Integrated Appraisal Methods

R&D Technical Report E2-044/TR

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Statement of Use
This report is to inform a variety of Agency staff and limited number of external contacts of the methods available to Agency policy makers to undertake integrated appraisals as part of its decision making process. It will help Agency policy makers select the most appropriate appraisal tools for the decision process they are undertaking.

Keywords
Integrated appraisal, appraisal tools, Cost-Benefit Analysis, Multi-Criteria Analysis, Life Cycle Assessment, Risk Assessment, Environmental Assessment, Environmental Impact Assessment, Strategic Environmental Assessment, Sustainability Appraisal, stakeholder involvement, sustainable development

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF BOXES

EXECUTIVE SUMMARY

Introduction

The Environment Agency commissioned research on integrated appraisal and its use within the Agency. In this context, integrated appraisal was defined as a process of assessing the performance of options or proposals in terms of their economic, social and environmental implications. The research involved an extensive literature review, two case studies examining appraisal practice within the Agency and workshops with Agency personnel. It has identified that it is appropriate for the Agency to use a two-stage approach to integrated appraisal. This should consist of an initial 'screening' stage at which potential impacts are identified against a checklist of economic, social and environmental concerns followed by more detailed appraisal of those impacts deemed significant and/or whose investigation is a regulatory obligation for the Agency. In undertaking more detailed appraisal, the research identified six appraisal tools or families of tools that might be employed:

Drivers for adopting an integrated approach

Integrated appraisal is an area of increasing relevance to public sector decision-making. Central Government (including DEFRA) and other organisations such as the National Assembly for Wales, the North West Regional Assembly and the European Commission are developing and formalising approaches to integrated appraisal. For Agency, there are several drivers for adopting an integrated approach to appraisal:

- the Agency's statutory duties to contribute to sustainable development and consider costs and benefits in exercising its powers;
- the explicit emphasis in Government guidance to the Agency on taking economic and social considerations into account in delivering its objectives;
- the growing emphasis on the social welfare dimensions of sustainable development and the need to take these into account alongside economic and environmental concerns;
- the perceived inadequacy of existing specialised or 'partial' appraisal tools.
- the need to streamline Agency work and improved efficiency.

Advantages and challenges of an integrated approach

Adopting an integrated approach to appraisal within the Agency has potential advantages but also presents several challenges. In terms of advantages, an integrated approach:

- demonstrates the Agency's commitment to looking beyond its immediate objectives in pursuing sustainable development (and thus 'leading by example');

- provides Agency decision-makers and stakeholders with information on the full range of likely impacts associated with options or proposals (rather than subsets of these as provided by specialised appraisal);

- provides an opportunity to identify inter-relationships between objectives including possible win-win-win solutions and also instances where trade-offs may be necessary;

- provides an opportunity to streamline appraisal practice within the Agency; and

- should encourage and facilitate co-operation and learning between different functions and disciplines within the Agency, increase the knowledge base and communicate sustainable development principles.

However, in promoting an integrated approach there is a risk that:

- given inevitable resource limitations, certain impacts (for example, on the environment) may not be subject to the same degree of exploration they might have been under a regime of more specialised appraisal (in other words, depth of impact investigation may be sacrificed for breadth of coverage);

- integrated appraisals may come to be dominated by particular sets of interests leading to the neglect of certain impacts;

- the advocacy role performed by specialised or 'partial' appraisal tools in explicitly promoting the issues on which they focus may be lost or undermined;

- Agency personnel may perceive integrated appraisal as an unnecessary burden or challenge unless the potential benefits are explained and demonstrated; and

- it may prove ineffective unless adequate guidance and training is provided particularly in assessing the social dimensions of change.

It is important to note that the term 'integrated' has more than one meaning in the context of appraisal and, in addition to the consideration of economic, social and environmental concerns within one appraisal, can also refer to: the linking together of appraisals undertaken at different levels in the decision-making hierarchy (vertical integration or 'tiering'); the integration of appraisal processes and findings into decision-making; and the integration or involvement of stakeholders in appraisal.

Integrated appraisal practice within the Agency

'Integrated appraisal' is being increasingly undertaken within the Agency. For example, Catchment Abstraction Management Strategies (CAMS) are required to undergo a Sustainability Appraisal which considers economic, social and environmental impacts and integrated appraisal has been applied to emerging Agency policies (e.g. that for landfill gas flaring policy). In addition, the Agency has explored the application of integrated appraisal to the River Basin Management Plans that must be prepared for the purposes of the EU Water Framework Directive and prepared draft guidance on *Integrated Appraisal of Environment Agency Policies*. However, these initiatives have

emerged in the absence of an Agency-wide framework for integrated appraisal and are not consistent in their approach (particularly in terms of the depth of impact investigation they advocate). As a result, there is a need to develop a framework for integrated appraisal within the Agency that promotes a consistent approach and takes into account the range of Agency decision-making, the Agency's regulatory obligations and current good practice.

A two-stage approach

An emerging trend in appraisal is the development of 'checklist' style integrated appraisal tools. These essentially comprise a list of questions or criteria organised around a series of impact categories that address economic, social and environmental concerns. The questions are designed to prompt consideration of the potential impacts associated with the options or proposals under scrutiny. To date, these tools have been developed by, amongst others, the National Assembly for Wales, the North West Regional Assembly and the Agency itself in its draft guidance on *Integrated Appraisal of Environment Agency Policies*. Useful as these checklist approaches might be for 'screening' or 'vetting' potential impacts, they generally advocate a 'broad brush' approach to appraisal and stop short of providing advice on how more detailed, in-depth appraisal might be undertaken should this be considered necessary.

In contrast to those tools limited to 'screening' potential impacts, some emerging integrated appraisal tools advocate more detailed impact investigation. Examples include the *Guidance Checklist for Policy Makers* developed by the Cabinet Office; the 'Integrated Policy Appraisal' (IPA) framework developed by several Government departments (including DEFRA); and the European Commission's 'Impact Assessment' tool. These developments indicate a trend towards a two-stage approach to integrated appraisal:

- an initial stage at which the potential impacts of the options or proposals under consideration are 'screened' or 'vetted' against a wide range of economic, social and environmental criteria;

- a second stage of more detailed appraisal where this is considered necessary using appropriate appraisal tools.

Importantly, given that a range of appraisal tools can be employed in support of integrated appraisal, the research concluded that the Agency should view integrated appraisal as a generic *approach* to appraisal and not as a single, discrete appraisal tool.

Appraisal tools

In undertaking more detailed appraisal, the Agency may employ one or more appraisal tools. The research identified six types or families of appraisal tools all of which are familiar to the Agency and currently employed by them to a greater or lesser degree:

- Cost-Benefit Analysis (CBA);
- Multi-Criteria Analysis (MCA);
- Life Cycle Assessment (LCA);
- Risk Assessment;

- Environmental Assessment and related tools (e.g. Social Impact Assessment); and
- Sustainability Appraisal and related tools.

Although these tools share a common aim to consider the gains and losses arising from options or proposals, they differ in terms of:

- their focus ('integrated', 'partial' or traditionally focused on particular impacts);

- the rationales they adopt for scoring gains and losses (e.g. CBA scores gains and losses on the basis of individuals' preferences expressed in monetary terms while Risk Assessment scores them on the basis of likelihood and consequence);

- at least conventionally, the degree to which they involve stakeholders (e.g. while Risk Assessment has tended, traditionally at least, to be an expert/technocratic activity, Environmental Assessment generally emphasises the importance of stakeholder involvement); and

- the degree to which they 'process' impact information and engage in trade-off analysis (e.g. while some tools may be content to simply provide decision-makers with a 'database' of impact information to aid deliberations, others may score potential impacts, weight competing objectives, and combine the scores and weights to produce a ranking of options, and direct decision-makers towards a preferred option(s)).

The choice of appraisal tools to be used will depend on a range of factors including the Agency's regulatory obligations (e.g. the use of some tools such as CBA or Environmental Assessment may be a regulatory requirement) and the nature of the impacts to be investigated (identified at the initial screening stage) (e.g. if environment impacts were identified as particularly significant then an Environmental Assessment might be necessary);

Advantages and challenges of a two-stage approach

A two-stage approach has several potential advantages:

- it provides a structured means to reconcile the trend towards 'checklist' style integrated appraisal with the in-depth appraisal necessary to fulfil the Agency's regulatory obligations and facilitate sound decision-making;

- the initial screening exercise provides an opportunity to identify the impacts, potential synergies (including win-win-win solutions) and trade-offs that might require further investigation and helps to ensure that further appraisal concentrates resources on exploring the most significant impacts;

- it provides Agency personnel with the freedom to employ those appraisal tools they consider appropriate given the circumstances and the impacts at stake (assuming that regulatory obligations do not dictate the use of a certain tool); and

- crucially, it continues to recognise the value of 'partial' appraisal tools such as Environmental Impact Assessment and their role in supporting integrated appraisal.

However, a two-stage approach raises a number of challenges and concerns:

- there is a risk that the initial screening stage could be regarded as sufficient and lead to the proliferation of relatively superficial appraisals;
- the application of integrated appraisal raises the issue of the competencies of those responsible and the skills and knowledge that might be required to identify and investigate the full range of impacts; and

- the potential application of more than one appraisal tool raises issues of duplication, double counting and the prospect of difficulties in co-ordinating the timings of different appraisals.

Way forward

A two-stage approach would provide the Agency with a structured means to reconcile the trend towards 'checklist' style integrated appraisal with the in-depth appraisal necessary to fulfil the Agency's regulatory obligations and facilitate sound decision-making. Drawing on the checklists in the draft guidance on *Integrated Appraisal of Environment Agency Policies* and the IPA plus those developed by, amongst others, the National Assembly for Wales and the North West Regional Assembly, it is recommended that the Agency should develop a single generic integrated appraisal checklist that is widely applicable across its functions. In developing the checklist, the Agency might also draw on the objectives of the eight Regional Sustainable Development Frameworks (RSDFs). Ideally, the checklist(s) developed should form part of a detailed guidance document on integrated appraisal within the Agency which includes:

- the checklist itself;

- guidance on screening impacts and determining significance;

- the Agency's regulatory obligations vis-à-vis appraisal (e.g. instances when certain appraisal tools must be employed);

- an introduction to the appraisal tools that might be used to investigate significant impacts (including links to existing guidance, case studies of past application and contacts within the Agency from whom advice can sought); and

- guidance on stakeholder involvement in appraisal (particularly the use of deliberative techniques).

To support and facilitate the introduction of integrated appraisal within the Agency, the research proposes a series of recommendations, which if implemented could enable the Agency to make a step-change in its development of integrated appraisal and help to provide a consistent approach. These recommendations relate to: articulating sustainable development; developing a consistent approach to integrated appraisal; understanding the wider context of Agency decision-making; and establishing support activities to develop networks, skills and knowledge in integrated appraisal.

While this research focused on integrated appraisal, the ultimate goal for the Agency should be *integrated decision-making* rather than the promotion of integrated appraisal *per se*. Integrated decision-making should take appropriate account of economic, social and environmental considerations in the pursuit of sustainable development. The acid test in evaluating the success or otherwise of integrated appraisal is whether or not its application actually influenced the decision and, more importantly, if it led to a more sustainable outcome.

GLOSSARY

Terms that appear in *italics* are explained elsewhere in the glossary.

Altruistic values — Reflect individuals' *willingness to pay* to ensure that a resource is available to others within the current generation. Altruistic values are an example of passive or *non-use values*.

Analytic-Deliberative Processes — Processes that combine analysis and *deliberation*, where analysis refers to the technical aspect (e.g. *Risk Assessment*) of the process and deliberation to the *stakeholder* discussion on that analysis. The analysis and deliberation are regarded as inextricably linked.

Appraisal — The process of assessing the performance of options or proposals.

Appraisal tool — A systematic means for assessing the performance of options or proposals.

Avertive behaviour — A *revealed preference technique* which assumes that the expenditure individuals make in order to avoid an environmental impact provides an indication of their *willingness to pay* to avoid that impact.

Baseline — A description of conditions existing at a certain point in time against which the changes resulting from a proposal can be gauged. Rather than constituting a 'snapshot' in time, the baseline is conventionally taken to be future conditions under the 'do nothing option' (i.e. forecast changes in the absence of a proposal).

Benefits transfer — A process whereby, rather than carry out original economic valuation studies, those responsible for a *Cost-Benefit Analysis* may glean estimates of economic value resulting from previous valuation studies from the literature and, with some adjustment, employ these as part of the appraisal process. Although benefits transfer does not require the collection of any new economic or environmental data, it may require data on, for example, the demographics of the affected population in order that the requisite adjustments can be made.

Bequest values — Reflect individuals' *willingness to pay* for maintaining a resource in order that future generations have the option to exploit it. Bequest values are an example of passive or *non-use values*.

Choice modelling — A *stated preference technique* which involves asking respondents to choose between different options that have different levels of particular attributes. The aggregate choice frequencies can be modelled to infer the relative impact of each attribute level on choice. One of the attributes is always cost or price which enables analysts to infer *willingness to pay* or *willingness to accept* compensation from the choices people make.

Contingent valuation — A *stated preference technique* which involves eliciting preferences through surveys directly asking individuals their *willingness to pay* or *willingness to accept* compensation for a given gain or loss of a specified good.

Consultation	A process for obtaining views from *stakeholders* on proposals. In the public sector this has traditionally involved dispatching documents and requesting comments on these with little to no interaction between the consultee and the proponent organisation.
Cost-Benefit Analysis (CBA)	Assigns a monetary value to costs and benefits on the basis of individuals' preferences. The aim should be to monetise as many of the costs and benefits of a proposal as possible including for those aspects for which the market does not provide a satisfactory measure of economic value. CBA is based on the principle that a proposal should only be implemented if all of its benefits are equal to or outweigh all of its costs.
Cost-Effectiveness Analysis (CEA)	An appraisal to identify the least cost option for achieving an objective (CEA is also referred to as least cost analysis).
Direct use values	The economic value attached to the actual use of resources. See *use values*.
Discount rate	Broadly speaking, individuals prefer to receive goods and services sooner rather than later and to bear the costs later rather than sooner. This is known as the 'social time preference' and, for the purposes of *Cost-Benefit Analysis (CBA)*, greater weight can be attached to earlier rather than later costs and benefits through the application of a discount rate which reduces the value of projected costs or benefits to their values as seen from the present day.
Ecological footprint	Evaluates the extent of people's appropriation of biologically productive space. The footprint of a certain individual or group of people shows the amount of biologically productive space needed to generate the resources consumed and to absorb its waste.
Environmental Assessment	The systematic identification and evaluation of the potential impacts of a proposal on the environment. At the *project* level, Environmental Assessment is generally known as *Environmental Impact Assessment (EIA)* while at the level of a *policy*, *plan* or *programme*, it is commonly referred to as *Strategic Environmental Assessment (SEA)*.
Environmental Impact Assessment (EIA)	The systematic identification and evaluation of the potential environmental impacts of proposed projects. In the EU, EIA is applied to certain projects under the provisions of Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') (as amended by Directive 97/11/EC).
Environmental Auditing	The systematic, documented, periodic and objective review of facility operations and practices relating to meeting environmental requirements.
Existence values	Reflect individuals' *willingness to pay* to maintain a resource for its own sake. Existence values are an example of passive or *non-use values*.

Health Impact Assessment (HIA)	The systematic identification and evaluation of the potential impacts of a proposal on health concerns. More specifically, Health Impact Assessment has been defined as a *"developing process that uses a range of methods and approaches to help identify and consider the potential – or actual – health and equity impacts of a proposal on a given population"* (Health Development Agency, 2002, page 3).
Hedonic pricing	A *revealed preference technique* which infers valuations for particular effects through market prices for a good or service where the market price reflects a number of different effects. If sufficient data on the price of the marketed good or service is collected then the value placed on a constituent effect cab be isolated using multiple regression analysis.
Human Capital	For example, education, skills, knowledge.
Indirect use value	Where society as a whole benefits from resources. See *use values.*
Integrated appraisal	A process of assessing the performance of options or proposals in terms of their economic, social and environmental implications. Note, there are other forms of *integration* in the context of appraisal, in addition to the simultaneous consideration of economic, social and environmental concerns within one appraisal.
Integrated appraisal tool	An *appraisal tool* which routinely examines the economic, social and environmental implications of options or proposals. Examples include *Cost-Benefit Analysis, Multi-Criteria Analysis* and *Sustainability Appraisal.* Contrast *partial appraisal tool.*
Integration	Has a variety of meanings in the context of appraisal although often refers to the consideration of economic, social and environmental concerns within a single *integrated appraisal.* Other forms of integration in the context of appraisal include vertical integration (i.e. 'tiering' between appraisals undertaken at different levels in the decision-making hierarchy); integration between decision-making and appraisal processes (i.e. promoting closer ties between the two processes); and the integration of stakeholders into appraisal processes.
Life Cycle Assessment (LCA)	A tool which assesses the environmental impacts at each stage in the life cycle of a product, service or activity (e.g. from the extraction of raw materials through to production, distribution, use and disposal).
Man-made capital	For example, infrastructure and machinery.
Multi-Criteria Analysis (MCA)	Any structured approach to determining overall preferences among alternative options, where the options accomplish several objectives. More specifically, MCA establishes preferences between options by reference to an explicit set of objectives for which criteria have been developed for assessing the extent to which the objectives are achieved.

Multi-Criteria Decision Analysis (MCDA)	An extension of *Multi-Criteria Analysis* which involves scoring the performance of each option under consideration in relation to each of a set of criteria, assigning weights to each criterion to reflect its relative importance in the decision-making process and combining the scores and weights to provide an overall assessment of each option.
Natural capital	For example, mineral resources, biodiversity, clean air and clean water.
Net present value (NPV)	The expected or certain value of a future cash flow discounted to the present at an appropriate discount rate.
Non-use values	The value placed on a resource by individuals who do not use that resource. Passive or non-use values can be considered to encompass *altruistic values, bequest values* and *existence values*.
Option values	Individuals' *willingness to pay* for the option of utilising a resource in the future. See *use values*.
Partial appraisal tool	An *appraisal tool* which examines the implications of options or proposals for particular issues. Examples include *Environmental Impact Assessment* and *Health Impact Assessment*. Contrast *integrated appraisal tool*.
Plan	A purposeful, forward-looking strategy or design, often with co-ordinated priorities, options and measures, that elaborates and implements *policy*.
Policy	A general course of action or proposed overall direction that an organisation is, or will be, pursuing and which guides ongoing decision-making.
Programme	A coherent, organised agenda or schedule of commitments, proposals, instruments and/or activities that elaborates and implements a *plan*.
Project	A proposed capital undertaking, typically involving the planning, design and construction of a large-scale plant, facility or structure.
Quality of Life Capital (QoLC)	The Quality of Life Capital approach is a tool for identifying what matters and why, so that the consequences (both good and bad) of plans, development projects and management options on quality of life can be taken into account. It was developed by the four statutory agencies, Countryside Agency, English Nature, English Heritage and the Environment Agency.
Regulatory Impact Assessment (RIA)	Regulatory Impact Assessment has been defined as *"a policy tool which assesses the impact, in terms of costs, benefits and risks of any proposed regulation which would affect businesses, charities or the voluntary sector"* (Cabinet Office, 2002a).

Revealed preference techniques	Techniques for valuing non-marketed goods or services that use data from actual markets to infer individuals' preferences for certain effects. Contrast *stated preference techniques.* Revealed preference techniques include *hedonic pricing*, *avertive behaviour* and *travel cost.*
Risk Assessment	The estimation of the probability and severity of hazards to human health, safety and ecosystem functioning or 'health'.
Scoping	An early stage in *appraisal* which essentially involves determining the issues or impacts upon which the appraisal will focus. In addition, scoping provides an opportunity to resolve a range of issues including the timetable for appraisal; the information to be assembled for the purposes of impact prediction; the opportunities for stakeholder involvement; the depth of impact investigation that will be undertaken; and the spatial and temporal boundaries of the appraisal.
Social capital	The networks, norms and trust that provide for community cohesion. Social capital is manifested through the connections between individuals and the networks, norms and trust these give rise to and, as such, belongs to the community. Indicators of social capital focus on a wide range of variables including, for example, levels of trust, participation (e.g. membership of clubs and societies and church attendance), electoral turnout, voluntary work, charitable donation and newspaper readership.
Social Impact Assessment (SIA)	The systematic identification and evaluation of the potential impacts of a proposal on people, whether as individuals or groups.
Stakeholder	Anyone who feels they have a stake in the outcomes of a decision-making or appraisal process. The term is used here to refer to representatives of organised groups and the wider public although it is acknowledged that others have used the term to refer specifically to individuals representing certain groups with an interest in the decision.
Stated preference techniques	Techniques for valuing non-marketed goods or services that create hypothetical markets by way of structured surveys that provide respondents with the opportunity to state their preferences. Contrast *revealed preference techniques*. Stated preference techniques can be categorised under the headings *contingent valuation* and *choice modelling.*
Strategic Environmental Assessment (SEA)	The systematic identification and evaluation of the potential impacts of proposed *policies*, *plans* and *programmes*. In the EU, SEA will (from July 2004) be applied to certain plans and programmes under the provisions of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (the 'SEA Directive').
Strategic	Any decision made above the *project* level, i.e. at the level of *policy*, *plan* or *programme*.

Sustainability Appraisal	A single *appraisal tool* which provides for the systematic identification and evaluation of the economic, social and environmental impacts of a proposal. In the UK, Sustainability Appraisal evolved in the 1990s from the environmental appraisal of development plans by local planning authorities and, while its application is now expanding, in the past it has principally been applied in the fields of local and regional planning.
Sustainable development	Conventionally defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Total Economic Value (TEV)	Comprises individuals' preferences that are related to the actual or future use of resources (*use values*) and those that are not related to any actual use (*non-use values*). Use values comprise *direct use values, indirect use values* and *option values*. Non-use values can be considered to encompass *altruistic values, bequest values* and *existence values*.
Trade-off	A choice to pursue one objective at the expense of another.
Travel cost	A *revealed preference technique* which can be used to infer the value visitors place on a recreational site based on their willingness to incur costs in travelling to and from that site.
Use values	The value placed on a resource by users of that resource. Use values incorporate *direct use values, indirect use values* and *option values*.
Willingness to accept (WTA)	The minimum amount of money that an individual would be willing to pay as compensation for incurring a cost.
Willingness to pay (WTP)	The maximum amount of money that an individual would be willing to pay in return for receiving a benefit.

ABBREVIATIONS AND ACRONYMS

AMP	Asset Management Plan
AST	Appraisal Summary Table
BAP	Biodiversity Action Plan
BAT	Best Available Techniques
BATNEEC	Best Available Technology Not Entailing Excessive Costs
BPEO	Best Practicable Environmental Option
BS	British Standards
CAMS	Catchment Abstraction Management Plan
CBA	Cost Benefit Analysis
CEA	Cost-Effectiveness Analysis
DEFRA	Department of the Environment Food and Rural Affairs
DETR	Department of Environment Transport and Regions
DTLR	Department of Transport Local Government and the Regions
EEA	European Environment Agency
EIA	Environmental Impact Assessment
FCDPAG	Flood and Coastal Defence Project Appraisal Guidance
HIA	Health Impact Assessment
IPA	DTLR's 'Integrated Policy Appraisal' framework
IPC	Integrated Pollution and Control
IPPC	Integrated Pollution Prevention and Control
ISO	International Organisation for Standardisation
LCA	Life Cycle Assessment
MAFF	Ministry of Agriculture, Fisheries and Food
LEAP	Local Environment Agency Plan
MAT	Multi attribute technique
MCA	Multi-Criteria Analysis
MCDA	Multi-Criteria Decision Analysis
NATA	New Approach to Appraisal
NGO	Non Government Organisation
ODPM	Office of the Deputy Prime Minister
OECD	Organisation for Economic Co-operation and Development
PPG	Planning Policy Guidance
QoLC	Quality of Life Capital
RBMP	River Basin Management Plan
RCEP	Royal Commission on Environmental Pollution
RDA	Regional Development Agency
REPAC	Regional Environmental Protection Advisory Committee
RESs	Regional Economic Strategies
RPG	Regional Planning Guidance
RSA	Restoring Sustainable Abstraction
RTAB	Regional Technical Advisory Body
RWRS	Regional Water Resources Strategy
SEA	Strategic Environmental Assessment
SEERA	South East England Regional Assembly
SEPA	Scottish Environmental Protection Agency
SIA	Social Impact Assessment
SMPs	Shoreline Management Plans (
TEV	Total Economic Value
WCED	World Commission on Environment and Development
WISARD	Waste - Integrated Systems Assessment for Recovery and Disposal
WLMP	Water Level Management Plan
WRMU	Water Resource Management Unit
WTA	Willingness to Accept
WTP	Willingness to Pay

1. INTRODUCTION

1.1 The Project Brief

The aim of the research was to investigate the issues surrounding integrated appraisal methods, particularly at the strategic level, concentrating primarily on horizontal integration (i.e. considering social, economic and environmental issues), but also considering vertical integration (i.e. tiering from policy to project). The contract specification states that the project was intended to:

- develop further the comparatively simple appraisal tools based on the collection and recording of environmental, social and economic information. This could include adapting or refining existing appraisal tools, techniques or approaches to apply to particular situations, as well as considering the integration of two or more for a particular purpose to provide added value;

- use case studies to provide an opportunity to develop appraisal tools, techniques and approaches; and

- consider the means of trade-off analysis between the environmental, economic and social impacts of options.

1.2 Research Methods

1.2.1 Approach

The approach to the research was developed in response to the project brief and involved:

- a literature review;
- development of a generic framework for decision-making and integrated appraisal;
- two case studies of integrated appraisal within the Agency;
- a special focus on trade-offs in decision-making and appraisal.

In addition, two Agency workshops, one on integrated appraisal and the other on trade-offs, were held during the research period.

The project was steered by a Project Board and many other Agency officers, as well as external organisations, participated in the research (see Appendix 1).

1.2.2 Literature review

A comprehensive literature review was undertaken as part of the R&D project and this focused in particular on the following themes:

- *current appraisal practice* - including guidance on the application of appraisal in specific circumstances and examples of the application of appraisal both within and beyond the Agency (see Chapter 4);

- *specific appraisal tools* - such as Cost-Benefit Analysis (CBA), Multi-Criteria Analysis (MCA), Life Cycle Assessment (LCA), Risk Assessment and Environmental Assessment and related tools (e.g. Environmental Impact Assessment (EIA), Strategic Environmental Assessment (SEA), Social Impact Assessment (SIA), Health Impact Assessment (HIA) and Sustainability Appraisal (see Chapter 4);

- *Agency related literature* - including corporate documents, R&D reports and legislation relevant to the Agency's duties;

- *stakeholder involvement in decision-making* – research and current guidance on, and examples of, stakeholder involvement in decision-making and appraisal within and beyond the Agency; and

- *other relevant topics* – including sustainable development and decision making theory.

Although a significant amount of material was available for certain relevant topics (e.g. stakeholder participation, sustainable development and well-established appraisal tools), for others there was comparatively little published material available (e.g. current appraisal practice within the Agency and integrated appraisal itself).

1.2.3 Development of generic framework for integrated appraisal

In order to guide the research, a generic framework for decision-making and integrated appraisal was developed on the basis of the literature review and brainstorming sessions within the project team (see Chapter 3). This framework (together with a list of questions which expanded upon it) provided the basis for the case studies of appraisal practice within the Agency.

1.2.4 Application of the framework to two case studies

In order to explore past appraisal practice within the Agency and appreciate the issues involved, two case studies of appraisal practice were investigated. After some discussion, it was decided that the first case study would focus on the appraisal of likely costs and benefits undertaken as part of the development of the Agency's policy on landfill gas flaring and the second examined the Sustainability Appraisal of the East Hampshire Catchment Abstraction Management Strategy (CAMS). The case study findings are reported in full in two R&D Project Records E2-044/PR/3 & E2-044/PR/4 and the key issues which emerged from the case studies are discussed in Chapter 5.

1.2.5 Workshops

Two workshops were held during the research period. These were attended by Agency staff, members of the project team and, in the case of the first workshop, external interests. The first workshop, held in February 2001, had the following objectives:

- to work towards developing a consensus view of what Strategic Integrated Appraisal does, and should mean, for the Agency;

- to share experience and learn from others involved in strategic and / or integrated appraisal;
- to identify and prioritise the requirements for the further development of integrated appraisal; and

- to provide an update on progress and guide its subsequent work, including the selection of case studies.

The discussion and results of the first workshop are written up in an R&D Project Record E2-044/PR/5.

The second workshop, held in September 2002, focussed on the issue of trade-offs (see section 1.2.6 below) and aimed *"to discuss issues surrounding trade-off analysis and come to some consensus on the factors that should be considered when deciding broad approaches and types of tools that might be used for trade-off analysis in the Environment Agency"*.

1.2.6 Special focus on trade-offs

The brief included a specific requirement to investigate the issue of trade-offs, particularly between economic, social and environmental objectives. This investigation focused on several key issues:

- the role of integrated appraisal in facilitating the identification of win-win-win solutions and identifying instances where trade-offs may be necessary;

- the Agency's role vis-à-vis sustainable development and the implications of this for its approach to trade-offs and its choice of appraisal tools;

- the different types of trade-offs Agency personnel might encounter;

- the approach various appraisal tools take to trade-offs and the degree to which they facilitate trade-off analysis; and

- the factors to be taken into account in determining an overall approach to trade-offs and the appraisal tools that might be used.

1.3 Structure of the Report

This report comprises seven chapters, including this introduction, and it supported by several appendices. Chapter 2 provides the context to the research, including a definition of the key terms; the drivers for undertaking integrated appraisal; the relationship between decision-making and appraisal; an introduction to the tools that may provide for integrated appraisal; and decision-making and appraisal within the Agency.

Chapter 3 presents the generic framework for decision-making and integrated appraisal developed as part of this research. Chapter 4 introduces six types, or families, of

appraisal tools and explores their advantages and challenges in turn. Examples of their application by the Agency and elsewhere are also summarised. The chapter also discusses the issue of stakeholder involvement in appraisal.

Chapter 5 provides background to each of the case studies, the Agency's policy on landfill gas flaring and the sustainability appraisal of the East Hampshire CAMS, and explores the key issues for appraisal.

Chapter 6 analyses the issue of trade-offs and integrated appraisal in detail, with particular reference to trade-offs between the environmental, economic and social objectives. It considers the importance of the conceptualisation of sustainable development within this debate and the different trade-offs made at different points in the decision making and appraisal process. It also describes how appraisal tools differ in the extent to which they facilitate trade-off analysis. Chapter 7 presents conclusions and recommendations from the research.

2. CONTEXT

2.1 Definitions

For clarity, it is important to define from the outset the terms 'integrated', 'appraisal' and 'integrated appraisal' as they are used in this report.

The terms **'integrated'** and **'integration'** have a variety of meanings in the context of appraisal (see section 2.4). However, in line with the brief, the research focused primarily on *horizontal* integration (i.e. the consideration of economic, social and environmental impacts within an 'integrated appraisal').

Other forms of 'integration' in the context of appraisal include:

- *vertical* integration (i.e. 'tiering' between appraisals undertaken at different levels in the decision-making hierarchy);
- integration between decision-making and appraisal processes (i.e. promoting closer ties between the two processes); and
- the integration of stakeholders into appraisal processes.

Each of these forms of integration are touched on in this report.

'Appraisal' has been defined as the process of examining options and assessing their relative merits (DETR, 2001). In other words, appraisal[1] is the process of assessing the performance of competing options. Having said that, appraisal can also be applied to a single preferred option or proposal (although its capacity to promote an overall change in approach may be somewhat diminished as a result). **Appraisal** is therefore the process of assessing the performance of options or proposals.

In light of the above, **'integrated appraisal'** can be defined as a process of assessing the performance of options or proposals in terms of their economic, social and environmental implications.

In undertaking an integrated appraisal, a range of **appraisal tools** may be employed and, for this reason, integrated appraisal is best viewed as an umbrella *approach* to appraisal and not necessarily as a single or discrete appraisal tool.

Appraisal tools can be integrated or partial in their focus. While **integrated appraisal tools** routinely examine the economic, social and environmental implications of options or proposals, **partial appraisal tools** focus on particular issues. Examples of integrated appraisal tools include Cost-Benefit Analysis (CBA), Multi-Criteria Analysis (MCA) and Sustainability Appraisal. Partial appraisal tools include Environmental Impact Assessment (EIA) and Health Impact Assessment (HIA).

[1] It should be noted that to some, the terms 'appraisal' and 'assessment' have different connotations. For example, an 'assessment' may be regarded as a data-hungry, technical and extended inquiry while an 'appraisal' may be considered an information-light, relatively informal and rapid investigation. However, for the purposes of this report, the two terms are regarded as synonymous and are used interchangeably.

Although partial appraisal tools may not provide decision-makers with the full range of impact information they may nonetheless perform a valuable role. For example, decision-makers might consider it important to undertake EIA or HIA, if they considered information on environmental or health effects to be lacking or particularly crucial to a decision. In addition, partial appraisal tools could, in combination, provide the 'building blocks' for an integrated appraisal process. In light of this, the report also considers partial appraisal tools such as EIA and HIA.

All appraisal tools can employ a range of **techniques** to support the assessment of options. For example, an EIA might employ field survey, Geographical Information Systems, expert testimony, public meetings and focus groups in order to identify and evaluate potential impacts.

Finally, for the purposes of this research project, a **'method'** is taken to be a systematic means for examining and assessing the relative merits of options or proposals and is considered, for the purposes of this report, to be synonymous with a **'tool'**.

Although this research focused on integrated appraisal, it should be recognised that the ultimate goal should be **integrated decision-making** rather than the promotion of integrated appraisal *per se*. Integrated decision-making takes appropriate account of economic, social and environmental considerations in the pursuit of sustainable development.

Box 2.1: Summary of the key messages from the definitions of terms

- **Appraisal** is the process of assessing the performance of options or proposals.
- **Integrated appraisal** aims to assess the performance of options or proposals in terms of their economic, social and environmental implications.
- **Integration** may also have a variety of other meanings in the context of appraisal, for example 'tiering' between appraisals undertaken at different levels in the decision-making hierarchy; integration between decision-making and appraisal processes; and the integration of stakeholders into appraisal processes.
- An **appraisal tool** provides a systematic means of undertaking an assessment of the performance of options or proposals.
- Integrated appraisal is best viewed as a generic or **umbrella approach** to appraisal and not necessarily a single or discrete appraisal tool. An integrated appraisal will need to be tailored to the particular situation in hand, while following a generic framework and set of principles.
- Appraisal tools may be **partial** or **fully integrated** in their focus (i.e. they may only consider social or economic or environmental implications, or they may cover the whole spectrum).
- **Partial appraisal tools** can make a valuable contribution to integrated decision-making and provide the 'building blocks' for an integrated appraisal.
- Appraisal tools may employ a variety of different **techniques** to support the assessment of options or proposals.
- The emphasis should be **integrated decision-making** and not integrated appraisal *per se*.

2.2 Drivers

From the point of view of the Agency, there are several key drivers for investigating and promoting integrated appraisal and these include:

- the Agency's statutory duty vis-à-vis sustainable development and the consideration of costs and benefits;
- an evolving understanding of what constitutes sustainable development; and
- the perceived inadequacy of partial appraisal tools.

These drivers are considered in turn below.

2.2.1 The Agency's statutory duty vis-à-vis sustainable development and the consideration of costs and benefits

Section 4(1) of the Environment Act 1995 states that:

> *"It shall be the principal aim of the Agency (subject to and in accordance with the provisions of this Act or any other enactment and taking into account any likely costs) in discharging its functions so to protect or enhance the environment, taken as a whole, as to make the contribution towards attaining the objective of achieving sustainable development…"*

Section 4(2) of the Environment Act requires the Secretary of State to periodically issue the Agency with guidance on its statutory objectives and the contribution it should make to sustainable development. In relation to sustainable development and the consideration of economic and social issues, the current Section 4 guidance (DEFRA, 2002a)[2] states:

> *"The Agency's main contribution to achieving sustainable development will be to deliver the objectives in part 4 of this guidance in a way which takes account (subject to and in accordance with the 1995 Act and any other enactment) of economic and social considerations."* (para. 3.6)
>
> *"The Agency's work can have major social and economic as well as environmental consequences. The Agency should develop approaches which deliver environmental requirements and goals without imposing excessive costs (in relation to benefits gained) on regulated organisations."* (para. 3.10)
>
> *"The Agency's ability to take account of economic and social considerations will in practice be affected by the extent of its knowledge of how these interact with environmental practice. It thus needs to develop and maintain or have access to adequate experience and understanding of the interactions between environmental practice and social and economic factors."* (para. 3.12)

[2] Similar guidance has been issued by the National Assembly for Wales for consultation (2002).

> *"In considering how best to integrate environmental, economic and social considerations the Agency should bear in mind all relevant Government policy and guidance."* (para. 3.13)

In light of the above, the development and promotion of integrated appraisal within the Agency could potentially help to:

- take account of economic and social considerations in delivering Agency objectives;
- gauge the potential costs of Agency decisions to regulated organisations;
- develop and maintain experience and understanding of the interactions between economic, social and environmental factors; and
- take into account Government policy and guidance which increasingly advocates an integrated approach to appraisal (see Chapter 4).

In addition, Section 39(1) of the Environment Act provides the Agency with a general duty to have regard to costs and benefits in exercising its powers. More specifically, the Section 4 guidance states:

> *"The Agency is required to take into account any likely costs in achieving its principal aim, and to take account of the likely costs and benefits in exercising its powers. This includes both costs to people and organisations, and costs to the environment."*
>
> (DEFRA, 2002a, para. 1.3)

The need to take account of costs and benefits including costs to people and organisations as well as the environment provides a further rationale for investigating, developing and promoting integrated appraisal.

2.2.2 An evolving understanding of what constitutes sustainable development

The World Commission on Environment and Development (WCED) defined sustainable development as *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (WCED, 1987, page 43). Although intra-generational equity is central to this definition, the social dimensions of sustainable development were somewhat overshadowed by an economy/environment axis during the early 1990s (Owens and Cowell, 2002). However, the present Government attaches considerable importance to the social welfare dimensions of sustainability and these have since come to the fore (Owens and Cowell, 2002; Environment Agency, 1999a).

The Government's emphasis on social issues and integrated (or 'joined-up') decision-making was reflected in the definition of sustainable development proposed in the second UK sustainable development strategy published in 1999. Here, sustainable development was defined to be the *simultaneous* achievement of four objectives (DETR, 1999a, para. 1.2):

- social progress which recognises the needs of everyone;
- effective protection of the environment;
- prudent use of natural resources; and
- maintenance of high and stable levels of economic growth and employment.

The increasing importance attached to the social dimensions of sustainable development and the need for integrated decision-making provides the Agency with a further driver for undertaking integrated appraisal.

2.2.3 The perceived inadequacy of partial appraisal tools

The development of integrated appraisal may, in part, be a response to concerns that existing partial appraisal tools (e.g. EIA and HIA) do not provide decision-makers with the breadth of information they need in order to decide on a preferred option.

By way of example, James (2001) argued, in the context of local minerals planning, that Sustainability Appraisal was superior to its predecessor environmental appraisal since it provided decision-makers with a greater amount of information *"thereby making it easier to identify where trade-offs occur and how they can be minimised, something that was virtually impossible in environmental appraisal because of a lack of integrated information on social and economic effects"* (James, 2001).

In addition, employing two or more partial appraisal tools (which might be necessary to gather the necessary information) could lead to concerns over, for example, double counting, duplication of effort, the inter-relationships between certain impacts being overlooked; and practice difficulties in co-ordinating the timing of different appraisals (Scrase and Sheate, 2002; Lee and Kirkpatrick, 2000).

Further debate over the relative merits of partial versus integrated appraisal tools is likely given the requirements of EU Directive 2001/42/EC *on the assessment of the effects of certain plans and programmes on the environment* (the 'SEA Directive'). The SEA Directive requires an environmental assessment to be undertaken for certain plans and programmes likely to have significant environmental effects and this requirement bucks the trend, at least in the UK, towards Sustainability Appraisal, particularly in the context of land use planning (see Chapter 4).

Concerns surrounding the adequacy of partial appraisal tools provide a further impetus for integrated appraisal, although partial tools may nonetheless perform a valuable role (see Chapter 4).

2.3 Decision-Making and Appraisal

A decision-making hierarchy may be envisaged ranging from policies down to plans, programmes and ultimately projects and each of these levels or tiers have particular characteristics (see Box 2.2). However, in practice this terminology is not consistently used and these distinctions are not as clear and elegant as they are in theory (Therivel and Brown, 1999).

Box 2.2: Levels of decision-making

Policy:	a general course of action or proposed overall direction that an organisation is, or will be, pursuing and which guides ongoing decision-making.
Plan:	a purposeful, forward-looking strategy or design, often with co-ordinated priorities, options and measures, that elaborates and implements policy.
Programme:	a coherent, organised agenda or schedule of commitments, proposals, instruments and/or activities that elaborates and implements policy and/or plan.
Project:	a capital undertaking, typically involving the planning, design, construction and subsequent operation and decommissioning of a large-scale plant, facility or structure.

The characteristics of decision-making may change considerably along the continuum between policies and projects and this has significant implications for accompanying appraisal. In particular, the range of potential options; the level of uncertainty to be managed; the level of detail that might be entered into; and the nature of impact prediction may vary considerably (see Figure 2.1).

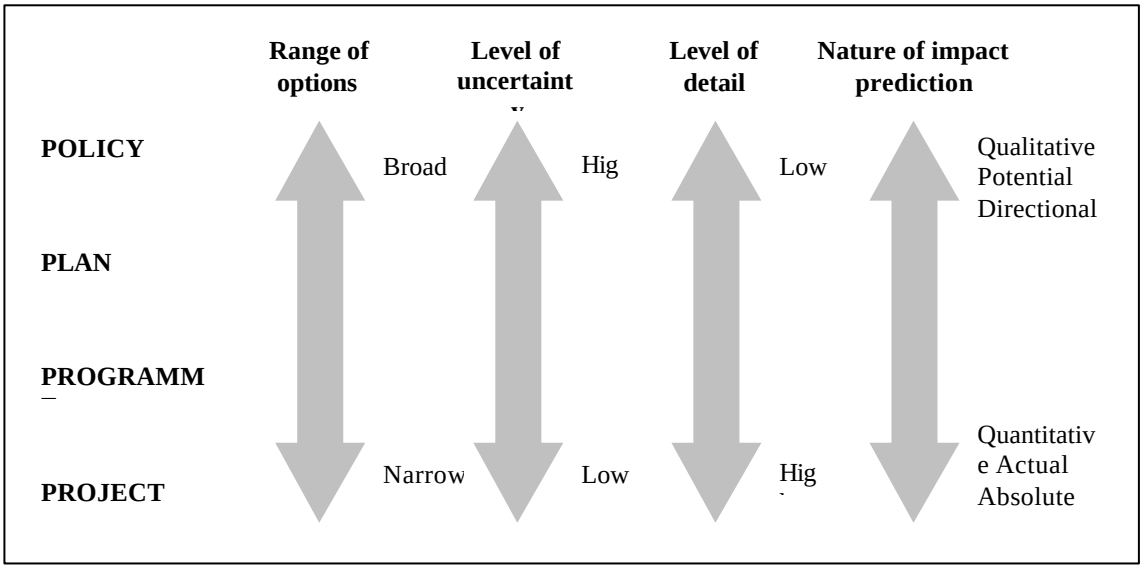

Figure 2.1: Broad trends in the nature of appraisal at different levels in the decision-making hierarchy

In particular, as the decision-making hierarchy is ascended, the level of uncertainty confronting decision-makers and appraisal practitioners will inevitably increase as it becomes progressively more difficult to envisage how decision-making ambitions will 'percolate' down the hierarchy and find expression on the ground. Appraisal at strategic levels must therefore find some means to manage this inherent uncertainty, for example, through gathering information in order to reduce or dispel uncertainty; making explicit assumptions that facilitate appraisal (for example, assuming that a proposal's ambitions will be met in full); and carrying out sensitivity analysis (i.e. asking what would happen if a particular variable(s) were to change).

The level of detail an appraisal enters into may increase as the decision-making hierarchy is descended since, in all likelihood, it will become progressively easier to

forecast the likely implications of an action on the ground and therefore make detailed predictions. However, the level of impact investigation undertaken should reflect the importance of the issues at stake and particularly the perceived significance of the impacts (the 'proportionality principle').

The way in which impacts are expressed may reflect the point in the decision-making hierarchy at which appraisal is undertaken. As the decision-making hierarchy is descended future impacts on the ground may be forecast with increasing certainty and the scope for making absolute, quantified predictions is consequently greater. However, quantified predictions may also be made at higher levels but these may depend increasingly on assumptions, generalisations and representative case studies.

Applying appraisal at the strategic level presents a number of potential challenges. Firstly, in contrast to decisions made at the project level, strategic decisions may be incremental with relatively few 'decision windows' – discrete moments in the decision-making process when decisions are made and appraisal may be applied and its findings effectively assimilated. Secondly, strategic decisions may be made over relatively long periods of time and it may be unrealistic to undertake an uninterrupted appraisal process in parallel. Thirdly, strategic decision-making processes may evolve over time and planning an appraisal process to proceed effectively alongside the decision-making process may be difficult.

2.4 Forms of 'Integration'

The term 'integration' has become something of a 'buzz word' in recent years and, according to Lee (2002), the term is used in the context of impact assessment in at least three different senses:

- *vertical integration of assessments*, i.e. linking together separate impact assessments, which are undertaken at different stages in the policy, planning and project cycle (hereafter referred to as the 'planning cycle') (in other words 'tiering');

- *horizontal integration of assessments*, i.e. bringing together different types of impacts – economic, environmental and social – into a single overall assessment at one, or more, stages in the planning cycle; and

- *integration of assessments into decision-making*, i.e. integrating assessment findings into decision-making at different stages in the planning cycle.

It is important to distinguish between 'integration' in the context of appraisal and 'integration' in the context of decision-making. Whereas the term is often used in the context of appraisal to refer to the consideration of economic, social and environmental considerations within one 'integrated' appraisal, in the context of decision-making it is frequently used to refer to the real world integration of economic, social and environmental concerns. Although these are two quite separate forms of 'integration', integration within appraisal is often assumed to facilitate integrated decision-making.

Integration is also used in other senses. Following a workshop held as part of this project, three categories of integration were proposed (see Box 2.3) which apply in the

context of both decision-making and appraisal. Furthermore, Eggenberger and Partidário (2000) identified five categories of integration in the context of development planning and assessment (see Box 2.4) while Scrase and Sheate (2002) went considerably further and identified *fourteen* types of integration in the context of environmental assessment and governance (see Table 2.1).

Box 2.3: Three types of integration identified at the first workshop (Environment Agency, 2001a)

- **Disciplinary and methodological integration** – integration of environmental, economic and social issues; integration of different disciplines; and integration of environmental, economic and social appraisal tools, techniques approaches (form of *horizontal* integration).
- **Procedural integration** – integration of different procedural requirements and approval/licensing requirements; integration between levels of decision-making (form of *vertical* integration); organisation structure to facilitate integration; exchange of information between different sectors/functions; and definitions of roles and responsibilities within and between organisations.
- **Integration of actors** – integration of different actors into the appraisal and decision-making processes (for example, stakeholders such as the public, employees, decision-makers and government departments); and provision of capabilities to cope with integration and new issues – skills, knowledge, behaviour, personality etc.

Box 2.4: Five forms of integration in the context of development and planning assessment (Eggenberger and Partidário, 2000)

1. **Substantive**
   - The integration of physical or biophysical issues with social and economic issues
   - The integration of emerging issues such as health, risks, biodiversity, climate change and so on
   - The (appropriate) integration of global and local issues

2. **Methodological**
   - The integration of environmental, economic and social (impact) assessment approaches such as cumulative assessment, risk assessment, technological assessment, cost/benefit analysis, multi-criteria analysis
   - The integration of the different applications, and experiences with the use of particular tools such as GIS (geographical information systems)
   - The integration and clarification of (sector) terminologies (including the element of 'strategic')

3. **Procedural**
   - The integration of environment, social, economic planning/assessment, spatial planning and EIA
   - The integration of sector approval/licensing processes, spatial planning and EIA
   - The adoption of co-ordination, co-operation and subsidiarity as guiding principles for (governmental) planning at different levels of decision-making
   - The integration of affected stakeholders (public, private, NGO (non-governmental organisations)) in the decision-making process
   - The integration of professionals in a truly interdisciplinary team

4. **Institutional**
   - The provision of capacities to cope with the emerging issues and duties
   - The definition of a governmental organisation to ensure integration
   - The exchange of information and possibilities of interventions between different sectors
   - The definition of leading and participating agencies and their respective duties and responsibilities

5. Policy

- The integration of 'sustainable development' as overall guiding principle in planning and EIA
- The integration of sector regulations
- The integration of sector strategies
- The timing and provisions of political interventions
- Accountability of government

Table 2.1: Meanings of integration in environmental assessment and governance (adapted from Scrase and Sheate, 2002)

Meaning	Main focus
A. Integrated information resources	Facts/data
B. Integration of environmental concerns into governance	Environmental values
C. Vertically integrated planning and management	Tiers of governance
D. Integration across environmental media	Air, land and water
E. Integrated environmental management (regions)	Ecosystems
F. Integrated environmental management (production)	Engineering systems
G. Integration of business concerns into governance	Capitalist values
H. The environment, economy and society	Development values
I. Integration across policy domains	Functions of governance
J. Integrated environmental-economic modelling	Computer models
K. Integration of stakeholders into governance	Participation
L. Integration among assessment tools	Methodologies/procedures
M. Integration of equity concerns into governance	Equity/socialist values
N. Integration of assessment into governance	Decision/policy context

2.5 Appraisal Tools

In recent years, a plethora of decision support tools have emerged with which the Agency will be familiar (see Box 2.5). In order to be considered an appraisal tool, a tool must provide a systematic means to assess options or proposals. As such, those support tools that are not, at least conventionally, used to assess options or proposals may be ruled out. Environmental Auditing, for example, is concerned with post-decision performance (Petts, 1999). In addition, Ecological Footprint and Quality of Life Capital are largely concerned with the provision of baseline information and Analytic-Deliberative Processes and Deliberative Inclusive Processes with stakeholder involvement. While all these tools can provide valuable inputs to appraisal, they are not appraisal tools in themselves.

Appraisal tools can be integrated or partial in their focus. Tools such as CBA, MCA and Sustainability Appraisal routinely consider economic, social and environmental issues. Others such as LCA and Risk Assessment conventionally focus on

environmental issues but can, at least in theory, be broadened to address economic and social concerns. However, others such as EIA, SEA, HIA and SIA focus, as their names suggest, on particular issues and are therefore partial appraisal tools.

Box 2.5: Decision support 'tools' or families of tools familiar to the Agency

- Analytic-Deliberative Processes
- Cost-Benefit Analysis
- Cost-Effectiveness Analysis
- Deliberative Inclusive Processes
- Ecological Footprint
- Environmental Auditing
- Environmental Impact Assessment
- Environmental Management System
- Health Impact Assessment
- Life Cycle Assessment
- Multi-Criteria Analysis
- Quality of Life Capital
- Regulatory Impact Assessment
- Risk Assessment
- Social Impact Assessment
- Strategic Environmental Assessment
- Sustainability Appraisal

For the purposes of the research, six tools or families of tools which can provide for integrated appraisal and/or provide the 'building blocks' for integrated appraisal have been focused on:

- Cost-Benefit Analysis (CBA);
- Multi-Criteria Analysis (MCA);
- Life Cycle Assessment (LCA);
- Risk Assessment;
- Environmental Assessment and related tools; and
- Sustainability Appraisal and related tools.

All six tools or families of tools are or have been used by the Agency (see section 2.7) and each is introduced in Chapter 4.

In promoting integrated appraisal, several obstacles may be encountered:

- *disciplinary protectionism* – for example, a reluctance on the part of those with an interest or specialism in certain appraisal tools to consider economic, social and environmental concerns in an integrated fashion;

- *lack of resources* – in terms of the requisite skills, knowledge, time and money to undertake an integrated appraisal;

- *legislative focus* – integrated appraisal does not have strong regulatory support whereas appraisal tools that provide for 'partial' assessments including EIA and SEA have (or will have) a strong regulatory basis; and

- *'dilution' of certain concerns* – some stakeholders may be concerned that particular issues will have a lower profile in integrated appraisal (and consequently command less importance in the decision-making process).

In addition, appraisal in general may encounter a range of obstacles, including:

- *lack of appropriate techniques* – in some cases, appropriate techniques to support appraisal tools may not be available; and

- *lack of agreed protocols* - some appraisal tools (e.g. Sustainability Appraisal) may lack agreed rules for implementation leading to inconsistency of application.

2.6 Agency Decision-Making and Appraisal

2.6.1 Agency decision-making

The Agency has to make a wide range of decisions across all its areas of work. However, it is important to characterise aspects of the decision-making process so as to be able to understand where appraisal may be required and what influence the Agency would have over that appraisal and, ultimately, the decision. In order to do this the following summarises a number of roles which the Agency has to fulfil:

- *regulator, including enforcement compliance assessor and prosecutor* - the Agency regulates various activities and processes (e.g. IPC / IPPC authorisations, land drainage consents, abstraction licences and waste disposal licences). As part of this role the Agency may require an applicant to provide certain information and/or undertake appraisal to help the Agency determine the application. In some cases the Agency may issue guidance on how the applicant should carry out the appraisal and/or may undertake its own appraisal as part of the determination process. The Agency may produce strategic plans and undertake more strategic appraisal to inform its licensing policy (e.g. CAMS);

- *developer and operating authority* - the Agency undertakes capital and revenue works and activities as part of fulfilling its functions and duties (e.g. flood and coastal defence, water resources, navigation, recreation and conservation). As part of this role the Agency may use appraisal to help develop plans and strategies to guide future work (e.g. Catchment Flood Management Plans) and use appraisal as part of the design process for individual projects;

- *consultee and advisor* - the Agency advises central, regional and local government, other government agencies, industry and developers. In some cases this may be a statutory process (e.g. consultee on certain planning applications). As part of this role the Agency may, for example, review or become involved in appraisals undertaken by third parties where it is not the competent authority but purely a consultee (e.g. Sustainability Appraisals of Regional Planning Guidance and EIAs undertaken for certain planning applications). It may also advise Government on the development of appraisal methodologies (e.g. *Guidance on the Methodology for Multi-Modal Studies* and the New Approach to Appraisal for road investment

proposals) and issue good practice guidance on appraisal (e.g. EIA Scoping Guidance, Environment Agency, 2002a); and

- *internal business management and support processes* - the activities involved in running the organisation (e.g. procurement, managing the Agency's estate and monitoring performance). As part of this role the Agency may, for example, use appraisal to inform decision-making and audit performance.

These roles cut across all functions and Appendix 2 provides some specific examples of the types of decision/activity that are carried out within Agency functions, while fulfilling these roles. As can be seen from this Appendix the range of decision making activity runs from project level through to the strategic level of policies, plans and programmes.

Box 2.6 provides specific examples of plans and programmes produced by the Agency while fulfilling different roles (i.e. regulator, developer and internal business management) and Box 2.7 provides examples of other plans and programmes in which the Environment Agency may be involved in the role of advisor or consultee.

Box 2.6: Examples of Agency plans and programmes

- Catchment Flood Management Plans;
- Flood and Coastal Defence Strategies;
- Shoreline Management Plans (SMPs)
- Water Level Management plans (WLMPs);
- Flood and Coastal Defence Capital Programmes;
- Flood and Coastal Defence Operational Maintenance Programmes;
- Water Resources National and Regional Strategies;
- Programmes of Measures and River Basin Management Plans (RBMPs) (future requirements under the Water Framework Directive);
- Catchment Abstraction Management Strategies (CAMS);
- Fisheries Action Plans;
- Recreation Strategies and Action Plans;
- Navigation (Waterways) Plans;
- Corporate Plan: and
- Local Contributions.

Box 2.7: Examples of other plans and programmes in which the Environment Agency may be involved in the role of advisor/consultee

- Regional Planning Guidance (RPG);
- Regional (Economic) Strategies (RESs);
- Regional Waste Strategies;
- Regional Sustainable Development Frameworks;
- statutory development plans (e.g. Structure Plans, Unitary Development Plans, Local Plans, Waste and Mineral Local Plans);
- Biodiversity Action Plans (BAPs);
- Community Plans;
- Multi-Modal Studies; and
- Local Transport Plans.

Note: The Planning Green Paper: *Planning: Delivering a Fundamental Change* (DTLR, 2001a) proposes replacing RPG with statutory Regional Spatial Strategies and replacing the current hierarchy of development plans (Structure Plans, Unitary Development Plans and Local Plans) with a single level of plan: the Local Development Framework.

At the strategic level, the Agency produces its own policies, corporate strategies and plans, as well a number of specific plans and programmes as part of its operational work. It is with these that there is likely to be particular scope for the development and application of strategic integrated appraisal methods.

2.6.2 Appraisal tools currently used by the Agency

The majority of the appraisal tools, techniques and approaches currently used by the Agency to support decision-making are specialist methods (i.e. relating to either environmental, economic, social or technical considerations) and applied at the level of an individual project or regulatory decision rather than at the strategic level. The forms of appraisal most commonly used include:

- Cost-Benefit Analysis (CBA) and Cost-Effectiveness Analysis (CEA);
- Multi-Criteria Analysis (MCA);
- Life Cycle Assessment (LCA);
- Risk Assessment;
- Environmental Impact Assessment (EIA);
- Strategic Environmental Assessment (SEA); and
- Sustainability Appraisal.

These are applied across a range of Agency activities (see Chapter 4 for examples). The form of appraisal process currently practised and the tools used in a particular situation may fall into three categories:

- *statutory requirement to undertake appraisal within a particular decision-making process and/or using a particular tool* - for example CBA may be required for grant aided flood defence works and EIA for certain types of development project;

- *appraisal following good practice or voluntary guidance (both produced by the Agency and by others)* - for example Sustainability Appraisal of CAMS (see Chapter 5); and

- *appraisal undertaken by a third party which the Agency comments on or uses to inform decisions* - for example in determining an IPPC authorisation, a BPEO and BAT assessment is required from the operator which is assessed by the Agency.

In its role as a regulator, the Agency provides guidance on the type of appraisal required for statutory decisions. Specific examples include BPEO and BAT for a range of regulated industrial processes (i.e. Agency's E1 BPEO guidance; BAT reviews and guidance notes for processes). In this role, given the statutory nature of the decisions it is likely to be quite tightly focused to what is legally required, potentially limiting the scope for increased integration, unless there are changes to the statutory requirements.

Some forms of appraisal within the Agency are also increasingly being applied at a more strategic level to support decision-making (e.g. SEA, particularly of flood defence strategies). Instances of integrated appraisal are rare although the Sustainability Appraisal of CAMS (see Chapter 5) and the draft guidance on *Integrated Appraisal of Environment Agency Policies* (Environment Agency, 2000a) are notable examples.

3. DEVELOPING A FRAMEWORK FOR INTEGRATED APPRAISAL

3.1 Developing the Framework

Figure 3.1 presents a diagrammatic illustration of the steps in what might be described as an idealised decision-making and appraisal process. The framework presents the appraisal and decision making processes in a unified way, although it should be recognised that in practice decision-making and appraisal processes may be more or less unified depending on the circumstances. As such, each step in the framework may be driven primarily by the overarching decision making process or by the appraisal process.

It is important to recognise that some steps (e.g. 'identify the options', 'select the preferred option(s)', 'monitor and deliver' and 'review and evaluate') lie largely in the realms of decision-making rather than appraisal. However, appraisal can play a supporting role at these points in the cycle to a greater or lesser degree. For example, in establishing arrangements for monitoring, appraisal can identify the significant impacts of the action that should be monitored and suggest potential indicators. The principal role for appraisal lies in its capacity to assess and compare options and provide information to decision-makers in order to facilitate selection of the preferred option(s). Stakeholder involvement has been illustrated at the centre of the decision-making and appraisal process as it has the potential to form part of each step in the framework.

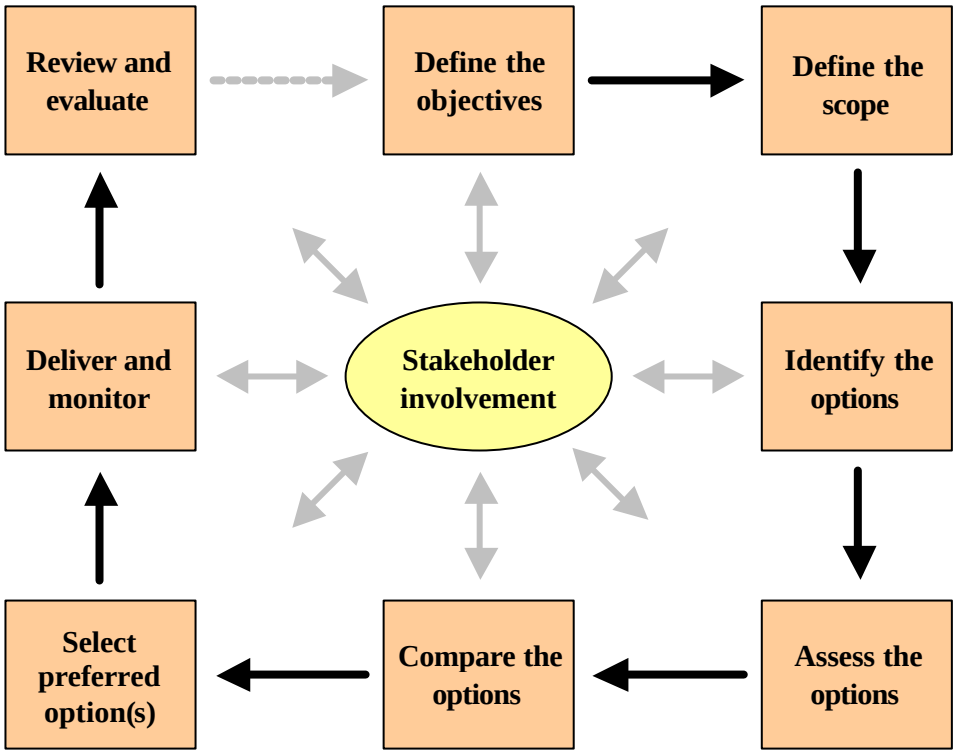

Figure 3.1: Steps in the decision-making and appraisal process

The framework was developed on the basis of the literature review, analysis of decision-making and appraisal processes and successive brainstorming sessions amongst the project team. While it is anticipated that the approach to appraisal will need to be tailored to the particular circumstances involved in each case, these common steps should be generally applicable. However, the level of detail and methods used to support each step may vary depending on the particular activity that is being appraised. Each of the steps in the framework is introduced in the sections that follow (see section 3.2) and a separate section also introduces the issue of stakeholder involvement.

Table 3.1 lists some of the key questions that should be asked at each stage in the framework to help refine the approach to integrated appraisal and guide the choice of different tools and techniques to ensure the appraisal process is 'fit for purpose'.

3.2 Steps in the Framework

3.2.1 Define the objectives

An objective is something that decision-makers seek to accomplish or to obtain by means of their decision. Moreover, an objective generally indicates the 'direction' in which we should strive to do better (Keeney and Raiffa, 1993). Several points should be noted in relation to objectives:

- in order to accurately define the objectives, it will first be necessary to clearly identify 'the problem' that is to be resolved through the decision-making process. In this way the desired aims can be reflected in the objectives. In some cases the problem is likely to be discrete and well-structured, but in others instances it may be more complex and ill-defined;

- objectives guide the entire decision-making process since they provide the basis for generating and evaluating alternatives. However, the objectives may not be 'set in stone' and may be revisited as a result of the appraisal;

- objectives should help to decide what information needs to be assembled;

- objectives may be placed in a hierarchy with lower level objectives progressively expanding upon what higher level objectives entail. Keeney and Raiffa (1993) used the term 'specification' to refer to the subdivision of an objective into more detailed lower-level objectives that serve to clarify the intended meaning of the more general objective. Appraisal criteria can be developed from the more detail sub-objectives and used as a benchmark against which to appraise option performance;

- the objectives of the decision-making process and those of the accompanying appraisal process may not necessarily be one and the same. For example, Sustainability Appraisals of Regional Planning Guidance and Regional Economic Strategies have in the past employed a set of objectives spanning the sustainable development agenda and these have not necessarily been the same as the strategy's own objectives. Appraisal against a set of wider objectives may serve to ensure that a wider range of concerns are taken into account in reaching a decision on the preferred option(s);

Table 3.1: Key questions for each of the steps in the decision-making and appraisal process

Step	Key questions
Define the objectives	• What are the objectives of the policy, plan, programme or project? • What are the objectives of the appraisal? • Are these objectives one and the same or different?
Stakeholder involvement	• When and how should stakeholders be involved? • What means of engagement of stakeholders will be employed? • How will the transparency of the appraisal be ensured?
Define the scope	• What issues will be addressed as part of the appraisal process (e.g. economic, environmental, social, technological)? • What depth of investigation will be needed for a robust decision? • What criteria will be used to appraise the options?
Identify the options	• Is there sufficient information to facilitate the identification of options? • What range of options will need to be considered? • How will the options be generated and short-listed (e.g. in consultation with stakeholders)?
Assess the options	• What methods to assess the options will be appropriate/practical? • What types of impacts will need to be considered (e.g. direct, indirect, cumulative, synergistic, permanent, temporary, positive, negative)? • How will significance be determined (e.g. consensus building, thresholds)? • What will be the appropriate balance between technical and participatory approaches and quantitative and qualitative predictions?
Compare the options	• Which options perform best against the appraisal criteria? • What are the trade-offs between the different options? • How will the costs and benefits of different options be expressed (e.g. qualitative or quantitative, monetary or non monetary) and how will these be combined?
Select the preferred option(s)	• How will the decision-makers be involved and how will the appraisal findings be presented to the decision maker(s)? • What other factors are relevant to the decision? • How will the preferred option(s) be determined?
Deliver and monitor	• How will the implementation of the policy, plan, programme or project be monitored? • What will be the frequency, methods and responsibility for monitoring? • How will the mitigation and enhancement measures be implemented?
Review and evaluate	• How will the implementation of the objectives be evaluated? • Who will be responsible for review and evaluation and what will be the appropriate timing?

Note: stakeholders should be involved throughout the decision-making and appraisal process.

- objectives may be derived from a variety of sources. Depending on the circumstances, the objectives from the relevant Regional Sustainable Development Framework (RSDF) or Local Agenda 21 objectives might be used or at least provide a starting point; and

- it may be that the objectives will conflict with one another in that progress in relation to one objective can only be accomplished at the expense of another (Keeney and Raiffa, 1993). In selecting the preferred option(s), trade-offs between competing objectives may therefore be necessary (see Chapter 6).

3.2.2 Stakeholder involvement

The issue of stakeholder involvement in appraisal is examined in Chapter 4. The key questions to consider in undertaking an appraisal are who should be involved, when and in what capacity? Ideally, stakeholder involvement should be an integral part of the appraisal process and should help to ensure the appraisal is transparent and commands a degree of ownership and support. The extent to which stakeholders are involved in appraisal and the way in which they are engaged will vary according to the characteristics of the process and should reflect the significance of the decision in hand.

3.2.3 Define the scope

As part of the appraisal process, the scope should be appropriately defined. Scoping essentially involves determining the issues or impacts upon which the appraisal will focus. In order that resources are allocated to best effect, the potential impacts and alternatives investigated should usually be those considered most significant.

In addition, a range of other issues may be resolved at the scoping stage. For example, scoping provides an opportunity to:

- determine responsibility for the appraisal;
- timetable the appraisal;
- decide on the information to be assembled for the purposes of impact prediction;
- identify key stakeholders and opportunities for their involvement;
- agree the appraisal tool(s) that will be employed;
- establish the depth of impact investigation that will be undertaken; and
- determine the spatial and temporal boundaries of the appraisal (i.e. the geographical area over which impacts will be considered and the time horizon over which impacts will be assessed).

In short, scoping affords an opportunity to clearly establish the appraisal's 'terms of reference' at the outset.

3.2.4 Identify options

Alternatives or options are the 'raw material' of decision-making and represent the range of potential choices for pursuing the objectives (Hammond *et al*, 1999). Several factors should be considered in relation to options:

- options considered may include the 'do nothing option' (or the 'no action alternative'). The implications of the do nothing option are conventionally established for the purposes of most appraisal tools (and are fundamental to CBA) since they provide the baseline against which an action's impacts may be gauged. The do nothing option frequently equates to the 'business-as-usual' scenario (i.e. continuing to maintain the project or implement the existing policy, plan or programme in its present form over time);

- a hierarchy of options may be identified. For example, the ODPM has recently published *Draft guidance on the Strategic Environmental Assessment Directive* (ODPM, 2002) and this proposes a hierarchy of alternatives that local authorities might consider in preparing land use plans:

  - need/demand: is it necessary?
  - mode/process: how should it be done?
  - location and timing: where should it go and when?
  - detailed implementation: e.g. what should it look like?

  The hierarchy aims to prompt broader higher-level thinking although the guidance recognises that it will not always be possible to consider the full range of options. It is likely that questions of need/demand will correspond to the policy level and issues of detailed implementation to the project level.

- several constraints on the identification of options may be encountered. For example, proponents may define the objectives so narrowly as to preclude reasonable alternatives or neglect to identify potentially sound alternatives. Drawing on the observations of Steinemann (2001), there may be a tendency for decision-makers to identify a preferred option(s) early on and short list clearly less attractive options to appraise alongside it, thus adding to the preferred option's perceived appeal;

- there may be cognitive barriers to the identification of alternatives. For example, proponents may favour alternatives that can be more readily linked to what is familiar (the 'representative heuristic') or to what was recent, memorable or successful (the 'availability heuristic') (DETR, 2001). Similarly, Hammond *et al* (1999) argued that most decision-makers display a strong bias towards alternatives that perpetuate the current situation (the 'status quo trap'); and

- some plans, programmes and projects comprise a 'bundle' or package of preferred options rather than a single preferred option.

3.2.5 Assess the options

Appraisal is the process of assessing the performance of options or proposals and it is at this stage in the framework that appraisal comes strongly into play. Various appraisal tools may be employed to assess options and the five types or families of tools identified for the purposes of this research are introduced in Chapter 4.

In assessing the options a range of impact dimensions should ideally be considered. These might include, for example, direct, indirect, cumulative, synergistic, permanent, temporary, positive and negative, real and perceived impacts. The significance of the identified impacts can be gauged through, for example:

- expert judgement;
- dialogue with stakeholders;
- the use of thresholds;
- reference to legislation and regulations; or
- some notion of 'capacity'.

Following appraisal, the insights gained may lead to options being revisited and the identification of potential measures for mitigating adverse impacts and enhancing positive impacts. In some cases, the appraisal findings may lead to changes in the overall objectives. Importantly, several rounds of appraisal may be undertaken and the range of potential options may be gradually narrowed down.

3.2.6 Compare the options

The appraisal tools introduced in Chapter 4 differ in the degree to which they 'process' impact information and facilitate the comparison of options. While some appraisal tools simply present information on the potential implications of the various options under consideration (albeit with some indication of impact significance and/or possibly some impact commentary and recommendations to decision-makers), other tools may explicitly evaluate the competing options, rank them and come to a conclusion as to the preferred option(s). Appraisal tools therefore differ in the extent to which they explicitly compare and rank options or leave this to decision-makers. In identifying and evaluating option performance, appraisal tools may also differ in the degree to which they involve stakeholders.

3.2.7 Select the preferred option(s)

This is the point at which, in theory, a decision is made as to which of the options under consideration best meets the objectives and should be taken forward. In reaching a decision as to the preferred option(s), trade-offs between the various objectives may be necessary (see Chapter 6). Depending on the circumstances, decision-makers may have to take a range of other factors into account in addition to the appraisal findings in reaching a decision as to the preferred option. If, for any reason, a preferred option(s) cannot be identified, it may be necessary to revisit the options and possibly the objectives.

3.2.8 Deliver and monitor

In delivering the preferred option(s), the consequences of doing so may be monitored in response to, for example, regulatory requirements. Appraisal can support the monitoring process through identifying the most significant potential impacts that might need to be observed into the future and suggesting indicators which provide a picture of the degree of change (if any) for a given variable.

3.2.9 Review and evaluate

The performance of the preferred option should be reviewed and evaluated on the basis of the monitoring findings and this should be an ongoing process throughout the life of a policy, plan, programme or project. Changes in the overall objectives might then be made in light of the review and evaluation. In support of review and evaluation other tools, such as Environmental Auditing, might be usefully employed.

4. TOOLS FOR INTEGRATED APPRAISAL

4.1 Introduction

In undertaking an integrated appraisal, one or more appraisal tools may be employed. A variety of appraisal tools are in use and these share a common aim to consider the gains and losses arising from options or proposals and also order information and thus render complexity more tractable. However, despite sharing fundamental aims, appraisal tools differ in terms of their focus; the rationales they adopt for scoring gains and losses; and, at least conventionally, the degree to which they involve stakeholders and the extent to which they permit gains and losses to be aggregated.

Classifying appraisal tools is difficult since very few have universally accepted procedures and methodologies associated with them and all have the potential to be undertaken in a variety of ways and are rarely implemented in their 'purest' form. As such, the boundaries between them are somewhat blurred. However, for the purposes of this research project, six types or families of appraisal tools have been identified and these are introduced in section 4.2:

- Cost-Benefit Analysis (CBA);
- Multi-Criteria Analysis (MCA);
- Life Cycle Assessment (LCA);
- Risk Assessment;
- Environmental Assessment and related tools; and
- Sustainability Appraisal and related tools.

In using this classification, several factors should be borne in mind:

- *it may be argued that certain types or families of tools are members or subsets of other types or families of tools* - for example, some commentators argue that CBA is essentially a form of MCA (DETR, 1999b) while Environmental Assessment and related tools frequently employ approaches strongly reminiscent of MCA;

- *the various tools do not necessarily have to be employed on a mutually exclusive basis, indeed, different tools might be used*:

  - *in combination*, for example, CBA might be combined with some system of scoring and weighting (i.e. MCA) for those impacts that cannot readily be expressed in monetary terms (DETR, 1999b);

  - *side-by-side*, for example, SEA and HIA might be carried out in parallel for a particular policy, plan or programme or project; and

  - *consecutively*, for example, options might be screened using SEA and those options considered environmentally acceptable subsequently evaluated using CBA, or a Sustainability Appraisal might be undertaken followed by a more detailed SEA or HIA if further investigation into environmental or health impacts, for example, was considered potentially beneficial.

- *all tools may employ a variety of techniques for their purposes* - for example, CBA may employ various techniques for valuing preferences (e.g. hedonic pricing and contingent valuation) while Environmental Assessment might, for example, employ computer modelling techniques or field survey in order to identify and evaluate impacts. Importantly, largely technical tools can employ various techniques for canvassing stakeholder opinion and therefore provide for something of a participatory approach;

- *some tools cannot operate in isolation* - CBA, for example, is primarily an evaluation tool not an impact identification tool (Petts, 1999) and depends for its analysis on the input of impact information from other sources (e.g. Environmental Assessment); and

- *not all tools are necessarily integrated in the sense that they simultaneously address economic, social and environmental issues* – appraisal tools may be divided into three categories:

  i. those which routinely consider all three dimensions of sustainable development (e.g. CBA, MCA and Sustainability Appraisal and related tools);
  ii. those which may have the capacity to consider all three dimensions but traditionally focus on environmental issues (e.g. LCA and Risk Assessment); and
  iii. those which are, almost by definition, concerned with particular aspects of sustainable development and thus provide for a partial appraisal (e.g. Environmental Assessment and related tools such as HIA).

Following an introduction to each tool or family of tools, the issue of stakeholder involvement in appraisal is discussed in section 4.3.

4.2 Appraisal Tools

4.2.1 Cost-Benefit Analysis (CBA)

Background

The consultation draft of the Treasury's Green Book[3] states that Cost-Benefit Analysis (CBA) *"seeks to quantify in monetary terms as many of the costs and benefits of a proposal as feasible, including items for which the market does not provide a satisfactory measure of economic value"* (HM Treasury, 2002, page 7)[4].

CBA is based on the principle that a proposal should only be implemented if all of its benefits are equal to or outweigh all of its costs. Among a set of competing alternatives, the preferred option should, all other things being equal, be the alternative with the highest net benefit (the highest positive Net Present Value).

[3] The consultation period on the draft Green Book ended on 18th October 2002 and HM Treasury aimed to finalise the guidance and issue the completed version later in 2002.
[4] The consultation draft of the Treasury's Green Book contrasts CBA with Cost-Effectiveness Analysis (CEA) (HM Treasury, 2002). For CEA, the objectives are either unanimously agreed or legally binding and the only purpose of the appraisal is to identify the least cost option for achieving the objective (CEA is also referred to as *least cost analysis*).

CBA assigns a value to costs and benefits on the basis of individuals' preferences. An individual receives a benefit whenever he or she receives something in return for which he or she is willing to give up something else that he or she values. Conversely, an individual incurs a cost whenever he or she surrenders something that he or she would willingly give up provided that he or she was granted something else he or she valued as compensation. If money is used to measure individuals' preferences (as is the convention in economic analysis), the size of a benefit can be gauged in terms of willingness to pay (WTP) – the maximum amount of money that a person would be willing to pay in return for receiving the benefit. In contrast, the size of a cost can be gauged in terms of willingness to accept (WTA) compensation – the minimum amount of money that a person would be willing to accept as compensation for incurring the cost[5]. There is an increase in economic efficiency if the sum of WTP for those who gain exceeds the sum of WTA for those who lose out.

As the definition of CBA in the draft Green Book states, the aim should be to monetise as many of the costs and benefits of a proposal as possible including those aspects for which the market does not provide a satisfactory measure of economic value. In order to estimate the monetary value of those commodities (particularly environmental resources) that are not traded in actual markets, a variety of economic valuation techniques have been developed. These fall into two categories: *revealed preference techniques* (which use data from actual markets to infer individuals' preferences for certain effects) and *stated preference techniques* (which create hypothetical markets by way of structured surveys that provide respondents with the opportunity to state their preferences). Importantly, stated preference techniques can reveal the motivations behind individuals' WTP or WTA. In addition, these techniques can provide a means for stakeholders' views to be taken into account more explicitly as part of the CBA process. Revealed preference techniques include hedonic pricing[6], avertive behaviour[7] and travel cost[8] while stated preference techniques can be categorised under the headings contingent valuation[9] and choice modelling[10]. Rather than carry out economic valuation studies for the purposes of an individual CBA, those responsible may glean estimates resulting from previous valuation studies from the literature and, with some adjustment, employ these as part of a CBA in a process known as *benefits transfer*. Although the latter does not require the collection of any *new* economic or environmental data, it may require data on, for example, the demographics of the affected population in order that the requisite adjustments can be made.

[5] It is not always possible to simply equate benefits with WTP and costs to WTA since which is used is dependent on the underlying property rights. For example, it may be appropriate to measure a cost or welfare loss by establishing WTP to avoid the loss.

[6] This infers valuations for particular effects through market prices for a good or service where the market price reflects a number of different effects. For example, property prices reflect a variety of factors including size, location, proximity to amenities and also individuals' preferences for environmental quality (e.g. in relation to noise, vibration and visual intrusion). If sufficient data is collected on property prices then the value placed on a particular effect (say noise pollution) can be isolated using multiple regression analysis.

[7] This approach assumes that the expenditure individuals make in order to avoid an environmental impact provides an indication of their WTP to avoid that impact (Eftec, 2002). For example, the amount of money individuals' expend on double-glazing may provide an indication of their WTP to avoid noise pollution.

[8] This approach can be used to infer the value visitors place on a recreational site based on their willingness to incur costs in travelling to and from that site. These costs comprise direct travel costs (e.g. for petrol) and the opportunity cost of time.

[9] This involves eliciting preferences through surveys directly asking individuals what they are WTP or WTA for a given gain or loss of a specified good (Bateman, 1999). Although there are variants of the technique, the most commonly applied approach is to interview householders either at the site of an environmental asset, or at their homes, and ask them what they are WTP towards the preservation of that asset (Turner *et al*, 1994). The average WTP of respondents can then be calculated and multiplied by the total number of people who enjoy the environmental asset to obtain an estimate of the total value that people have for the asset.

[10] This involves asking respondents to choose between different options that have different levels of particular attributes. The aggregate choice frequencies can be modelled to infer the relative impact of each attribute level on choice. One of the attributes is always cost or price that enables analysts to infer WTP/WTA from the choices people make.

Advantages

- It provides a systematic means to enumerate all the costs and benefits of a proposal and thus provides a common metric for ease of comparison.

- In principle, CBA should address all the costs and benefits associated with a proposal.

- It follows a simple rule whereby benefits *must* be at least equal to or exceed costs; options which do not satisfy this requirement are therefore not worthwhile should be rejected. Among those options whose benefits exceed their costs, CBA directs attention towards the option with the maximum net benefits (benefits minus costs). In this way, CBA is able, unlike other appraisal tools, to explicitly answer the question of whether or not any changes to the status quo (i.e. pursuing an option other than the 'do nothing option') would be desirable as well as identifying the best option amongst a set of alternatives.

- Individuals' preferences, as revealed through their WTP/WTA, encompass not only concerns for their own personal wellbeing but also any concerns they might have for others, future generations and other species (i.e. intra- and inter-generational equity and wildlife conservation – key tenets of sustainable development)[11]. However, some may argue that certain, particularly environmental, resources have an *absolute* value that goes beyond the *relative* value that individuals' attach to them.

Challenges

- Some impacts may not be readily monetised and invariably those responsible will be faced with the challenge of ensuring that non-monetised impacts are nonetheless taken into account as part of the appraisal (and decision-making) process.

- In order to generate reliable estimates of individuals' preferences for those impacts that are not readily monetised, several obstacles may be encountered. For example, the underlying scientific data upon which valuations are based may be absent or inadequate for the task; the commodity in question may not be something for which individuals express a preference (e.g. reducing Biological Oxygen Demand in rivers); research into individuals' preferences for environmental effects may be lacking (thus preventing benefits transfer); and original economic valuation studies might be prohibitively expensive. In order to obtain the scientific data upon which valuations are based, CBA may be reliant on the information generated through other appraisal tools (e.g. Environmental Assessment).

- CBA has traditionally focused on the net impacts a proposal will generate for society as a whole rather than the question of who in particular will bear the costs

[11] The motivations behind individuals' preferences for resources can be categorised as either those related to the actual or future use of resources (and their services) (*use values*) and those that are not related to any actual use (*passive* or *non-use values*). Use values incorporate *direct use values* (where individuals make actual use of a resource in a consumptive or non-consumptive way); *indirect use values* (the benefits of ecosystem functions such as watershed protection); and *option values* (where individuals are willing to pay for the option of utilising a resource in the future). Passive or non-use values can be considered to encompass *existence values* (which reflect WTP to maintain a resource for its own sake); *altruistic values* (which reflect WTP to ensure a resource is available to others within the current generation); and *bequest values* (which reflect WTP for maintaining a resource in order that future generations have the option to exploit it). Collectively these values are known as Total Economic Value (TEV). It is important to recognise that *"TEV.... is related to valuation of preferences held by people (anthropocentric and instrumental value) and does not encompass any value which may intrinsically reside 'in' environmental assets"* (Turner et al, 1994, page 109).

and who will enjoy the benefits. However, the consultation draft of the Treasury's Green Book states that it may be necessary for the appraisal to establish how the proposal impacts on different sections of society - the so-called 'distributional impact' (HM Treasury, 2002). According to the draft Green Book, these impacts can be taken into account using weightings for different socio-economic groups. However, the Agency's response to the draft Green Book emphasises that the use of *"distributional weights should not be a substitute for proper social appraisal of options and the need to involve different social groups affected by proposals in decision-making"* (Environment Agency, 2002b, para. 6.0.2).

- The choice of discount rate[12] - the speed at which benefits decline into the future - may serve to unduly discriminate against options that yield benefits in the long-term (i.e. those that might be considered more 'sustainable'). According to Bateman (1999), the choice of discount rate can dominate the results of a CBA and can frequently determine whether or not a given proposal is adjudged to be socially beneficial or not. Interestingly, the consultation draft of the Treasury's Green Book (HM Treasury, 2002) recommends a discount rate of 3.5% whereas its predecessor stipulated a discount rate of 6% (HM Treasury, 1997)[13]. This may be significant since lower discount rates may take better account of longer-term costs and benefits. It should be recognised that the application of a discount rate allows CBA to address temporal impacts explicitly whereas other appraisal tools may be less explicit as to the time horizon over which impacts are being considered.

Application by the Agency and others

The Agency routinely applies CBA to a range of proposals. The Agency has produced guidance on the application of CBA in the context of water resource planning (Environment Agency, 1998a), contaminated land (Environment Agency, 1999b) and contaminated groundwater (Environment Agency, 2000b, see also Environment Agency, 2002c). CBA is also used in relation to Best Practicable Environmental Option (BPEO), Best Available Technique (BAT) assessments and Regulatory Impact Assessments (RIAs). The Agency also uses Government guidance, for example Part 3 of the Government's guidance on the appraisal of flood and coastal defence projects (FCDPAG3 - *Economic appraisal*) identifies methods of valuing costs and impacts in monetary terms and also sets out a recommended decision process, based on economic values (Ministry of Agriculture, Fisheries and Food, 2000a). The Agency has also undertaken research into economic valuation and has produced, for example, guidance on valuing the non-market benefits of recreation (Environment Agency, 2002d).

The current internal draft of the Agency's *Basic Economic Appraisal Guidance* provides practical assistance on how to conduct economic appraisal in order to support the Agency's regulatory duties. It acknowledges that, in most cases, it will not be possible to express all the impacts of a proposal in monetary units and, for this reason,

[12] Generally speaking, individuals prefer to receive goods and services sooner rather than later, and to bear costs later rather than sooner. This is known as 'social time preference' and the social time preference rate is the rate which reflects the value society places on consumption of goods and services now, compared with consumption in the future (HM Treasury, 2002). In the public sector, greater weight can be attached to earlier rather than later costs and benefits through the application of a *discount rate* which reduces the value of projected future costs or benefits to their values as seen from the present day ('present value') (HM Treasury, 2002).

[13] According to the consultation draft of the Treasury's Green Book, the new standard discount rate of 3.5% must be applied as a matter of course except in certain circumstances. For example, the draft states that for projects with very long-term impacts, a lower discount rate may be appropriate (HM Treasury, 2002). The draft cautions, however, that the proposed use of an alternative rate should be discussed with HM Treasury.

only a 'partial' CBA can ever be undertaken. In light of this, the guidance suggests that, depending on the significance of the non-monetary impacts, it might be necessary to undertake a more complex assessment using Multi-Criteria Analysis (MCA) (Environment Agency, 2002e).

4.2.2 Multi-Criteria Analysis (MCA)

Background

According to the manual on Multi-Criteria Analysis (MCA)[14] published by the former DETR, the term MCA can be used to describe any structured approach to determining overall preferences among alternative options, where the options accomplish several objectives (DETR, 2001). More specifically, MCA establishes preferences between options by reference to an explicit set of objectives for which criteria have been developed for assessing the extent to which the objectives are achieved (DETR, 2001). A typical goal of MCA is the construction of a *performance matrix* (or consequence table), which sets out how each of the options under consideration performs against each of the criteria (DETR, 2001). In a basic form of MCA, the performance matrix may be the final product of the appraisal and the task of processing the information it presents will rest with decision-makers.

However, MCA can go considerably further than merely summarising option performance and can seek to prioritise between competing concerns. This equates to Multi-Criteria Decision Analysis (MCDA)[15] which involves scoring the performance of each option in relation to each criterion and then combining the scores by means of a system of weights to yield an overall ranking for each option (DETR, 2001). Essentially, MCDA involves explicitly formalising a value structure and using this to evaluate competing alternatives. Scoring involves assigning the anticipated performance of each option in relation to each criterion a score (e.g. from 0 to 100 with preferred options scoring higher) while weighting involves assigning weights to each criterion to reflect their relative importance in the decision-making process. The twin components of scoring and weighting can be combined to provide an overall assessment of each option.

Although some commentators argue that CBA is essentially a form of MCA (albeit one that adopts a particular rationale for scoring gains and losses based on individuals' preferences), the term is often used to describe those methods which do not rely predominantly on monetary valuations (DETR, 2001). Other appraisal tools including Environmental Assessment and related tools and Sustainability Appraisal and related tools may also employ approaches reminiscent of MCA, particularly performance matrices and these are discussed in section 4.2.5.

Advantages

- MCA can bring a degree of structure, analysis and openness to classes of decisions that lie beyond the practical reach of CBA (DETR, 2001).

[14] Also referred to as multi-attribute analysis and multi-goal analysis.
[15] Although the manual on MCA prepared on behalf of the former DETR differentiated between MCA and MCDA (DETR, 2001), this distinction is not always used in practice and the two may be treated synonymously.

- It allows the systematic consideration of qualitative and quantitative information. MCA can accommodate a variety of performance measures (e.g. quantitative, qualitative, monetary and non-monetary, rating scales, directly assessed preferences and model-derived performance measures).

- It can employ a variety of techniques for generating the information in the performance matrix and developing any weighting system. For example, weightings can be determined on the basis of expert testimony, stakeholder values or some combination of these.

Challenges

- The use of scoring and weighting techniques is accompanied by a risk that the outcome may be rendered somewhat arbitrary depending on how the impacts were scored and who was responsible for assigning relative weights and on what basis this was done. Stakeholder involvement in scoring and weighting may help to increase the credibility of MCA findings although in practice it may difficult to reach consensus on appropriate weightings[16].

- Option performance in relation to each criterion should be independent of option performance in relation to other criteria (i.e. the criteria should be 'preference independent', DETR, 2001). However, in practice this may not be the case and may lead to misleading outcomes or the need to apply complex models for combining scores.

- Although MCA can rank options according to their capacity to achieve a given objective it cannot show whether or not an option adds more to welfare than it detracts since, unlike CBA there is no rule that demands that benefits should exceed costs. Thus in MCA the 'best' option can be inconsistent with improving welfare so the 'do nothing' option could be preferable in principle (DETR, 2001).

Application by the Agency and others

Part four of the Government's guidance on the appraisal of flood and coastal defence projects (FCDPAG4 - *Approaches to Risk*) acknowledges that for large scale planning decisions and during the early stages of strategy development and project appraisal, it may not be possible or appropriate to express all of an option's attributes in monetary terms and, under these circumstances, MCA methods can be employed to help screen options (Ministry of Agriculture, Fisheries and Food, 2000b). According to the guidance, MCA methods can also be helpful in building consensus between project participants with possibly divergent objectives. Note, DEFRA and the Agency have recently commissioned independent consultants to produce guidance on the application of MCA in the context of flood defence work.

In the past, the Agency has experimented with MCA as a means to forge consensus between stakeholders in the development of the New Forest Local Environment Agency Plan (see section 6.4.3). In addition, the Agency developed the *MAT* [Multi-Attribute Technique] *Scoring and Weighting System* for the purposes of assessing the relative

[16] For example, the MCDA used by Nirex (or MADA – Multi-Attribute Decision Analysis as it was termed) in their application for a Rock Characterisation Facility in Cumbria in 1995 was severely criticised by the public inquiry inspector for the biased way in which weightings were assigned (McDonald, 1997).

costs and benefits of all schemes being proposed for discretionary expenditure as part of the third Asset Management Plan (AMP3)[17] (Environment Agency, 1999c). In order to establish the weighting system for the purposes of the latter, the Agency employed two different approaches. Firstly, the views of stakeholders representing the range of key water-related interests in the area were elicited through intensively run focus group sessions and, secondly, the opinions of the Agency's Regional Environmental Protection Advisory Committee (REPAC) were sought (Environment Agency, 1999c). However, the way in which the scores and weights were derived for the purposes of the MAT Scoring and Weighting System has been questioned internally and this highlights the importance of establishing a rigorous and unbiased approach to scoring and weighting for MCDA.

The Government's *Guidance on the Methodology for Multi-Modal Studies* for transport investment proposals employs a basic form of MCA and involves the completion of a performance matrix for each option under consideration known as the Appraisal Summary Table (AST). The AST provides a one page tabular summary of option performance in relation to five criteria (environment, safety, economy, accessibility and integration) and their associated sub-criteria. Option performance is gauged using established techniques where possible (e.g. economic valuation) and impacts are recorded in quantitative or qualitative terms. Importantly, the AST merely summarises information on option performance and provides decision-makers with a 'database' to inform decision-making; it does not assign relative weight to the various criteria *"and so does not provide a mechanistic way of reaching a decision"* (DETR, 1998, para. 1.4).

4.2.3 Life Cycle Assessment

Background

Life Cycle Assessment (LCA), or cradle-to-grave analysis, is an analytical environmental management tool based on a scientific understanding of inputs and outputs of processes and their effects on the environment (van der Vorst *et al*, 1999). It is used to evaluate the effects of a product, service or activity ('the product system'). The usefulness of LCA lies in its capacity to include impacts occurring upstream and downstream from the product system. Although LCA focuses primarily on the environmental impacts of the product system, according to Nierynck "*there is consensus that… the life-cycle approach may be useful in considering economic and social issues too"* (Nierynck, 1998, page 213).

'Life cycle thinking' describes the considering of all of the upstream and downstream processes involved in delivering a product or service, so that the overall effects on the environment can be determined. This means that all the processes that contribute to manufacturing the product or providing the service, from the extraction of raw materials through to waste management requirements, are considered as part of the assessment. LCA has developed from this general approach as a formal systems analysis methodology for documenting the potential environmental impacts associated with product systems.

[17] The proposed costs and timings of investments by water companies in environmental improvements have to be agreed by OFWAT, DEFRA and the Agency. This constitutes the AMP (Asset Management Plan) process, which has a quinquennial cycle (AMP1 - 1990 to 1995, AMP2 - 1995 to 2000, AMP3 - 2000-2005 and AMP4 - 2005-2010).

LCA differs from a process-specific or site-specific assessment, since it includes a number of processes that may be carried out in different geographical areas or at different times. Clearly, the main difference between LCA and other approaches to environmental assessment is that all the processes involved in service delivery are included regardless of where they occur in terms of space and time. This contrasts with site-specific approaches, which tend to focus on a geographical area and process-specific approaches focussing on improvements for a single process step.

The development of LCA over the past ten years has seen much effort to create a standard methodological framework for its use. The general framework is outlined in BS EN ISO 14040 (British Standards Institution, 1997), which consists of four phases. These phases, whilst they appear to be distinct, are in fact highly iterative, as illustrated in Figure 4.1. They are known as:

- *goal definition and scoping* (BS EN ISO 14041 (British Standards Institution, 1998)) - this concerns the determination of the intended application of the results, the reasons for carrying out the study and to whom the results will be communicated. The choice of product systems to be analysed will also be made at this stage;

- *inventory analysis* (BS EN ISO 14041 (British Standards Institution, 1998)) - this involves the collection of data about the product systems investigated and the quantification of the relevant material and energy inputs and outputs for each of them. The goal and scope of the study influence data collection considerably;

- *impact assessment* (BS EN ISO 14042 (British Standards Institution, 2000a)) - in general, this involves evaluating the inventory of inputs and outputs to the product systems in terms of their potential environmental impact. The choice of impacts evaluated and the methodologies used depend on the goal and scope of the study; and

- *interpretation* (BS EN ISO 14043 (British Standards Institution, 2000b)) - in this phase, the findings from the inventory analysis and the impact assessments are combined to allow conclusions to be drawn and recommendations to be made. This usually takes into account any sensitivity analyses carried out. It may sometimes involve an iterative process where the scope of the study is redefined, so that the nature and quality of data collected can meet the needs of the goal of the study.

Working within this framework, the standards still provide enough flexibility in approach to allow practitioners to adapt the LCA to meet the needs of the decision context. There is a basic assumption within current LCA methodology that trade-offs between different environmental impacts is acceptable. However, in decisions affecting a number of stakeholders (such as public policy decisions), it is often the case that this assumption is often not acceptable to all parties (Cowell, 2002). It is recognised that more attention will need to be paid to developing a different, non-generic and adaptive approach to using LCA in public policy decision contexts (Elghali, 2002).

Advantages

- Thorough process for evaluating the environmental effects of a product, process or activity.

- Allows clear comparisons between product systems, leading to greater understanding of the way in which environmental impacts are generated. This focuses attention on finding the "hotspots" in the product system.

- LCA has proved especially useful in applications such as product design and process optimisation.

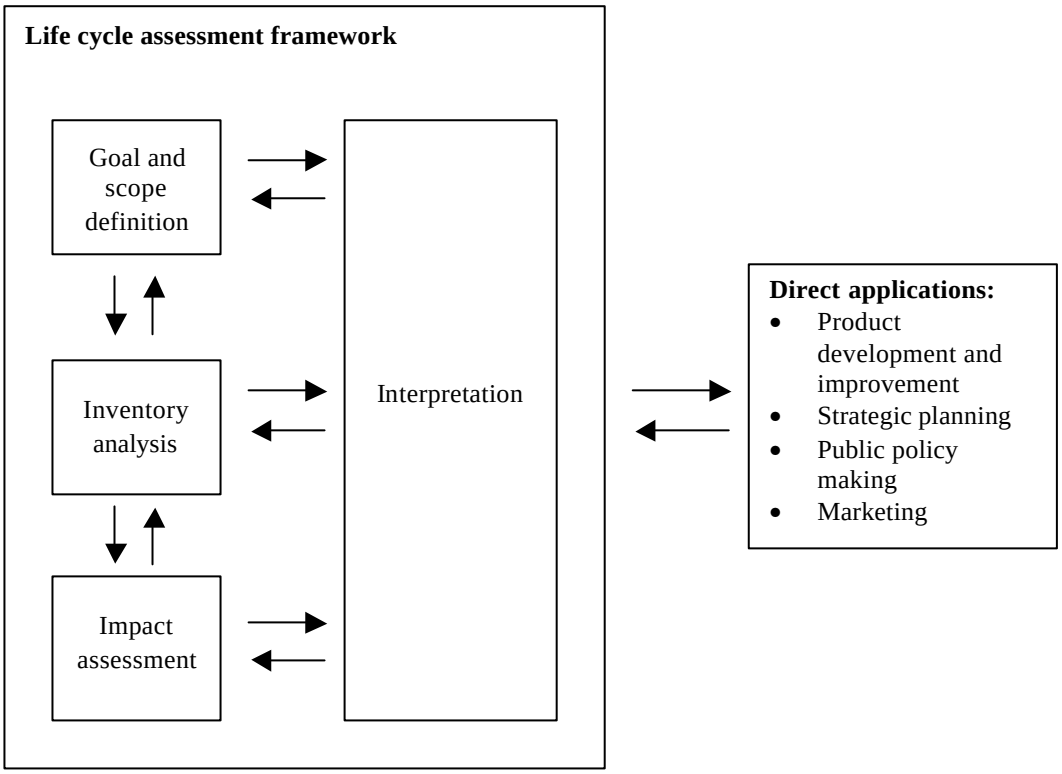

Figure 4.1: Stages in conducting an LCA study (adapted from BS EN ISO 14040)

Challenges

- Does not systematically consider economic and social impacts.

- LCA can be time and resource intensive unless robust streamlining of the assessment is incorporated as part of the process (see for example, Christiansen, 1997).

- Although LCA can be used to compare the environmental performance of different (alternative) though generalised products (van der Vorst *et al*, 1999), it is generally applied to a single product, service or activity.

- The data required for the inventory analysis are often not available or of insufficient quality.

- Standard impact assessment methods may not include an evaluation of the most relevant impacts for a specific context. For example, at present LCA methodology cannot easily deal with effects that cannot be readily quantified (e.g. effects on the aesthetic quality of a landscape). However, there is no reason to suppose that this precludes a qualitative approach to such evaluations.

- Standard impact assessment in LCA does not usually deal with location specific environmental impacts – a tonne of sulphur dioxide is treated the same no matter where it is emitted.

- The reliability of the impact assessment is dependent on both the weighting procedure to aggregate impacts and the data quality of the inventory. However, sensitivity analysis and a reliability evaluation are usually carried out as part of the interpretation process.

Application by the Agency and others

In 1999, the Agency, with the support of the Scottish Environmental Protection Agency (SEPA) and other international partners, launched an LCA software tool dubbed WISARD (Waste Integrated Systems Assessment for Recovery and Disposal). WISARD applies the LCA methodology approved by the International Organisation for Standardisation (ISO) to strategic waste management planning. It is aimed at assessing the best practicable waste option (BPEO) for municipal waste management. However, the tool can be used in a number of ways: helping local authorities prepare their municipal waste management strategies; to assess the environmental impacts of new waste facilities or collection systems; and in tendering for waste management contracts. The Agency used WISARD in its regional Strategic Waste Management Assessments published in 2000.

The former DETR commissioned, as part of the planning and waste management R&D programme, the preparation of guidance on 'Planning for Sustainable Waste Management'. This will be aimed at the Regional Technical Advisory Bodies (RTABs) and will recommend a set of objectives and indicators against which strategic waste planning options can be appraised. It will also set out a methodology for comparing the performance of options and recommend a decision-making process that can be used to identify a preferred option. The methodology aims to be relatively simple and quick and draws on WISARD but also incorporates 'softer' environmental and planning issues (e.g. ecology and landscape). A case study using the guidance has been undertaken in the North West and the guidance is anticipated to be published shortly.

4.2.4 Risk Assessment

Background

Risk Assessment involves the estimation of the probability and severity of hazards to human health, safety and ecosystem functioning or 'health' (DETR, 1999b). The term 'risk assessment' is often loosely applied and can be used to describe a whole range of procedures, from a simple statement about possible hazards and risks to formalised, quantitative risk estimates (Petts, 1999). The *Guidelines for Environmental Risk*

Assessment and Management produced jointly by the former DETR, the Agency and the Institute for Environment and Health (DETR *et al*, 2000) emphasise the benefits of taking a tiered approach, beginning with risk screening and progressing to detailed quantitative Risk Assessment. The transition from "broad-brush qualitative methods" to more quantitative methods is echoed in *Flood and Coastal Project Appraisal Guidance: Approaches to Risk* (Ministry of Agriculture, Fisheries and Food, 2000b). Within each tier, the process is broken down into number of key stages:

i. hazard identification;
ii. identification of the consequences;
iii. estimation of the magnitude of the consequences;
iv. estimation of the probability of the consequences; and
v. evaluation of the significance of the risk.

Hazard identification refers to identifying a property or situation that under certain circumstances could lead to harm. Examples include the release into the environment of a chemical used within an industrial process and, at the strategic level, the adverse impacts of road transport on the environment (DETR *et al*, 2000). Identification of the consequences involves identifying what would happen if the harm from the hazard was realised. In the case of a chemical from an industrial process, consequences might include land and water contamination. At this stage all potential consequences should be listed. The next stage involves identifying the magnitude of the consequences and these could be measured along several dimensions (e.g. the spatial and temporal scale of the consequences and the time to onset of the consequences). Stage (iv) involves estimating the probability of the consequence occurring, which covers three areas: the probability of the hazard occurring, the probability of the receptors being exposed to the hazard and the probability of harm resulting from exposure. The final stage is the evaluation of the significance of the risk which involves placing the risk in a context, for example with respect to an environmental standard or in the comparison of options.

Having evaluated the significance of a risk, a decision must be made as to whether the risk is acceptable as it stands, whether it should be modified, or whether it should be removed altogether (DETR *et al*, 2000). This process equates to *risk management*, which involves considering the various options for dealing with an identified risk (Eduljee, 1999; DETR *et al*, 2000).

A key focus of Risk Assessment is on uncertainty. It specifically acknowledges that there is uncertainty, of various types, within the Risk Assessment process. Uncertainty can be categorised as data uncertainty and decision uncertainty (Petts *et al*, 2002). Data uncertainty refers to uncertainty over the quality of the data and its availability and decision uncertainty refers to the many decisions that are made on the basis of expert judgement. Sensitivity analyses can be carried out to develop an understanding of which variables are most sensitive to change and where the uncertainty may therefore lie.

Advantages

- Risk Assessment emphasises the quantification of impact significance.

- Uncertainty in data input and impact predictions can be handled in a formal and explicit manner and can be quantified (Eduljee, 1999).

- It makes risks explicit through formal description and should enable better management (Ministry of Agriculture, Fisheries and Food, 2000b).

Challenges

- Does not generally consider social impacts.

- Although Risk Assessment can be applied to a series of options, it is typically used to develop estimates of risk associated with a single proposed action (Eduljee, 1999).

- Risk Assessment has tended, historically at least, to be an expert/technocratic activity rather than an open analytical process, with few opportunities provided for formal incorporation of subjective information and public opinion (Petts, 1999).
- Unlike the other tools, Risk Assessment does not typically examine the benefits or positive impacts of an action. However, Government guidance on Risk Assessment in the context of flood and coastal defence projects states that *"risk assessment is taken to mean the integrated assessment of all outcomes, both positive and negative"* (Ministry of Agriculture, Fisheries and Food, 2000b, page 7).

Application by the Agency and others

The Agency has to deal with a wide range of risk issues and their assessment (see *Environment Agency Risk Portfolio*, Environment Agency, 2000c). Risk Assessment is employed across a range of Agency functions. It varies in detail and scope from qualitative through to quantitative assessment and whether it is *"regulatory risk assessment, where the Agency per se undertakes the risk assessment or applicant risk assessment, where the Agency is involved in critically reviewing risk assessments that operators, dischargers, developers or abstractors are required to undertake to support applications to discharge, operate or develop facilities*" (Petts *et al*, 2002, page 7). In addition, Risk Assessment is part of the project appraisal for flood and coastal defence (Ministry of Agriculture, Fisheries and Food, 2000b). This guidance provides information on Risk Assessment for flood and coastal projects and its place within project appraisal.

The Agency has carried out research into the development of a tool for the strategic consideration of environmental harm (Environment Agency, 2000d). This was a qualitative approach designed to enable the comparison of risks from different sources so a prioritised risk management approach could be developed. Using expert workshops a series of attributes of environmental harm were characterised including both "objective" characteristics (e.g. stock at risk) and "subjective" characteristics (e.g. dread). Risks could be defined, by expert judgement, in terms of these characteristics

and then ranked against each other thus enabling comparison for risk management purposes.

To explore the potential for involving stakeholders in the process of Risk Assessment the Agency commissioned a project to develop an approach to *Participatory Risk Assessment* (Petts *et al*, 2002). A trial process involved lay participants meeting to discuss the Risk Assessment requirements for the burning of tyres in a cement kiln.

4.2.5 Environmental Assessment and related tools

Background

Environmental Assessment involves the systematic identification and evaluation of the potential impacts of a proposal on the environment. At the project level, Environmental Assessment is generally known as Environmental Impact Assessment (EIA) while at the level of policies, plans and programmes it is commonly referred to as Strategic Environmental Assessment (SEA). Alongside Environmental Assessment, other specialised appraisal tools such as Social Impact Assessment (SIA)[18] and Health Impact Assessment (HIA)[19] have been developed over the years. Environmental Assessment and related tools are 'process tools' and follow an essentially similar procedure involving:

- *screening* - determining whether an assessment is necessary;
- *scoping* - deciding the issues on which the assessment will focus;
- *assessment* - identifying and evaluating the impacts of the option(s) under consideration;
- *mitigation and enhancement* - proposing means to minimise adverse impacts and maximise positive ones; and
- *monitoring* - observing the impacts of decision-making.

They may also employ a range of different techniques for identifying and evaluating impacts ranging from the technocratic (e.g. field survey, expert testimony, Geographic Information Systems and computer modelling) to the participatory (e.g. focus groups, public meetings and various other means to canvass stakeholder opinion).

Environmental Assessment and related tools frequently employ an approach strongly reminiscent of MCA since they invariably involve appraising option performance in relation to a set of objectives and/or criteria and may also present the findings in matrix form. Moreover, they generally occupy a position somewhere on the continuum

[18] The relationship between SIA and EIA has been rather uncertain with some seeing SIA as an integral component of EIA and others holding it to be a separate process (Barrow, 2000). In practice, SIA has rarely been undertaken in isolation and social impacts may be considered to some degree as part of project EIA. This reflects the broad interpretation of the term 'environment' in the EIA Directive which takes it to include the 'population' likely to be significantly affected by the development. Vanclay (1999) noted that the SIA process is rather similar to the ideal EIA process. However, according to Vanclay (1999) a major difference between the two is that SIA must be seen as embodying a professional value system which promotes openness and accountability, fairness and equity and defends human rights, rather than being seen purely as a scientific technique that can be applied mechanistically.

[19] HIA has been described as a *"developing process that uses a range of methods and approaches to help identify and consider the potential – or actual – health and equity impacts of a proposal on a given population"* (Health Development Agency, 2002, page 3). According to the Health Development Agency (2002), the primary output from HIA should be a set of evidence-based recommendations geared to informing the decision-making process. In addition, the Health Development Agency emphasises that in some situations it may be worth enhancing the health and equity element of an Environmental Assessment, rather than undertaking a separate HIA (Health Development Agency, 2002). The British Medical Association (1998) has published *Health and Environmental Impact Assessment – An Integrated Approach*. Interestingly, the SEA Directive adopts a broad notion of the environment which it takes to include 'human health'.

between MCA and MCDA since they often employ simple scoring techniques (and thus provide some indication of impact significance) but rarely assign explicit weights to individual objectives or criteria. However, Environmental Assessment and related tools go well beyond MCA since they are very much process tools which may involve extensive information collection and consultation with interested parties.

Advantages

- Specialised forms of assessment (e.g. EIA, SEA, SIA and HIA) may serve to raise the profile of the issues on which they focus and help to ensure that these are accorded an appropriate degree of weight in the decision-making process. For example, Kørnøv and Thissen (2000) argued that SEA might be considered an *advocative* approach in that it purposely seeks to raise the profile of environmental concerns (this contrasts to Sustainability Appraisal and other related tools which aim to support the decision-making process with respect to *all* aspects of sustainable development and therefore remain ostensibly neutral with respect to the interests at stake).

- EIA and SEA are particularly well established and the subject of EU Directives which provide for their statutory application in certain contexts and require their findings to be taken into account as part of the decision-making process.

Challenges

- In order to assemble a broad range of information, it may be necessary to employ a range of specialised appraisal tools and Lee and Kirkpatrick (2000) identified three levels at which the difficulties associated with carrying out more than one appraisal might become apparent:

  - at the *procedural* level, it will become more difficult to co-ordinate the timings of the separate appraisals and to synchronise these with the timings of decisions made within the plan or programme preparation process;

  - at the *methodological* level, there is an increased likelihood of inconsistencies between the appraisal methods being used, of interdependencies between certain types of impact being overlooked, and of increasing difficulties in constructing overall appraisals for use in decision-making; and

  - in *organisational* terms, the extra workload of managing and co-ordinating separate appraisals might be considerable.

- The range of impacts considered as part of a specialised assessment(s) may not encompass a sufficient range of concerns to facilitate integrated decision-making.

Application by the Agency and others

In the UK, certain projects for which the Agency is the chief proponent may require EIA under the regulations giving effect to EU Directive 85/337/EEC *on the assessment of the effects of certain public and private projects on the environment* (the 'EIA

Directive') (as amended by Directive 97/11/EC)[20]. In addition, the Agency is a statutory consultee under the regulations implementing the EIA Directive. Furthermore, in summer 2001 the EU adopted Directive 2001/42/EC *on the assessment of the effects of certain plans and programmes on the environment* (the 'SEA Directive') and, from summer 2004, the Agency may have to apply SEA as required by the Directive to a range of its plans and programmes. The former DTLR prepared a tentative list of those plans and programmes that might be subject to the Directive's requirements and this list included: Catchment Flood Management Plans; Regional Water Resources Strategies; CAMS; and River Basin Management Plans (TRL and Collingwood Environmental Planning, 2002).

The Agency has developed final working draft Policy and Procedures on *Strategic Environmental Assessment and Environmental Impact Assessment - Environment Agency Internal Works and Activities* (Environment Agency, 2002f) which provides guidance on applying EIA and SEA to Agency projects, programmes and plans (which satisfies the EIA and SEA Directive and in some cases goes beyond them). This reflects the Agency's draft policies on EIA and SEA (P-01 and P-02 respectively) which both state that *"the assessment and management of environmental consequences is seen as integral to the work of the Agency and key to delivering the Agency's organisational objectives, including those of sustainable development"* (see Environment Agency, 2002f). The Agency has also produced *A handbook for scoping projects* requiring EIA (Environment Agency, 2002a) aimed principally at EIA activity beyond the Agency.

4.2.6 Sustainability appraisal and related tools

Although Environmental Assessment has, since its inception, tended to broaden its focus to address certain economic and social issues, recent years have witnessed a trend (particularly at more strategic levels of decision-making) towards the application of Sustainability Appraisal and other related tools which routinely consider impacts on economic, social *and* environmental concerns. In illustration of this trend, recently published Government *Draft Guidance on the Strategic Environmental Assessment Directive* seeks to demonstrate *"how work to comply with the Directive can be integrated with current practice on sustainability appraisal"* (ODPM, 2002, para. 1.11).

Sustainability Appraisal, as currently practiced, generally employs an 'objectives-led' approach whereby the performance of a strategy, policy, plan or programme is gauged in relation to a series of aspirational objectives for sustainable development. This contrasts with the 'baseline-led' approach traditionally used in EIA and SEA whereby potential impacts are assessed in relation to an actual baseline (future conditions under the 'do nothing' option).

[20] For example, Schedule 2 of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 lists those projects for which EIA may be required to include: coastal work to combat erosion and maritime works capable of altering the coast through the construction, for example, of dykes, moles, jetties and other sea defence works, excluding the maintenance and reconstruction of such works; and inland-waterway construction (not included in Schedule 1), canalisation and flood-relief works. In addition, the Environmental Impact Assessment (Land Drainage Improvement) Regulations 1999 require that improvements to existing land drainage infrastructure likely to have significant environmental effects should be subject to EIA and the Harbour Works (Environmental Impact Assessment) Regulations 1999 also require EIA for certain projects with significant effects.

In the context of regional planning, Sustainability Appraisal has been defined as:

> *"a systematic and iterative process undertaken during the preparation of a plan or strategy, which identifies and reports on the extent to which the implementation of the plan or strategy would achieve the environmental, economic and social objectives by which sustainable development can be defined, in order that the performance of the strategy and policies is improved."*
>
> (DETR, 2000b, para. 2.1)

Advantages

- According to Lee (2002), the potential benefits of applying 'integrated assessment' tools such as Sustainability Appraisal include:

  - greater relevance to decision-makers and other stakeholders who wish to be informed of the full range of likely impacts, associated with proposed measures, rather than subsets of these;

  - greater ability to capture the indirect and synergistic effects which result from linkages between economic, environmental and social impacts which otherwise might be overlooked in separate, more specialised assessments; and

  - greater opportunities to streamline the overall assessment process, reduce duplication and double-counting problems, and to strengthen the consistency between methods and data used within the overall assessment. According to Lee, streamlining has become a bigger issue, given the apparent paradox between a continuing proliferation of *specialist* forms of impact assessment and proposals for greater *integration* within impact assessment.

Challenges

- Concern has been expressed that integrated assessments such as Sustainability Appraisal are at risk of being 'captured' (i.e. that one set of interests will come to dominate the assessment process) leading to the neglect of particular types of impacts (Lee, 2002).

- The Royal Commission on Environmental Pollution (RCEP) in report on *Environmental Planning* voiced concern that:

  "sustainability appraisal can in fact marginalise the very environmental and social appraisals that it is supposed to bolster as a counterpoint to dominant financial and economic assessments. Clearly, where the driver or imperative for a policy, plan or programme is an economic one, as it often is, appraising the effects of the policy, plan or programme in terms of economic criteria and subsequently justifying it on that basis renders the appraisal meaningless…We believe that the environmental component of sustainability appraisal must be strengthened, as a condition for its retention."

  (RCEP, 2002, page 98)

- Given inevitable resource limitations (e.g. financial constraints or lack of time), the transition from specialised to integrated appraisal tools may be accompanied by a danger that certain impacts on, for example, the environment and health, may not be subject to the same degree of exploration they might have been under a regime of more specialised tools such as EIA and HIA. In other words, there is a risk that depth of impact investigation might be sacrificed for breadth of coverage.

- An 'integrated' perspective carries positive connotations of completeness and impartiality (Scrase and Sheate, 2002), which may be misleading.

Application by the Agency and others

Instances of Sustainability Appraisal being undertaken at the strategic level both within and beyond the Agency are increasing. Examples within the Agency include the application of Sustainability Appraisal to CAMS (see Chapter 6) and National and Regional Water Resources Strategies and beyond the Agency to Regional Planning Guidance (DETR, 2000b; 2000c), Regional Economic Strategies (DETR, 1999c) and local authority development plans (Structure Plans, Local Plans and Unitary Development Plans) (DETR, 1999d). Sustainability Appraisal is also being increasingly undertaken for a range of public sector initiatives. For example Sustainability Appraisal has been applied to:

- funding applications in the North West under the Single Regeneration Budget (James and Donaldson, 2001);

- the submissions of the UK Sustainable Development Commission to the Policy Commission on Food and Farming (UK Sustainable Development Commission, 2001); and

- various strategies developed by the South East England Regional Assembly (SEERA) including the Regional Spatial Strategy for Tourism (SEERA, 2002a) and the Regional Strategy for Energy Efficiency and Renewable Energy (SEERA, 2002b).

Other examples of integrated appraisal tools are also emerging. For example, the Agency has prepared draft guidance on *Integrated Appraisal of Environment Agency Policies* (see Box 4.1) and integrated appraisal tools have also been developed by the National Assembly for Wales (see Box 4.2) and the North West Regional Assembly (see Box 4.3). In essence, tools such as these involve asking of each option or proposal under consideration a series of questions designed to prompt consideration of their potential impacts - what Boothroyd (1995) referred to as 'policy vetting'. Both these examples involve scoring impacts using a relatively simple classification essentially ranging from positive to negative (see boxes). Tools such as these generally stop short of advocating more detailed impact investigation and are best viewed as tools for 'screening' potential impacts.

Box 4.1: Integrated appraisal of Environment Agency policies

The Agency's former National Centre for Risk Analysis and Options Appraisal developed draft guidance on *Integrated Appraisal of Environment Agency Policies* which advocates *"a simple, mainly qualitative, assessment of risks and appraisal against environmental, economic and social objectives"* (Environment Agency, 2000a, page 2).

In developing the guidance, those responsible felt it was pragmatic to 'walk before running' and the guidance advocates a relatively simple 'policy vetting' procedure whereby key 'Appraisal Questions' are asked of each of the options under consideration in order to prompt consideration of their potential impacts (Pollard and Brookes, 2001). It was felt that this 'checklist approach' would help to build an awareness of the importance and benefits of appraisal within the Agency; develop appraisal skills within the Agency; and prepare the ground for the implementation of more detailed integrated appraisal tools in the future (Pollard and Brookes, 2001). The last point indicates that the approach was seen as something of an 'interim measure'.

The 'Appraisal Questions' are listed in a pro forma and organised around the four objectives for sustainable development identified in the UK strategy for sustainable development (DETR, 1999a): social progress which recognises the needs of everyone; effective protection of the environment; prudent use of natural resources; and maintenance of high and stable levels of economic growth and employment. Examples questions include 'What will be the effect of the policy on biodiversity, landscape, sites of historic, cultural value and amenity value?'; 'To what extent will the policy favour resource efficiency and/or the sustainable use of renewable resources?' and 'What impacts will the policy have on human health and safety?'. The guidance emphasises that appraisal should be applied from the early stages of policy development and that the *"proforma should not simply be completed after the policy has been formulated to justify decisions already made"* (Environment Agency, 2000a, page 5).

Those responsible for developing the guidance acknowledged the *"need for further levels of policy appraisal to allow more in-depth appraisal of impacts identified by the screening approach. This fact was recognised by those Agency staff involved in trials of the checklist, who…emphasised the need for more detailed appraisal"* (Pollard and Brookes, 2001, page 555).

Box 4.2: The 'Integration Tool' developed by the National Assembly for Wales

In September 2002, the National Assembly for Wales launched what it refers to as an 'Integration Tool' for use by its staff. Assembly staff developed the tool during a series of seminars that were led and facilitated by Forum for the Future.

The tool provides a standard matrix for assessing the performance of a policy or project against a series of nine objectives for Wales (e.g. 'Creating a modern economy', 'Fostering a sense of identity' and 'Supporting rural Wales'). The contribution the policy or project makes to each objective is expressed on a scale from 'U' (Undermining - significantly undermines the objective) to 'E' (Excellent – makes a close to optimal contribution to the objective).

The tool is noteworthy in that the matrices must *"be completed by an Appraisal Group drawn either from a vertical slice through a division or a cross section of the organisation as a whole"* (National Assembly for Wales, 2002a, page 1). According to the Assembly, staff *"were particularly interested in the opportunity the tool offered for stimulating dialogue and debate around policies, generating new ideas and approaches, spotting gaps and opportunities and encouraging joined-up thinking"* (National Assembly for Wales, 2002b, page 1). According to the Assembly, the discussion should take no longer than one hour. It is currently being decided whether or not the use of the tool becomes mandatory and in what circumstances.

Box 4.3: The 'Integrated Appraisal Toolkit' developed for the North West

In October 2002, the North West Regional Assembly (2002) published an 'Integrated Appraisal Toolkit' (IAT) for consultation. Contributors included the Assembly, the North West Development Agency, the Government Office for the North West and the Environment Agency.

The IAT aims to help decision-makers throughout the region assess the contribution of their work towards the regional priorities for sustainable development set out in *Action for Sustainability* (the Regional Sustainable Development Framework).

The IAT handbook contains two checklists against which a proposal can be appraised: a 'Quick Scan Checklist' designed to highlight key issues and omissions and intended for use at the outset of the appraisal process and an 'Extended Checklist' which is intended to stimulate more detailed analysis of key sustainability issues. The Extended Checklist lists a series of questions to be asked of the project, programme, plan or strategy in question. For example, will it 'Develop those business clusters identified in the Regional Economic Strategy?'; 'Increase the provision of affordable housing'; and 'Minimise the use of fossil fuels?'. Impacts are scored using a simple rating system ranging from (-) (will have a negative impact) to (++) (will have a strong positive impact).

The handbook advises that *"More than one person should be involved in the process, including those who have a detailed knowledge of the project, programme, plan or strategy as well as those with an external perspective"* (North West Regional Assembly, 2002, page 5). The handbook also emphasises that the exercise should be *"proportionate to the importance of the project, programme, plan or strategy you are considering"* (North West Regional Assembly, 2002, page 5).

In contrast to those tools limited to 'screening' potential impacts, some emerging integrated appraisal tools advocate more detailed impact investigation. Examples include the *Guidance Checklist for Policy Makers* developed by the Cabinet Office; the 'Integrated Policy Appraisal' framework developed by several central Government departments; and the European Commission's 'Impact Assessment' tool.

The Cabinet Office developed a *Guidance Checklist for Policy Makers* (Cabinet Office, 2002) as a means to deliver the Government's commitment to integrated appraisal contained in the 1999 White Paper on *Modernising Government*[21]. This internet-based guidance helps policy-makers to 'screen' the potential impacts of their proposals and directs them towards up-to-date detailed guidance on appraising particular impacts. Links to detailed guidance on several appraisal tools are provided including: Regulatory Impact Assessment (RIA); Risk Assessment; Gender Impact Assessment; HIA; and Consumer Impact Assessment. In essence, the guidance checklist suggests a two-stage approach: initial screening followed by more detailed appraisal using a range of appraisal tools.

The 'Integrated Policy Appraisal' framework (IPA) was developed by several central Government departments including the Department for Environment, Food and Rural Affairs (DEFRA) (the Agency's sponsoring department) as a means of building on the checklist developed by the Cabinet Office. The IPA also proposes an essentially two-stage approach to integrated appraisal: an initial screening of the policy through a brainstorming exercise at the initiation stage to identify the significant impacts and a

[21] The White Paper on *Modernising Government* was published in March 1999 and commits the Government to *"producing and delivering an integrated system of impact assessment and appraisal tools in support of sustainable development, covering impacts on business, the environment, health and the needs of particular groups in society"* (Prime Minister and the Minister for the Cabinet Office, 1999, page 20).

further assessment of these impacts at the detailed policy design stage using existing assessment tools (DEFRA, 2002b). According to DEFRA, the appraisal tools used will depend on the nature of the significant impacts identified at the screening stage. Further details of the IPA can be found in Box 4.4.

The European Commission has recently developed a tool referred to as 'Impact Assessment' for application (gradually from 2003 onwards) to all major initiatives. According to the Commission, the "*new impact assessment method integrates all sectoral assessments concerning direct and indirect impacts of a proposed measure into one global instrument, hence moving away from the existing situation of a number of partial and sectoral assessments*" (Commission of the European Communities, 2002, page 2). Crucially, the Commission's communication on 'Impact Assessment' lists several appraisal tools that can be employed for the purposes of assessment including Cost-Benefit Analysis (CBA), Cost-Effectiveness Analysis (CEA), Multi-Criteria Analysis (MCA) and Risk Assessment (Commission of the European Communities, 2002)[22].

The key message to emerge from these developments is that a two-stage approach to integrated appraisal is increasingly advocated:

- an initial stage at which the potential impacts of the options or proposal under consideration are 'screened' or 'vetted' against a wide range of criteria; and

- a second stage of more detailed appraisal where this is considered necessary using appropriate appraisal tools.

In addition, since a range of appraisal tools can be employed in support of integrated appraisal, it is clear that integrated appraisal is best viewed as an *approach* to integrated appraisal rather than a single or discrete appraisal tool.

[22] Technical guidelines for undertaking Impact Assessment were scheduled for publication in September 2002.

Box 4.4: The Integrated Policy Appraisal framework

The Integrated Policy Appraisal framework (IPA) was developed by the former Department of Transport, Local Government and the Regions (DTLR) and DEFRA in association with the Department of Health (DoH). It was piloted by DTLR and DEFRA as part of the 2002 Spending Review. In addition, the IPA is currently being piloted as part of the rollout of DEFRA's sustainable development strategy *Foundations For Our Future* (DEFRA, 2002c).

The IPA provides a framework or template within which the economic, social and environmental impacts of policy options and their distributional effects on different groups in society (e.g. the elderly and those on low incomes) can be assessed.

DEFRA (2002b) emphasise that the IPA is applicable to a wide range of initiatives including policies, strategies and individual projects and that it should be an ongoing, iterative part of the decision-making process and not a one-off exercise. According to DEFRA, the IPA is carried out in two stages:

1. an **initial screening** of the policy through a brainstorming exercise at the initiation stage to identify the significant impacts of the policy; and

2. a **further assessment** of the significant impacts at the detailed policy design stage through the use of existing assessment tools.

According to DEFRA, the particular appraisal tools used will depend on the nature of the significant impacts identified at the screening stage.

DEFRA emphasise that the IPA is not an additional appraisal requirement: *"It simply brings together all the various appraisal requirements which policy teams need to consider when developing a policy by providing a coherent framework and streamlining the process as far as possible"* (DEFRA, 2002b). Crucially, *"Although it links together a number of existing appraisal regimes…the IPA does not replace or devalue these separate requirements"* (DEFRA, 2002b). According to DEFRA, specific requirements for separate appraisals such as Regulatory Impact Assessments (RIAs) will still need to be satisfied but working through the IPA process will help to determine the scope of these and simplify their analyses.

Two IPA templates have been developed - a 'screening template' and a 'full template'. The former lists a series of questions to be asked of the proposal in question and these are organised around four impact categories – 'economic', 'social', 'environmental' and 'cross-cutting'. In addition, the template includes tables for recording the distributional impacts and the potential risks. The full template is similar in structure and layout but provides space to assess the significant impacts identified at the screening stage. In addition to the templates, supplementary guidance has been prepared which provides advice on appraising particular impacts (on, for example, consumers, business, small firms, public health and safety, social capital, community and education, air quality and biodiversity) and a guide to existing appraisal methods.

The Quality of Life Capital (QoLC) approach seeks to systematically identify the benefits and services provided by the economy, society and the environment and can provide a useful input to Sustainability Appraisal and related tools. The approach was developed jointly by the Countryside Agency, English Nature, English Heritage and the Environment Agency originally under the name Environmental Capital. In 1998/99, 18 pilots projects applied the Environmental Capital approach to a range of different tasks ranging from the site specific to the more strategic. A key outcome of these pilots and other research was that the approach was equally valid for social and economic as well as environmental benefits and it was therefore renamed. The approach is introduced in Box 4.5.

Box 4.5: Quality of Life Capital

The core idea of Quality of Life Capital (QoLC) approach is that the environment, the economy and society provide people with a range of benefits and that it is these benefits or services which we need to protect and/or enhance. All applications of the approach involve the same six basic steps (Countryside Agency *et al*, 2001a):

Step A: Purpose – be clear on the purposes of the study

Step B: Identifying what is there – the purpose will imply which sources of social, economic and environmental benefits need to be studied.

Step C: Benefits and services – the key to the method is to ask: what are the benefits and services which are affected by the planning process or the decision at issue?

Step D: Evaluation – this examines the benefits and services systematically, using a series of questions: who the services matter to, why, and at what spatial scale; how important are they; whether we have enough of them; and what (if anything) could make up for any loss or damage to the service.

Step E: Policy/management implications – from the evaluation, this step draws clear messages about the aims of policies which would be needed to ensure that social, economic and environmental benefits were maintained or enhanced rather than damaged.

Step F: Monitoring – the benefits and services identified as important in the process are, for this very reason, the aspects which should be monitored.

According to the Countryside Agency et al (2001b), QoLC should be seen as an addition to the 'toolkit' of methods and techniques available for the better management of human impacts on quality of life. It can be used on its own to inform decisions or it can be linked to a range of existing processes, including SEA and Sustainability Appraisal and, in particular, can provide an indication of whether an 'effect' matters and, if so, what can compensate for it (Countryside Agency *et al*, 2001b) (see also Chapter 6). The Environment Agency (2002g) shares the view that the QoLC approach can usefully complement other appraisal techniques such as EIA, economic appraisal and public involvement and consultation. The Agency also emphasised that QoLC should not be presented as a 'novel' single solution and can instead provide benefits when integrated with other appraisal techniques (Environment Agency, 2002g). The Agency also considers the approach *"more applicable to the appraisal of specific projects rather than strategies and policies since the former involve more specific and local impacts that can be more readily assessed in specific terms"* (Environment Agency, 2002g, page 3). For more information see http://www.qualityoflifecapital.org.uk.

4.3 Stakeholder Involvement in Appraisal

4.3.1 Background

This section addresses a key aspect of the appraisal process, that is, the extent to which it involves stakeholders. Two points should be noted. Firstly, the term 'stakeholder' is used here to refer to representatives of organised groups *and* members of the public, that is, all who feel they have a stake in the process. Secondly, stakeholder involvement is not considered an appraisal tool by itself, rather the issue of stakeholder involvement cuts across all the tools discussed above since all could be undertaken by experts alone or could be adapted to involve a range of stakeholders.

Stakeholder involvement is important in light of recent calls for greater openness and transparency which have been articulated as a need for greater stakeholder participation in a range of processes. Specifically, for the Agency the recent Section 4 guidance

provides a clear opportunity for the Agency to develop this area further[23]. In addition, in order to ratify the Aarhus convention[24], the European Commission has proposed a Directive[25] which explicitly calls for public participation in plans and programmes relating to the environment[26]. These processes are generally referred to as "environmental decision making processes", some of which have been appraisal processes, in the sense that they are about choosing between options. In addition, integrated methods of appraisal are likely to be carried out for complex issues and will therefore involve a diverse range of information, which together with trade-offs necessitate the involvement of stakeholders.

Stakeholder involvement covers a wide range of approaches and degrees of involvement (see IEMA, 2002 for details). With respect to appraisal processes, three levels of stakeholder involvement can be identified as relevant:

- *information feedback* – the dissemination of information with a request for feedback to supplement knowledge and gain a better understanding of issues (e.g. surveys, staffed exhibits and displays, staffed telephone lines);

- *involvement and consultation* – formal or informal dialogue to identify issues of concern (e.g. workshops, focus groups, open house); and

- *extended involvement* – participants are able to contribute to the formation of a plan or proposal and to influence a decision through group discussions or activities.

The first level centres on providing information and soliciting views on that information but does not involve dialogue between the information providers and the respondent stakeholders. First level methods include surveys and focus groups, where an organisation wants to gather views on an issue, for example local services. The intention is a one-off information gathering exercise with little or no commitment to act on the views of stakeholders. The second level describes a situation whereby views are sought and there is an intention to act on and possibly discuss those views. The traditional consultation process, whereby information is sent out in documentary form and stakeholders are asked to provide feedback on the document, possibly with direction to specific questions, should fit into this category although in the past it probably fitted better under the first category[27]. The third level involves deliberation with stakeholders who have the opportunity to actively shape the proposal.

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[23] The Section 4 guidance refers to the need to understand the *"interactions between environmental practice and social and economic factors"* (para. 3.12) and suggests that its partnerships with the public, local authorities, and other representatives of local communities together with partnerships with, for example, the Department of Health and the Health and Safety Executive would be ways to develop that understanding.

[24] The UNECE *Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters* (the Aarhus Convention) was adopted on 25th June 1998 and entered into force on 30th October 2001. There are currently forty signatories including the UK and the EU. Article 7 of the Aarhus Convention requires Parties to *"make appropriate practical and/or other provisions for the public to participate during the preparation of plans and programmes relating to the environment, within a transparent and fair framework, having provided the necessary information to the public"*. Article 6(4) of the Convention (which must be applied) states that *"Each Party shall provide for early public participation, when all options are open and effective public participation can take place"*.

[25] Proposed directive *Providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending council directives 85/337/EEC and 96/61/EC*.

[26] There is an issue that will need to be considered which is the balance of public involvement between the plan and the appraisal process. This will need to be carefully considered so as to avoid consultation fatigue.

[27] However, the process of consultation by government departments has been scrutinised under the Modernising Government programme and from that a Code of Practice on Consultation (Cabinet Office, 2000b) has been developed which sets out good practice guidance on consultation and is encouraging standardisation within government consultations. This attention to the standard process of consultation is likely to lead to a general consideration of how government engages with its stakeholders, and in that sense may make it more of an active process than it has been in the past.

With respect to appraisal processes the first two levels of involvement provide ways in which stakeholders could be involved in existing processes and can be thought of as "opening up" the appraisal process, but would not radically change existing processes. This has been done with CBA (e.g. valuation exercises using focus groups), is a requirement for EIA[28], good practice for Sustainability Appraisal[29] and an integral part of the QoLC approach[30]. The value of this involvement should not be underestimated as done well it should enable the appraisal to be "owned" by a range of different stakeholders as well as providing a broad range of options for consideration in the formal appraisal process.

The third level refers to more extended involvement and it is in this area that there has been most development over the past 5 – 10 years. Within this area new "methods" have been developed which aim to involve lay people in environmental decision-making. There are a range of these processes some of which are more structured and designed with the specific intent of encouraging dialogue between experts and lay people. These processes have been termed Analytic-Deliberative Approaches (Stern and Fineberg, 1996) since they emphasise analysis *and* deliberation. According to Petts *et al*, *"both the analysis (the specific and more specialised process associated with risk assessment) and deliberation (a more interactive means by which ideas are deliberated upon by wider stakeholders) are not seen as mutually exclusive but instead inextricably linked and influential"* (Petts *et al*, 2002, page 21). Theoretical work in this area (e.g. Webler, 1995) focused on defining a normative ideal for public participation which provides criteria against which processes can be evaluated. Analytic-Deliberative Processes come closer to that normative ideal of "fairness" and "competence"[31] than other types of involvement. Furthermore, authors such as Irwin (1995) and Functowitz and Ravetz (1993) have discussed working towards a science that is improved by the *"creative conflict between popular and expert epidemiologies"* (Irwin, 1995, page 172) and it is these processes that should help facilitate this improvement.

This level, due the nature of the involvement has the potential to transform existing appraisal processes into new approaches that can provide greater benefits in terms of "*legitimation of decision-making, enhancement of democracy and enlargement of citizenship"* (Petts and Leach, 2000). For example, the Environment Agency resolved priorities for the New Forest LEAP (Clark *et al*, 1998) by recruiting a stakeholder group to review the issues in a consultation draft and prioritise them using a MCA approach. This involved a systematic evaluation and weighting of issues against a range of criteria (environmental, economic and social costs, risks and benefits). Petts *et al* (2002) provide an excellent review of examples of analytic-deliberative approaches to a range of environmental decisions, some of which are focussed on appraising a range of options. Box 4.6 outlines a three-stage process used in Germany which provides some detail on how stakeholder groups might be involved in an options appraisal process.

[28] IEMA (2002) provide a set of guidelines on participation in environmental decision-making which covers participation in EIA.

[29] In the final report on Sustainability Appraisal of Regional Planning Guidance (DTLR, 2001b) it is recommended that the DLTR *"Places more emphasis on stakeholder consultation and involvement in Sustainability Appraisal at the formative stage of RPG, in appraising options and the emerging spatial strategy."* (Chapter 7).

[30] The guide to public participation in Quality of Life Capital suggests that *"The results of public participation exercises can be used to complement the findings of professionals, or could simply be used to enable dialogue with the local community"* page 1 (available at: http://www.qualityoflifecapital.org.uk/pdfs/public_participation.pdf) (accessed 7 January, 2003).
. The guide usefully provides information on public participation in Quality of Life Capital drawing on the experiences of 18 pilot studies.

[31] Palerm, (1999) provides a detailed discussion of those criteria together with an evaluation of the Aarhus convention and the EIA Directive in the light of those criteria.

Box 4.6: Example of stakeholder involvement in an appraisal process (from Petts *et al*, 2002)

"Particularly the production of a co-operative discourse model, known as the 'three step process' offers a structured way of incorporating the views of a diverse group of stakeholders in environmental decision-making (Renn *et al*., 1993; Renn *et al*., 1997; Renn, 1999). The three steps are as follows:

Step 1 At this stage the various stakeholder groups identify their values and criteria for judging different options. These include economic, political, social, cultural and religious values. This concerns and criteria list is then appraised and added to by experts, citizens and sponsors of the process and the concerns are transformed into qualitative and quantitative indicators.

Step2 Identification and measurement of impacts and consequences related to different policy options. The indicators are approved by the participants in the process and are used to evaluate each policy option. The group Delphi method involves experts from a range of disciplines who are asked to judge the performance of each policy option against each indicator, through group interaction and reconciliation of conflicts about the factual evidence.

Step 3 The potential solutions are discussed by a group of randomly selected citizens who evaluate the policy options based on their own knowledge and values with regard to the decision. At this stage the various stakeholder groups, experts and sponsors act as witnesses to the panels. The process facilitator is responsible for the compilation of a citizen report. The final outcome at the end of this stage should be the priority of options and policy recommendations.

The potential of the three-step model lies in its structure and the clarity of the objectives and outcomes arising at each stage. It provides an holistic approach to environmental decision-making including a wide range of people and groups, by involving them in a proactive way (Renn, 1999)."

While stakeholder involvement might generally be considered "a good thing", it is vital that clear objectives for any stakeholder involvement are established at the outset. The appraisal team (which should ideally include stakeholders) must decide on clear objectives for that involvement, once that is done it then becomes possible to decide on what method might be most appropriate to use so that those objectives can be met (Delbridge *et al*, 2002). A crucial question to ask is what influence the views of the stakeholders will have over the appraisal process. This can range from limited influence (e.g. providing information that otherwise would not be obtainable) or suggesting alternative options through to more extensive influence (e.g. influence over the objectives of appraisal and the choice of appraisal tools). The amount of influence given to stakeholders will depend on how much control of the appraisal process is shared with stakeholders by the commissioning authority, and to what extent they are willing to stand by the results. If the appraisal process is very prescriptive and in that way quite controlled then extensive involvement of stakeholders is likely to be redundant as there will be no space for influence. If on the other hand there is a genuine desire to work with both lay and expert views on issues then the process will be more amenable to extended stakeholder involvement.

Table 4.1: Examples of stakeholder involvement in the appraisal process

Level	Technique	Potential use in appraisal process	Comments	Example
Information feedback	Staffed exhibits/ displays.	This could be used at the start of an appraisal process to convey information about the issue, collect views of stakeholders on what aspects they regard as important, and have expert staff on hand to answer questions. It could also be used at the end of an appraisal process as a method of communicating to a wider group of stakeholders.	Need to ensure that there is a mechanism for feedback to stakeholders and that it is clear what will happen to their comments and views. Again this is likely to be part of a wider stakeholder involvement process – either at the beginning or the end.	Agency study on The Assessment of benefits associated with low-flow alleviation on the River Mimram. In this study a staffed exhibition was used to gauge stakeholders views on the importance of certain aspects of the river and its use. This was then used, with information from focus groups to input into the development of a willingness to pay questionnaire (CBA).
Involvement and consultative	Stakeholder forums	This could be used in a number of ways, to discuss with stakeholders their views of what is valued in an area but also to understand their perception of impacts and benefits of a particular issue or to provide weighting for different criteria in an appraisal.	Need to ensure that it is clear what the stakeholders' involvement will achieve, too easy to set up "talking shops" which do not have any influence over the appraisal process. Need to ensure that the tasks for these groups are clearly defined.	As part of the CAMS Sustainability Appraisal process a 'Stakeholder Group' is formed (see Chapter 5) and this meets up to five times over the period of the appraisal. Their main role is as information providers and in assisting the identification of options. The Agency's MAT Scoring and Weighting System used focus groups as one means to determine the relative weighting of impact categories in relation to schemes proposed as part of the AMP3 process (see 4.2.2).
Extended involvement	Stakeholder dialogue	This could be used to set the objectives for the appraisal, as well as carrying out parts of the appraisal.	Provides a focus on the process of engagement. Ensures that all views are heard and is flexible to the problem at hand. Suitable for dealing with controversial issues. Not all interests may be represented. The flexibility of the method can also be a weakness in that key issues can be compromised	The New Forest LEAP process (Clark et al, 1998) involved recruiting a stakeholder group who were tasked with reviewing the issues in the consultation draft by using a multi-criteria analysis. The stakeholders were drawn from the public sector, voluntary sector and the private sector had to evaluate and weight the issues against a range of environmental, economic and social criteria.

Some of the advantages and disadvantages of stakeholder involvement and employing more Analytic-Deliberative Processes as part of appraisal are summarised below.

4.3.2 Advantages of stakeholder involvement in appraisal processes

- Most conceptions of sustainable development stress the importance of public engagement in determining what is sustainable (Owens and Cowell, 2002).

- Stakeholders may identify previously unforeseen impacts and bring new options to the table.

- Stakeholders may feel ownership and responsibility for the outcome which can aid implementation.

- Time may be saved at the end of the process as there may not be need for rounds of consultation and approval by stakeholders because agreement has been reached at the beginning of the process.

- It can open up the "black box" of appraisal to scrutiny which can help build trust with a diverse range of stakeholders.

- It can involve stakeholders who traditionally have not been involved in this type of decision-making (e.g. local residents).

- It can enable stakeholders to become aware of others' legitimate views and provide the basis for compromise.

- It can provide a means for stakeholders to be accountable for the views and opinions they express and tie them into the decision making process.

4.3.3 Challenges to stakeholder involvement in appraisal processes

- In practice, given the increased complexity of the involvement processes, as one moves up the levels of involvement towards extended involvement, it is more likely that fewer stakeholders will be involved and that those stakeholders will tend to be representatives of organised groups rather than members of the public. The nature of the level of involvement does not dictate this by itself, but often given the time commitment asked for, together with the often complex nature of the issues under examination, extra efforts will need to be made to ensure that members of the public are involved.

- Designing an analytic-deliberative process needs considerable attention to the objectives of the process and a clear understanding of what aspect of the appraisal is open to influence, or change.

- Analytic-Deliberative Processes may be relatively expensive, take considerable time to set up and involve a relatively small numbers of stakeholders.

- These processes may not lead to clear cut outcomes and could increase conflict, rather than reduce it.

- Although information must be supplied to facilitate the debate there is a difficult line to be drawn between providing information that expresses a range of viewpoints and steering the debate towards one particular outcome (Owens and Cowell, 2002).

- It is easy to allocate too little time to planning these processes and to providing enough time for participants to become familiar with the issues.

- Experts may feel their professional identities under threat from the involvement of members of the public.

- There will be issues of language and terminology that have to be addressed so that all participants have a shared understanding of the task.

- These processes typically require quite a commitment from stakeholders that may restrict the type of person who gets involved.

- Their use raises the awkward question of what Foster (1997) referred to as 'discursive competence', an issue that tends to be evaded, perhaps because it provokes accusations of elitism, yet must nonetheless be confronted particularly when complex and demanding issues are at stake (Owens and Cowell, 2002).

4.4 Characteristics of Appraisal Tools

It is clear from the previous sections that appraisal tools vary considerably in their characteristics. By way of summary, appraisals tools can be imagined to occupy different positions on a range of continua (see Figure 4.2). Although the position that various tools occupy may be somewhat dictated by their theoretical underpinnings, all the tools are flexible in the sense that they can employ a variety techniques and, as such, can shift their positions to some degree. Each of the continua are discussed in turn below.

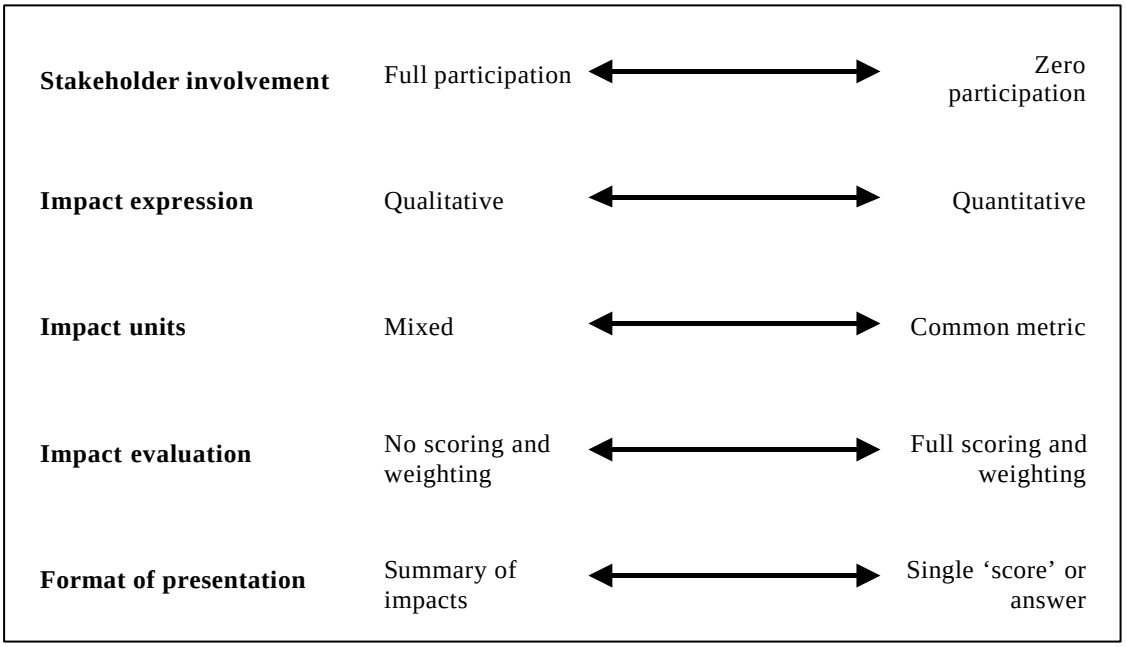

Figure 4.2: Appraisal tools can occupy various positions on five continua

4.4.1 Stakeholder involvement

Involving stakeholders in appraisal can yield considerable benefit but also presents significant challenges (see section 4.3). Even the most technical tools, such as CBA and Risk Assessment, can provide for some degree of stakeholder involvement. For example, economic valuation techniques that directly elicit individuals' preferences can be undertaken for the purposes of CBA and the Agency has commissioned research on participatory Risk Assessment (Petts *et al*, 2002). The nature and appropriate extent of stakeholder involvement in appraisal will vary depending on a range of factors including, for example:

- the political sensitivity of the decision;
- the point in the decision-making hierarchy at which the appraisal takes place;
- the degree to which the appraisal adopts a technical approach; and
- the extent to which there are likely to be different perspectives on the issues at stake.

It should be recognised that Analytic-Deliberative Processes provide an opportunity for stakeholders to debate the options under consideration and the trade-offs at stake and could therefore form a central element of appraisal, if this was considered appropriate.

4.4.2 Impact expression

Whether impacts are expressed in a qualitative or quantitative form will depend on a variety of factors. For example,

- some impacts, for example on various aspects of social capital, may be inherently difficult to quantify given the nature of the receptors;

- uncertainty over potential impacts may increase the challenge of quantification and impacts may be expressed on a qualitative, directional basis;

- in order to quantify impacts it is necessary to assemble the underlying baseline data and, for one reason or another, this may not be available; and

- quantifying impacts may inevitably involve greater time and expenditure than qualitative analysis and if financial resources are limited or a rapid response is required quantification may not be feasible or appropriate.

4.4.3 Impact units

Some appraisal tools may express impacts in a common metric which facilitates comparison between diverse impacts. CBA, for example, attempts to express impacts in a common monetary metric and MCDA may reduce impacts to a common metric through scoring and weighting. Similarly, Risk Assessment may reduce impacts to a commonly understood metric of probability). However, other tools tend to present impacts in a wide range of different units.

4.4.4 Impact evaluation

Some tools, such as CBA, inherently involve scoring and weighting while others may employ it depending on the circumstances (see Chapter 6). If scoring and weighting is employed, it is important that the system used has a rational basis for deriving, comparing and aggregating the scores and weights. In particular, it may be important to involve the right stakeholders to the right degree otherwise the appraisal process may be open to accusations of arbitrariness and the findings open to question.

The degree to which scoring and weighting will be possible or appropriate will depend on a variety of factors. For example, as the decision-making process becomes progressively more strategic so it may become commensurately more difficult to reach consensus on a scoring and weighting system given the number of potentially interested parties and the inherent uncertainty over future impacts.

4.4.5 Format of presentation

It is clear from the introduction to the various appraisal tools or family of tools, that while some are content to merely assemble impact information for the benefit of decision-makers, others focus on processing impact information and consequently directing decision-makers towards a preferred option(s). For example, while Environmental Assessment and related tools and Sustainability Appraisal and related tools may employ simple systems for scoring impact significance, they rarely assign weight to competing objectives. Instead, the task of processing the impact information presented rests largely with decision-makers who will employ their judgement in reaching a decision as to the preferred option(s). In contrast, other tools – CBA and MCDA in particular – will act to process the impact information assembled through other means for the benefit of decision-makers and direct them towards a preferred option. In the case of CBA, the option with the highest net benefit will be identified and a firm conclusion reached as to the preferred option(s). However, even then the ultimate decision as to the preferred option rests with decision-makers who may take into account a range of factors in addition to the appraisal findings in reaching a decision on the most appropriate way forward. As such, all appraisal tools are decision-*aiding* rather than decision-*making*.

5. CASE STUDIES

5.1 Introduction

In order to investigate and evaluate past integrated appraisal practice within the Agency, two case studies were undertaken. The first case study explored the appraisal of the likely costs and benefits of the Agency's policy on landfill gas flaring (see section 5.2) and the second investigated the Sustainability Appraisal of the East Hampshire Catchment Abstraction Management Strategy (see section 5.3). Note that the case study findings are presented in full in separate R&D Project Records E2-044/PR/3 & E2-044/PR/4.

Both case studies involved assessing the performance of the appraisal process against the generic review criteria set out in Table 5.1 and discussing the process with the key players involved. The criteria provided a means to explore past appraisal practice and were organised around the key stages in the framework for integrated appraisal (see Chapter 3).

5.2 Case Study 1: Appraisal of the Agency's Landfill Gas Flaring Policy

5.2.1 Background

Landfill gas is an end product of the degradation of biodegradable wastes in landfill sites. Typically, it is a mixture of up to 65% methane and 35% carbon dioxide, plus trace concentrations of a range of organic gases and vapours. In addition to being a significant source of greenhouse gases, landfill gas can also be toxic, explosive, asphyxiating and highly odorous, making it a potential threat to human health and amenity. Passive venting of landfill gas is no longer recognised as a suitable disposal/control option and recent years have witnessed a reduction in emissions through the increased use of flares as well as greater landfill gas collection efficiency and an increased number of landfill gas utilisation schemes, particularly at modern landfills (Environment Agency and SEPA, 2001).

Government guidance on landfill gas (DoE, 1991)[32] advises that landfill gas should be controlled, preferably by collection and burning in flares or in an energy recovery plant. The purpose of flaring is to dispose of the flammable constituents, particularly methane, safely and to control odour nuisance, health risks and adverse environmental impacts. Replacing open flares with closed flares provides a means to improve combustion and render airborne emissions less harmful. In addition, emissions from enclosed flares can be readily monitored whereas emissions from open flares are virtually impossible to monitor with any confidence or degree of consistency. R&D undertaken by AEA Technology recommended that existing waste management licenses should be modified to require the replacement of open flares with more costly enclosed flare technology in order that monitoring could be undertaken and emissions standards set (Environment Agency, 1997).

[32] The Agency's National Landfill Gas Group has commissioned a review of Government guidance with the aim of producing a comprehensive guidance document on best practice management of landfill gas.

Table 5.1: Case study review criteria

Step	Key questions
Define the objectives	**Were the decision and appraisal objectives clearly defined from the outset?** • How were the objectives derived (e.g. did they originate from a higher level decision?) and did they encompass an appropriate range of issues? • Were appraisal objectives established and, if so, how were they derived (e.g. from a sustainable development strategy) and did they address an appropriate range of issues?
Stakeholder involvement	**Was the appraisal open to stakeholder involvement?** • Were there adequate and appropriately timed opportunities for stakeholder involvement? • What means of engaging stakeholders were employed (e.g. focus groups, leafleting) and were these appropriate and effective? • Were stakeholders representing an appropriate range of views encouraged to become involved? • Was the appraisal process transparent and conducive to stakeholder involvement (e.g. were key stages adequately documented, was non-technical language employed)?
Define the scope	**Was the appraisal scope clearly defined?** • What issues did the appraisal resolve to address and were these (a) appropriate and (b) subsequently explored? • What depth of investigation did the appraisal commit to undertake for each issue and was this (a) appropriate and (b) subsequently carried out?
Identify the options	**What options were considered and how were they generated and short listed?** • What range of options were considered (e.g. 'do nothing', demand management, different locations) and were these genuine alternatives? • How were these options generated and short listed (e.g. through brainstorming, stakeholder consultation)?
Assess the options	**What method(s) were used to assess the implications of options?** • What method(s) were used to assess the options and were these appropriate in light of (a) the depth of investigation required, (b) the likely significance of the issues and (c) the time, resource and skills base available? • Was an appropriate level of relevant information used in assessing the options? • At what points in the decision-making process was appraisal undertaken (e.g. at planned points in the process or when opportunities arose) and were these junctures appropriate? • Was the emphasis on a technical or participatory approach to impact identification and was the balance between these approaches appropriate? • Was the emphasis on quantitative or qualitative predictions and again was the balance appropriate? • Was an appropriate range of impact dimensions considered (e.g. direct, indirect, cumulative, synergistic, short-, medium- and long-term, permanent and temporary, positive and negative)? • Were appropriate mitigation and enhancement measures proposed as part of the appraisal process?
Compare the options	**How were options compared?** • What approach was taken to assigning impact significance (e.g. consensus building, threshold setting) and was this appropriate? • How were the options compared (e.g. using a particular appraisal method, through stakeholder consultation) and was the means adopted appropriate?
Select preferred option(s)	**How was the preferred option(s) selected?** • Were the appraisal findings presented to decision-makers in an appropriate way? • How was the preferred option(s) determined (e.g. through stakeholder consultation)?
Deliver and monitor	**Were mechanisms for monitoring implementation established?** • How will the implementation of the decision be monitored (e.g. through indicators linked to its objectives)? • Was responsibility for monitoring assigned to appropriate bodies/individuals? • Were any mitigation and enhancement measures linked to the preferred option implemented?
Review and evaluate	**Did the decision achieve its objectives?** • Was an appropriate review and evaluation procedure established? • If the decision did not achieve its objectives, why not and what changes should be made in the future?

Note: stakeholders should be involved throughout the decision-making and appraisal process.

5.2.2 The appraisal process

In light of the recommendation by AEA Technology, the Agency drafted a policy for landfill gas flaring. The appraisal was carried out in response to a newly introduced requirement that before a policy could be presented to the Agency's Environmental Protection Group it had to undergo an appraisal of likely costs and benefits. It should be noted that the policy was drafted before those responsible were informed of the appraisal requirement.

The appraisal considered the likely costs and benefits of the policy and quantified the likely capital costs to industry (see Table 5.2). In addition, the appraisal considered several alternative approaches to implementing the policy (see Table 5.3). These options focused on the timescale for replacing open with closed flares and the preferred option of replacement within five years formed part of the final policy (see Box 5.1).

The preferred option was selected on account of its:

> *"significant expected benefits in terms of improved monitoring and control of emissions from landfill gas flaring which will allow benefits for the environment, the public, especially communities in the vicinity of landfill gas flares and the agency…The proposed option is considered to minimise the costs to operators by allowing replacement of flares in a timescale which is expected to allow natural replacement of open flares with enclosed flares at the end of their expected life, and avoids imposing excessive costs on operators by focusing on those sites with the largest emissions and sufficient revenues for installation of flares"*
>
> (Environment Agency, 1999d, page 4)

Box 5.1: The Agency's policy on landfill gas flaring

Policy No: WML007/B Landfill Gas Flaring

The Environment Agency requires:

(a) that no more 'open' flares shall be installed at licensed landfill sites, except for experimental or emergency purposes;

(b) that all currently operational landfill gas flares operated as 'open' flares at licensed landfill sites shall be replaced progressively with 'enclosed' flares, or non-combustion techniques offering equivalent performance, by 31st December 2003 (the Agency will prioritise sites which produce large amounts of gas or pose a significant risk to the local environment); and

(c) that all existing 'enclosed' flares operating at licensed landfill sites shall demonstrate operational performance required to meet the prescribed emission standard.

Table 5.2: The likely costs and benefits of the landfill gas flaring policy (adapted from Environment Agency, 1999d)

Area	Costs and Benefits
Environment	• It is thought that the more controlled combustion conditions within enclosed flares allow greater destruction of trace compounds with a potential to cause local and near-field air pollution and health impacts. • Enclosed flares may offer some visual impacts benefits as there is no visible flame, but open and enclosed flares are not considered to differ significantly in terms of noise, landscape impacts and planning issues. • Whereas the design of open flares prevents the monitoring of emissions, enclosed flares provide conditions under which emissions may be monitored. The resultant data provides for the understanding, control and regulation of potential pollution from flaring.
Society	• Better information on emissions from landfill gas flaring should benefit all actors – industry, government, the Agency, NGOs and others through informing measures to reduce potential environmental and health impacts arising from flaring. • Improved information on environmental and health impacts should be available to address the concerns of people living or working in the vicinity of landfill sites that use flaring.
The Operator	• This policy ensures that competitors are applying best practice in the flaring of landfill gas. • The monitoring data will provide operators with information to inform the siting of landfill sites, to control potential pollutants and for communicate with the public. • The additional capital costs for the installation of an enclosed flare as opposed to an open flare are in the range of £46,000 - £65,000 per flare, to meet the minimum performance standards required by the Agency. • The costs to operators will include the capital costs of the new equipment, but also any costs associated with replacing existing flares before the end of their expected life. • Operators will also have to meet the costs of monitoring, with a maximum estimated cost of £10,000 - £15,000 per annum per site for a full analytical suite under routine monitoring (where no problems are encountered with emissions). • The manpower requirements for the operation of enclosed flares do not differ significantly from open flares. The technology, design and input requirements are also similar.
The Agency	• The policy will help the Agency to apply its duty to protect human health and the environment through the licensing of landfill sites. • The installation of enclosed flares will allow the Agency to monitor emissions from landfill gas flares thus allowing the control of emissions from landfill gas flares to be improved towards the level achieved for other combustion processes. This will allow the Agency to determine whether and where reductions in pollutant emissions from flares are required, and contribute to improved risk-based regulation. • Enable the Agency to move towards greater consistency in licensing. • Improved information on emissions should enable the Agency to respond to public concerns about emissions from flares and improve the Agency's credibility in addressing potential and perceived impacts of trace components in emissions.

Table 5.3: Policy implementation options considered for the landfill gas flaring policy (Environment Agency, 1999d)

Option	Likely Costs and Benefits
Option 1 – Business as usual (the baseline)	• Certain operators would apply best practice and install flares at new sites, and replace open flares at the end of their life with enclosed flares • Other operators would continue to install cheaper flares • Reliable monitoring of emissions would not be possible
Option 2 – Replacement within 3 years	• This would require more operators to replace open flares with enclosed flares before the end of their normal life, imposing additional costs on operators
***Preferred option* – Replacement within 5 years**	• Considered to minimise the costs to operators by allowing replacement of flares in a timescale which is expected to allow natural replacement of open flares with enclosed flares at the end of their expected life
Option 3 – Replacement within 10 years	• Would result in no additional cost to operators due to replacement of technologies before the end of their natural life • Would delay the expected benefits from monitoring of landfill gas flaring emissions in terms of potential for emissions control and better risk-based regulation, and prevent the Agency from addressing problems in regulatory consistency and credibility • The Agency may be seen as being too lenient with operators

5.2.3 Critique of the appraisal

From the review of the appraisal process against the generic review criteria, four key issues emerged.

The range of options considered

The appraisal focused on several options all of which centred on the timescale for delivering the policy, rather than the nature of the policy itself. This raises the question of whether or not it would have been useful for the appraisal to have been initiated earlier to provide the opportunity to consider options governing the ambitions of the policy itself, as well as its implementation.

The policy was developed from R&D carried out by AEA Technology (Environment Agency, 1997) and the scope of the appraisal was therefore limited to considering options for implementation and was not in a position to question the fundamental rationale for the policy or consider the different approaches that might have been taken. Ideally, other potential approaches should have been considered higher up the decision-making hierarchy and subject to appraisal. Interestingly, the appraisal included a paragraph on another option for managing landfill gas (energy recovery – see below) but it was unclear whether this option and others had been systematically appraised at a higher level.

"Requiring the use of landfill gas for energy recovery has been considered, but is not proposed at this moment. At present, it is believed that combustion engines for energy recovery may have a poorer combustion performance. This could result in the formation of trace compounds. Further investigation of emissions from energy recovery technologies is being investigated. Flares also allow better dispersion of emissions than combustion engines, reducing the potential impact on near-field communities"

(Environment Agency, 1999d, page 5)

This highlights the need for the Agency to establish an appropriate appraisal regime at all levels in the decision-making hierarchy to help ensure that a comprehensive range of options are explicitly and transparently considered and that potentially viable options are not prematurely foreclosed.

The timing of the appraisal

The appraisal was only initiated once the policy had been drafted. This was reflected in the fact that the appraisal was limited to considering options for implementation. As a general rule, appraisal should be initiated early in the decision-making process and continued on an iterative basis. In this way, appraisal can proactively influence the decision-making process and act as something of a design tool (as opposed to purely being employed as a post hoc testing or evaluation tool).

The depth of impact investigation

Judging by the documentation available, the appraisal of the flaring policy was undertaken in a relatively short space of time and the potential impacts only briefly described and only quantified in the case of costs to operators. This contrasts to the three to four months the Sustainability Appraisal of the East Hampshire CAMS took to complete (see section 5.3). This raises the issue of whether or not the degree of analysis undertaken in each case reflected the significance of the likely impacts (the 'proportionality principle'). Both the flaring policy and the East Hampshire CAMS will influence business interests (landfill operators and water companies/other abstractors, respectively) and could potentially increase their costs and this raises the question of whether the duration and detail of the appraisals should have been so different. Interestingly, the officers responsible for the sustainability appraisal of the East Hampshire CAMS questioned whether or not the outcome of the appraisal justified the amount of time spent on it. The difference between the two appraisals in terms of duration and detail also draws attention to the differences between 'integrated appraisal' as currently practiced within the Agency and the fact that these appraisals range from rapid and relatively informal enquiries to extended and detailed investigations.

Stakeholder involvement in appraisal

The appraisal of the flaring policy was undertaken on an internal basis by a range of Agency personnel and there was no external consultation on the policy itself or the options for implementation considered (although consultation had been undertaken on preceding R&D). This reflects the fact that the Agency does not, as a rule, consult externally on its policies (other than with Government). However, it does consult on

the guidance prepared for implementing its policies (in line with Government requirements) and guidance related to the landfill gas flaring policy was subject to internal and external consultation.
To gain support for the policy, it might have been advisable to enable stakeholders (landfill operators, environmental NGOs etc.) to play a greater role in the consideration of policy and implementation options. In contrast, the CAMS appraisal process involved a 'Stakeholder Group' which included representatives from interested parties including water companies (see section 5.3).

5.2.4 Conclusions on the appraisal

The appraisal of the landfill gas flaring policy was a valuable exercise in itself to inform the decision as to the most appropriate timescale for implementing the policy, however it was limited in scope and detail. It appears that no appraisal was undertaken higher up the decision making hierarchy to inform the development of the policy itself.

The case study raised issues relating to the three types of integration:

- tiering or vertical integration and the question of whether or not alternatives to the policy itself had been properly considered at higher levels in the decision-making hierarchy;

- the retrospective nature of the appraisal process meant there was little scope for integration between the decision-making and appraisal processes and limited opportunity for the appraisal to act as a design tool; and

- the lack of external consultation as part of the policy development or appraisal process raised the question of stakeholder integration and whether or not this would have been advisable in the circumstances and to what degree.

In addition, the study raised the question of what depth of impact investigation it might have been appropriate to undertake. Was a rapid 'quickscan' appraisal of the likely costs and benefits fitting in the circumstances or did the impacts warrant a more in-depth investigation? Determining what type and level of appraisal is 'fit for purpose' in a particular situation was a key issue to emerge from the research and is returned in Chapter 7.

5.3 Case Study 2: Sustainability Appraisal of the East Hampshire CAMS

5.3.1 Background

In March 1999, the Government published *Taking Water Responsibly* (DETR and Welsh Office, 1999), which outlined changes to the abstraction licensing system. Principal among these was the proposal that the Agency prepare Catchment Abstraction Management Strategies (CAMS). CAMS are strategies for the management of water resources at the local level and aim to achieve several objectives (see Box 5.2).

Box 5.2: Objectives for CAMS (Environment Agency, 2001c)

- to make information publicly available on water resources availability and licensing within a catchment;
- to provide a consistent and structured approach to local water resources management, recognising both abstractors' reasonable needs for water and environmental needs;
- to provide the opportunity for greater public involvement in the process of managing abstraction at a catchment level;
- to provide a framework for managing time-limited licences; and
- to facilitate licence trading.

The CAMS development process is illustrated in Figure 5.1. A key element of the CAMS process is the 'resource assessment' which provides an indication of the quantity and location of water within the catchment and is based on the measurement of various elements of the water cycle. On the basis of the resource assessment findings, each Water Resource Management Unit (WRMU) within the catchment is assigned an indicative 'resource availability status'. A WRMU is the largest subdivision of a catchment that may be managed in the same way. The resource availability status indicates the relative balance between committed and available resources, showing whether licences are likely to be available and highlighting areas where action is needed to reduce current abstraction. There are four categories of resource availability: 'Water available', 'No water available', 'Over-licensed' or 'Over-abstracted' (see Table 5.4).

Table 5.4: Resource availability status categories (Environment Agency, 2001c)

Indicative resource availability status	Definition
Water available	Water likely to be available. Restrictions may apply.
No water available	No water available although there may be exceptional circumstances in which a licence may be available.
Over-licensed	No water available on the basis of licensed abstractions. Full use of existing licences has the potential to cause unacceptable environmental impact
Over-abstracted	No water available on the basis of licensed and actual abstractions. Existing abstraction is causing unacceptable environmental impact

The East Hampshire CAMS was the first of four CAMS to be produced in the Hampshire and Isle of Wight Area. Development of the CAMS was initiated in Summer 2001 and the draft CAMS was published for consultation in July 2002 (Environment Agency, 2002h).

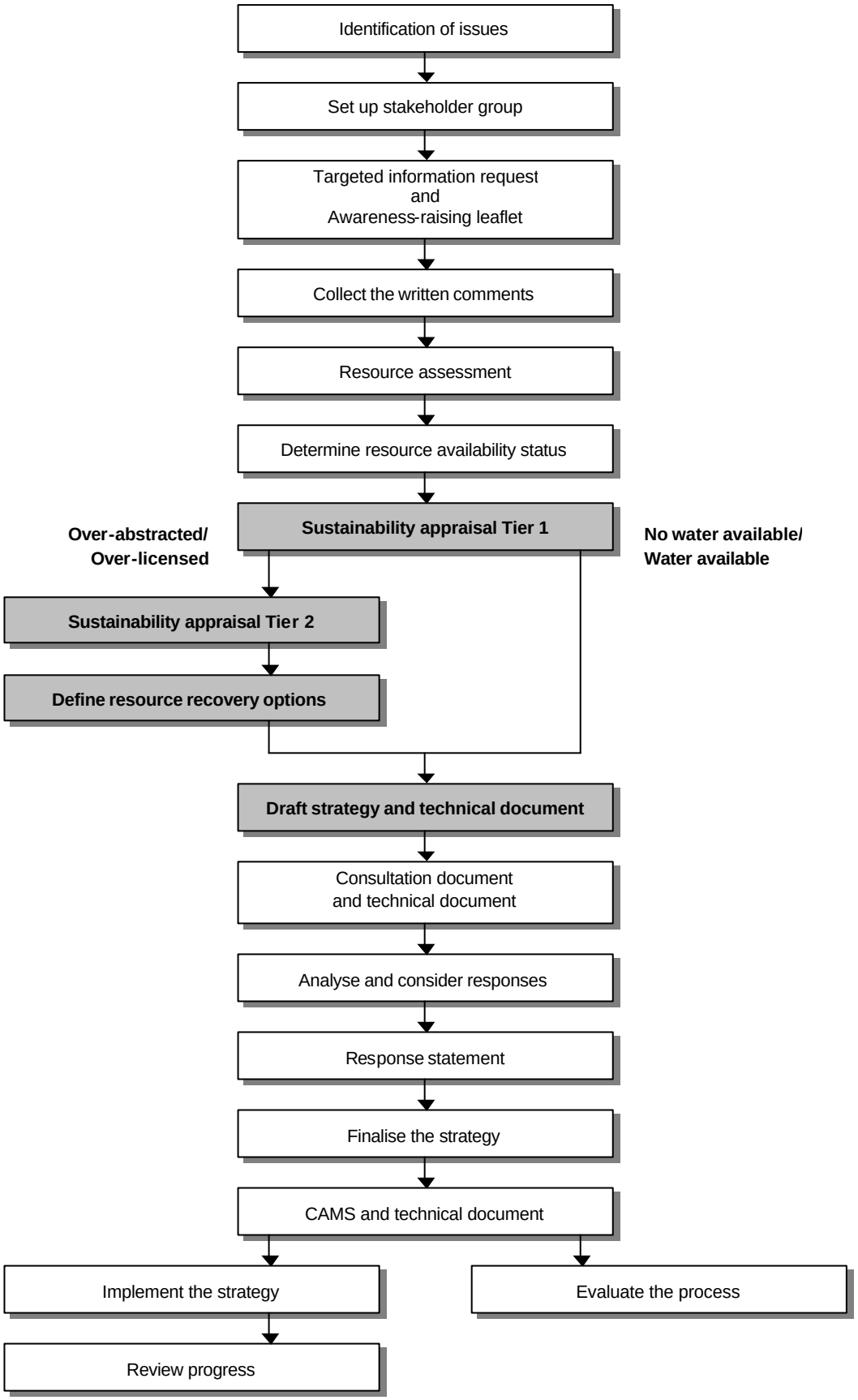

Figure 5.1: The CAMS process highlighting the Sustainability Appraisal (Environment Agency, 2001c)

5.3.2 The appraisal process

To ensure that the Government's four objectives for sustainable development[33] are taken into account in the development of CAMS, the Agency requires that a Sustainability Appraisal be undertaken as an integral part of the strategy development process. To this end, the Agency has prepared detailed guidance on undertaking Sustainability Appraisal of CAMS (Environment Agency, 2002i). The appraisal process (see Figure 5.2) takes a largely qualitative approach and considers what the resource availability status for each WRMU should or could be after a six-year cycle. In catchments that are classified 'Over-abstracted' or 'Over-licensed', options are considered for reclaiming water resources and in units where there is 'Water available', the appraisal process defines the resource availability status that could be reached, but should not be exceeded.

The CAMS appraisal process essentially involves assessing the options against a previously established baseline (the situation in each WRMU at the time the appraisal is undertaken) and awarding the impacts a score together with a likelihood and consequence rating. The impacts are categorised as 'environmental impacts, 'social implications', 'economic impacts' or 'impacts on natural resources' (reflecting the Government's four objectives for sustainable development). Once the individual options have been appraised, their impacts are compared and their overall performance ranked in order to facilitate identification of a preferred option. Indicators for monitoring any residual risks associated with the preferred option and any impacts (both positive and negative) identified in the appraisal are also established. In addition, the CAMS 'Stakeholder Group' should also be engaged throughout the appraisal process.

5.3.3 Critique of the appraisal

From the review of the appraisal process against the generic review criteria, six key issues emerge.

Tiering or vertical integration

Several of the options considered originated from the Regional Water Resources Strategy (RWRS) (Environment Agency, 2001d) and commanded a greater weight than those sourced from elsewhere. However, the Agency's guidance on CAMS appraisal stresses the importance of being open to 'less obvious' options that may come from within the Agency or from members of the Stakeholder Group. This raises the issue of 'tiering' or vertical integration and specifically the degree to which decisions made at a certain point in the decision-making hierarchy (in this case at the regional level) should guide and possibly delimit the options considered at a lower level (in this case the catchment level).

Nationally it was emphasised that the options promoted in CAMS should 'fit' with the overall content of the RWRS while acknowledging that RWRSs focus primarily on Public Water Supply, CAMS focus on wider catchment management in addition to this. However, a clear system of tiering would help to avoid confusion and wasted resources

[33] Social progress which recognises the needs of everyone; effective protection of the environment; prudent use of natural resources; and maintenance of high and stable levels of economic growth and employment (DETR, 1999a).

and ensure that an appropriate range of options are appraised at the right point in the decision-making hierarchy.

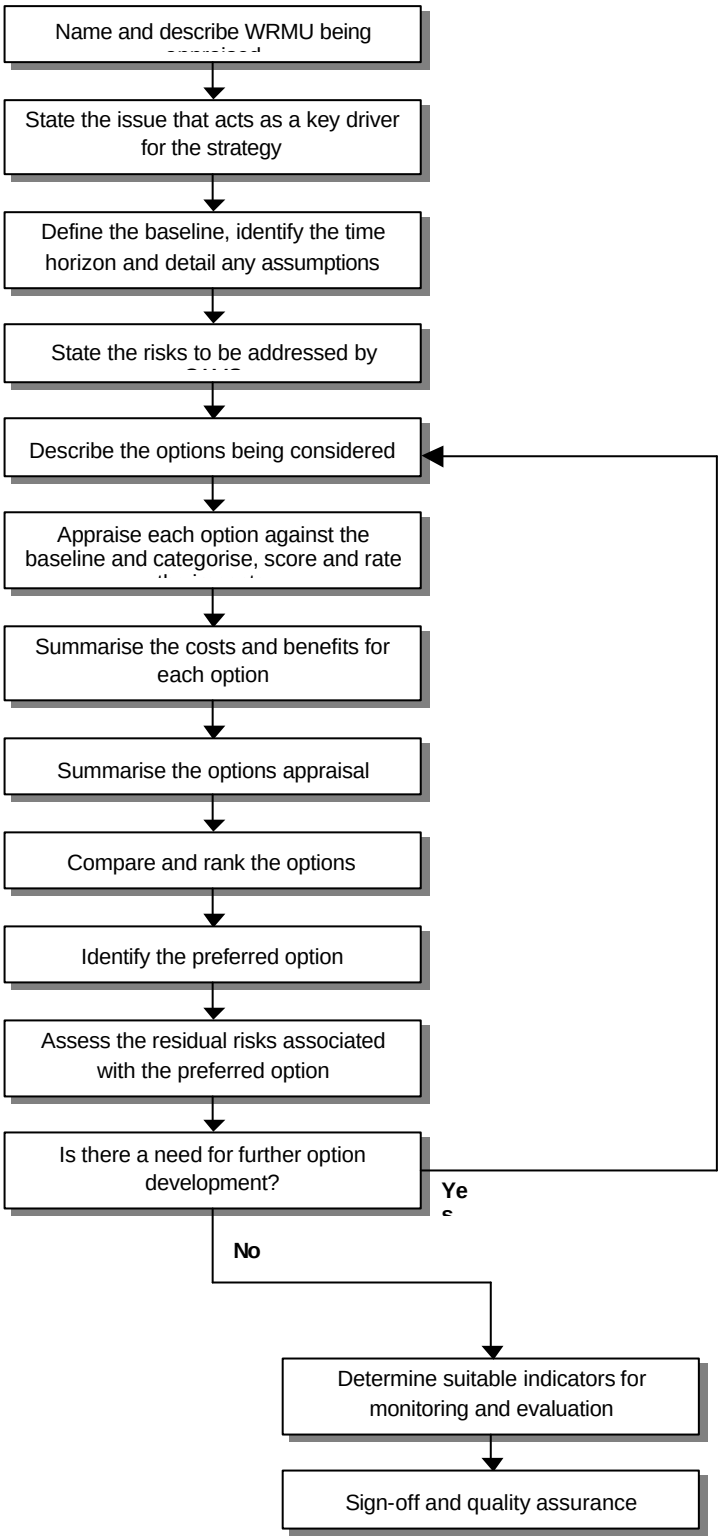

Figure 5.2: The CAMS Sustainability Appraisal process (adapted from Environment Agency, 2002e)

Stakeholder involvement in appraisal

The Agency's guidance on CAMS appraisal emphasises the 'key role' of the Stakeholder Group in the appraisal process and suggests they can be invited to:

- provide information to inform the options appraisal;
- identify potential options;
- comment on the options appraisal; and
- help to identify unforeseen impacts.

However, it is clear from the discussions with those involved that they experienced difficulties in managing a Stakeholder Group with disparate views and different backgrounds, personalities and perspectives; maintaining interest in the participating in the process; and explaining the relatively complex appraisal guidance. This indicates the need for both greater officer training in managing stakeholder involvement and further reflection on the role that stakeholders can realistically play in the appraisal process.

Comprehensiveness of appraisal

In theory at least, an integrated appraisal should equate to a *comprehensive* appraisal in that it should encompass all the issues relevant to the decision (including financial and political considerations). However, concerns were expressed that the potential costs to the Agency from the options under consideration were not necessarily adequately explored. This highlights the need for integrated appraisal to be as comprehensive as possible in its scope otherwise there is a risk that its findings and recommendations will fail to reflect the realities of decision-making (in this case the financial costs incurred by the Agency). In the case of the CAMS appraisal process, this could be rectified by simply adding a further impact category of 'costs to the Agency' thus ensuring that these are explicitly taken into account throughout the appraisal.

Consistency versus flexibility in appraisal

The officers responsible for undertaking the CAMS appraisals raised concerns regarding the inflexibility of the Agency's guidance and the consequent lack of scope for adapting the appraisal process to reflect local circumstances. Clearly there is a need for a balance between providing prescriptive guidance that served to foster a nationally consistent approach and allowing a certain degree of flexibility in order that the process might address local issues and priorities and be adaptable to different circumstances. The balance between the national and local perspectives will clearly depend upon the circumstances, but in order to be a useful to decision-makers, appraisal processes should clearly be adaptable to the realities of decision-making. On the other hand, the process needs to be sufficiently robust and consistent between different catchments in order that its findings command support and are defensible.

One means to avoid tension and foster ownership would be for national guidance to be developed in collaboration with those officers likely to use it (i.e. a combination of a 'top-down' and 'bottom-up' approach). In this way guidance would likely promote a consistent approach while providing practitioners with sufficient flexibility to adapt the guidance to their local circumstances. Clearly, any appraisal process must reflect the

significance of the potential impacts and risks at stake (the 'proportionality principle'). The length of time taken to complete the CAMS appraisal (three to four months) may not necessarily have been appropriate in the circumstances and a slimmed down process may have yielded similar results. Having said that, increased officer experience will doubtless speed up subsequent CAMS appraisals.

The depth of impact investigation

A key issue to emerge from the case study was the depth of impact investigation that should be undertaken for the appraisal. The officers involved argued that the Agency's guidance on CAMS appraisal promotes too detailed a level of investigation and that CAMS should be restricted to the consideration of strategic issues. Concerns were voiced that the CAMS appraisal process was caught between a qualitative and quantitative approach and that it constituted neither a high-level overview nor a detailed CBA. It was also argued that, as it stands, the process does not provide the detail required to make major decisions and is certainly not robust enough a basis for recommending the revocation of abstraction licenses. Interestingly, the latest draft of the Agency's guidance on CAMS appraisal places a greater emphasis on the quantification of costs than earlier drafts and, according to the National CAMS Co-ordinator, quantification has been emphasised in response to stakeholder views.

The level of detail the appraisal enters into again raises the issue of tiering and the need to ensure that the right issues are addressed at the right level in the decision-making hierarchy to the right level of detail. As such, there is a need to map the relationships between CAMS and those strategies, policies, plans and programmes above and below it in the hierarchy and ensure that CAMS appraisal is examining the right issues in sufficient detail. Other key initiatives include the RWRSs and the Restoring Sustainable Abstraction (RSA) programme, a lower-level initiative which covers the diversity of sites that are, or are suspected of being, adversely affected by abstraction.

Baseline information and uncertainty

A key issue to arise was the uncertainty associated with the outcomes of the 'resource assessment'. This provides an indication of the quantity and location of water within the catchment and is used to construct the baseline for the appraisal. This highlights the importance of securing robust information for the purposes of appraisal and managing uncertainty as part of the appraisal process. The lack of robust information was reflected in the pursuit of a large number of 'information-gathering options'. These seek to assemble further information on certain topics with the aim of increasing understanding and therefore reducing risk and uncertainty in the decision-making process. However, they do not necessarily have a direct impact on receptors and the officers involved in the appraisal highlighted the difficulties in comparing their performance with those of other options.

Concerns over uncertainty also led baseline to be *"taken as the situation in the catchment at the time that the assessment is undertaken"* (Environment Agency, 2002e, page 1). The possibility of taking the 'do nothing option' or the 'business-as-usual scenario' as the baseline was apparently discounted because it would effectively involve appraising an additional option and forecasting the impacts of the 'do nothing option' would introduce a greater level of uncertainty into the appraisal. However, most forms

of appraisal take the business-as-usual scenario as the baseline (as the does the SEA Directive which may apply to future CAMS) and such an approach might need to be followed in the future.

5.3.4 Conclusions on the appraisal

The case study highlighted issues associated with three forms of integration:

- the importance of ensuring that appraisal is comprehensive in its scope and addresses an appropriate range of issues (such as costs to the Agency) (horizontal integration);

- the importance of clearly establishing the relationships between various policies, plans and programmes (in this case CAMS and RWRSs and the RSA programme) (vertical integration); and

- stakeholder integration and the challenges of explaining the appraisal process, managing stakeholder views and identifying an appropriate role for stakeholders.

In addition, consideration will need to be given to the requirements of the SEA Directive, if it applies to CAMS, and how compatible the existing appraisal process is with the Directive's requirements. Overall, although the appraisal process closely followed the generic decision-making and appraisal framework (see Chapter 3), the duration and detail of the appraisal was arguably disproportionate to the significance of the impacts and the likely influence of the strategy.

6. TRADE-OFFS AND INTEGRATED APPRAISAL

6.1 Introduction

Trade-offs arise because resources (e.g. financial resources and physical resources such as land and freshwater) are in limited supply and choices must be made as to how they are best utilised. When making decisions on how resources should be used, decision-makers are often confronted with multiple and conflicting objectives and, in essence, are faced with a dilemma of trading off the achievement of one objective against that of another (Keeney and Raiffa, 1993). However, part of the challenge of sustainable development is to adopt innovative approaches that avoid trade-offs and instead lead to win-win-win solutions (i.e. solutions that generate a net gain for economic, social and environmental objectives).

The emphasis should therefore always be on the identification and pursuit of win-win-win solutions as a priority and trade-offs should only be considered when such solutions cannot be identified. By considering economic, social and environmental impacts, integrated appraisal provides an opportunity to identify synergies between objectives and potential win-win-win solutions. However, although these solutions may be the ideal they may not always be possible. For example, in the context of land use planning, the conflicting nature of development plan objectives led research for the Countryside Agency (2000a) to conclude that win-win-win solutions were the exception rather than the rule and consequently there was a need to make trade-offs between competing objectives. Similarly, in the context of local minerals planning, James (2001) emphasised that the economic importance of the resource coupled with the limited number of sites available for quarrying would mean that a trade-off rather than win-win-win model was likely to prevail.

In light of this, the chapter seeks to investigate the issues surrounding trade-offs from an Agency point of view and, in particular, discusses the role of various appraisal tools in facilitating their identification and determination. In particular, the chapter:

- introduces the concept of sustainable development and the 'rules' or guiding principles this might provide for identifying and deciding trade-offs. Sustainable development is a key consideration given the Agency's statutory duty to promote the concept and the overarching policy imperative that it provides;

- explores the different 'types' of trade-offs that decision-makers and appraisal practitioners might encounter and discusses what these might involve;

- considers the broad approaches that might be taken towards identifying and making trade-offs and, in particular, the potential role of various appraisal tools; and

6.2 Trade-offs and Sustainable Development

The Environment Act 1995 provides the Agency with an overarching statutory duty to contribute to sustainable development (see section 2.2.1). The concept of sustainable development first appeared in the World Conservation Strategy (IUCN, 1980) which

emphasised the need to invent and apply patterns of development that conserved the living resources essential for human survival and well being (Allen, 1980). However, it wasn't until the publication of *Our Common Future*, the report of the World Commission on Environment and Development (WCED), that the term assumed political orthodoxy. The report defined sustainable development as *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (WCED, 1987, page 43).

Sustainable development is often conceptualised in terms of capital resources. Capital has been defined as *"a stock that yields a flow of valuable goods or services into the future"* (Costanza and Daly, 1992, page 38) and Pearce (1993) identified three different types of capital that taken together comprise the aggregate capital stock of a nation:

- human capital (e.g. education, skills, knowledge);
- man-made capital (e.g. infrastructure and machinery); and
- natural capital (e.g. mineral resources, biodiversity and clean air and water).

Other forms of capital include 'financial capital' and 'social capital'. Although there is some confusion as to what constitutes the social capital, some consensus has emerged in favour of a definition that emphasises the role of networks and civic norms (Office for National Statistics, 2001)[34].

Pearce identified a sustainability spectrum ranging from 'very weak' to 'very strong' sustainability and argued that 'weak' conceptions of sustainability are indifferent to the composition of the aggregate capital bequeathed to future generations (i.e. the relative proportions of human, man-made and natural capital) providing that the total stock passed on is no less than that of the present day. Thus, according to the weak sustainability interpretation, "*there is no special place for the environment. The environment is simply another form of capital"* (Pearce, 1993, page 16). Put simply, environmental assets are potentially open to trade-off.

However, while the concept of weak sustainability is predicated on the assumption that all forms of capital are wholly substitutable (and therefore open to trade-off), ecologists point to the limited capacity for substitution between man-made and natural capital. Indeed, Pearce (1993) reasoned that certain environmental assets might be considered *critical natural capital* since they provide vital services that human endeavour could not plausibly replace. In such a scenario, only those ecological assets recognised as important for their contribution to human welfare would merit protection but this protection would be mandatory and non-negotiable (Dobson, 1996). Assets awarded critical status would therefore be unavailable for trade-off.

[34] Putnam defined social capital as those *"features of social life - networks, norms, and trust - that enable participants to act together more effectively to pursue shared objectives…Social capital, in short, refers to social connections and the attendant norms and trust"* (Putnam, 1995). Similarly, the Organisation for Economic Co-operation and Development (OECD) has taken social capital to encompass *"the networks, norms, values and understandings that facilitate cooperation within or among groups"* (OECD, 2001, page 4). The World Bank, however, has adopted a broader understanding and suggests that, *"Social capital refers to the institutions, relationships and norms that shape the quality and quantity of a society's social interactions"* (World Bank, 2002). Importantly, whereas human capital is associated with individuals and comprises a stock of skills, qualifications and knowledge, social capital is manifested through the connections between individuals and the networks and norms these give rise to and, as such, belongs to the community. Indicators of social capital focus on a wide variety of variables including, for example, levels of trust (which figure highly in the debate on social capital), participation (e.g. membership of clubs and societies and church attendance), electoral turnout, voluntary work, charitable donation, and newspaper readership (Office of National Statistics, 2001; OECD, 2001). The Office for National Statistics is currently undertaking a research project on social capital, the aim of which is to examine and develop an overall framework for the measurement and analysis of social capital (see http://www.statistics.gov.uk/socialcapital/).

Costanza and Daly (1992) argued that preserving critical natural capital is insufficient and insisted that a minimum necessary condition for sustainability is the maintenance of *total natural capital* at or above the current level. They argued that society cannot allow the stock of total natural capital to deplete any further given the uncertainty surrounding the way in which ecological systems function. The pursuit of 'strong' conceptions of sustainable development therefore rests on the protection of critical natural capital at the very least while a broader interpretation would necessitate maintaining the overall stock of natural capital (Pearce, 1993). Under a broader interpretation those ecological assets deemed critical would enjoy guaranteed protection while the loss or trade-off of other environmental assets could be sanctioned providing their loss was adequately compensated for.

However, delineating different forms of capital is fraught with difficulty for a variety of reasons and, as Owens and Cowell (2002) argued, we have travelled a long way from any notion that this could be a straightforward technical process or that it might provide clear 'rules' for decision-making. However, the ideas outlined above could find expression in certain policies to, for example, guarantee the protection of valuable sites (critical natural capital) and ensure 'no net loss' of other assets (maintenance of overall natural capital).

In addition to being thought of in terms of capital resources, sustainable development is commonly considered to embrace three different dimensions – the economic, the social and the environmental. In this context, sustainable development is typically illustrated in diagrammatic form and conceived to be the point at which three circles representing each of the dimensions intersect (see Figure 6.1). Alternatively, the three circles can be arranged concentrically with the largest and outermost circle representing the environmental dimension and the successively smaller circles within this representing the social and economic dimensions, respectively (see Figure 6.2). In the latter 'Russian doll' model (James and Donaldson, 2001), a healthy environment is seen as the bottom line upon which society and the economy ultimately depend and this has obvious parallels with the notion of critical natural capital discussed above. The former model might be termed the win-win-win model since it views sustainability as the point at which the three dimensions coincide.

The idea of win-win-win is implicit in the Government's current definition of sustainable development which defines this to be the *simultaneous* achievement of four objectives (see section 2.2.2). However, as the Royal Commission on Environmental Pollution (RCEP, 2002) noted, there are substantial practical difficulties in achieving economic, social and environmental goals simultaneously and, for this reason, priorities will need to be established and trade-offs ultimately made. The RCEP also argued that environmental considerations have been far too readily subordinated to economic and social interests in many interpretations of sustainable development and there needs to be a recognition that the environment can impose constraints on human actions and that sometimes this will lead to hard choices (RCEP, 2002).

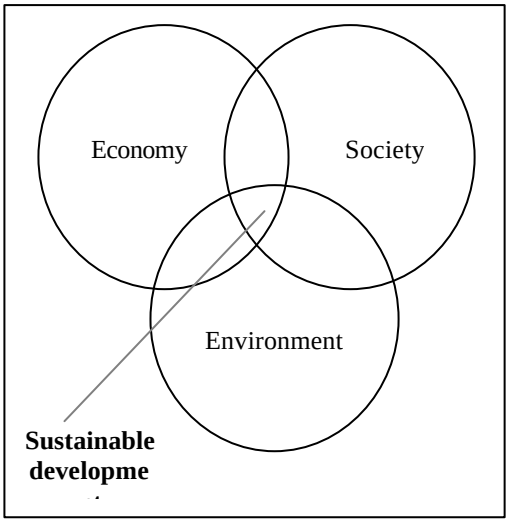

Figure 6.1: 'Win-win-win' model

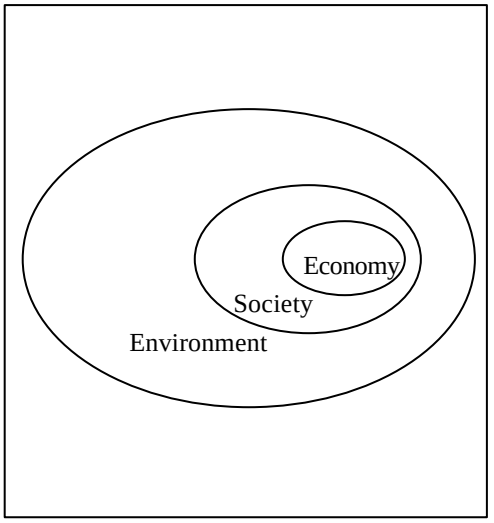

Figure 6.2: 'Russian doll' model

Sustainable development has also been conceived of in other ways. For example, research for the Agency conceptualised sustainability as a *process of negotiation* that seeks to identify the correct trajectory society should adopt (Environment Agency, 1999a). The implication here is that no pre-determined conception of sustainable development exists and therefore precisely what constitutes 'sustainable' in any given situation will *emerge* over time and be heavily context-dependent. Although there may be little concrete consensus on what sustainability entails, there are nonetheless various 'rules' or guiding principles which provide some clue and might exert an influence over any negotiations. These arise from various sources including legislation, regulation, Government and sectoral objectives and contemporary ideas as to what sustainable development involves. However, despite some guiding principles as to what the concept involves, what emerges as 'sustainable' in any given situation will depend on the trade-offs made and these will depend on the configuration of actors, the level of resources, the availability of information and innumerable other variables.

In addition, the Government provides the Agency with statutory guidance on its objectives and the contribution the Agency should make to sustainable development[35] and therefore where its priorities should lie. In this context, the DEFRA and the National Assembly for Wales have recently published statutory guidance on the Agency's objectives and contribution vis-à-vis sustainable development for consultation (DEFRA, 2002a and National Assembly for Wales, 2002). In discharging its functions and in developing its corporate strategy a statutory objectives for the Agency is to:

> *"Protect or enhance the environment, taken as a whole, in a way which takes account (so far as is consistent with the Agency's legal obligations) of economic and social considerations, so as to make the contribution towards achieving sustainable development which the Secretary of State considers appropriate…"*
>
> (DEFRA, 2002a, page 10)

[35] Section 4 of the Environment Act 1995 requires the Secretary of State for Environment, Food and Rural Affairs to periodically provide the Agency with guidance on the objectives the Agency should pursue in discharging its functions and the contribution the Agency should make towards achieving sustainable development.

According to the guidance, the Agency's principal contribution to sustainable development will be to deliver this and other proposed statutory objectives (relating to, for example, flood defence, water quality and water resources, waste management and fisheries). Since the Agency's objectives and functions relate primarily to environmental issues it may be that on a day-to-day basis at least the Agency will promote an inherently 'strong' conception of sustainable development that favours the protection rather than trade-off of environmental assets. This is a useful juncture to emphasise that in support of its objectives the Agency advises on the preparation of land use plans and may comment on planning applications. According to the guidance, the Agency's primary role here is to advise on those aspects that relate to its operational functions. As such, the Agency may promote environmental concerns and seek to protect environmental assets from trade-off in areas of decision-making other than its own.

6.3 Types of Trade-offs

6.3.1 Trade-offs at different points in the decision making and appraisal process

In the context of decision-making and integrated appraisal the issue of trade-offs is largely associated with choices made *between* economic, social and environmental objectives. For example:

- in the context of flood risk management, the Agency might face a hypothetical choice between constructing flood defences for a historic town which provide for a high-level of protection but are considered visually intrusive or constructing defences which provide for a lower-level of protection but preserve the visual character of the town (i.e. a trade-off between environmental and social objectives); and

- in the context of land use planning, a local authority might face a choice in preparing its development plan between increasing the allocation of land for employment purposes at the expense of greenfield sites or preserving existing greenfield sites but not providing sufficient land for potential employment (i.e. a trade-off between economic and environmental objectives).

It is important to emphasise that trade-offs may also be made *within* the economic, social and environmental spheres. For example:

- again in the context of flood risk management, the Agency might face a choice between spending limited financial resources on providing a relatively small number of homes with flood defences which provide for a high-level of flood protection versus providing a larger number of homes with defences which provide for a lower-level of protection (i.e. a trade-off within the social sphere); and

- again in the context of land use planning, a local authority might face a choice between granting planning permission for a wind farm on a valued upland landscape versus refusing permission in order to preserve the integrity of the landscape but

failing in its aim of promoting renewable energy (i.e. a trade-off within the environmental sphere).

While the remainder of the chapter focuses on the trade-offs between and within economic, social and environmental objectives, it is important to recognise that in making any decision or undertaking any appraisal a number of choices will be encountered that require 'procedural' and 'methodological' trade-offs to be made and these can have a strong bearing on the final outcomes. Eckley, for example, cautioned that *"Conducting any assessment involves a choice of what to include in, and what to exclude from, analysis; such choices generally involve trade-offs on the assessment's credibility, salience, and legitimacy to particular users"* (EEA, 2001, page 18). Procedural and methodological trade-offs can occur at various points in the decision-making and appraisal process (see Figure 6.3) and examples are listed below:

- the collection of information may help to reduce or dispel uncertainty and decision-makers and appraisal practitioners will need to decide upon the level of presumably limited resources that should be invested in information collection as opposed to other aspects of the decision-making or appraisal process - hence the trade-off;

- in developing the decision-making or appraisal objectives and indicators, those responsible will need to ensure that the objectives and indicators encompass an appropriate range of the issues while at the same time ensuring that the number is kept manageable (i.e. there is a trade-off between being comprehensive and being pragmatic);

- decision makers will have to shortlist a series of options for detailed consideration and there may be a trade-off to be made between appraising a wide range of options at a relatively superficial level or alternatively considering a limited number of options in relative depth (i.e. there is a trade-off between breadth of coverage and depth of impact investigation);

- the time horizon and geographical area over which impacts are assessed may be critical in determining the significance and acceptability of a proposal and appraisal practitioners must decide on the level of resources that should be invested in, for example, forecasting short-term versus long-term impacts and impacts in the immediate vicinity versus impacts over a wider area; and

- stakeholder involvement in appraisal can serve to increase the level of transparency, legitimacy and support the process enjoys but may be relatively expensive and time-consuming and appraisal practitioners must decide on the level of resources that should be channelled into stakeholder involvement as opposed to other aspects of the process.

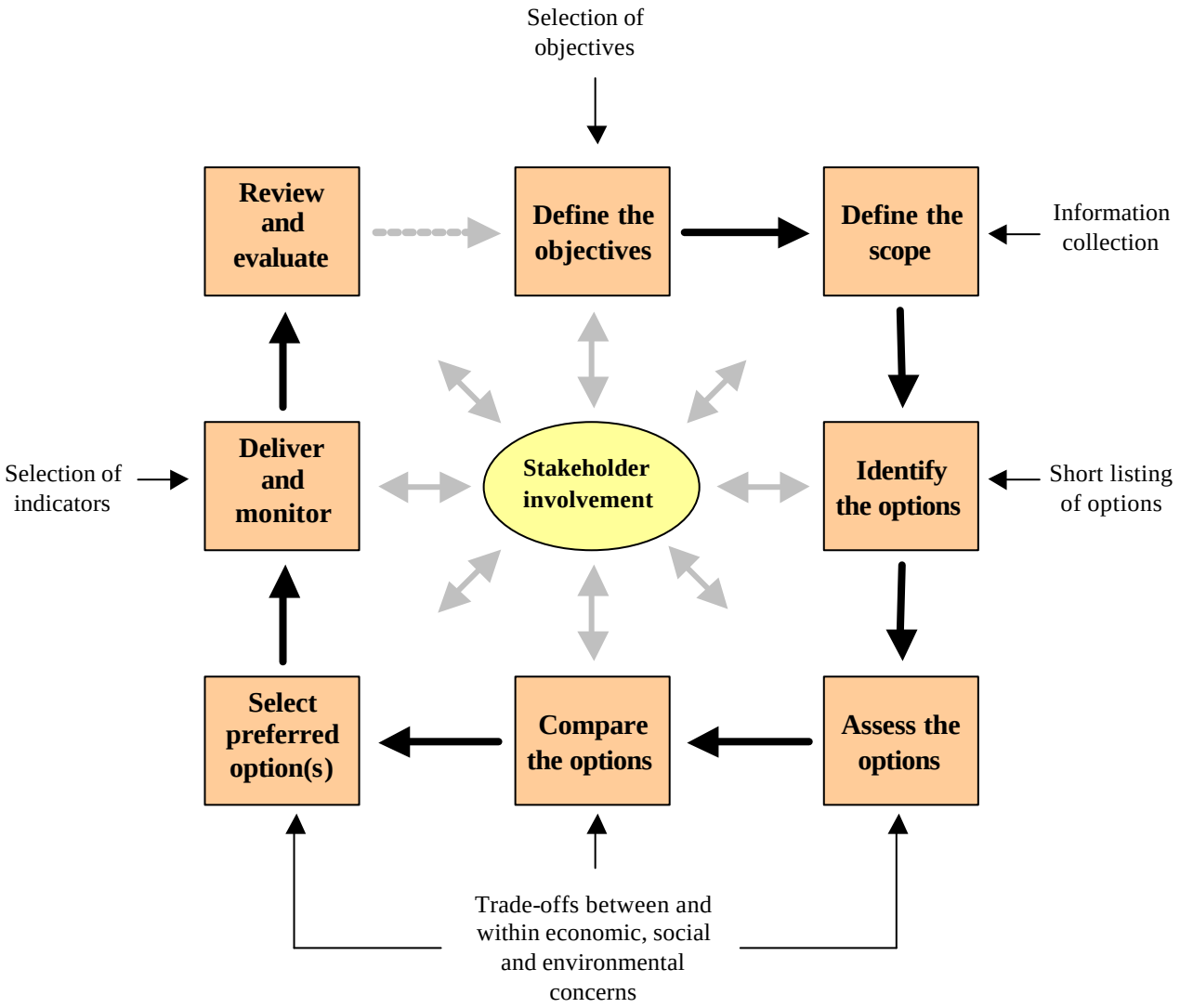

Figure 6.3: The decision making and appraisal process and examples of trade-offs

6.3.2 General approaches to trade-offs

Deciding the trade-offs to be made as part of any decision essentially involves debating the level of priority or degree of weight that should be attached to competing objectives in reaching a decision as to which of the options under consideration should be promoted. In this way, while the opportunity to advance one objective is pursued the opportunity to promote another is foregone (the latter equates to the opportunity cost).

On the ground, decisions on the level of priority attached to competing objectives often translate into the substitution of one form of capital for another. In recent years, the Agency has undertaken collaborative work on the QoLC approach, a tool designed to maximise the environmental, economic and social benefits resulting from any land-use planning or management decision (see Box 4.5). The issue of substitution between various assets that yield 'benefits' is an inherent part of the QoLC approach and a set of eight guiding principles and questions on substitution have been developed (see Box 6.1). According to the QoLC approach, any substitutions made should be for *benefits*

not *things*, i.e. the importance lies not with assets themselves (e.g. clean rivers) but with the benefits or services they provide (e.g. drinking water, amenity and wildlife habitat). The QoLC approach argues the importance of maintaining the benefits that people derive from the economy, society and the environment and ensuring that any losses or detriment in benefit are adequately offset. However, the QoLC approach acknowledges that certain assets from which benefits are derived cannot be substituted and are effectively irreplaceable. Examples include buildings of historical and cultural significance and long established habitats such as ancient woodland. Although assets such as these should therefore be considered beyond trade-off, the QoLC approach emphasises that they may be managed so as to increase the benefits that flow from them. For example, linking sites of amenity value to the public transport network can help to ensure that people from all parts of the community have the opportunity to enjoy the benefits these sites provide.

Box 6.1: Guiding principles on substitution[36]

- Substitution for *benefits* not *things*
- Is this benefit really substitutable at all?
- What range of substitutions (type/location) are valid in principle?
- Within this range, which are potentially practicable?
- How can the adequacy of a substitution be assessed – and by whom?
- How *much* substitution is theoretically desirable – and how much practically achievable?
- What's the mechanism for making sure the substitution is actually done?
- Is like-for-like substitution necessary or desirable?

The QoLC approach emphasises the importance of ensuring that any proposals to offset a lost or impaired benefit are undertaken. This raises the issue of ensuring that mitigation measures identified in decision-making and appraisal processes to ameliorate adverse impacts are actually implemented and this, in turn, highlights the importance of post-decision monitoring.

According to research for the Countryside Agency (2000b) there are several ways of making choices or trade-offs. These include:

- presenting the analysis to decision-makers for them to use their judgement;
- asking stakeholders and letting them take a decision; and
- deciding in advance which interests will command priority in the decision-making process.

Of course, these approaches are not mutually exclusive and decisions over trade-offs may be informed by information from a variety of sources. However, broadly speaking, trade-offs may be decided on the basis of *technocratic* or *participatory* approaches. While the former relies on technical means to determine the appropriate weightings to assign to the various objectives (and therefore the trade-offs that should ultimately be made), the latter involves canvassing stakeholder opinion on the level of priority that

[36] See http://www.qualityoflifecapital.org.uk

should be attached to the various objectives at stake. The reasons for adopting either a technocratic or participatory approach may be many and varied. For example, legislation, regulation, a traditional way of doing things, the availability of resources and the level in the decision-making hierarchy at which the decision is being made may all have a bearing on the approach taken. However, decision-makers should ask themselves to what extent is it appropriate for the choices open to them to be made on the basis of technical evidence or stakeholder values or what an appropriate mixture of the two might be.

The appraisal tool(s) used to inform the decision-making process can be used to reflect the overall approach adopted, with some tools taking a largely technocratic approach and others a more participatory approach. However, having said that, each of the five tools or families of tools considered for the purposes of this research can employ various techniques for their purposes and these can provide for either a technocratic or participatory element (see Chapter 4). The six tools or families of tools and their approach to trade-offs are discussed in section 6.4.

6.4 Trade-offs and Appraisal Tools

6.4.1 Introduction

Integrated appraisal can provide decision-makers with a means to identify and model potential trade-offs (and also search for win-win-win solutions and other synergies). Integrated appraisal can employ one or more appraisal tools and these aim to order impact information and consider the gains and losses arising from an initiative (see Chapter 4). However, appraisal tools differ in the degree to which they engage in explicit trade-off analysis and this issue is discussed below.

6.4.2 Appraisal tools and their approach to trade-offs

Although all six appraisal tools or families of tools share a common aim to consider the gain and losses arising from a proposal, they differ, at least conventionally, in the extent to which they 'process' impact information (i.e. engage in trade-off analysis) for the benefit of decision-makers. While some tools are content to merely provide decision-makers with a 'database' of impact information to inform deliberations, others seek to explicitly evaluate potential trade-offs and direct decision-makers towards a preferred option(s). As a general rule, the greater the degree of *processing* a tool undertakes, the closer it comes to choosing between the options and determining the trade-offs that might be made. Processing in this context essentially involves scoring the potential impacts, weighting the competing objectives and combining the scores and weights to generate a ranking of options and therefore an indication of the trade-offs that might ultimately be made. The degree to which each of the six tools or families of appraisal tools identified for the purposes of this research (see section 4.1) process impact information and engage in trade-off analysis is summarised in Table 6.1 and illustrated in Figure 6.4.

6.4.3 Trade-offs and stakeholder involvement

In the context of land use planning, research for the Countryside Agency (2000a) emphasised the importance of stakeholder involvement in decision-making, but highlighted that conventional consultation techniques often yield incompatible 'wish lists' (reflecting the fact that most people harbour conflicting aspirations). As a result, the research proposed that the emphasis should instead be on more sophisticated *deliberative* means of consultation whereby stakeholders are confronted with the costs and benefits of an action and asked to judge accordingly. The research considered especially important given the dearth of win-win-win solutions for the 'crunch' issues in land use planning (such as increased housing provision) and the consequent need for trade-offs between competing objectives.

In recent years, processes specifically designed to encourage dialogue between experts and lay people have emerged and these have been termed *analytic-deliberative* approaches (Stern and Fineberg, 1996). The Agency experimented with an analytic-deliberative approach to appraisal as part of the development of the New Forest LEAP. The Consultation Report on the New Forest LEAP identified thirty-three issues relevant to the Agency and a stakeholder group comprising representatives from the public, private and voluntary sectors was recruited and tasked with reviewing these issues and reaching consensus on their relative priority using MCA. This involved a systematic evaluation and weighting of the issues against a set of ten criteria which encompassed economic, social and environmental costs, benefits and risks (Environment Agency, 1998b). Approaches such as this provide a means to confront stakeholders with the choices at stake and a structured framework in which they can deliberate over the potential trade-offs.

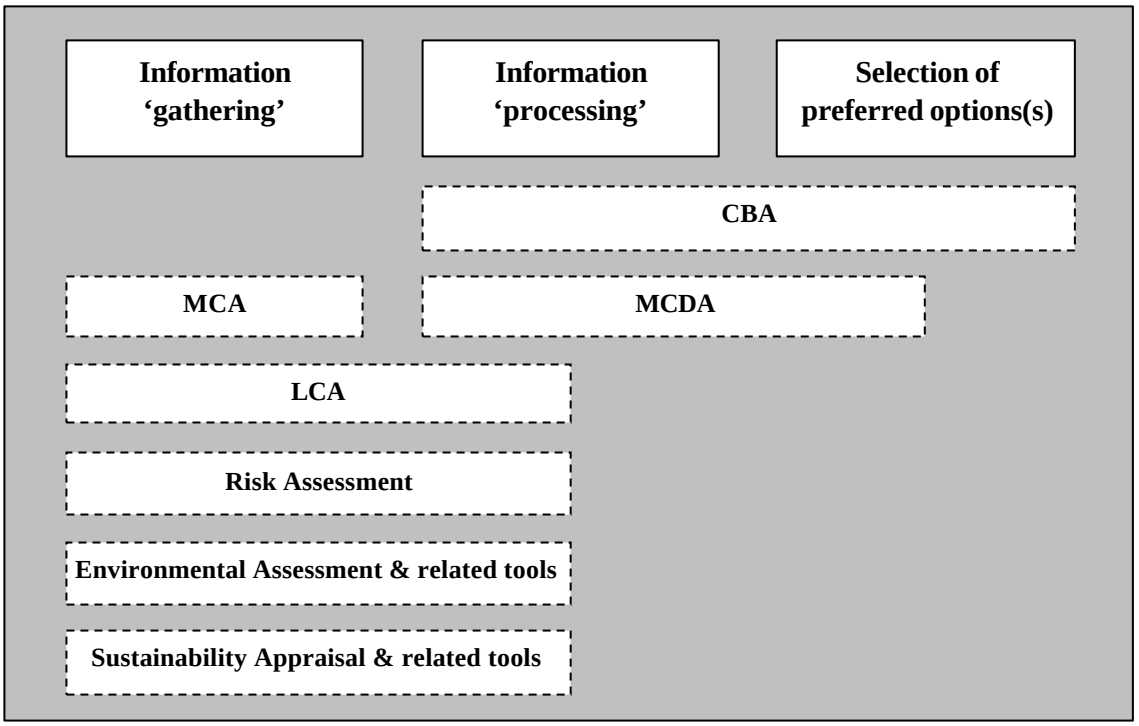

Figure 6.4: Indication of the degree to which tools process impact information and engage in trade-off analysis

Table 6.1: Trade-offs and appraisal tools

Tool	Approach to trade-offs
Cost-Benefit Analysis (CBA)	Of the six tools or families of tools, CBA engages in the greatest level of trade-off analysis. Unlike some appraisal tools (e.g. LCA and Environmental Assessment and related tools) which are largely concerned with information gathering, CBA is solely concerned with processing information retrieved from other sources. In processing this information, CBA adopts a particular rationale for scoring gains (benefits) and losses (costs) based on individuals' preferences expressed in monetary terms. Among a set of competing options, CBA identifies the option with the highest positive net present value and thus provides decision-makers with a clear indication of the trade-offs that should be made in order to secure the greatest overall benefit.
Multi-Criteria Analysis (MCA)	In a simple form of MCA, a performance matrix may be the final product of the appraisal and the task of processing the information it presents will rest with decision-makers. However, Multi Criteria *Decision* Analysis (MCDA) involves scoring the performance of each option under consideration in relation to each objective/criterion and then combining the scores by means of a system of weights to yield an overall ranking for each option. Weighting involves assigning weights to each objective/criterion to reflect their relative importance in the decision-making process. MCDA acts to process impact information and identifies a preferred option(s) and therefore the trade-offs that might be made should this option be selected.
Life Cycle Assessment (LCA)	LCA is designed to provide information on environmental impacts throughout the life cycles of products, services or activities. The general framework for LCA outlined in BS EN ISO 14040 consists of four phases, the last of which is called *interpretation* and this involves drawing conclusions and making recommendations based on the previous inventory analysis and impact assessment phases (see Chapter 4). In reaching conclusions and recommendations, those responsible will evaluate the significance of the impacts identified and the potential trade-offs and advise decision-makers accordingly. LCA does not, at least conventionally, involve scoring and weighting in the way that CBA and MCDA do and does not engage in structured trade-off analysis.
Risk Assessment	Risk Assessment essentially involves identifying a hazard, the potential consequences associated with that hazard and the magnitude of these consequences and their probability. Following this, the significance of the identified risk is evaluated (possibly in relation to an existing standard or the risk arising from other options). Risk Assessment therefore provides information on risk, but goes further and seeks to evaluate the significance of that risk for the benefit of decision-makers. However, Risk Assessment does not, at least conventionally, involve scoring and weighting in the way that CBA and MCDA do and does not engage in structured trade-off analysis.
Environmental Assessment and related tools	Environmental Assessment and related tools frequently employ approaches strongly reminiscent of MCA since they often involve appraising option performance in relation to a set of objectives/criteria and may also present the findings in matrix form. Moreover, they generally occupy a position somewhere on the continuum between MCA and MCDA since they often employ simple scoring techniques (and thus provide some indication of impact significance) but rarely assign explicit weights to individual objectives/criteria. Environmental Assessment and related tools do not therefore, at least conventionally, involve scoring and weighting in the way that CBA and MCDA do and do not engage in structured trade-off analysis.
Sustainability Appraisal and related tools	Sustainability Appraisal and related tools frequently employ approaches strongly reminiscent of MCA since they often involve appraising option performance in relation to a set of objectives/criteria and may also present the findings in matrix form. Moreover, they generally occupy a position somewhere on the continuum between MCA and MCDA since they often employ simple scoring techniques (and thus provide some indication of impact significance) but rarely assign explicit weights to individual objectives/criteria. Sustainability Appraisal and related tools do not therefore, at least conventionally, involve scoring and weighting in the way that CBA and MCDA do and do not engage in structured trade-off analysis. Sustainability Appraisal and related tools address economic, social and environmental impacts with the aim of identifying potential synergies and win-win-win solutions and potential trade-offs between competing objectives.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The application of integrated appraisal in public sector decision-making is a fast emerging area of interest and one that is subject to an increasing level of discussion. In light of the investigation into integrated appraisal presented in this report, several conclusions have been reached (see section 7.2) and a series of recommendations made to the Agency on the basis of these (see section 7.3). Note that some of these conclusions and recommendations relate to appraisal generally, while others relate to integrated appraisal more specifically.

7.2 Conclusions

7.2.1 Developing and applying an integrated approach to appraisal

Definition of integrated appraisal

For the purposes of this research project, 'integrated appraisal' was defined as an assessment of the performance of options or proposals in terms of their economic, social and environmental implications. Integrated appraisal is best viewed as a generic approach to appraisal and not necessarily a single or discrete appraisal tool. An integrated appraisal will need to be tailored to the particular situation in hand, while following a generic framework and set of principles.

Drivers for integrated appraisal

There are several key drivers for taking an integrated approach to appraisal within the Agency including:

- the Agency's statutory duties to contribute to sustainable development and consider costs and benefits in exercising its powers;
- the explicit emphasis in the recently revised Section 4 guidance on taking economic and social considerations into account in delivering Agency objectives;
- the growing emphasis on the social welfare dimensions of sustainable development and the need to take these into account alongside economic and environmental concerns;
- the increasing application of integrated appraisal within central Government and elsewhere (e.g. in the European Commission); and
- the perceived inadequacy of existing specialised or 'partial' appraisal tools.

Experience of applying integrated appraisal

The research revealed an increasing application of integrated appraisal within the Agency although the actual number of integrated appraisals undertaken remains relatively small. Both case studies, for example, focused on the application of integrated appraisal. In the case of the Agency's landfill gas flaring policy, a largely qualitative appraisal of the likely costs and benefits had been undertaken in terms of impacts on the environment, society, landfill site operators and the Agency itself. In the case of the East Hampshire CAMS, a Sustainability Appraisal considering economic, social and environmental concerns was undertaken and such an appraisal has been or will be applied to all emerging CAMS.

The Agency has also prepared guidance on *Integrated Appraisal of Environment Agency Policies* (Environment Agency, 2000a), although it has not yet been applied as a matter of course to the development of Agency policies, and explored the application of integrated appraisal to the River Basin Management Plans that must be prepared for the purposes of the Water Framework Directive (Environment Agency, 2001e). In addition, DEFRA, in collaboration with the Agency, has recently commissioned research on the potential use of MCA in the appraisal of flood and coastal defence proposals.

However, the case studies along with these other examples emphasise the inconsistencies between current integrated appraisal practice in the Agency not least in terms of level of detail (contrasting simple checklists to more sophisticated combinations of tools). Generally these approaches have been developed in isolation, in the absence of a consistent Agency-wide framework.

Integrated appraisal is also being increasingly applied beyond the Agency. In October 2000 the former DETR published a *Good Practice Guide on Sustainability Appraisal of Regional Planning Guidance* (DETR, 2000c), which provides a qualitative methodology for simultaneously assessing the economic, social and environmental impacts of emerging RPG. Similarly, Planning Policy Guidance (PPG) 12 *Development Plans* (DETR, 1999d) encourages local authorities to undertake a Sustainability Appraisal of Structure Plans, Unitary Development Plans and Local Plans. Sustainability Appraisal has also been applied to Regional Development Agency (RDA) economic strategies and is being increasingly applied to other public sector plans, programmes and initiatives.

At the national level, the former DTLR has developed guidance on integrated policy appraisal (DTLR, 2002) and at the European level, the European Commission has developed 'Impact Assessment' for application to all major initiatives (Commission of the European Communities, 2002).

Advantages and challenges of integrated appraisal

There are a number of potential advantages and challenges associated with fostering an integrated approach to appraisal within the Agency (see Table 7.1). Crucially, failure to establish a system of integrated appraisal could put the Agency at odds with central Government departments and other organisations such as the National Assembly for

Wales and the European Commission who are quickly developing and formalising approaches to integrated appraisal.

Table 7.1: Advantages and challenges of an integrated approach to appraisal within the Agency

Advantages	Challenges
• Provides a means to help the Agency deliver its statutory objectives in a way which takes account of economic and social considerations (in line with recent Government guidance to the Agency on its statutory objectives and the contribution it should make to sustainable development) • Demonstrates the Agency's commitment to looking beyond its immediate objectives and pursuing truly sustainable development (and thus 'leading by example') • Provides decision-makers and stakeholders with information on the full range of likely impacts associated with options or proposals rather than subsets of these impacts as provided by specialised appraisal (Lee, 2002) • Provides a greater opportunity than specialised appraisal to identify win-win-win solutions as well as indirect impacts and instances where trade-offs between competing objectives may be necessary • Could facilitate wider stakeholder involvement in Agency decision-making than specialised appraisal since stakeholders with a variety of backgrounds and perspectives spanning the sustainability agenda may wish to become involved • Provides an opportunity to streamline appraisal processes within the Agency and lessen problems of duplication and double-counting associated with specialised appraisal • An integrated approach should encourage and facilitate co-operation and learning between functions and disciplines within the Agency and also increase the knowledge base and promulgate sustainable development principles within the organisation • Reflects the current trend in central Government departments and elsewhere (e.g. at the European Commission) towards integrated appraisal	• Given inevitable resource limitations (e.g. financial constraints or shortage of time), the transition from specialised to integrated appraisal may be accompanied by a danger that certain impacts (for example, on the environment) may not be subject to the same degree of exploration they might have been under a regime of more specialised appraisal. In other words, there is a risk that depth of impact investigation may be sacrificed for breadth of coverage • Concern has been expressed that integrated appraisals are at risk of being 'captured' by a dominant set of interests (i.e. that one set of interests will come to dominate the assessment process) leading to the neglect of particular types of impacts (Lee, 2002) • Specialised forms of appraisal may serve to raise the profile of the issues on which they focus and help to ensure that these are accorded an appropriate degree of weight in the decision-making process and this advocacy role may be lost or diminished under a regime of integrated appraisal • Integrated appraisal does not enjoy strong regulatory support whereas appraisal tools that provide for 'partial' assessments including Environmental Impact Assessment have a strong regulatory base • Agency personnel may perceive integrated appraisal as an unnecessary burden or challenge to the status quo unless the potential benefits are explained and demonstrated • Cross-disciplinary working may be necessary for effective integrated appraisal and any tensions within the Agency between different functions or disciplines would have to be addressed • Training for Agency personnel in integrated appraisal may be necessary particularly in relation to assessing the social dimensions of change

A two-stage approach to integrated appraisal

An emerging trend in appraisal is the development of 'checklist' style integrated appraisal tools. These essentially comprise a list of questions organised around a series of impact categories that address economic, social and environmental concerns. The questions are designed to prompt consideration of the potential impacts associated with the option or proposal under scrutiny. To date, tools such as these have been developed by, amongst others, the National Assembly for Wales ('Integration Tool') and the North West Regional Assembly ('Integrated Appraisal Toolkit') (see Chapter 4). In addition, the *Integrated Appraisal of Environment Agency Policies* (Environment Agency, 2000a) is a checklist style approach. However, useful as these may be for 'vetting' or 'screening' potential impacts, they generally stop short of providing advice on how more detailed appraisal might be undertaken should this be considered necessary.

In contrast to those tools limited to 'screening' potential impacts, some emerging integrated appraisal tools advocate more detailed impact investigation. Examples include the *Guidance Checklist for Policy Makers* developed by the Cabinet Office; the 'Integrated Policy Appraisal' framework developed by several central Government departments; and the European Commission's 'Impact Assessment' tool.

The Cabinet Office developed a *Guidance Checklist for Policy Makers* (Cabinet Office, 2002) as a means to deliver the Government's commitment to integrated appraisal contained in the 1999 White Paper on *Modernising Government*[6]. This internet-based guidance helps policy-makers to 'screen' the potential impacts of their proposals and directs them towards up-to-date detailed guidance on appraising particular impacts. Links to detailed guidance on several appraisal tools are provided including: Regulatory Impact Assessment (RIA); Risk Assessment; Gender Impact Assessment; HIA; and Consumer Impact Assessment. In essence, the guidance checklist suggests a two-stage approach: initial screening followed by more detailed appraisal using a range of appraisal tools.

The 'Integrated Policy Appraisal' framework (IPA) was developed by several central Government departments including the Department for Environment, Food and Rural Affairs (DEFRA) (the Agency's sponsoring department) as a means of building on the checklist developed by the Cabinet Office. The IPA also proposes an essentially two-stage approach to integrated appraisal: an initial screening of the policy through a brainstorming exercise at the initiation stage to identify the significant impacts and a further assessment of these impacts at the detailed policy design stage using existing assessment tools (DEFRA, 2002a). According to DEFRA, the appraisal tools used will depend on the nature of the significant impacts identified at the screening stage. Further details of the IPA can be found in Chapter 4.

The European Commission has recently developed a tool referred to as 'Impact Assessment' for application (gradually from 2003 onwards) to all major initiatives. According to the Commission, the "*new impact assessment method integrates all sectoral assessments concerning direct and indirect impacts of a proposed measure into one global instrument, hence moving away from the existing situation of a number of partial and sectoral assessments*" (Commission of the European Communities, 2002, page 2). Crucially, the Commission's communication on 'Impact Assessment' lists several appraisal tools that can be employed for the purposes of assessment including

Cost-Benefit Analysis (CBA), Cost-Effectiveness Analysis (CEA), Multi-Criteria Analysis (MCA) and Risk Assessment (Commission of the European Communities, 2002).

The Countryside Agency has also taken a two-stage approach for the purposes of 'Rural Proofing'. In the Rural White Paper, the Government made a commitment to 'rural proof' its policies and the Countryside Agency has drawn up a Rural Proofing checklist designed to help policy makers consider whether their policy is likely to have a different impact in rural areas. The checklist is described as a 'screening tool' but *"If the checklist indicates a need for impact assessment… policy makers should use their established methods or seek the advice of the Countryside Agency"* (Countryside Agency, undated).
Guidance prepared by the Scottish Environment Protection Agency (SEPA, 2000) on the preparation of Area Waste Plans provides an example of an integrated appraisal process that draws on a range of appraisal tools (and techniques). The guidance states that the options can be appraised *"using a variety of different appraisal methods which provide quantitative and/or qualitative information about the positive and negative effects if each option"* (SEPA, 2000, page 20).

The key message to emerge from these developments is that a two-stage approach to integrated appraisal is increasingly advocated:

- an initial stage at which the potential impacts of the option or proposal under consideration are 'vetted' or 'screened' against a wide range of criteria on the basis of professional opinion;

- followed by a second stage of more detailed appraisal, where appropriate, using suitable appraisal tools.

The implication of this approach is that integrated appraisal is broad in scope at the outset but becomes subsequently focused on those impacts considered significant enough to warrant further investigation utilising specific tools where appropriate.

The potential advantages of a two-stage approach, include:

- the initial screening provides an opportunity to identify the impacts, potential synergies (including win-win-win solutions) and trade-offs that might require further investigation;

- provides a structured means to reconcile the trend towards 'checklist' style integrated appraisal with the in-depth appraisal necessary to facilitate Agency decision-making and fulfil regulatory obligations;

- ensures that a standard set of issues are considered as part of appraisal within the Agency thus providing for some degree of consistency; and

- provides Agency personnel with the freedom to employ appropriate appraisal tools (regulations permitting) to reflect the circumstances in question; and

- continues to recognise the importance of partial appraisal tools (e.g. EIA, SEA and SIA);

Potential challenges of a two-stage approach, include:

- there is a danger that the initial screening stage could be regarded as sufficient and lead to the proliferation of relatively superficial appraisals;

- since the initial screening stage would be undertaken largely on the basis of professional people, a range of Agency personnel representing different functions and disciplines (and possibly external stakeholders) might be needed to identify the full range of potential impacts and their relative significance;

- the initial screening stage could be seen as an additional administrative burden unless the benefits are clearly explained and demonstrated;
- it might be necessary to develop criteria for establishing impact significance in order that potentially important impacts are the subject of detailed appraisal following the initial screening; and

- in order to produce a screening checklist, an appropriate interpretation of sustainable development will have to be articulated and this might necessitate workshops and debate in order to get the checklist right from the outset.

Consideration of other forms of 'integration'

Although integrated appraisal involves the consideration of economic, social and environmental concerns within a single appraisal process, there are several other forms of 'integration' in the context of appraisal that the Agency should also consider:

- *vertical integration* – both case studies demonstrated the importance of establishing a clear system of tiering (i.e. continuity and coherence) between different levels of the Agency decision-making hierarchy in order to facilitate effective appraisal. An appropriate system of tiering will help to ensure that appraisals address the right issues to the right level of detail;

- *integration with the decision-making process* - for integrated appraisal to be effective it should be initiated at the outset of the decision-making process before a preferred option(s) has been settled upon; in this way, appraisal should have the opportunity to act as a design tool and influence the emerging options or proposal while they remain relatively fluid. An appraisal conducted towards the end will almost inevitably focus on 'fine tuning' the proposal and may at best yield marginal changes to the preferred option. However, as Birley (2002) observed, *retrospective* (as opposed to *prospective*) assessment may provide a valuable contribution to the knowledge base. Appraisal can only influence the decision-making process if appropriate lines of communication are established between the two processes and the appraisal findings are taken into account in the decision-making process. According to Brookes *et al* (2001), the acid test in evaluating the success or otherwise of integrated appraisal is whether or not its application actually influenced the decision and, more importantly if it led to a successful (i.e. sustainable) outcome.

- *stakeholder integration* – the importance of stakeholder input to the appraisal process, which can help to:

  – design an appropriate appraisal system;
  – ensure that the full range of potential impacts are identified and their significance gauged;
  – increase ownership of the appraisal process; and
  – facilitate learning between stakeholders.

7.2.2 Appraisal and decision-making

Importance of integrated decision-making

It is important to emphasise 'appraisal for integrated decision-making' rather than 'integrated appraisal' per se. Although integrated appraisal should be a priority, it is important that the emphasis within the Agency is on translating this into integrated decision-making (i.e. decision-making which takes appropriate account of economic, social and environmental concerns in the pursuit of sustainable development). In other words, integrated appraisal is a means to an end – integrated decision-making – and not an end in itself.

Owens and Cowell (2002) questioned the utility of appraisal tools and argued that too much has been expected of administrative or technical approaches to integration such as Sustainability Appraisal when the real issues are those of power and advantage. Indeed, they argue that attention should be shifted away from the incremental 'sharpening' of tools to address pertinent (and political) questions of agency and power, that is, to examine where power lies in decision-making and its impact on the final decision outcomes. In other words, more has been generally expected of tools than they are able to deliver and, although methodological and procedural refinements may in some cases be beneficial, faith in their ability to make a significant difference to outcomes may be deeply misplaced (Owens and Cowell, 2002).

Generic framework for decision-making and integrated appraisal

A series of common steps in what might be described as an idealised decision-making and appraisal process has been identified as part of the research (see Figure 3.1). These appear to be generally applicable, while it is anticipated that the approach will need to be tailored to each case and the level of detail and tools employed in support of each step in the framework may vary significantly depending on the nature of the decision-making process.

Challenges and opportunities of appraisal at the strategic level

Undertaking appraisal at the strategic level presents a number of potential challenges:

- first and foremost, as the decision-making hierarchy is ascended, the level of uncertainty will inevitably increase as it becomes progressively more difficult to anticipate how decision-making ambitions will percolate down the hierarchy and manifest themselves on the ground. For this reason, strategic level appraisal may

employ various means to manage uncertainty (e.g. the use of sensitivity analysis and explicit assumptions to facilitate impact forecasting);

- in contrast to decisions made at the project level, strategic decisions may be incremental with relatively few 'decision windows' – discrete moments in the decision-making process when decisions are made and appraisal may be applied and its findings effectively assimilated;

- strategic decisions may be made over relatively long periods of time and it may be unrealistic to undertake an uninterrupted appraisal process in parallel. Hence the need to consider appraisal and decision-making as an integrated process, rather than two separate ones;

- as decision-making becomes progressively more strategic and long-term there is the potential that the number of variables and interested parties will increase (along with the level of uncertainty) and, as such, it will become more difficult to reach consensus on the way in which impacts should be scored and objectives weighted. Decision-making at higher levels may therefore tend to rely on relatively simple appraisal tools, such as Sustainability Appraisal, which, conventionally at least, attempts to map potential impacts and gauge their significance and but avoids the controversy associated with detailed scoring and weighting.

However, undertaking strategic level appraisal also presents opportunities. As the decision-making hierarchy is ascended, the number of options potentially open to decision-makers will almost certainly increase and appraisal may have the opportunity to assess a wide variety of alternatives. Moreover, as the hierarchy is ascended, the options will become increasingly diverse and may include options for reducing (as opposed to simply managing) demand for certain resources and services.

7.2.3 Tools for an integrated appraisal process

Characteristics of appraisal tools

Following an initial vetting or screening of potential impacts, a number of appraisal tools might be employed to further identify and/or evaluate impacts. Although each of the six appraisal tools or families of tools identified for the purposes of this research (i.e. CBA, MCA, LCA, Risk Assessment, Environmental Assessment and related tools and Sustainability Appraisal and related tools) share a common goal, that is to consider the gains and losses arising from a proposal, they differ in a number of respects:

- their focus (see below);

- the rationales they adopt for expressing gains and losses and the degree to which they permit their aggregation; and

- at least as conventionally, the extent to which they involve stakeholders.

The six appraisal tools or families of tools should provide the Agency with the range of tools to cover most of its appraisal needs, while not being exhaustive. This provides the

Agency with a clear set of tools in which to develop expertise and experience for stages of appraisal beyond the screening stage.

Focus of appraisal tools

Appraisal tools may be divided into three categories:

i. those which routinely consider all three dimensions of sustainable development (e.g. CBA, MCA and Sustainability Appraisal);

ii. those which have the capacity to consider all three dimensions, but traditionally focus on only one (e.g. LCA and Risk Assessment which traditionally focus on environmental issues); and

iii. those which are, almost by definition, concerned with particular aspects of sustainable development (e.g. Social or Health Impact Assessment).

In carrying out more detailed appraisal, practitioners may employ a single tool that provides for a simultaneous assessment of economic, social and environmental concerns or, alternatively, partial appraisal tools that gather information on certain impacts. Ultimately, tools and elements of different tools may be employed in combination to create a bespoke integrated appraisal process designed to suit a particular decision-making process.

Issues considered as part of integrated appraisal

To be useful to decision-makers, integrated appraisal should be comprehensive in its scope and ideally incorporate political and financial considerations and thus reflect the realities of decision-making. To date, Sustainability Appraisal in particular has tended to adopt an 'idealistic' approach, employing aspirational objectives which reflect the goals of sustainable development and not necessarily the practicalities of decision-making. If integrated appraisal fails to consider the political and financial implications of an action, these factors will nonetheless have to be considered at the point when a decision is made and this could lead to appraisal findings being sidelined in the decision-making process.

Integrated appraisal need not investigate economic, social and environmental concerns to the same degree. For example the Agency may have a statutory duty to consider particular aspects of the environment in detail as part of a regulatory decision, but it may also be necessary to consider wider aspects of sustainable development using less detailed appraisal for the Agency to put its specific duties in context.

Appraisal tools should be 'fit for purpose'

A variety of factors including the diversity of policies, plans, programmes and projects, the different demands and expectations placed on appraisal and the different characteristics of appraisal tools lead to the inescapable conclusion that no one appraisal tool is likely to be universally applicable in all circumstances (i.e. tools must be 'fit for purpose'). For this reason, the choice of appraisal tool(s) (and importantly how they are deployed) should, ideally, reflect the circumstances in question and the impacts at stake.

However, a range of factors including legislative, regulatory and administrative requirements may constrain the choice of appraisal tool(s) in any given situation, although there may be some flexibility as to how they are deployed (e.g. in terms of the techniques they employ).

Use of techniques as part of appraisals tools

Appraisal tools can employ a variety of *techniques* in order to identify and/or evaluate impacts ranging from the *technocratic* (e.g. field survey, computer modelling and expert testimony) to the *participatory* (e.g. focus groups, citizens' juries and other means to canvass stakeholder opinion). The fact that tools may employ a range of techniques renders them relatively flexible and may help to ensure they can be made 'fit for purpose'. In addition, utilising an appropriate combination of technocratic and participatory techniques can help to ensure that the appraisal outcomes are based on a suitable blend of technical evidence and stakeholder values.

Stakeholder involvement in appraisal

Analytic-Deliberative Processes and Deliberative-Inclusive Processes are rapidly emerging areas of interest and provide for in-depth stakeholder involvement and may increasingly be employed for the purposes of appraisal. In particular, they can provide a counterbalance to technocratic means of identifying and evaluating impacts and help stakeholders to confront and address the potential trade-offs at stake.

7.2.4 Trade-offs and integrated appraisal

The role of integrated appraisal

By considering the economic, social and environmental implications of options or proposals, integrated appraisal can invigorate the search for synergies between objectives and win-win-win solutions (solutions that generate a net gain for economic, social and environmental objectives). However, integrated appraisal can also identify instances where trade-offs between competing objectives may be necessary.

The Agency's approach to sustainable development

The Agency's approach to sustainable development has implications for its choice of appraisal tools and the way in which these are deployed. For example, given the increasing emphasis on equity issues the Agency might investigate (in line with the consultation draft of the Treasury's Green Book) the distributional impacts of a proposal on different groups in society as part of any CBA.

Processing impact information

Appraisal tools differ, at least conventionally, in the degree to which they *process* impact information (i.e. the degree to which they score, weight, rank and identify a preferred option(s)). While some tools, such as Environmental Assessment and related tools, may score impacts using a relatively simple scoring system or simply provide a written commentary on their effects (and thus provide for some indication of impact significance), others such as CBA can provide an 'answer' as to the preferred option

based on a single overall score. A greater level of information processing equates to a greater level of trade-off analysis and this may influence the choice of appraisal tool(s) depending on the circumstances.

Procedural and methodological trade-offs

In designing and conducting an appraisal, those responsible will inevitably be confronted with procedural and methodological choices and potential trade-offs. Key trade-offs may relate to:

- the level of information collected;
- the number of appraisal objectives employed;
- the number of options appraised; and
- the geographical area and time horizon over which impacts are assessed.

In relation to Agency practice in particular, a key issue to emerge from the case study of the Sustainability Appraisal of the East Hampshire CAMS was the dilemma or trade-off at the national level between providing prescriptive appraisal guidance that served to foster a nationally consistent approach, versus allowing a certain degree of flexibility in the appraisal process in order that it might be adapted to reflect local issues and priorities.

7.3 Recommendations

In light of the conclusions set out in section 7.2, and the research more generally, a number of recommendations can be made and these are detailed in the sub-sections that follow. One of the key issues for the Agency in furthering its work on integrated appraisal will be how to develop a consistent and relevant approach across its wide and diverse range of activities (see Appendix 2). We suggest that there are a number of key recommendations, which, if implemented could enable the Agency to make a step-change in its development of integrated appraisal and help to provide that consistent approach.

7.3.1 Articulating Sustainable Development

Recommendation: ***Articulate the Agency's interpretation of the Section 4 guidance in terms of objectives for appraisal and examine the extent to which existing appraisals are meeting those objectives***

The publication by DEFRA and the National Assembly for Wales of revised guidance to the Agency on its statutory objectives and contribution to sustainable development provides an opportunity to reinterpret precisely what this means to the Agency and the implications it might have for the Agency's approach to appraisal and trade-offs in particular.

Key questions might include to what degree should the Agency promote and pursue an environment-led interpretation of sustainable development and to what extent the Agency should take economic and social concerns into account in different situations. Specifically, it would be useful for the Agency to examine this for each of its functions.

The outcomes will have implications for the Agency's appraisal objectives and therefore choice of appraisal tools and the way in which these are deployed.

7.3.2 Developing a consistent approach to integrated appraisal

Recommendation: ***Develop an Agency 'policy' and 'process' on appraisal which emphasises the value of integrated appraisal and the need to consider social, economic and environmental concerns to deliver the Section 4 guidance***

The Agency should develop a policy statement on integrated appraisal together with an implementation plan. This should initially be drafted by a working group on integrated appraisal (see below).

Recommendation: ***Adopt and promote a single generic framework for integrated appraisal within the Agency***

The common decision-making and appraisal steps proposed as part of the research (see Figure 3.1) and the key questions for each of the steps in the decision-making and appraisal process (see Table 3.1) provide for the basis of a generic framework for planning and designing an integrated appraisal and it is recommended that the Agency build on this work and develop and adopt a coherent and widely applicable framework for integrated appraisal. To assist in planning and designing future integrated appraisals some guiding principles and advice are provided in Appendix 3. These set out a tentative approach to planning an integrated appraisal and provide an indication of the issues that should be addressed.

Recommendation: ***Adopt a two-stage approach to integrated appraisal***

The Agency would benefit from adopting a two-stage approach to integrated appraisal (see Figure 7.1). Such an approach would provide the Agency with the opportunity to screen options and proposals conceived at all levels of the decision-making hierarchy against a checklist of economic, social and environmental concerns and identify potential impacts that warrant further, more detailed, investigation.

In many cases, further appraisal of certain impacts may be necessary and the Agency can employ a range of appraisal tools including one or more of the six appraisal tools or families of tools identified in Chapter 4. For example, if environmental impacts of a project are considered potentially significant, an EIA might be advisable. In many instances, the use of one or more of these tools may be a regulatory obligation (e.g. CBA or Environmental Assessment) but this does not remove the need to firstly screen the options or proposal under consideration against a checklist of economic, social and environmental concerns. Indeed, such a screening exercise will help to ensure that whatever appraisal tool is used focuses on the appropriate range of impacts.

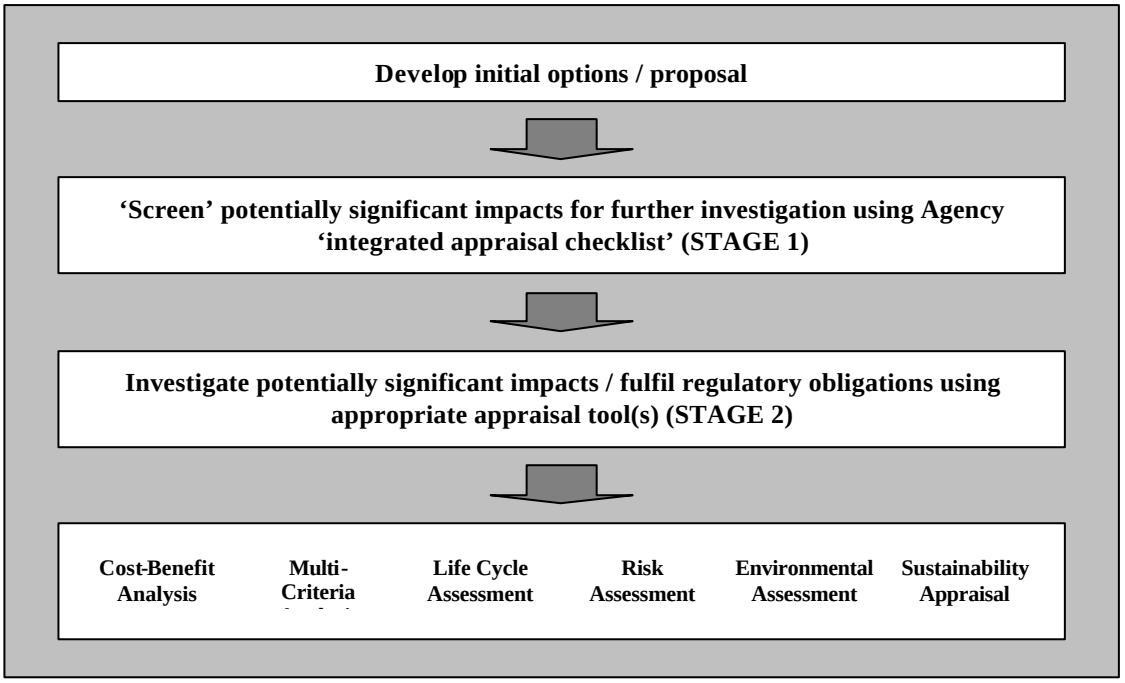

Figure 7.1: A two-stage approach to integrated appraisal within the Agency

Recommendation: ***Develop a widely applicable integrated appraisal checklist for use within the Agency***

Drawing on the diversity of checklists that have already been developed within the Agency and beyond, including the list in the draft guidance on *Integrated Appraisal of Environment Agency Policies* and those developed by, amongst others, the National Assembly for Wales, the North West Regional Assembly and the former DTLR, the Agency should develop an single generic integrated appraisal checklist that is widely applicable across its functions. The Agency may also draw on the objectives of the eight Regional Sustainable Development Frameworks (RSDFs) [37] and the Section 4 guidance.

The checklist should perform a 'screening' function and list a series of questions spanning the economic, social and environmental spheres. Importantly, the checklist should be comprehensive and include practical considerations such as financial costs potentially incurred by the Agency. Although a single generic checklist may suffice, it may prove necessary to prepare checklists appropriate to different tiers of the decision-making hierarchy (e.g. policies and projects) or different functions within the Agency.

Recommendation: ***Prepare guidance on integrated appraisal which includes the checklist together with advice on carrying out more detailed appraisal***

[37] In the UK sustainable development strategy, the Government stated its wish *"to see high level sustainable development frameworks for each English region by the end of 2000"* (DETR, 1999a, page 66). To this end, the former DETR published *Guidance on Preparing Regional Sustainable Development Frameworks* in February 2000 (DETR, 2000d). This envisaged Regional Sustainable Development Frameworks (RSDFs) to be high-level documents that set out a widely supported vision of sustainable development for their regions and provided a point of reference for other regional activity. More specifically, RSDFS were encouraged to establish regional objectives for sustainable development which would *"provide common and agreed starting points for revisions to, and sustainable development appraisals of, other regional strategies and policies"* (DETR, 2000d, page 7).

The Agency should prepare detailed guidance on integrated appraisal. This should include the checklist of economic, social and environmental concerns together with detailed guidance on how and when to use, amongst others, the six appraisal tools or families of tools identified in this report (see Chapter 4). The guidance should include the advantages and challenges associated with each tool; situations in which their use may be a regulatory obligation; case studies of their previous application; useful sources of information, including details of more detailed guidance available; and, ideally, a contact person within the Agency from whom advice on their application may be sought. In addition, the guidance should include advice on stakeholder involvement in appraisal (in line with the proposed Agency policy and process on consultation and engaging stakeholders). The guidance could also include advice on who should undertake appraisal and the skills and competencies that might be necessary.

This guidance could be placed on the Agency's Intranet site and operate in a similar way to the *Guidance Checklist for Policy Makers* developed by the Cabinet Office (2000) (i.e. with a series of hyperlinks to more detailed guidance).

Recommendation: Concentrate the application of integrated appraisal initially at the policy level

The two-stage approach to integrated appraisal could initially be developed and applied at the policy level where previous work has been carried out. The existing draft guidance on *Integrated Appraisal of Environment Agency Policies* includes a checklist addressing economic, social and environmental concerns and would benefit from detailed guidance on the use of appraisal tools for investigating significant impacts.

Recommendation: Establish an evaluation process for the performance of integrated appraisals

The Agency should investigate the added value of undertaking appraisal (integrated or otherwise) on an ongoing basis. This can be facilitated by carefully documenting appraisal processes within the Agency and, in particular, recording changes made to emerging proposals in light of appraisal. Appraisal performance can also be evaluated by recording the views of those practitioners and stakeholders involved as to what benefits they considered the appraisal to bring. Such discussions can also help to capture perhaps less obvious benefits that appraisal might yield (e.g. learning between different stakeholder groups).

7.3.3 Understanding the wider context of Agency decision-making

Recommendation: Map the interrelationships between plans and strategies at different levels of the Agency's business so as to clearly establish the links between those levels

The case study of the Sustainability Appraisal of the East Hampshire CAMS highlighted uncertainty as to how different Agency initiatives related to one another and the implications this has for appraisal. Clearly mapping the links between various Agency policies, plans, programmes and strategies could help to facilitate effective appraisal and ensure that the right issues are addressed to the right level of detail at the

right point in the decision-making hierarchy. The complexities are illustrated by the various levels within water resources (i.e. National and Regional Water Resources Strategies, River Basin Management Plans, CAMS, the Restoring Sustainable Abstraction (RSA) programmes and individual licensing discussions) and flood defence (i.e. Catchment Flood Management Plans, Shoreline Management Plans, Flood Defence Strategies, capital and revenue programmes and individual schemes).

Recommendation: Explore the institutional barriers to, and opportunities for, integrated appraisal within the Agency

Effective integrated appraisal will be facilitated by co-operative working between different disciplines and functions within the Agency and the Agency should explore any barriers to collaborative working that might hinder future integrated appraisal. Potential barriers might include lack of resources, skills, and institutional support from senior managers as well as inertia that favours familiar approaches. In addition, it would be useful to highlight the opportunities for integrated appraisal which exist in the Agency.

Recommendation Investigate the practical application of integrated appraisal where the Agency is not the sole decision-maker

Integrated appraisal is being increasingly undertaken in areas where the Agency is not the sole decision-maker, but nonetheless has a valuable (and often statutory) contribution to make (e.g. land use planning). As such, the Agency would benefit from exploring and developing a greater understanding of the appraisal processes undertaken in these areas and the role it might play in them (e.g. as provider of information or expertise or environmental advocate). Involvement in integrated appraisal (in say land use planning) could provide the Agency with a key route into the decision-making process and a means to promote its objectives.

7.3.4 Establish support activities to develop networks, skills and knowledge in integrated appraisal

Recommendation: Set up a cross-functional internal working group to bring all Agency appraisal initiatives together in order to establish consistency and share experience

Recommendation: Establish a single co-ordinator in order to lead on integrated appraisal across all areas of the Agency's work

To date, the integrated appraisals that have been developed within the Agency have been largely developed in isolation. Benefits could be achieved by forging closer links between the different groups responsible who may be within different Agency functions or external organisations, but are grappling with similar issues.

The Agency should establish an internal working group and co-ordinator to map the use of appraisal within the Agency; keep up-to-date with developments in the appraisal field; establish a library of appraisal documentation; develop common and consistent language; collate examples of good practice; and disseminate information within the Agency. In particular, there is a need to establish a mechanism to pool and exchange

experience of developing and applying appraisals and to collate evidence of 'added value'.

The exchange of experience could be facilitated by establishing an Agency Intranet site dedicated to integrated appraisal (linked to any specialist sites dealing with economic, social or environmental appraisal) where examples of good and evolving practice could be shared.

Recommendation: Develop expertise in the social dimension of integrated appraisal

Expertise and experience within the Agency, and indeed elsewhere, in the social dimension of integrated appraisal is comparatively limited and is a key area where capacity needs to be developed. This includes the identification and appraisal of social impacts as well as providing for stakeholder involvement. In relation to the specific issue of stakeholder involvement in appraisal, guidance on determining the appropriate level and mechanism for stakeholder participation in a particular situation would be beneficial.

Recommendation: Strengthen existing links with Government and other statutory bodies with respect to integrated appraisal

In order to keep abreast of wider developments, the Agency should strengthen existing links with Government and the other statutory bodies, as well as universities and other institutions, and consider establishing an informal external working group on integrated appraisal to share experience. This is a particularly topical issue, as illustrated by the current debate on the relationship between Sustainability Appraisal and SEA following the publication by ODPM of draft guidance on implementing the SEA Directive. It is key for the Agency to be aware of these developments and participate in the debate.

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APPENDICES

Appendix 1: Participants in the R&D Project

Name		Position/Organisation
Environment Agency		
Clare Brooke*	–	formally Strategic Planner, South West Region
Andrew Brookes*#	–	formally Options Appraisal Manager, Centre for Risk and Forecasting
John Colvin	–	Social Policy Manager, Head Office
Heidi Curren	–	Principle Officer, Strategic Environmental Planning, North West Region
Rob Curry	–	Economist, Head Office
Clare Dinnis	–	National CAMS Coordinator, Head Office
Elizabeth Diprose	–	Water Resources Development Manager, Head Office
Jonathan Fisher*	–	Environmental Economist, Centre for Risk and Forecasting
Colin Foan*#	–	Environmental Forecasting Adviser, Centre for Risk and Forecasting
Peter Fox*	–	Principal Scientist Sustainable Development, North West Region
Liz Galloway	–	Regional EIA Coordinator, Midlands Region
Jan Gronow	–	Landfill Policy Manager, Head Office
Stuart Homann*	–	Water Resources Planner, North East Region
Richard Horrocks*	–	Regional Flood Defence Manager, South West Region
Richard Howell	–	Sustainable Development Policy Manager
Hugh Howes*	–	Regional Strategic Planner, Thames Region
Jimi Irwin	–	Head of Centre for Risk and Forecasting
John Lambert	–	Technical Planning Manager, Wales
Henry Leveson-Gower	–	Economic Analyst, Head Office
Paul McMahon	–	formally Business Economist, Centre for Risk and Forecasting
Paula Orr*	–	Social Issues Officer, Head Office
Ronan Palmer*	–	Chief Economist, Head Office
Vicky Pollard	–	formally Business Economist, Centre for Risk and Forecasting
Jim Poole*	–	Corporate Strategist, Wales
Sue Reed	–	National EIA Coordinator, Head Office
Alison Rennie	–	Water Resources Team Leader, Hampshire and Isle of Wight Area, Southern Region
Cath Saunders	–	Regional EIA Coordinator, North West Region
Richard Smith	–	R&D MSO
Gerard Stewart*	–	Environmental Developments Officer, Centre for Risk and Forecasting
Clare Twigger-Ross	–	formally Social Issues Officer, Centre for Risk and Forecasting
Rob Waite	–	CAMS Officer, Hampshire and Isle of Wight Area, Southern Region
Mark White	–	Senior Scientist , Science Programme Group
External organisations		
Steve Humphries	–	National Human Health Project Manager, NCEHC
Moira Jones	–	HSE
John Walls	–	HSE
Jonathan Burney	–	Economic Advisor, Environmental Impacts Team, English Nature
Ivan Scrase	–	Imperial College PhD student
Consultants team		
Ric Eales	–	Principal, Collingwood Environmental Planning
Steve Smith	–	Environmental Consultant, Collingwood Environmental Planning
Ece Ozdemiroglu	–	Environmental Economist, Eftec
Bill Sheate	–	Senior Lecturer in EIA, Imperial College
Rita van der Vorst	–	Lecturer in Clean Technology, Imperial College
Chris Fry	–	Group Manager, Environmental Assessment, TRL Ltd
Paul Tomlinson	–	Environmental Assessment and Policy Manager, TRL Ltd

* Project Board members # Agency Project Manager

Appendix 2: Examples of the Types of Decision/Activity Carried out by the Agency

Decision/Activity	Agency role				Level of decision-making				
	Regulator	Developer and operating authority	Consultee and advisor	Internal business management	Policy	Plan	Programme	Project – pre-implementation	Project – post implementation / operational
Industrial process regulation									
• determine IPC/IPPC authorisation	●							●	
• review and develop authorisation improvement plans, monitor compliance and enforcement action	●								●
Radioactive Substances and chemicals									
• determine registrations of premises and authorisations for disposal or accumulation	●							●	
• monitoring compliance and enforcement of prohibition notice	●								●
• enforce packaging regulations	●								●
• monitor transfrontier shipments of waste									
• assess risks of new and existing chemicals	●								●
Waste Management									
• determine licences on waste disposal and handling facilities	●							●	
• regulate special waste	●								●
• registration of waste carriers	●								●
• undertake Strategic Waste Management Assessments			●			●			
• advise on waste minimisation techniques			●						●
• comment on Waste Local Plans			●			●			
• advice and comment on Regional Waste Strategies			●			●			
• implement Duty of Care Regulations	●								●
• advise government on the national Waste Strategy and assist in its implementation			●		●	●			
Land Quality									
• advise local authorities on the identification of special sites	●								●
• determine remediation required at special sites / issue & enforce remediation notices	●								●
Surface Water Quality									
• determine discharge consents	·							·	
• monitor controlled waters	●								●
• control pollution / discharges	●								●
• advise DEFRA on priorities for proposed environmental improvements by water companies (AMP)			●				●		
• advise DEFRA on setting of River Quality Objectives			●						●
• advise on pollution prevention issues			●						●

Decision/Activity	Agency role				Level of decision-making				
	Regulator	Developer and operating authority	Consultee and advisor	Internal business management	Policy	Plan	Programme	Project – pre-implementation	Project – post implementation / operational
Groundwater Quality									
• decide on remediation strategy and approve technique	●								●
• determine discharge consents	●							●	
Air Quality									
• advise government on the national Air Quality Strategy and assist in its implementation	●				●	●			
• advise local authorities on local air quality and in particular on AQMPs			●			●			
Water Resources									
• prepare and implement Water Resource Strategies (national/regional)	●					●			
• prepare and implement CAMS	●					●			
• determine applications for abstraction licences	●							●	
• competent authority for water resources projects under EIA Regulations	●							●	
• determine drought order applications	●							●	
• maintain and construct water resource projects		●						●	●
• produce and implement capital programme		●					●		
• comment on Water Level Management Plans (WLMPs)		●				●			
• advise DEFRA on priorities for proposed environmental improvements by water companies (AMP)		●					●		
• implement RSA programme	●						●	●	
• implement and manage ALFs and SPZs	●							●	
Flood Defence									
• operate, maintain and improve flood defences		●						●	●
• construct new flood defences		●						●	
• produce and implement capital work programmes		●					●		
• produce and implement revenue work programmes		●					●		
• produce and implement flood defence strategies and Catchment Flood Management Plans		●				●			
• operate flood warning system		●	●						●
• produce S.105 flood risk maps		●	●			●			
Conservation and Fisheries									
• produce and implement (regional) biodiversity strategies			●			●			
• contribute to BAPs			●			●			
• lead organisation for certain BAP species			●			●			●
• carryout conservation and fisheries enhancement projects		●						●	
• produce and implement capital work programmes									

Decision/Activity	Agency role				Level of decision-making				
	Regulator	Developer and operating authority	Consultee and advisor	Internal business management	Policy	Plan	Programme	Project – pre-implementation	Project – post implementation / operational
• review of Agency permissions under EU Habitats and Bird Directive	●							●	
• undertake fish introductions		●							●
• grant and enforce rod and net licences	●								
• prepare and implement Fisheries Action Plans			●			●			
• prepare and implement Sea Fisheries Action Plans			●			●			
Navigation									
• operate, maintain and improve navigation structures		●						●	●
• operate boat registration scheme	●							●	
• construct new navigation works		●						●	
• produce and implement capital work programmes		●					●		
Recreation									
• produce recreational strategies and action plans			●			●			
• construct enhancement projects and provide facilities		●						●	
Local Government Liaison and Development Control									
• determine land drainage consents	●							●	
• comment on planning applications (with and without EIAs)			●					●	
• comment on local authority development plans, Regional Planning Guidance (RPGs) and Regional Economic Strategies (RESs)			●			●			
• comment on government legislation/policy			●		●				
• comment on road programmes, transport proposals, Multi Modal Studies and local transport plans			●			●	●		
• comment on Community Plans			●			●			
• comment on Sustainable Development Frameworks			●		●	●			
Health and Safety									
• implementing COMAH	●							●	●
Corporate and Business Management									
• develop Agency policies and procedures	●	●	●	●	●				
• develop Agency corporate vision, corporate plan, national targets and Local Contributions				●		●			
• management of Agency estate and assets				●					●

Appendix 3: Guiding Principles to Planning and Designing an Integrated Appraisal

Introduction

Integrated appraisal aims to assess the performance of options or proposals in terms of their economic, social and environmental implications. This report advocates an essentially two-stage approach to integrated appraisal: an initial stage at which potential impacts are 'vetted' or 'screened' against a checklist of questions encompassing economic, social and environmental concerns followed by more detailed appraisal of those impacts considered to warrant further investigation. This more in-depth impact investigation can be undertaken using a range of appraisal tools or families of tools including:

- Cost-Benefit Analysis (CBA);
- Multi-Criteria Analysis (MCA);
- Life Cycle Assessment (LCA);
- Risk Assessment;
- Environmental Assessment and related tools; and
- Sustainability Appraisal and related tools.

A two-stage approach

Stage 1: impact screening

As the options or proposal begin to emerge, the potential impacts should be 'screened' against a checklist of economic, social and environmental concerns. In developing such a generic checklist, it is proposed that the Agency draws on existing checklists developed by, amongst others, the National Assembly for Wales (2002), the North West Regional Assembly (2002) and the Agency's existing draft guidance on *Integrated Appraisal of Environment Agency Policies* (Environment Agency, 2000).

The initial screening of impacts using the checklist should be undertaken by a team of Agency personnel, ideally drawn from a range of functions and disciplines. In this way, the full range of potential impacts are more likely to be anticipated. Appraisal against a checklist of economic, social and environmental concerns should facilitate the identification of potential synergies and win-win-win solutions (i.e. solutions that generate a net gain for economic, social and environmental objectives) and identify instances where trade-offs between objectives may be necessary.

Stage 2: detailed appraisal

Once the potential impacts, synergies and trade-offs have been identified using the checklist, those responsible should discuss with the necessary Agency personnel (and stakeholders where appropriate) which of these (if any) warrant further investigation and how this investigation might be carried out. In selecting an appropriate appraisal tool(s), those responsible should consider a number of factors:

- *legislative or regulatory requirements* – there may be specific requirements for particular appraisal tools to be used. For example, Environmental Impact

Assessment (EIA) is a regulatory requirement for certain projects and Strategic Environmental Assessment (SEA) will be required for certain plans and programmes once the 'SEA Directive' comes into force in July 2004. In addition, the Agency may be obliged to undertake CBA as a prerequisite for funding and may be required to undertake Regulatory Impact Assessment (RIA) before introducing a new requirement on operators;

- *existing guidance or Agency policies* - central Government or the Agency may have issued guidance relating to the application of appraisal in particular circumstances (e.g. DEFRA flood and coastal defence project appraisal guidance and the 'Green Book') or the Agency may have existing policies and procedures that need to be considered (e.g. the Agency's policy and procedures relating to EIA/SEA);

- *Agency role in a particular decision-making process* – the Agency's role (i.e. as regulator/competent authority, developer or consultee/advisor) will affect the purpose of an appraisal and the resulting selection of tools. For example, is the Agency reviewing or verifying an application made/appraisal undertaken by a third party or is undertaking an appraisal as part of developing its own proposal?

- *the boundaries set by a particular decision-making process* – the scope of issues that the Agency may be required to consider could be limited by a particular decision-making process, for example as the regulator under IPC/IPPC the Agency may be limited in the scope and nature of the impacts that can be used to determine the application, however to accompany a detailed appraisal of these aspects the Agency may also wish to consider a broader-brush appraisal of social, economic and environmental concerns to provide context and to inform its wider sustainable development duties; and

- *tiering* – it is important to ensure that the right issues are addressed to the right level of detail at the right point in the decision-making hierarchy. In order to ensure this and avoid the duplication of effort, decision-making processes should be appropriately 'tiered' with decisions made at each level or tier in the decision-making hierarchy taking proper account of decisions made at higher and lower tiers. An appropriate system of tiering will also help to ensure that accompanying appraisals also address the right issues to the right level of detail at the most appropriate point in the hierarchy. Therefore, when planning an appraisal it will be important to consider what has gone before and what is anticipated to come next.

This list highlights the importance of legal and regulatory requirements and existing guidance, policies and procedures in influencing the selection of the tools to be used. Additional, factors that might also need to be considered include:

- *past practice or 'the way things have always been done'* – there may be resistance to introducing a more approach, but any inertia should be challenged and current practices reviewed to determine whether there would be added value to taking a different approach;

- *the resources available* – the resources available (e.g. funding, staff time and expertise) for the appraisal will to some extent dictate the approach. Ideally, however, the appraisal should be proportionate, or fit for purpose, to the decision in

hand and therefore driven by what is required rather than the resources available. Resources should be directed towards appraising the most significant impacts;

- *the extent to which competing views will need to be reconciled* – the more contentious a decision, the more detailed and involved the appraisal is likely to have to be to address the competing objectives and trade-offs that will inevitably have to be made and the more important it will be to involve a range of stakeholders in a deliberative environment; and

- *decision-makers' background* and *how to ensure 'buy in' to the appraisal process by stakeholders, decision-makers and practitioners* – what resonates with decision-makers can influence the approach adopted, the tools and techniques used and how the results are presented – is mere information provision sufficient or is processed impact information required (i.e. structured trade-off analysis) (e.g. Sustainability Appraisal versus CBA).

In undertaking an integrated appraisal, a range of appraisal tools may be employed and, for this reason, integrated appraisal is best viewed as an umbrella *approach* to appraisal and not necessarily as a single or discrete appraisal tool. Appraisal tools can be integrated or partial in their focus. While integrated appraisal tools routinely examine the economic, social and environmental implications of options or proposals, partial appraisal tools focus on particular issues. Examples of integrated appraisal tools include Cost-Benefit Analysis (CBA), Multi-Criteria Analysis (MCA) and Sustainability Appraisal. Partial appraisal tools include Environmental Impact Assessment (EIA) and Health Impact Assessment (HIA).

Although partial appraisal tools may not provide decision-makers with the full range of impact information they may nonetheless perform a valuable role. For example, decision-makers might consider it important to undertake EIA or HIA, if they considered information on environmental or health effects to be lacking or particularly crucial to a decision. In addition, partial appraisal tools could, in combination, provide the 'building blocks' for an integrated appraisal process.

Planning an appraisal

The generic decision-making and appraisal steps (see Figure 1), and the key questions for each of the steps (see Table 1), can provide a useful framework for planning and designing an appraisal in more detail.

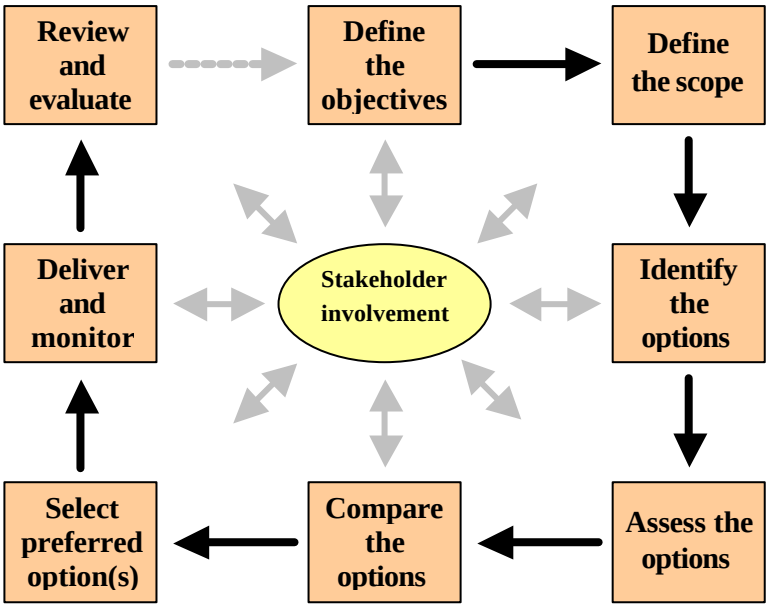

Figure 1: Steps in the decision-making and appraisal process

Table 1: Key questions for each of the steps in the decision-making and appraisal process

Step	Key questions
Define the objectives	• What are the objectives of the policy, plan, programme or project? • What are the objectives of the appraisal? • Are these objectives one and the same or different?
Stakeholder involvement	• When and how should stakeholders be involved? • What means of engagement of stakeholders will be employed? • How will the transparency of the appraisal be ensured?
Define the scope	• What issues will be addressed as part of the appraisal process (e.g. economic, environmental, social, technological)? • What depth of investigation will be needed for a robust decision? • What criteria will be used to appraise the options?
Identify the options	• Is there sufficient information to facilitate the identification of options? • What range of options will need to be considered? • How will the options be generated and short-listed (e.g. in consultation with stakeholders)?
Assess the options	• What methods to assess the options will be appropriate/practical? • What types of impacts will need to be considered (e.g. direct, indirect, cumulative, synergistic, permanent, temporary, positive, negative)? • How will significance be determined (e.g. consensus building, thresholds)? • What will be the appropriate balance between technical and participatory approaches and quantitative and qualitative predictions?

Table 1: (cont) Key questions for each of the steps in the decision-making and appraisal process

Compare the options	• Which options perform best against the appraisal criteria? • What are the trade-offs between the different options? • How will the costs and benefits of different options be expressed (e.g. qualitative or quantitative, monetary or non monetary) and how will these be combined?
Select the preferred option(s)	• How will the decision-makers be involved and will the appraisal findings be presented to the decision maker(s)? • What other factors are relevant to the decision? • How will the preferred option(s) be determined?
Deliver and monitor	• How will the implementation of the policy, plan, programme or project be monitored? • What will be the frequency, methods and responsibility for monitoring? • How will the mitigation and enhancement measures be implemented?
Review and evaluate	• How will the implementation of the objectives be evaluated? • Who will be responsible for review and evaluation and what will be the appropriate timing?

While it is anticipated that the approach to appraisal will need to be tailored to the particular circumstances involved in each case, these common steps should be generally applicable. However, the level of detail and tools and techniques used to support each step may vary significantly depending on the particular activity that is being appraised (see below).

See Chapter 3 of the R&D Technical Report for details on each of these steps.

In undertaking any appraisal, the appraisal should be:

- *proportionate* - the approach and tools should be fit for the purpose in hand and pitched at a level of detail which reflects the significance of the impacts at stake;

  > *"The Impact Assessment will be conducted according to the principle of proportionate analysis, i.e. varying the degree of detail to the likely impacts of the proposal. This means that the depth of the analysis will be proportionate to the significance of the likely impacts."*
  >
  > (Commission of the European Communities, 2002, page 8)

- *iterative* - appraisal should be initiated early in the decision-making process and be conducted on an iterative basis from that point onwards with feedback loops between iterations as necessary;

- *transparent* – the approach, however simple or complex, should be documented for the purposes of honesty, openness and scrutiny and involve an appropriate level of participation.

In selecting the tool(s) to be used, it should be remembered that the various tools can occupy different positions along several continua depending on the techniques they employ. For example, the majority of tools can employ a variety of means to engage stakeholders and thus provide for something of a participatory approach to appraisal.

Equally important is the choice of techniques that the appraisal tool(s) will employ. Appraisal tools can employ a variety of *techniques* in order to identify and/or evaluate impacts ranging from the *technocratic* (e.g. field survey, Geographical information Systems, computer modelling and expert testimony) to the *participatory* (e.g. focus groups, citizens' juries and other means to canvass stakeholder opinion). The range of techniques that tools may employ renders them relatively flexible and may help to ensure they can be made 'fit for purpose'. In addition, utilising an appropriate combination of technocratic and participatory techniques can help to ensure that the appraisal outcomes are based on a suitable blend of technical evidence and stakeholder values.

Stakeholder involvement should, ideally, be a key element of any appraisal process. Involving stakeholders can help to:

- ensure that the full range of potential impacts are identified and their significance gauged;
- increase ownership of the appraisal process; and
- facilitate learning between stakeholders.

Analytic-Deliberative Processes and Deliberative-Inclusive Processes are a rapidly emerging area of interest and provide for in-depth stakeholder involvement and may increasingly be employed for the purposes of appraisal. In particular, they can provide a counterbalance to technocratic means of identifying and evaluating impacts and help stakeholders to confront and address the potential trade-offs at stake.