

Chapter 6

ON INTEGRATED ASSESSMENT

6.1 Interpreting integration

Use of the term ‘integrated assessment’ is very varied. Eggenberger and Partidario (2000) recognise five main types of integration related to “development planning and assessment and its impact on our living space” (Box 6.1), whilst Scrase and Sheate (2002) go much further, identifying up to 14 different types of integration in the context of environmental assessment and governance (Table 6.1)

Box 6.1: Forms of integration

1. *Substantive*

- The integration of physical issues with social and economic issues;
- The integration of emerging issues such as health, risks, biodiversity, climate change, etc,
- The integration (where appropriate) 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, using particular tools such as GIS;
- The integration and clarification of (sector) terminologies (including the element of ‘strategic’).

3. *Procedural*

- The integration of environmental, social and 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 subsidiary as guiding principles for governmental planning at different levels of decision making;
- The integration of affected stakeholders (public, private, NGOs) 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 for political interventions
- Accountability of government

Table 6.1: Integration of environmental assessment and governance

(Source: 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 modelling
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

Some approaches focus on the environmental dimension. For example, the European Environmental Agency (EEA) defines integrated environmental assessment (IEA) as “an interdisciplinary process of identification, analysis and appraisal of all the relevant natural and human processes which affect the quality of the environment and environmental resources. The objective of IEA is to facilitate the framing and implementation of optimal policies and strategies, accounting for both environmental effects and other priorities (eg cost constraints)” (Peirce 1998).

Details of the EEA approach to IEA with examples of uses of practical applications is provide in a technical report and descriptions of how computer models and tools can support assessment work is provided in Peirce (1998). Because there are many aspects to IEA, a wide range of computer tools are potentially useful, such as simulation models, information management tools and decision support systems. The report also gives details of a selection of publicly-available computer programmes written with IEA specifically in mind.

Other approaches share the goal of developing a process which integrates sectors, themes or issues (economic, social and environmental). Following this theme, Lock (2003) describes IEA as a “mix of economic, environmental, social and other forms of impact assessment the purpose of integration (being) to achieve sustainable development objectives”.

A number of countries appear to have made some progress in introducing such integrated assessment approaches, eg. Hong Kong - which has recently developed a computer-aided sustainability evaluation tool (Box 6.2), Canada’s federal EIA process (Box 6.3), and the UK (where sustainability appraisal is being used as an integrated assessment tool in connection with regional strategies, development plans and other policy documents as well as at the local government level- see next section).

Box 6.2: Computer-aided Sustainability Evaluation Tool (CASET), Hong Kong

In December 2001, the Hong Kong government we have put in place a sustainability assessment (SA) system. Its purpose is to promote the integration of sustainability principles into the government's decision-making process, through assessing the impacts of proposals on the economic, environmental and economic conditions of Hong Kong in an integrated manner. A Sustainable Development Unit (SDU) provides training to colleagues on sustainable development and the use of this SA system.

The SA system helps to facilitate Government bureaux and departments to identify sensitive or cross-sectoral issues associated with their proposals as early as possible and to resolve these issues through a concerted effort.

To ensure that government agencies carry out the SA process in a structured and consistent manner, a computer programme - "*Computer-aided Sustainability Evaluation Tool*" (CASET) has been developed in the context of the "Sustainable Development in Hong Kong for the 21st Century" study. CASET guides users through the evaluation process step-by-step. The assessment is based on eight guiding principles covering economy, health and hygiene, natural resources, society and social infrastructure, biodiversity, leisure and cultural vibrancy, environmental quality and mobility, and 39 associated quantifiable indicators. These principles and indicators were devised following extensive public consultation and discussion with the relevant stakeholders. Bureaux and departments are required to assess the impacts of their proposals against the relevant indicators (only the relevant indicators would be selected for assessment). Apart from these 39 quantifiable indicators, the assessment also requires the responsible bureaux and departments to evaluate other non-quantifiable yet important considerations in the process to ensure that the assessment is comprehensive.

Put simply, the assessment system requires responsible bureaux and departments, as proponents, to:

- Set out the objectives and assumptions of their proposals;
- Go through a checklist of simple "yes" and "no" questions covering potential economic, social and environmental implications of these proposals;
- Give an assessment of the likely impact of their proposals against each and every affected indicators;
- Check the validity of the findings and consider possible alternative options, if necessary;
- Prepare a report that summarizes the key findings of the assessment process, which includes an SA diagramme to illustrate the positive and negative implications of the proposal.

The role of SDU mainly involves advising on and auditing the proper use of the assessment system and ensuring that decision-makers are fully aware of the sustainability implications before they may approve a new policy or proposal.

Source: Dora Fu (pers.comm..) and www.susdev.gov.uk

Box 6.3: Integrated environmental impact assessment: a Canadian example

The Canadian federal process for EIA integrates health, social and environmental aspects into either a screening, comprehensive study, or a review by a public panel, depending on the expected severity of potential adverse environmental effects.

In 1994, BHP Diamonds Inc. proposed to develop Canada's first diamond mine in the Northwest Territories, where 50% of the population are Aborigines. A Public Review Panel considered the proposal and instructed the company to determine how to incorporate traditional knowledge into the

gathering of baseline information, preparing impact prediction, and planning mitigation and monitoring.

The company was instructed to ensure the EIA considered a range of issues: health, demographics, social and cultural patterns; services and infrastructure; local, regional and territorial economy; land and resource use; employment, education and training; government; and other matters. Cooperative efforts between government, industry and the community led to a project that coordinated the concerns of all interested stakeholders and the needs of present and future generations.

The EIA report (8 volumes, 5000 pages) was reviewed by the Panel and 18 days of public hearing were held in the project area. The mitigations measures that were implemented took account of: income and social status, social support networks, education, employment and working conditions, physical environment, personal health practices and coping skills, and health services.

Source: Kwiatkowski and Ooi (2003).

6.2 Experience in the UK

Several types of strategic assessment processes emerged in the UK during the 1990s including integrated appraisals of national policies, ‘environmental appraisals’ (and latterly ‘sustainability appraisals’) of local and regional development plans, and *ad hoc* SEAs carried out in specific sectors (e.g. transport and water). Good practice guidance have been prepared for both English local authorities and central government departments (see Boxes 6.4 and 6.4, respectively). This guidance forms part of the Government’s approach to ensuring that development is sustainable, e.g. as set out in the first and second UK Strategies for Sustainable Development (HMSO 1990, 1994). So far, policy appraisal has been applied narrowly and inconsistently and will not be directly affected by the EU SEA Directive. But development plan evaluation must be brought in line with the SEA Directive (see below).

Box 6.4: UK Guidance on SEA and SA for national policies

The Government’s White Paper on the Environment, *This Common Inheritance* (DoE 1990), emphasised the importance of incorporating environmental considerations into policy development. Commitments made in the White Paper resulted in the publication of *Policy Appraisal and the Environment* in 1991 (DoE, 1991). This guide was aimed at central government agencies and emphasised the use of cost-benefit techniques as a basis for taking environmental effects into account in policy development. A companion study provided advice on good practice. It indicated that progress was uneven and slower than anticipated with considerable variation in implementation of policy appraisal. It brought into question the extent to which the government-wide commitment to address the potential environmental impact of its own proposals was being met. A subsequent study drew similar conclusions and confirmed there was scope for further improvement (DETR, 1997). Updated guidance was prepared on this basis (DETR, 1998).

The policy appraisal process involved several basic steps (DoE, 1991; DETR, 1997):

- *List the objectives* of the proposal and *summarise the policy* issue, identifying possible trade-off’s and constraints;
- *Specify the range of options* for achieving the objectives, including the ‘do nothing’ option;
- *Identify and list all impacts* on the environment and consider mitigation measures to offset them;
- *Assess the significance* of the impacts in relation to other costs and benefits;

- Use an appropriate method to *value costs and benefits*, including those based on monetary values, ranking or physical quantities;
- *State the preferred option* with reasons for doing so;
- *Monitor and evaluate the results*, making appropriate arrangements for doing so as early as possible.

More recently, the emphasis has switched from environmental to ‘integrated policy appraisal’. The *Modernising Government* White Paper of 1999 committed Government “*to produce and deliver an integrated system of impact and appraisal tools in support of sustainable development covering impacts on business, the environment, health and the needs of particular groups in society*” (UK Government, 1999). In response, an approach to Integrated Policy Appraisal (IPA) was developed by several Government departments to help policy makers assess the full range of social, economic and environmental impacts of their initiatives. IPA was designed to act as a “gateway” to other appraisal methodologies, reducing work by identifying which appraisals needed to be done for a specific policy proposal.

Following a series of pilot studies, the IPA tool has now been incorporated into the existing system of Regulatory Impact Assessment (RIA). As part of RIA, policy makers must explicitly identify the economic, social and environmental costs and benefits of their proposals. This is intended to provide a unified approach, bringing together within one tool the two complementary aims of better policy-making and sustainable development. From 1 April 2004, the RIA system was extended to cover all substantial policies and proposals, which will have an impact on the public and private sectors. In order to ensure that RIAs are properly completed, a number of quality checks have been put in place in addition to Ministerial sign-off:

RIAs are placed in the public domain and are a key part of the consultation process:

- RIAs accompany letters seeking collective agreement to proposals so that Ministers, in their responses, are able to comment on the analysis presented in the RIA;
- From 2003/04, the National Audit Office has a new role in reviewing the quality of a sample of RIAs;
- From 2004, departmental reports will require statements on what is being done to support better regulation and to improve the quality of RIAs;
- The Cabinet Office Regulatory Impact Unit is working with departments to enhance the quality of analysis in RIAs and the Department for Environment, Food and Rural Affairs and other departments will be involved in efforts to improve the assessment of social and environmental costs and benefits.

To supplement the RIA regime, the Department of Environment, Food and Rural Affairs (DEFRA) is preparing detailed guidance “designed to make it as easy as possible for policy makers to spot the environmental impacts of their policy options during the policy-making process”.

For further information see: <http://www.sustainable-development.gov.uk/sdig/integrating/index.htm>

Box 6.5: UK Guidance on SEA and SA of development plans

Initial guidance on the role of SEA in the preparation of development plans was issued in Policy Planning Guidance Note 12, *Development Plans and Regional Planning Guidance* (PPG12) (DoE, 1992). This required planning authorities to consider the environmental implications of their development plans. In response, a number of local authorities began to carry out ‘environmental appraisals’ of their development plans and the Department of Environment prepared *Environmental Appraisal of Development Plans: A Good Practice Guide* (DoE, 1993). In comparison to the conventional model of SEA, ‘environmental appraisal’ of development plans has been variously described. Examples include ‘a less systematic’ but ‘more integral and iterative process’ (Sadler and Verheem 1996), ‘less comprehensive and onerous’ (Therivel, 1998), ‘less detailed’ (Russell, 1999) and simply ‘informal’ (Glasson and Gosling, 2001). Therivel (1998) argued that many of the SEAs carried out in Britain – particularly the environmental appraisals of development plans – were only *partial* SEAs since they did not describe the baseline

environment, consider alternatives, make rigorous, quantitative predictions and offered little in the way of (concrete) mitigation measures. But she went on to argue that the majority of these nonetheless fulfilled the aims of SEA – including improved decision-making and greater awareness of environmental issues amongst decision-makers. Sadler and Verheem (1996) emphasised their sustainability dimensions and scales - a linkage that the government has sought to maintain in preparing guidance pursuant to the SEA Directive.

During the mid-1990s, many local authorities expanded their environmental appraisal to encompass economic and social concerns; indeed, Therivel (1998) reported that approximately one-third on respondents to a 1997 questionnaire on appraisal practice characterised their appraisals as ‘sustainability appraisals’. The trend toward Sustainability Appraisal (SA) culminated in the publication of a revised PPG12 in 1999. This required local authorities to carry out a full environmental appraisal of their development plans, but encouraged them to extend this to cover other sustainable development objectives.

Local Councils are using this tool broadly to help with a range of activities: policy and programme development and review, service planning, budget, service and project planning; contract development and assessment, grant assessment, and committee report writing. A good example is South Gloucestershire Council which uses a set of web-based guidance notes and a checklist of prompt questions adapted from the Council’s strategic goals on sustainability (www.southglos.gov.uk/environmental-protection/sustain-appraisal.htm). The questions are considered in terms of the effects of the proposal: positive, negative, not significant, or opportunity to amend the proposal to increase positive or reduce negative effects.

At the regional level, the former Department of Environment, Transport and the Regions published a *Good Practice Guide on Sustainability Appraisal of Regional Planning Guidance* (DETR 2000). Recent research by the EIA Centre at the University of Manchester has demonstrated an increasing use of SA (Short *et al.* 2003). It shows that development plans have become more environmentally sound in the majority of cases. In just over half of the plans examined, some changes also occurred as a result of applying SA (mainly changes in wording of policies and re-prioritisation of proposed allocation sites within the plans).

The voluntary system of environmental / sustainability appraisal of local and regional plans is set to change considerably in light of the EU SEA Directive and the new Planning and Compulsory Purchase (PCP) Act which was due to receive royal assent in June 2004. In particular, *Strategic Environmental Assessment Directive: Guidance for Planning Authorities* (ODPM, 2003) indicates how the requirements of the SEA Directive are to be incorporated into the wider SA process. The PCP Act introduced fundamental changes to the planning system, replacing the system of Unitary Development Plans, Structure Plans and Local Plans in England with a single level of planning: Local Development Framework (LDF). Significantly, the constituent parts of an LDF – Local Development Documents (LDDs) – must undergo *statutory* SA. For the first time, SEA and SA will both be statutory requirements for local authority development plans. The Government advocates a unified approach to SEA / SA and has commissioned guidance (to be published by the end of 2004) on undertaking SA of LDDs which fully incorporates the legal requirements of the SEA Directive.

Government guidance on undertaking SEA for spatial and land use plans (ODPM, 2003), advocates a five stage approach to SEA and SA (see Figures 6.1 and Table 6.2). Further draft generic practical guidance on SEA for non-planning authorities, prepared by the Office of the Deputy Prime Minister together with the Scottish Executive, the Welsh Assembly Government and the Northern Ireland Department of the Environment was published in July 2004 with a three month consultation period provided for comments. The guidance includes sections on the

Figure 6.1. Five-stage approach to SEA / SA (ODPM, 2003)

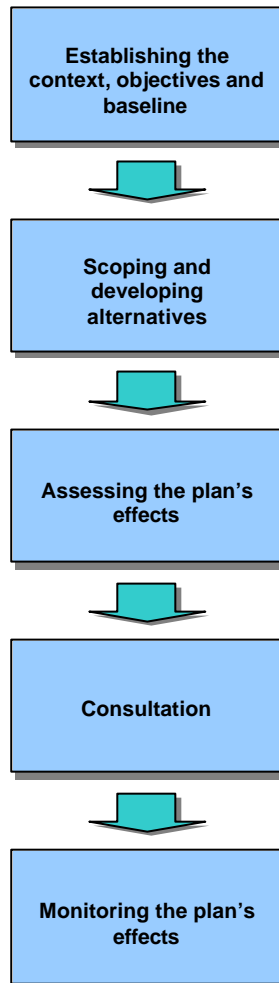


Table 6.2: Stages, decisions and outputs of SEA and sustainability appraisal (ODPM, 2003)

Planning stage	SEA or Sustainability Appraisal stage	The purpose of this stage	What to decide	What to record
Identify the issues and options and prepare for consultation	<p>A. Setting the context and establishing the baseline</p> <ul style="list-style-type: none"> Identify other relevant plans and programmes; Identify environmental protection objectives, and state their relation to the plan; Propose SEA and sustainability appraisal objectives; Propose indicators; Collect baseline data, including data on likely future trends; Identify environmental and sustainability problems. 	<ul style="list-style-type: none"> Document how the plan is affected by outside factors; suggest ideas for how any inappropriate constraints can be addressed; Focus on key environmental and sustainability issues; help to identify SEA and sustainability problems, objectives and alternatives; Streamline the subsequent baseline description, prediction and monitoring stages; Provide a base for effects prediction and monitoring 	<ul style="list-style-type: none"> What other plans, programmes and environmental protection objectives influence the plan; What environmental/sustainability objectives and indicators to test the plan options and policies against; What data to collect and how to structure it so it can be easily used; What environmental and sustainability problems to consider during plan-making. 	<ul style="list-style-type: none"> List of relevant plans, programmes and environmental protection objectives; List of SEA/sustainability appraisal objectives and indicators; Data on environmental/sustainability baseline; List of relevant environmental/sustainability problems.
Consultation on issues and options	<p>B. Deciding the scope of SEA and developing alternatives</p> <ul style="list-style-type: none"> Identify alternatives; Choose preferred alternatives; Consult authorities with environmental responsibilities and other bodies concerned with aspects of sustainability 	<ul style="list-style-type: none"> Clarify baseline, identify problems and alternatives; Ensure that the SEA and sustainability appraisal covers key issues; Help to ensure that the plan is sustainable. 	<ul style="list-style-type: none"> What alternatives to consider, possibly linked to each problem identified in Stage A; What to include in the draft report 	<ul style="list-style-type: none"> List of alternatives; Results of Stages A-B.
Prepare proposed plan	<p>C. Assessing the effects of the plan</p> <ul style="list-style-type: none"> Predict the effects of the plan; Evaluate the plan's effects; Propose measures to prevent, reduce or offset adverse environmental effects. 	<ul style="list-style-type: none"> Consider all likely effects; Ensure that all relevant effects are identified and proposed mitigation measures are considered. 	<ul style="list-style-type: none"> What the effects of specific options, policies and proposals will be; How any adverse effects of implementing plan policies can be avoided, reduced or offset 	<ul style="list-style-type: none"> Effects of the plan options, policies and proposals; List of preferred alternatives and explanation of why these are preferred;

			(mitigated); <ul style="list-style-type: none"> • The preferred alternatives; • How to present the information. 	<ul style="list-style-type: none"> • Proposed mitigation measures and how they will be implemented; • What methods have been used to analyse data and limitations; • Draft Environmental Report
Full public consultation on proposed plan	<i>D. Consulting on the draft plan and the Environmental Report</i> <ul style="list-style-type: none"> • Present the results of the SEA up to this point; • Seek inputs from the public and authorities with environmental responsibilities; • Take consultation results into account; • Show how the results of the Environmental Report were taken into account in finalising the plan. 	<ul style="list-style-type: none"> • Gather more information on the environmental baseline and problems; • Discover the opinions and concerns of the public on environmental and sustainability issues; • Show that information and opinions on environmental and sustainability issues have been appropriately considered 	<ul style="list-style-type: none"> • Who to consult (in addition to statutory consultees) and how; • How to analyse to consultation results 	<ul style="list-style-type: none"> • Consultation process
Monitor plan implementation	<i>E. Monitor the significant effects of implementing the plan on the environment</i>	<ul style="list-style-type: none"> • Ensure that plan is well implemented and feeds into the future plans or reviews next round of SEA/Sustainability Appraisal; • Ensure that adverse effects can be identified ; • Provide information for future SEA's. 	<ul style="list-style-type: none"> • How to measure the actual effects of plan on the environment and <i>sustainability</i> 	<ul style="list-style-type: none"> • Proposed monitoring programme.

background and context of the SEA Directive, consultation, SEA and sustainable development, and the steps in the SEA process (ODPM 2004).

The government's Statutory Instrument 2004 No. 1633 sets out regulations transposing the EU SEA Directive into law in England (see: www.hmso.gov.uk/si/si2004/20041663.htm).

Transposition of the SEA Directive into national law has been dealt with separately in Scotland, Northern Ireland (NI) and Wales. In line with the Partnership Agreement – *A Partnership for a Better Scotland* (Scottish Labour Party and Scottish Liberal Democrats, undated) – Scottish Ministers aim to achieve and surpass the objectives set out in the EU SEA Directive. This involves a two-stage process. The Scottish Parliament has adopted a set of regulations implementing the SEA Directive; however, these will be revoked by a comprehensive bill on SEA, which will apply it to a wider range of public sector strategies, plans and programmes than the Directive requires (Sheate, 2003). Similarly *Sustainability Appraisal of Unitary Development Plans in Wales: A Good Practice Guide*, issued by the National Assembly for Wales (2002) was superseded by interim guidance on the implications of the SEA Directive for Unitary Development Plan (UDP) preparation. This in turn will be replaced by guidance on a combined approach to SEA / SA. In the UK at least, SEA is increasingly incorporated into a wider approach to sustainability appraisal or integrated assessment.

The London-based Town and Country Planning Association (TCPA)¹ has also published a guide to sustainability appraisal, drawing on current best practice, to foster integrating the concept of sustainable development into planning decision-making (Harridge *et al.* 2002). The guide seeks to combine techniques of SEA and sustainability appraisal to achieve a more integrated approach to evaluation. It proposes several tasks (Box 6.6):

**Box 6.6: Tasks in sustainability appraisal proposed by the
Town and Country Planning Association**

- *Development of an appraisal framework* tailored to the need at hand, based on sustainability objectives and criteria that clarify each objective. It is suggested the objectives might be based on those set out in regional sustainable development frameworks and strategies (as they reflect both regional priorities and the overarching national strategy) – but with amendments added as appropriate to reflect local priorities and needs. Project specific questions can be added to test the performance of the plan, strategy or proposal being appraised. Table 6.3 provides an example.
- *Testing the framework* for compatibility with the sustainable development objectives identified by the government.
- *Defining the baseline*- looking at existing environmental, social and economic characteristics of the area being appraised, and how these might develop without intervention.
- *Scoping the plan, strategy or proposal*.- an early 'health' or consistency check which considers the relationship with relevant regional and national policies, and reviews the content for breadth of coverage of objectives.
- *Appraisal of different options* against the appraisal framework objectives.
- *Appraisal of policies and proposals* against the framework objectives (the most significant

¹ The TCPA covers England, Wales and Northern Ireland. A separate association operates in Scotland where planning laws are different.

component - can take several days).

- *Reporting*

Table 6.3: Example sustainability appraisal framework

Sustainability objectives	Criteria
<i>Social progress which recognises the needs of everyone</i>	
1. To ensure that everyone has the opportunity of a decent and affordable home	<ol style="list-style-type: none"> 1. Availability of affordable and private sector housing 2. Accessibility of housing 3. Energy efficiency in housing stock/fuel poverty 4. Quality of housing stock
2. To improve the health and well-being of people and reduce inequalities in health	<ol style="list-style-type: none"> 1. Protection of health 2. Health improvement 3. Equity – reducing g health inequalities
<i>Effective protection of the environment</i>	
3. To protect and enhance existing biodiversity and natural habitats, and create new wildlife habitats	<ol style="list-style-type: none"> 1. Conservation of biodiversity 2. Enhancement of biodiversity 3. Maintenance/restoration of habitats (land management) 4. Creation of new habitats 5. Biodiversity/wildlife education 6. Impact on relevant biodiversity action plan
4. To reduce road traffic and congestion through reducing the need to travel by car and improving travel choice	<ol style="list-style-type: none"> 1. Reduced road traffic (personal and freight) 2. Increased support for more sustainable forms of transport 3. Reduced need to travel
<i>Prudent use of natural resources</i>	
5. To reduce waste generation and disposal, and achieve sustainable management of waste	<ol style="list-style-type: none"> 1. Minimise waste production 2. Reduce waste disposal 3. Sustainable waste management (waste hierarchy)
6. To increase the proportion of energy generated and consumed in the region from renewable sources	<ol style="list-style-type: none"> 1. Increased production of renewable energy 2. Increased consumption of renewable energy sources as a total proportion of energy use
<i>Maintenance of high and stable levels of economic growth and employment</i>	
7. To ensure that people have access to quality employment and occupation opportunities	<ol style="list-style-type: none"> 1. Availability of employment opportunities 2. Quality of employment opportunities 3. Social inclusion 4. Support facilities (eg flexible working practices, child care)
8. To invest to secure future prosperity and quality of life	<ol style="list-style-type: none"> 1. Investment in infrastructure 2. Investment in R&D 3. Investment in social capital 4. Equitable distribution of wealth 5. Investment in the housing stock

Source: Harridge *et al.* (2002; www.entecuk.com/download/sustain.pdf)

6.3 *Other experience with integrated assessment*

Varey (2004) describes a model for Integrated Sustainability Assessment (ISA) developed in Western Australia as a conceptual tool. It is also based firmly in sustainability principles and aims to form an integrated component of policy and decision-making processes. It combines 20 key components (Box 6.7) into a simple one-page 'Thinking Tool' (Figure 6.2 which was used as a template for a group exercise (involving municipal executives and managers responsible for development proposals and public works) to assess 12 development proposals² submitted to a small local government Council. This 'Thinking Tool' was "designed to reflect the psycho-dynamics involved in the complementary integration of conflicting components and the hierarchy of application needed to work through a holistic grouping of considerations". The form of the completed assessments ranged from a single poster-sized page spreadsheet with multiple sub-components, to a detailed sustainability report with fully-integrated EIA field and technical evaluations. Others incorporated extensive community consultation data and processes, costed business plans and expert evaluation reports. The testing of the ISA model showed that omission of one or more elements from the model created distinctly different outcomes from the assessment process.

Another computer-based approach which adopts a broader focus is that of the APEIS³ IEA sub-project project in the Asia-Pacific region. This is undertaking systematic assessment of innovation strategies for sustainable development, through several models and a database based on a set of well-known computer simulation models for the region, collectively called AIM (Asia-Pacific Integrated Model) (<http://www.ecoasia.org/APEIS/pages/sub-project.iea.html>). The models are integrated can also be applied to the assessment of the environment-economy interactions.

The Netherlands Commission for Environmental Impact Assessment has undertaken research on the development of integrated approaches to preparing plans and projects in development cooperation – to overcome the weaknesses of the aspect-by-aspect appraisal. Analysing available instruments, Post and Scholten (undated) concluded that "for appraisal of policies, plans and programmes, a fully integrated instrument should be developed from the best assessment instruments currently available, taking one of them as the core instrument." For project appraisal, they recommend the identification of a "leading theme' and other themes of importance (contributory issues), "that the assessment instrument developed for the

² The projects covered a diverse range of sustainability impacts and included: major tourism and boating marina, a community cultural centre and performing arts venue, long-term groundwater supply infrastructure, a multiple-use youth recreation facility, street trees management and streetscape amenity, industrial leachate discharge, enhancement to an underwater tourism development in the form of an artificial dive-site, stockyard bio-solids and wastewater handling, road-works gravel extraction and mining, historical landmark preservation, the removal and storage of a 175 year old archived records management facility and an urban development proposal.

³ The APEIS (Asia-Pacific Environmental Innovation Strategy) project was launched in 2001 under the framework of the Environment Congress for Asia and the Pacific (ECO ASIA). The project aims to establish scientific infrastructure on environment and development and to provide policy-makers with knowledge-based tools and innovative policy options that can support their informed decision-making for sustainable development in the Asia-Pacific region. APEIS consists of three scientific sub-projects:

- satellite- and ground-based integrated monitoring (IEM: Integrated Environmental Monitoring);
- research on innovative and strategic policy options (RISPO), in collaboration with multiple research organizations in the region;
- assessments using environment-economy integrated models (integrated environmental assessment, IEA)

Box 6.7: 20 key components of a proposed Integrated Sustainability Assessment framework

1. **Sustainability definition:** that used by the organisation to frame its sustainability enquiry – what is to be sustained (eg economic, social and ecological values), for whom (eg the community) and for how long (eg future generations).
2. **Issue:** the matter that is causing the need for proposed action. It should not be phrased as a solution (eg issue: the number of introduced weeds in parklands).
3. **Outcome:** the desired result in wide terms. It should not be phrased as the absence of a problem (eg that natural parklands contain a healthy mix of biodiverse indigenous flora – not, for example, the elimination of a certain weed).
4. **Economic principles:** the sustainability principles that reflect financial and non-financial economic considerations (eg cost estimates must aim to minimise both external and internal accounted for costs).
5. **Social principles:** the sustainability principles that reflect social, community, heritage, cultural, gender and other humanitarian considerations (eg development must preserve amenity in the heritage areas of cultural significance or uniqueness).
6. **Environmental principles:** the sustainability principles that reflect ecological sustainability (eg application of the precautionary principle in the preservation of at-risk, non-renewable natural resources).
7. **Ethical principles:** the sustainability principles that reflect good governance and moral considerations (eg compliance with both State law and issued, but not yet effective, policy).
8. **Required outcome criteria:** the specific financial, social, environmental and ethical criteria derived from the principles that are the ‘must haves’ for a proposal of that type to be acceptable (eg is within budget approvals, preserves heritage value, creates no pollution and complies with the Building Code).
9. **Proposal:** the proposed action itself – describing its essential elements (including a timeframe and location). This may be modified and adapted many times before becoming a final proposal but is stated with clarity for the purposes of assessment.
10. **Final proposal:** the proposal once developed and assessed, incorporating any improvements required to satisfy the *required outcome criteria*, to distinguish this from the initial proposal, pre-assessment.
11. **No action alternative:** the description of what is most likely to occur in the future if the present position is maintained and no action is taken or if the proposal is accepted.
12. **Benefit:** for each of the sustainability categories, the (tangible and intangible) benefits of the particular proposal. A benefit is something that improves the existing position, now and in the future (ie does not alleviate problems with a potential position).
13. **Impact:** the adverse (tangible and intangible) impacts for each of the sustainability categories.
14. **Here:** the geographical or locational artificial boundary of the particular proposal for thinking purposes. A ‘here’ may be geographically disaggregated (eg all community playgrounds within the region).
15. **There:** everywhere else that is not defined within the category of ‘Here’ for a proposal.
16. **Now:** the temporal delineation of effects for the particular proposal for thinking purposes (eg effects that become obvious this day/month/in a 20-year period) determined as appropriate for the timeframe of the effects.
17. **Then:** everything else in terms of time that is not defined within the category of ‘now’ for a proposal (ie past events are considered in the aggregate as part of the present comprised in ‘Now’).
18. **Assessment criteria:** the scoring or metrics system used to assess each benefit and impact dimension (eg at its simplest, a ranking 0-5 where 0 is no benefit and 5 is maximum potential benefit).
19. **Decision criteria:** the basis on which the scored assessment will determine if a proposal will be recommended for implementation (eg the benefits outweigh impacts, net benefits and impacts must exceed 100 points in the assessment criteria, etc.). This may be influenced by whether the proposal is essential or optional to ensure sustainability – with a higher threshold for optional projects. There may be only a decision criterion for the whole proposal, or specific threshold criteria for each of the multiple bottom lines (eg no environmentally adverse impacts or irreparable nature) depending on the nature of the proposal. Flexibility is provided subject to transparency.
20. **Timeframe:** must the issue be decided on information available up to a particular time, or can it be decided in an open timeframe without invoking the No-Action Alternative.

Source: Varey (2004)

Figure 6.2: Integrated Sustainability Assessment “Thinking Tool” (Varey 2004)

Issue:			Outcome:						
Economic	Required Criteria:	Proposal	Benefit		Impact		Score		
			Here	Now	Here	Now			
			There	Then	There	Then			
Social			Here	Now	Here	Now			
				Then	There	Then			
Environmental			Here	Now	Here	Now			
				Then	There	Then			
Ethical			Here	Now	Here	Now			
				Then	There	Then			

leading theme be applied and that assessment of the contributory issues be incorporated in that instrument”.

Kolhoff *et al.* (1998) also note the inadequacies of aspect-by-aspect approaches in their research on integrating assessments for integrated water management projects in developing countries. They see a major task of integrated analysis as managing the interdisciplinary process to keep the team together and identify two important procedural steps:

- *coordination of sectoral studies* through organised inter-expert meetings - to generate awareness of differences in sectoral approaches and to adapt contributions accordingly (the manager of the assessment process plays a crucial role in this);
- *integration of sectoral studies*. Where undertaken at a lower level, a common set of project alternatives is identified from all sectoral studies. If carried out at a higher level, no sectoral studies are undertaken and “an interdisciplinary team of experts produces one single assessment covering all relevant appraisal aspects”. At the latter level, the assessment would need to focus mainly on working routines so as to enable sufficient management of the multi-disciplinary process.

Whilst approaches to integrated planning have been introduced in several countries (e.g. Denmark, New Zealand and UK), often they tend to be restricted to “substantive integration” as categorised by Eggenberger and Partidário (2000) (see Box 6.1).

Buselich (2002) suggests that sustainability-based assessment could involve an almost organic combination of processes:

“Different approaches and techniques, and different combinations of processes and techniques, would apply for different purposes. Sustainability-based procedures and tools would need to be carefully selected (through consensus) and would be subject to continual review”.

6.4 Approaches and techniques to support decision-making

A critical issue for sustainability assessment is the integration of qualitative and quantitative information. Techniques for multi-criteria analysis can help as well as other decision-aiding approaches (which involve stakeholders working together) such as weighted summation, concordance/discordance analysis, planning balance sheet (PBS) and goals-achievement matrix (GAM) – most of which have been applied for decision-making in urban planning contexts. A brief review of such methods is provided by Buselich (2002). Suitability of such techniques will depend on the circumstances at hand.

6.4.1 Sustainability-based environmental assessment

Gibson *et al.* (2001) discuss the application of *sustainability-based environmental assessment* as a means of improving decision-making by enabling decision-takers to “gain and apply a better appreciation of the potential effects of the available options”. The focus is on using analysis of “significance” to determine if a particular risk or trade-off is acceptable. The possible limitations of a sustainability assessment process are recognised, for example, where compensation and net calculations become influenced by the different interests of those involved. In response, it is suggested to formulate general rules for dealing with compromises and trade-offs and selecting associated processes – defined according to the context and reliant on the cooperation of all stakeholders. A set of sustainability-based significance

questions are proposed (Box 6.8). When used with indicators, these would guide the evaluation of the significance of effects, and then of undertakings. General criteria for evaluating the significance of trade-offs and compromises are also suggested (Box 6.9) as well as an illustrative list of trade-off decision rules.

Box 6.8: Generic sustainability-based criteria for evaluating the significance of effects

1. Could the effects add to stresses that might undermine ecological integrity at any scale, in ways or to an extent that could damage important life support functions?
2. Could the effects contribute substantially to ecological rehabilitation and/or otherwise reduce stresses that might otherwise undermine ecological integrity at any scale?
3. Could the effects provide more economic opportunities for human well-being while reducing material and energy demands and other stresses on socio-ecological systems?
4. Could the effects reduce economic opportunities for human well-being and/or increase material and energy demands and other stresses on socio-ecological systems?
5. Could the effects increase equity in the provision material security and effective choices, including future as well as present generations?
6. Could the effects reduce equity in the provision material security and effective choices, including future as well as present generations?
7. Could the effects build government, corporate and public incentives and capacities to apply sustainability principles?
8. Could the effects undermine government, corporate or public incentives and capacities to apply sustainability principles?
9. Could the effects contribute to serious or irreversible damage to any of the foundations for sustainability?
10. Are the relevant aspects of the undertaking designed for adaptation (e.g. through replacement) if unanticipated adverse effects emerge?
11. Could the effects contribute positively to several or all aspects of **sustainability** in a mutually supportive way?
12. Could the effects in any aspect of **sustainability** have consequences that might undermine prospects for improvement in another?

Source: Gibson *et al.* (2001)

Box 6.9: Generic criteria for evaluating the significance of trade-off elements

Will the **positive effects** to be gained in a proposed trade-off:

- Reduce stresses on ecological integrity at any scale?
- Increase economic opportunities for human well-being?
- Reduce material and energy demands and other stresses on socio-ecological systems?
- Increase equity in the distribution of material security and effective choices?
- Strengthen government, corporate and/or public incentives and capacities to apply **sustainability** principles? and/or
- Develop complementary efforts to serve different aspects of **sustainability** in ways that
 - are or may be great in intensity, magnitude, scale, extent, duration or frequency?
 - are or may be permanent and irreversible (or at least sustainable for the foreseeable future)?
 - preserve or enhance highly valued ecological or socio-economic qualities?
 - may combine with the effects of other undertakings for more positive cumulative results?
 - avoid potentially dangerous uncertainties and prepare for surprise?
 - earn a high level of public approval?

- encourage performance beyond levels anticipated in regulatory standards and/or public policies?
- enhance international relations? And/or
- set important precedents?

Might the **adverse effects** to be accepted in a proposed trade-off:

- Damage ecological integrity at any scale in ways or to an extent that could damage important life support functions?
- Reduce economic opportunities for human well-being?
- Increase material and energy demands and other stresses on socio-ecological systems?
- Reduce equity in the distribution of material security and effective choices?
- Involve or introduce important uncertainties and/or risks?
- Undermine government, corporate or public incentives and capacities to apply sustainability principles?
- Build tensions between efforts to serve different aspects of sustainability in ways that:
 - are or may be severe in intensity, magnitude, scale, extent, duration or frequency?
 - are or may be permanent or irreversible?
 - involve rare, scarce, unique or otherwise highly valued ecological or socio-economic qualities?
 - may combine with the effects of other undertakings for more adverse cumulative results?
 - have indirect adverse effects that may also undermine prospects for improvement in another aspect of sustainability?
 - stir a high level of public controversy?
 - contravene important regulatory standards and/or public policy positions?
 - damage international relations? And/or
 - set important precedents?

Source: Gibson *et al.* (2001)

6.5 Consistency analysis matrix for policy assessment

In seeking to assess sustainability, the Environmental Alliance (2001) has examined the use of internal and external consistency checking, impact forecasting and recording of outcomes. In assessing particular plans or policies, it proposes the use of a “*consistency analysis matrix*” to evaluate whether elements are inherently consistent (see Table 6.4A). Following this step, compatibility *between* plans or policies can be assessed using a matrix with axes denoting of the elements of two different plans/policies. If necessary, one or more elements could be revised to make them more compatible. Finally, potential environmental, social and economic impacts of particular plan/policy elements can be forecasted using a “policy impact matrix.”. Table 6.4B provides an example of such a matrix (illustrating environmental objectives) in the context of the outcomes of impact prediction for a regional development plan. This matrix approach might also be useful for comparing alternatives or to analyse policy scenarios. Here, the scenarios would form one axis and indicators the other, and the impacts (on the indicators) of alternatives would be indicated in the cells. To help manage outcomes, it is suggested that these are recorded on a “policy record sheet” (Table 6.4C).

6.6 Sustainability test

Land Use Consultants – a UK-based consultancy company – have developed a ‘sustainability test’ as a practical tool for appraising policies, plans and programmes (PPPs) and other planning processes and activities such as budget formulation. It is designed for use within SEAs and particularly to guide group discussion about the relative sustainability of different

Table 6.4A: Testing the consistency of policy elements for a hypothetical land-use plan
(Source: Environmental Alliance (2001))

	Economy	Culture and language	Natural environment	Built environment	Energy	Pollution
Economy	-					
Culture and language	✓?	-				
Natural environment	✓?	✓?	-			
Built environment	✓?	✓?	✓	-		
Energy	X?	O	✓	✓	-	
Pollution	X?	O	✓	✓?	✓	-

✓, compatible; ✓?, probably compatible; X?, probably incompatible; O, no relationship.

Table 6.4B: Example of a policy impact matrix for forecasting

Environmental Objectives →	Global Sustainability				Natural Resources				Local Environmental Quality			
	Transport efficiency: trips	energy: energy	Built environment: energy efficiency	Renewable energy potential	Rate of CO ₂ fixing	Air quality	Water conservation and quality	Land and soil quality	Landscape and open land	Urban liveability	Cultural heritage	Public access to open space
To provide a network for open space corridors	•	•	•	•	✓	✓	•	✓	✓?	✓	✓	✓
To concentrate residential development on an existing public transport corridor of the city	•	✓	•	•	•	x	•	•	✓?	✓	✓?	x
To concentrate residential development on a new rural "green" settlement	x	✓	✓?	✓?	•	✓?	x	x	x	✓	✓?	x

Legend:

• No relationship, or insignificant impact	✓ Significant positive impact	✓? Likely, but unpredictable impact	X Significant negative impact	? Uncertainty of prediction or knowledge
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Table 6.4C: Example of a policy record sheet

Policy No.	Original Policy Statement 1					
	Policy Revision 2					
	Policy Revision 3					
	1		2		3	
Environmental Sub-objectives	Original Policy Impact	Commentary/ Action required where impact is significant	Revised Policy Impact	Commentary/ Action	Further Revised Policy Impact	Commentary/ Action
1						
2						
3						

policy statements and alternative courses of action. The technique is designed for use at all tiers of SEA (national, regional and local) and examines policies against selected biophysical, social and economic criteria and produces a recognisable visual image of performance on a single side of paper. Three steps are involved (Nelson 2003):

- Step 1: The PPP is described in some detail to ensure that those appraising its sustainability are fully aware of the aims and objectives and the way in which the PPP is likely to be implemented.
- The standard criteria (see column of Table 6.5) are reviewed and any additions/deletions or changes in wording are made to suit the particular circumstances. Indicators (column 2) are also refined as appropriate.
- One member of the appraisal group acts as facilitator and the group considers the performance of the PPP against each criterion in turn. The group works towards a consensus, and the reasons for their decision to accord a particular 'score' are noted on a separate record sheet.

Where differences of opinion arise over appropriate scores, the lower score is taken. This encourages debate about the measures that might be needed to make the PPP more sustainable – by moving the score to the right. Where there are conflicting opinions about the sustainability of the PPP (eg over implementing a policy with different levels of sustainability⁴), both score are recorded

Experience shows that smaller group of 5-6 people work more effectively than large groups. With half a day's training, previously inexperienced groups can review a PPP in 20 minutes. An example of the test applied to providing piped water supply in remote villages in Ghana is shown in Table 6.5.

6.7 Sustainability impact assessments

Sustainability impact assessment (SIA) has emerged directly from EIA as a way of addressing broader concerns related to sustainable development. Most approaches recognise the need to provide decision-makers with a practical instrument to assist them in understanding how the three pillars of sustainable development (economy, society and environment) can be integrated and to facilitate the adoption of sustainable policies or activities. UNDP has proposed an instrument that would be primarily used for ex ante evaluation with a view to design and prepare policies, programmes, or projects, but could as well be useful for interim, final or ex post evaluation work (<http://capacity.undp.org/cases/insights/comolet.htm>). The method will use a structured checklist of questions and comprise four phases: characterisation of the action; pre-screening; screening; and evaluation and reporting. The University of Manchester has also used an SIA approach to assess the impact that WTO multilateral trade negotiations (see Box 9.2).

⁴ For example, a policy for introducing piped water to remote villages will require diesel generators or electricity to operate the pumps in perpetuity. This conflicts with the criterion on Energy and results in a score of '2'. However, redesign of the policy may allow gravity fed solutions or solar/wind energy to drive the pumps; in this instance the score might be 4 or 5.

Table 6.5: Examples of sustainability appraisal on providing piped water to isolated rural communities in Ghana (Source: Nelson 2001)

Policy Statement: Extend pipeline to give piped water supply to 200 homes		
CRITERIA – BASIC AIMS AND OBJECTIVES	INDICATORS	PERFORMANCE MEASURE
EFFECTS ON NATURAL RESOURCES		
Protected Areas and Wildlife: should be conserved, and these resources should be enhanced where practical.	Sensitive areas shown on maps	(0) 1 2 3 4 5
Degraded Land: and areas vulnerable to degradation should be avoided. Already degraded land should be enhanced.	Vulnerable areas shown on maps	(0) 1 2 3 4 5
Energy: The PPP should encourage efficient energy use, and maximise use of renewable rather than fossil fuels.	Quantity and type of fuel/energy to be identified	(0) 1 2 3 4 5
Pollution: Discharges of pollutants and waste products to the atmosphere, water and land should be avoided or minimised.	Quantity and type of pollutants and waste to be identified	(0) 1 2 3 4 5
Use of Raw Materials: All raw materials should be used with maximum efficiency, and recycled where practical.	Quantity and type of materials to be assessed	(0) 1 2 3 4 5
Rivers and Waterbodies: should retain their natural character.	Minimum flows/ water levels to be set	(0) 1 2 3 4 5
EFFECTS ON SOCIAL AND CULTURAL CONDITIONS		
Local Character: and cohesion of local communities should be maintained and enhanced where practical.	Opinions of local communities to be assessed	(0) 1 2 3 4 5
Health and Well-being: The PPP should benefit the work force, and local communities in terms of health and well-being, nutrition, shelter, education and cultural expression.	Number of people exposed to water-borne disease, or lacking adequate food and shelter to be assessed	(0) 1 2 3 4 5
Gender: The PPP should empower women.	Number of women to be empowered	(0) 1 2 3 4 5
Work for Local People: Priority should be given to providing jobs for local people and particularly women and young people.	Number of people to be employed	(0) 1 2 3 4 5
Participation: Active participation and involvement of local communities should be encouraged (especially vulnerable and excluded sections).	Level of participation proposed	(0) 1 2 3 4 5
Access: of the poor to land should be improved.	Number of the poor to be assisted	(0) 1 2 3 4 5
Access of the poor to water should be improved	Number of the poor to be assisted	(0) 1 2 3 4 5
Access of the poor to transport should be improved.	Number of the poor to be assisted	(0) 1 2 3 4 5
Sanitation: Should be improved.	Number of the poor to be assisted	(0) 1 2 3 4 5
Equity: Adverse and beneficial impacts from development should be distributed equitably and should not discriminate against any groups, especially vulnerable and excluded people.	Number of the poor to benefit on equitable terms	(0) 1 2 3 4 5
Vulnerability and Risk: of drought, bushfire, floods crises and conflicts and epidemics should be reduced.	Occurrence to be noted and monitored	(0) 1 2 3 4 5
EFFECTS ON THE ECONOMY		
Growth: The PPP should result in development that encourages strong and stable conditions of economic growth.	Economic output to be evaluated	(0) 1 2 3 4 5
Use of local materials and services: The PPP should result in the use of raw materials and services from local industries where possible.	Description of sources	(0) 1 2 3 4 5
Local Investment of Capital: Development should encourage the local retention of capital and the development of downstream industries, utilising local raw materials, products and labour.	Description of investment strategy	(0) 1 2 3 4 5

