This would go some way to achieving the initial intention of NEPA's authors. *A further improvement would be to ensure that EISs and environmental assessments (EAs) are made shorter and more readable and thus accessible to decision-makers.*

Other improvements include *mandatory public review of FONSI, the provision of guidance on EA generally and the role of public participation in particular.* EPA has prepared a sourcebook that provides guidance on the whole EIA process and CEQ is coordinating the development of a handbook on cumulative impact assessment. *Rendering post-decision monitoring compulsory is a necessary reform. Additional auditing studies are also needed to ensure that innovative mitigation measures are effective.* The referral of more cases to CEQ and an extension of CEQ's role in EIA oversight might also be helpful in increasing the effectiveness of EIA. *There is also a need to improve the quality of predictions by developing methodologies (e.g. for cumulative impacts and effects on ecosystems), by preparing technical guidance and by peer review.*

6.3 United Kingdom

The UK EIA system fully meets four and partially meets another four of the 13 evaluation criteria employed in this comparative review (108 point score) .

Britain's is probably a fairly typical first generation EIA system with screening, environmental statement (ES) publication and public participation provisions integrated into existing town and country planning decision-making processes but without scoping, early participation, unpenalized rights to further information, true centrality of EIA to the decision, third party appeal or monitoring provisions. Obviously, experience of EIA is being gathered by local planning authorities (LPAs), developers and consultants as time elapses and the diffusion of practice takes place, especially in regard to ESs.

However, while the range of experience within consultancies is growing, local authority experience of EIA is still very limited in many cases. This situation will obviously improve with time, with the publication and diffusion of the promised guidance on preparation and review of ESs and with the greater incorporation of environmental considerations into land use plans.

The shortcomings of the UK EIA system relate to impact coverage, to the consideration of alternatives in design, to scoping, to the proponent's response to public comments, to the use made of EA in decision making, to project monitoring, to consultation and participation, to formal system monitoring. They are a reflection of the UK's implementation almost to the letter of the somewhat rudimentary compromise requirements of the European Directive. In these and other aspects of the environmental assessment (EA) process practice varies very considerably from the exemplary to the unprofessional.

These shortcomings mean that the aims of EA, better quality project planning and better quality decision making, are not being universally achieved. If weaknesses continue to be evident as practice evolves, then changes more radical than the provision of EA guidance for those preparing ESs and for those receiving them will be necessary. As a first step, measures relating to many topics could be taken, such as:

- better diffusion of EA information and, in particular, of ESs

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- further training provision
- clarification of screening criteria
- improvement of LPA procedures for coping with EA
- better provision of information to the public
- briefing of planning inspectors on the acceptability of ESs
- research into several aspects of the EA process.

If practice subsequently failed to improve sufficiently then the EA system itself would need to be strengthened, as has happened over the years in many mature EIA systems (e.g. the United States and New Zealand) which now satisfy far more criteria than does the UK's. *Changes to the EA system (and in particular to the treatment of alternatives, to scoping, to formal ES review, to project monitoring and to SEA) should be designed to ensure that the evaluation criteria employed in this review are met more fully than at present.*

6.4 New Zealand

The highly complicated Resource Management Act is one of the first attempts in the world to achieve sustainable management. It is, perhaps, all the more surprising that New Zealand should have relied quite so completely on local discretion in its Mark II EIA system. While the temptation to devolve responsibilities has proved irresistible to a reformist, monetarist, central government, the implementation gap is potentially enormous.

New Zealand is famous for 'do it yourself' activities but to leave local authorities with tiny professional staffs and little or no experience of EIA to evolve screening, scoping, review and decision-making procedures individually seems courageous. Quite apart from the huge task faced by planners in coping with EIA (and other aspects of the Resource Management Act requiring significant professional reorientation) 'there is a danger of turning the clock back 20 years to when central government first embarked on environmental assessment procedures'.

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As each local authority strives to put appropriate EIA provisions in place, it is felt that significant variations would be inevitable, resulting in confusion and uncertainty for proponents and public alike, and so it has proved.

It can be seen from Table 6.1 that the New Zealand EIA system fails to meet several of the evaluation criteria. This may, to some extent, be an inevitable consequence of making the EIA system applicable to such an extraordinary range of activities from the trivial to the highly significant. The EIA system necessarily provides considerable flexibility to ensure that the scale of the EIA is appropriate to the likely severity of the impacts. In some instances (e.g. scoping) a failure is recorded because the requirement is not mandatory. The EIA activity may nevertheless be very strongly encouraged and, for notified projects, in practice almost universally undertaken.

Overall, however, *there are some weaknesses in scoping, in EIA report preparation, in the centrality of EIA to the decision, in monitoring, in public participation and in EIA system monitoring.* So, greater consultation in scoping and in EIA report preparation should be made.

Actually, there is a need to develop EIA prediction methods and to enhance skills in, for example, the assessment of cumulative impacts. Improvements in local authority monitoring and enforcement procedures and methods are also needed. Equally, there would be many benefits in diffusing information and practice through better EIA system monitoring by, for example, maintaining a central record of all EIA documents.

Because of the lack of experience of EIA among most applicants, their consultants and local authority officers and elected members there is a pressing need for training and for more specific guidance on the different stages in the EIA process for the various participants. Training and encouragement to adapt are particularly necessary in overcoming the resistance of traditional land use planners to the new EIA procedures which require reorientation of practice from control of use to control of effects. Training and growing experience, further guidance, Planning Tribunal decisions, Parliamentary Commissioner interventions, and the implementation of regional policy statements and plans and district plans and, perhaps, the results of

Ministry for the Environment 'call-ins' will all undoubtedly help to realize the potential of New Zealand's innovative EIA system.

6.5 Egypt

Egypt EIA system fully meets 3 and partially meets 4 of the 13 evaluation criteria employed in this comparative review (66 point score). It performs worst of all the four EIA systems. The main shortcomings of the system relate *to its coverage, to the consideration of alternatives in design, to scoping, to reviewing EIA report, to using EA in decision making, to project monitoring, to mitigating impacts, to consultation and participation, to formal system monitoring.*

Other weaknesses relate *to the lack of experience of EIA among all of persons involved (applicants, consultants who advise in, or totally prepare the EIA study! and authority officers who intended to review and evaluate the study!!).* In addition, weaknesses relate *to the lack coordination between environmental authorities and administrative/licensing authorities involved in the process.*

The other weaknesses relate *to the lack of awareness (among all society levels) of environmental cases and how much it became important.* On the other hand, there is a serious weakness relates *to the difficulty in publishing, transferring and exchanging the data/information not only throughout the EIA process but also through most of the activities all over Egypt.*

With all of the previous shortcomings and weaknesses, it could be noticed that Egypt falls in a serious marsh of the environmental problems. Actually, Egypt needs a revolution to overcome, correct and solve the cumulative environmental problems. Such a revolution must depend on two different strategies, one of them works on the long term and the other works on the short term.

6.5.1 Long term strategy

In this strategy the view is very comprehensive, it means that the strategy doesn't see the environment alone but it sees it as a component of many others to be integrated to produce a balanced society. Hence the strategy presents many comprehensive recommendations which emphasize on:

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- The integration between all development policies (urban, economic, environment, social ...etc) whether on the national level or regional and local.
- The revision of all laws that are related (directly or indirectly) to the environment and make the required modifications in order to achieve a unified law(s) helps the public, developers and decision-makers to work without confusion.
- The diffusion of the environmental awareness among all parts of the Egyptian society. This awareness should be concentrated on; the environmental importance in our life, ways of conserving it and everyone's mission in that. This awareness could be achieved by the following:
 - Establish a national environmental awareness program for all level of the society.
 - Establish (reinforcement the existing) environmental educational courses for students at all levels of education (university, secondary schools, prep schools and primary school).
 - Use all kinds of media (TV, Radio and Newspapers) as tools for quickly reaching the knowledge/information to the society members.
 - Emphasize on the existence of the public participation in environmental control programs at all levels.
- Capacity building for all members involved directly or indirectly in the field of environment (environmental agency officers, national and local administrative authorities, elected popularity councils members and decision-makers) at all levels. it can be achieved by:
 - Establishing technical training courses on environmental aspects, and may be oriented in specified topics (EIA or environmental management, for example).
 - Encouragement and financial support for the researchers and researches in the field of environment.

- Encouragement and financial support for the conferences and workshops which debates environmental topics.
- Establishing environmental technology information centers include databases on all components of the Egyptian environment to provide the decision-maker and other members with accurate information.

6.5.2 Short time strategy

This strategy focused effectively on the improvement of the effectiveness and efficacy of the EIA system itself and its closed activities, so the recommendations presented by this strategy divided in two kinds, general (for the closed activities of EIA) and specific (for EIA itself) as follows:

6.5.2.1 General recommendations

Actually, these general recommendations focused on the closed associated activities to EIA process, and which effects in its effectiveness and efficacy. These recommendations includes:

- **Establishing a new research center for EIA**, its responsibilities focus on:
 - Assisting EEAA in outlined the environmental management policy in Egypt and the other environmental action plans.
 - developing and monitoring the whole EIA system
 - searching for new approaches of screening and scoping of impacts
 - searching for new appropriate easy-to-apply, more quickly and cost-effectively methods and procedures for EIA (avoiding the methodological over-elaboration)
 - searching for new approaches of mitigation measures of environmental, economic, social, health and other impacts.
 - publishing guidelines (general and specific on the different stages in the EIA process), annual reports, magazines, catalogs on EIA
 - training the members involved in the EIA process

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- presenting consultancy for the various participants the EIA process (administrative authorities, EEAA, decision-makers and proponents) and for whom it may concern (any other person concerns with environmental aspects).
- **Building quality control system for the whole EIA process** : its responsibilities include the comprehensive review of all activities in EIA system and identify new mechanisms to how these can be applied cost-effectively from screening to post-project analysis;
- **Emphasizing on the importance of public involvement** and looking for new modes to strength public involvement and input as essential part of the EIA and throughout the process. It is preferred that both political parties and elected popularity councils involves.
- **Emphasizing on the coordination between all agencies involved in the EIA process** in order to avoid duplication of works or confusion in decisions in cases where the EIA process involves two or more governmental agencies.
- **Emphasizing on the transparency (between all participants) throughout the EIA process**, and the proponent rights both to know everything about his EIA study and appeal against any decision at any stage of EIA process.
- **emphasizing on the public rights in obtaining all available information** from EEAA or administrative authorities throughout the process.

6.5.2.2 Specific recommendations

Actually, these recommendations specified for EIA itself, so the recommendation will be presented for each item in EIA process separately.

- **The legal base of EIA**
 - each step in EIA process (and it's all activities) should be clearly specified in Law or its executive regulations.
 - the legal provisions should be sufficiently unambiguous in application

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- an acceptable degree of discretion should be exist in the provisions.
- time limits for the various steps and for the EIA system as a whole should be specified
- **The coverage of EIA**
 - the EIA system should be applied to all public and private environmentally significant projects
 - provisions should be applied in practice to all the actions covered in principle
 - all significant environmental impacts should be covered by the EIA system
- **consideration of alternatives**
 - clear evidence of the consideration of the environmental impacts of alternatives must be apparent in preliminary EIA documentation.
 - realistic consideration of the impacts of reasonable alternatives, including the no-action alternative must be evident in the EIA report.
 - published guidance on the treatment of the impacts of reasonable alternatives should be exist.
- **Screening of actions**
 - legal test of whether the action is likely to affect the environment significantly should be exist.
 - clear specification of the type of action to be subject to EIA should be exist.
 - clear criteria/thresholds (e.g. size, location) should be exist
 - documentation must be submitted by the proponent to assist in screening.
 - information about actions, criteria, thresholds and screening procedures should be readily accessible.
 - consultation and participation should take place during screening.
 - the right of appeal against screening decisions should be exist.
- **Scoping of impacts**
 - scoping should be mandatory in each case.

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- general or generic set of impacts must be addressed in the EIA.
- action-specific scoping guidelines must be prepared.
- guidance on scoping procedures and methods should be published .
- consultation and participation should be required in scoping.
- the right of appeal against scoping decisions should be exist.
- **EIA report preparation**
 - EIA report must include description of actions, environments affected, forecast impacts, indicate significance and contain a non-technical summary.
 - information held by the relevant authorities about the environment or type of action or any other information must be made available to the proponent.
 - published guidance on EIA report preparation must be exists.
 - checks on the content, form, objectivity and accuracy of the information presented should be occurred before reviewing of the EIA report.
 - consultation and participation must be required in EIA report preparation.
- **EIA report review**
 - review of the EIA report must take place.
 - checks on the objectivity of the EIA report review should be exist.
 - review criteria to determine EIA report adequacy must be exist.
 - findings of the EIA report review should be published.
 - the proponent could be asked for more information following review.
 - draft and final EIA report must be prepared.
 - published guidance on EIA review procedures and method must be exist.
 - Consultation and participation should be required in EIA report review.
 - consultation and participation should be required where further information is submitted.
 - the right of appeal against review decisions must be exist.

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- **decision making**
 - the decision must be postponed until the EIA report has been prepared and reviewed.
 - permission be refused, conditions be imposed or modifications be demanded at the decision stage must be exist (if necessary).
 - the decision should be made by a body .
 - Is any summary evaluation prepared prior to decision making made public?
 - the decisions, the reasons for it, and the conditions attached should be published.
 - published guidance on the factors to be considered in the decision must be exist.
 - consultation and participation should be required in decision making.
 - the right of appeal against decisions must be exist.
- **Monitoring and auditing of actions**
 - monitoring of the implementation of the action must take place.
 - monitoring of action impacts must take place.
 - monitoring should be linked to the earlier stages of the EIA process.
 - action monitoring arrangements must be specified in the EIA report.
 - proponent could be required to take ameliorative action if monitoring demonstrates the need for it.
 - results of monitoring must be compared with the predictions in the EIA report.
 - published guidance on monitoring and auditing action implementation and impacts should be exist.
 - monitoring and auditing results must be published.
 - public right of appeal if monitoring and auditing results are unsatisfactory must be exist.
- **Mitigation of impacts**
 - clear evidence of the mitigation/avoidance of environmental impacts must be apparent in the action designs in preliminary EIA

documentation.

- details of mitigation and its implementation must be set down in the EIA report.
- evidence of the consideration of mitigation must be presented during screening, during scoping, during EIA report review and revision, during decision making and during monitoring.
- published guidance on mitigation and modification should exist.

▪ **consultation and participation**

- consultation and participation must take place prior to scoping, during scoping, during EIA report preparation, during review and following revision, during decision making and during monitoring.
- copies of EIA documents should be made public at each stage of the EIA process.
- copies of EIA documents should be obtained/purchased at a reasonable price.
- consultation and participation methods should be appropriate to the stage of the EIA process at which they are employed.
- adjoining authorities must be consulted (if necessary)
- published guidance on consultation and participation should exist.
- results of consultation and participation must be published.
- rights of appeal should exist at the various stages of the EIA process.

▪ **EIA system monitoring**

- record of EIA reports for various types of action should be kept and made public.
- records of other EIA documents should be kept and made public.
- EIA reports and other EIA documents publicly should be available at one or more locations.
- records of the financial costs of EIA should be kept and made public.
- information on the time required for EIA should be collected and made public.
- lessons from specific EIAs must be fed back into the system.

- consultation and participation should be required in EIA system review.
- **costs and benefits of EIA Systems**
 - financial costs of the EIA process to proponents, consultees, the public and the decision-making authorities should not be exceed those which would have been incurred in any event.
 - times required to complete the various stages of the EIA process should not be exceed those specified.

6.6 Improving EIA (as a general)

It can be seen from Table 6.1 that the EIA systems do not perform equally well, and that certain shortcomings become more evident when they are seen overall, rather than partially as in the previous chapter.

Certain general shortcomings in the current state of EIA practice can be observed. These may be summarized as:

- weaknesses in coverage
- weaknesses in integrating EIA into decision making
- weaknesses in impact monitoring and enforcement
- weaknesses in public participation
- weaknesses in system monitoring

In addition, there are widely acknowledged weaknesses in the quality of many EIA reports. A number of specific measures can be used to strengthen the different EIA systems by introducing or bolstering appropriate procedural requirements (above). There continues to be a need, in each EIA system, for three other elements to strengthen EIA practice: guidance, training and research.

The existence of published guidance on the EIA systems as a whole is clearly useful to those responsible for preparing EIA reports, to those reviewing them and making decisions, to those consulted and to the public. Such guidance provides a valuable aid in undertaking any stage of the EIA process. Guidance materials can include manuals, leaflets, computer programs and video tapes. The provision of guidance of this type tends to vary from EIA system to EIA system, just as the provision of more detailed

guidance on the different stages of the EIA process varies, but could be strengthened to assist in overcoming the weaknesses identified above.

The provision of EIA training for EIA project managers, for technical specialists and for others involved in the EIA process is an effective method of increasing the standard of practice even in mature EIA systems. While EIA training need not be provided only by the agency responsible for EIA, encouragement of, and participation in, such training by the agency is clearly desirable. A variety of different training methods is appropriate in most EIA systems: courses, manuals, guides, case studies, video tapes, computer programs, etc. The involvement of responsible authorities in EIA training tends to vary from jurisdiction to jurisdiction but the need for further training remains. This is especially true in case of Egypt.

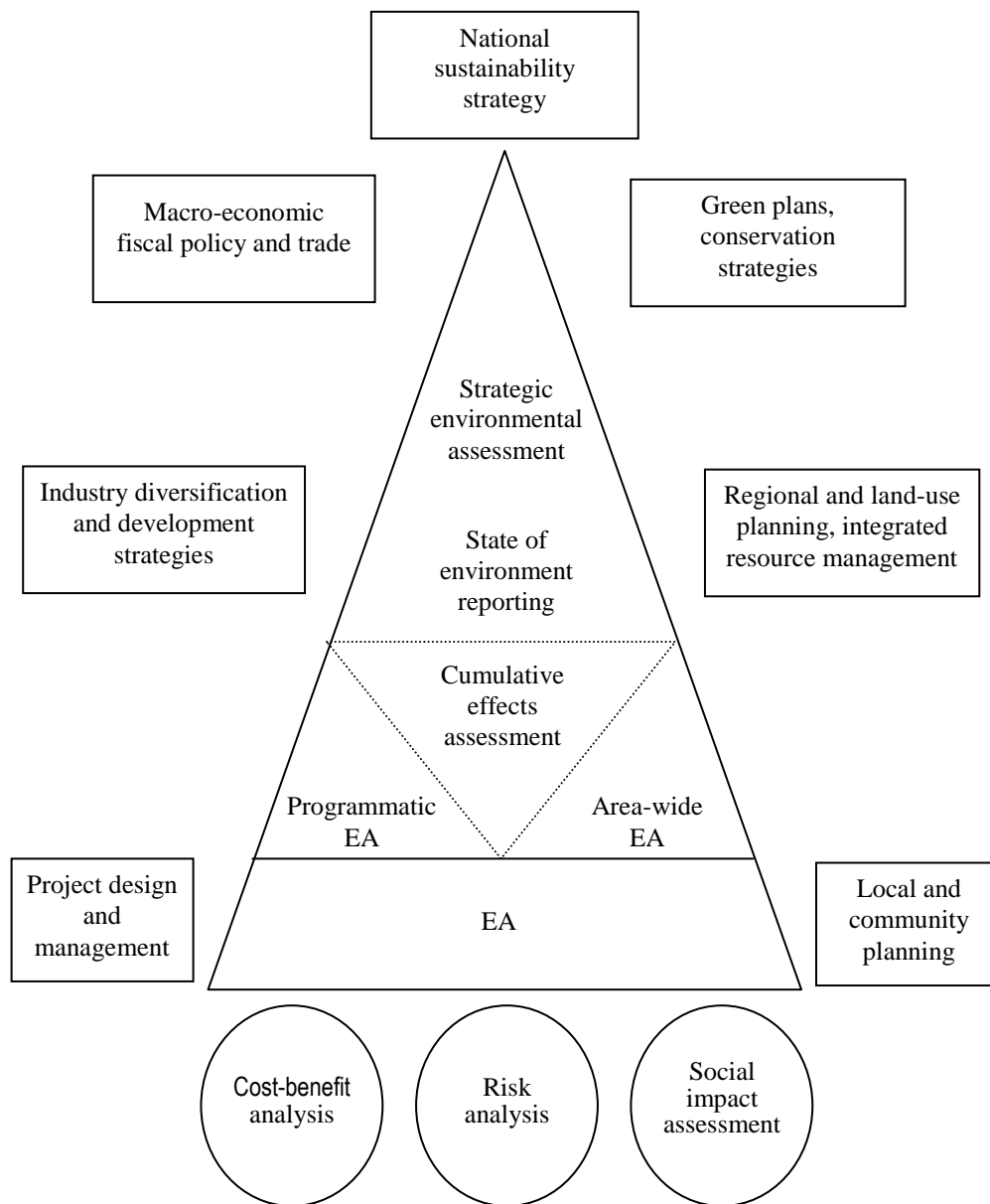
There is a continuing need for research on various aspects of EIA, both general and specific. Generally, research on the treatment of alternatives, on scoping, on forecasting, on review methods, on the integration of EIA in decision making, on monitoring, on public participation, on system monitoring and on strategic environmental assessment is clearly needed. Such research needs to be concerned with both substantive (methodological) and procedural issues.

Although research on EIA methods is likely to be of most application across EIA systems, the results of procedural research tend also to be widely disseminated since there is a need to share knowledge and insights. Clearly, each EIA system is likely to have its own specific research needs in addition to those identified here.

The steps outlined above should enable progress to be made. However, it is necessary not only to improve EIA systems but also to ensure that they receive real public and political endorsement.

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Fig. 6.1. The emerging context of EIA ⁽¹⁾



There are undoubtedly pressing demands from many countries for the achievement of sustainability goals and to meet the requirements of Agenda 21. Actually, there is a need for a 'second generation' EIA process which places EIA firmly in the context of other policy and environmental instruments (Fig. 6.1). In such policy, EIA systems incorporating effective Strategic Environmental Assessment (SEA) would fit this

(1) **Sadler, B.** ; "International Study of the Effectiveness of Environmental Assessment: Proposed Framework"; Federal environmental Assessment Review Office; Hull; Quebec; 1994.

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context admirably. These systems could be designed to achieve more ambitious goals such as 'no net environmental deterioration' or 'net environmental gain'.

ABBREVIATIONS AND BIBLIOGRAPHY

ABBREVIATIONS

AEAM	Adaptive environmental assessment and management
CAA	Competent Administrative Authority (Egypt)
CACA	Chartered Association of Certified Accounts (UK)
CBA	Cost Benefit Analysis
CEQ	Council on Environmental Quality (USA)
CFCs	Chloro-fluorocarbons
dB	Decible scale measure of sound
DOE	Department of the Environment (UK)
EA	Environmental Assessment (document: USA)
EC	European Community
EEAA	Egyptian Environmental Affairs Agency (Egypt)
EES	Environmental Evaluation System
EHIA	Environmental health impact analysis
EI	Environmental Impact
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report (New Zealand)
EIS	Environmental Impact Statement (USA)
EPA	Environmental Protection Agency (USA)
EPEP	Environmental Protection and Enhancement Procedures (New Zealand)
EQI	Environmental Quality Index
ES	Environmental Statement (UK)
FONSI	Finding of No Significant Impact
LDCs	Less Developed Countries

LPA	Local Planning Authority (UK)
MfE	Ministry for the Environment (Egypt)
mg/m ³	Milligrams per cubic meter
µg/m ³	Micrograms per cubic meter
NEPA	National Environmental Policy Act 1969 (USA)
NOI	Notice of Intent (USA)
NZ	New Zealand
OECD	Organization for Economic Co-operation and Development (UK)
PCBs	Polychlorinated Biphenyls
PCE	Parliamentary Commissioner for the Environment (New Zealand)
PEAs	Primary Ecological Alterations
RMA	Resource Management Act 1991 (New Zealand)
ROD	Record of Decision (USA)
SEA	Strategic Environmental Assessment
SIA	Social Impact Assessment
UK	United Kingdom
UNEP	United Nations Environment Program
USA	United States of America
WHO	World Health Organization

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