

GA NCR4eA

21 MAR 2001

**FINDINGS OF A SEMINAR ON  
INTEGRATED APPRAISAL FOR WATER  
QUALITY MANAGEMENT**

Jonathan Fisher and Ashley Holt

Report No 41

March 2001

<b>Title: Findings of a Seminar on Integrated Appraisal for Water Quality Management</b>	<b>Report No 41</b>	
	<b>Version: 0.9</b>	
	<b>Issue Date:</b>	
<b>Approval</b>	<b>Signature</b>	<b>Date</b>
Jimi Irwin	JG Irwin	21 March 2001
<b>Distribution: Environment Agency External</b>		
<b>This is version 0.9 for final review by the Agency and DETR prior to circulation to participants at the seminar for their comments</b>		

## CONTENTS

<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	Objective of this report	1
1.2	Outline of the Report	1
<b>2</b>	<b>OVERVIEW OF NEEDS FOR AN APPRAISAL SYSTEM</b>	<b>2</b>
<b>3</b>	<b>THE FUTURE POLICY CONTEXT</b>	<b>4</b>
3.1	The Water Framework Directive (WFD)	4
3.2	Heavily Modified Water Bodies - Links with Flood Defence, Recreation and Navigation	5
<b>4</b>	<b>POSSIBLE MEASURES</b>	<b>7</b>
4.1	Water industry/AMP 4/5	7
4.2	Economic Instruments	7
4.3	Agriculture	8
<b>5</b>	<b>PROPOSED INSTITUTIONAL AND DECISION-MAKING FRAMEWORK AND PROCESS: ROLES AND RESPONSIBILITIES OF KEY DECISION-MAKERS</b>	<b>10</b>
5.1	EC	10
5.2	National - DETR	10
5.3	Environment Agency Head Office (EA HO)	11
5.4	Regions	12
5.2	An Agency region is likely to include a small number of basins.	12
5.5	Local – RBMP	12
5.6	Outstanding Institutional Issues	12
	The seminar raised the following outstanding institutional	12
<b>6</b>	<b>ELEMENTS OF A POSSIBLE APPRAISAL SYSTEM</b>	<b>13</b>
6.1	DETR at National Level	13
6.2	Appraisal of RBMPs	14

6.3	Overall outstanding issues on Appraisal Techniques	31
	ANNEX I: Agenda For Seminar	33
	ANNEX II: Participants At The Seminar	35
	ANNEX III: Economic Elements Of The Water Framework Directive	37
	ANNEX V: "Reasons For Failure" – Examples From	50
	ANNEX VI: Illustrative Example Of A Water Quality Management Case	57
	ANNEX IX: Assessment Of The Economic, Social And Environmental Impacts Of The Options: Review Of Existing Approaches And Techniques	64
	ANNEX X: Integrated Appraisal For River Basin Management Plans: Terms Of Reference For A Virtual Scoping Study	66

## **FINDINGS OF A SEMINAR ON INTEGRATED APPRAISAL FOR WATER QUALITY MANAGEMENT**

### **Executive Summary: Conclusions and Proposed Research Needs**

The attached report presents the findings of a seminar that the Environment Agency organised on 1 and 2 November 2000 to discuss the development of an appraisal system for implementing the Water Framework Directive (WFD).

The seminar enabled a useful dialogue between economists and policy officials from DG Environment (EC), DETR, MAFF and DTI, Environment Agency policy and operational managers, and key stakeholders from OFWAT, industry, English Nature and RSPB together with leading experts and academics from the natural and social sciences. Considerable progress was made in enhancing understanding amongst these parties and outlining elements of an integrated appraisal system.

Possible measures for achieving the good water quality target set in the WFD were discussed. Some measures, such as direct regulation of discharges, could be implemented and enforced by the Environment Agency under its existing powers. However others, for example concerning the water industry investment for AMP or measures affecting agriculture, will ultimately be determined or shaped by government at the national level, for example, by DETR.

There was recognition that agricultural practice is a major influence on water quality in some areas and that any proposed measures affecting agriculture would require careful appraisal due to their potentially significant social and economic implications.

The seminar discussions outlined various elements of a system for appraising River Basin Management Plans (RBMPs). This aims to generate information to aid decision-making on appropriate water quality targets, measures needed to achieve them and, whether there is a justifiable need to apply a derogation to achieve a lower quality target than the good quality status target set in the WFD. Such derogations could be allowed if the measures needed to achieve targets within the WFD timescales are judged 'disproportionately expensive' (a term enshrined in the WFD).

This means that the onus for appraisal and changing UK water quality standards will shift from justifying achieving a good quality target to justifying not meeting the good quality target set in the WFD. The good status 'benchmark' target having been agreed when the WFD was passed.

Further development of the appraisal system depends on clarification (by DETR in liaison with the EC) of what is meant by "disproportionately expensive" and what economic analyses are needed to inform decisions on when measures would be '*disproportionately expensive*'?

The discussions at the seminar identified the following linked elements of a possible outline appraisal system for RBMPs. Further work will be needed to refine and work up these elements and determine their appropriate sequencing before a draft appraisal system could be developed.

Element 1: Stakeholder analysis and engagement to identify pressures on water quality and options for water quality improvements and to scope issues of concern

regarding the impacts of these options in the river basin. This is partly designed to comply efficiently with article 14 of the WFD to involve actively all interested parties in the production of the RBMPs. But more importantly it also would further the Agency's practices on this subject and Central Government code of practice for modernising Government<sup>1</sup>, which both stress the importance of early consultation as a key to the success of policy initiatives and securing co-operation of the key parties involved.

**Element 2:** Assess current water quality status in the basin and its water resource availability where this affects water quality. This would be in line with Article 5 of the WFD.

**Element 3:** Assess likely future developments regarding pressures on water quality in the river basin (in a business as usual scenario with no interventions) to determine future projected water quality status to see if the basin will achieve good quality status by the end of the appraisal period. This would be in line with Article 5 of the WFD.

As the **output** of these element 1 – 3, the Agency's manager will prepare a report that characterises the RB with a breakdown into surface and groundwater bodies. This will identify the likelihood of not being able to achieve good status by 2015 and set out the nature of the environmental impacts of the pressures if the water bodies are unlikely to be able to achieve good quality. Environment Agency HO will then quality assure this (eg in respect of ensuring consistency of data collection, analyses and reporting) and collate the assessments for review by DETR. This would then form part of the analysis required by article 5 which must be completed by December 2004.

**Element 4:** Assess the effectiveness of the different measures that could be used and build packages of measures for achieving good quality status at the surface and groundwater bodies. This is line with Article 11 of the WFD. This work will include careful scientific assessments of the effects of each option on the various parameters that determine good quality. There are considerable uncertainty and knowledge gaps on this subject. The project manager in liaison with stakeholders would then draw up a shortlist of options to cost. These stakeholders would in particular include the parties involved in the practical implementation of measures (Farmers, other dischargers etc.).

**Element 5:** Estimate the cost and economic impacts of individual options on the basis of submissions of preliminary and revised final cost estimates by the companies or organisations concerned which would be reviewed and scrutinised by appropriate experts such as Ofwat's reporters in respect of water company cost estimates. This should build on and be linked with the technical analysis in element 4. This work will be carried out in the context of articles 4.4 and 4.5 of the WFD.

**Element 6:** On the basis of the findings of elements 1-5, the Agency's project manager, in consultation with affected parties, will prepare costed packages of cost-effective options to achieve various water quality states in the basin relating to the objectives to be met. These appraisals will be collated and quality assured by the Agency's Head Office and fed through to DETR for their review. This will be in pursuance of articles 4 and 5 and Annex III of the WFD.

---

<sup>1</sup> Cabinet Office (2000) Code of Practice on Written Consultation.

Element 7. Appraisal of the costs and benefits of Options to achieve different water quality states. The appraisal will focus on appraising the costs and environmental benefits for packages of options to achieve various water quality objectives or to change the risks of failing to achieve a specific water quality objective. This will be in pursuance of articles 4.4 and 4.5 of the WFD. The economic appraisal and valuation of the significance of these environmental benefits will primarily be carried out as an integral part of this appraisal to ensure that it can best aid decision-making. It will include the following elements 8 - 11

Element 8. The fundamental element for the benefits assessment/valuation will be careful scientific assessments of the environmental effects of each alternative water quality state. There are considerable uncertainty and knowledge gaps on this subject.

Element 9. Cost-benefit analysis of the environmental benefits of different water quality states. This would use benefits transfer where these can yield robust valuations that can aid DETR's decisions. This might include monetary valuation of the readily monetisable environmental impacts such as:

- impacts on marketable products - water supply for domestic, industrial or agricultural uses, impacts on agricultural outputs and commercial fisheries;
- impacts on services that participants directly pay for - fishing and other formal in-stream recreation including canoeing, boating, water sports;
- and impacts on leisure services that participants do not directly pay for such as informal recreation (although there may be difficulties obtaining representative data on the numbers of beneficiaries).

In addition, there are likely to be some other important intangible impacts that are more difficult to value in monetary terms using benefit transfer valuations, but which were identified as being particularly important at the seminar. This may include impacts on natural habitats, biodiversity and the primary ecosystem, culture, heritage and equity impacts. At this stage, there will be a substantive and objective description of the scale, nature and significance of these impacts. Valuation of these impacts using Stated Preference techniques is included in element 11. If SP surveys will be needed for many basins, then we will need to find a mechanism for transferring the findings from surveys in selected basins to other basins as part of the cost-benefit analysis in element 9.

Element 10. Stakeholder consultation. The Agency's project manager (probably assisted by a consultant) would then collate the findings of the appraisal for in-depth discussion by a group of stakeholders to relay their concerns about particular issues and aspects of the options and their impacts. This would be in line with article 14 of the WFD to consult the public about the RBMPs by 2008, plus also the Agency's practices and Central Government code of practice for modernising Government.

Element 11. Stated Preference surveys to seek the views on the outstanding options and their (conflicting) impacts. These surveys will cover a larger sample of affected parties than those represented by the responses to the consultation exercise in element 10.

Element 12. Review of Findings by DETR. The Agency's project manager, in liaison with stakeholders, will provide a report on the findings of the analyses for the elements 1-11 above. This will be collated and quality assured by the Agency's Head Office and delivered to DETR for review so as to enable preparation of the RBMPs.

This will be in line with articles 4, 5 and 13 of the WFD, which requires publication of the RBMPs and justifications for any derogations by 2009.

The seminar concluded that due to the implementation timescale of the Directive, it is advisable to develop and trial the appraisal system as soon as possible.

The elements of an appraisal system for RBMPs outlined above could provide a sound basis for determining some of the water industry measures needed in AMP 5. Thus, the appraisal would identify and specify water industry measures that are cost-effective means of achieving specific water quality states for relevant water bodies in each basin and provide a process to elicit the views of the key stakeholders and public on these measures.

However, this also raises the question of what interim appraisal is appropriate for AMP4 as preparations for this do not correspond with timescales for producing River Basin Management Plans under the Directive. Similar transitional issues arise regarding the first tranche of the Catchment Abstraction Management Strategies (CAMS).

### **Research Needs**

The following research topics were identified at the seminar.

It was suggested that the Environment Agency should commission a 'virtual' appraisal study based on one of the proposed basins. Annex X presents the terms of reference for this study. The basin chosen will be one that has a representative range of issues covering pollution, water resource, and navigation and flood defence issues.

Specific issues to be addressed in this virtual study include:

- Scope, characterise and differentiate the various stretches of water bodies in the selected basin so as to identify bodies of water for which objectives must be set and measures identified,
- Characterise the various possible measures to achieve good quality status in terms of the level (eg national or local) at which decisions have to be taken on them and the level at which these measures have to be implemented.
- Characterise the diverse parties affected positively or negatively by the impacts of these various possible measures to achieve good quality status so as to help inform (in subsequent research) how their views could be input to decision-makers.
- How to present information on measures and combinations of measures to show costs, benefits (where appropriate) and other factors where relevant to aid decision-making on the various types of options
- How could the various elements of the appraisal system best generate this information and how this information could fit together well in practice.
- How an area manager would input the findings of the various stages of the appraisal system to HO/DETR for their reviews and how HO/DETR would report their views back to inform the next stages of the appraisal as necessary?

- How best to use the available information given by existing scientific, risk assessment and economic appraisal systems on the environmental, economic or social impacts of the possible measures so as to aid decision-making on them. What are the key gaps in information, analyses and technical expertise that need to be addressed to undertake cost-effectiveness and cost-benefit analysis?
- How much time and resources would be available to carry out the appraisal of measures in the basin? How much time and resource would be required to carry out an appraisal at the various types of basins? How to reconcile the likely imbalance between needs and available resources (eg streamline the appraisal process while maintaining its key elements)?
- Identify outstanding staff resourcing and capability issues. For example, are there sufficient numbers of trained staff at regional level and centrally to co-ordinate data collection and economic analysis?
- Identify needs for specific research, including pilot RBMP studies, to investigate in depth and clarify particular outstanding issues regarding the practical application of an appraisal system.

The seminar highlighted that the issues that may need to be investigated in such possible follow up pilot studies might include:

- How to assess consistently the costs and economic impacts of measures covering different sectors (eg agriculture, water industry, and non-water industries subject to international competition)? This includes not only control options, but also government expenditures on technical assistance and advisory programmes (eg agri-environment schemes)?
- How to assess changes in the pressures on water quality up to 2009 and 2015, including not only prospective analyses of pollution sources but also other matters affecting water quality such as possible climate changes?
  - How to assess and present the important non-use environmental benefits?
  - What form of Stated Preference survey technique would be needed? How to carry them out and report their findings to aid decision-makers?
- How to estimate the number of beneficiaries of the water quality improvements?
- How to carry out the consultation processes and to report the findings of the consultation to aid decision-makers?
- Whether the cost-effectiveness estimates for achieving the selected water quality target in a RBMP could subsequently be used as benchmark estimates - any appeals against decisions on individual consents needed to achieve this WQO might then focus on whether the cost-effectiveness of the controls exceed this benchmark.



## **1 INTRODUCTION**

This report presents the findings of a seminar that the Environment Agency organised on integrated appraisal for water quality management. Annex I presents the agenda and Annex II lists the participants. The objectives of the seminar were:

- to discuss, in depth, methods helpful for those carrying out appraisals of options for water quality improvements;
- to seek the views of the main stakeholders on the development of an appraisal system that can be used by the Environment Agency and others to assess cost and benefits of water quality improvements so as to appraise and allow different options to be compared;
- to discuss the latest methodological advances in risk assessment, environmental assessment, economic valuations of benefits and costs, public involvement and consultation that could be applied in an appraisal system. In particular, to discuss advances in co-operation *between* these disciplines to help the Agency develop and apply practicable and effective appraisal;
- to help identify issues for further research and development.

Consistent with these objectives, there were extensive fruitful discussions at the seminar between various policy and decision-makers at different levels and between practitioners and experts in a number of appraisal techniques and approaches.

### **1.1 Objective of this report**

The objectives of this report are to collate the findings of the seminar, highlight a number of outstanding issues and propose actions to address them. We intend that this report should aid development of practical and efficient appraisal methods that the Agency's Water Quality Managers can apply in practice, taking into account the need for co-operation with stakeholders.

### **1.2 Outline of the Report**

**Section 2** highlights the requirements for an appraisal system. The key requirement is that it should aid decision-making on the key policy questions.

**Section 3** therefore describes the policy context.

**Section 4** then identifies a number of possible policy measures and identifies key the decision-makers and the level at which the measures would be implemented.

**Section 5** examines the institutional framework and process and sets out the roles and decision-making responsibilities of the bodies at each level. It outlines criteria for making these decisions and the outputs of the appraisal information that they need. This provides an overview of the appraisal system needed at each level.

**Section 6** then sets out various linked elements in a possible appraisal system for each level of the decision-making process above, with outstanding options and issues identified for each element and level.

## **2. OVERVIEW OF NEEDS FOR AN APPRAISAL SYSTEM**

The aim of this project is to develop a stable appraisal system to aid catchment management and, in particular, implementation of the Water Framework Directive. This therefore includes both decisions on setting appropriate environmental objectives and the design of the programmes of measures that will be needed to achieve them. Some of the principles may also be applicable in other discussions on setting and implementing other environmental goals and targets.

In its regulatory activity, the Environment Agency is called to make judgements that balance the needs and interests of all groups in order to contribute to sustainable development. This is no simple task. It involves the following important challenges:

- Setting objectives for the short and long term that are both achievable and which capture society's aspirations;
- The increasing demand (by the public) for greater environmental protection;
- The rising costs of securing additional pollution abatement from the major polluters;
- The need to consider *all* of the main the activities that can affect water flows and quality; industry, housing (as served by the water industry) and the important sources of 'diffuse' pollution;
- The need to deliver appropriate, even-handed and fair control of all these sources.

Consequently, we need an appraisal system to generate the information required to support the decisions that shape the development and implementation of control measures for water pollution. It must meet the following criteria:

- **Aid to decision-making.** The appraisal system should yield information in the appropriate form to help decision-makers.
- **Comprehensive:** covers the environmental, economic and social implications of options. It should also address the concerns of all stakeholders affected. There must be rigorous specification of the costs and benefits covered so that no impact is omitted or inadequately covered while at the same ensuring that it is clear as to what is covered by each category and that there is no double counting.
- **Inclusive:** *involve* all the stakeholders.
- **Transparent and Auditable:** open to scrutiny by all parties, with no 'black boxes' that could leave anyone wondering how a particular answer has emerged. Everyone concerned must be able to understand the process that leads to the decision, even though they might not necessarily support a particular outcome themselves.
- **Integrated:** combines positively and effectively 'best practice' in the relevant appraisal techniques. No single perspective regarding appraisal techniques should be predominant or be perceived to be so.

- **Robust and rigorous:** based on sound information and capable of supporting a consistent *approach* to decisions.
- **Deliverable:** the appraisal should lead to a decision that is achievable and capable of being implemented;
- **Consistent:** The appraisal system must be able to be applied consistently to various different schemes across the country, while allowing appropriately for differences in their circumstances and the values placed by affected parties on the impacts;
- **Proportionate:** The level and form of the appraisal should be proportionate to the potential impact, contentiousness and scale of the decision in question;
- **River Basin level appraisal:** The appraisal should be carried out at the appropriate level in the Agency (eg River basin management areas) bringing in expert advice while still being well anchored on the actual problems and options on the ground. Specific operational decisions by Agency officers can then be simplified in terms of achieving these objectives in the most cost-effective way.
- **Simple (KISS) -** but still able to address the complex matters involved.
- **Trust.** The different stakeholders and various decision-makers at different international, national, and regional/local levels need to have considerable trust in the appraisal system. A key goal for the seminar was to seek the views of these various parties and help to devise an appropriate appraisal system accordingly.

### **3 THE FUTURE POLICY CONTEXT**

#### **3.1 The Water Framework Directive (WFD)**

The EC Water Framework Directive (WFD) places obligations on member states to implement measures to achieve specific environmental objectives for water bodies including rivers, lakes, groundwater and estuaries. In the case of rivers, future management under the Directive is likely to resemble current practice, in the shape of river stretches for which River Quality Objectives currently apply. Annex IV discusses this current practice.

The WFD requires that for most surface water bodies, the target of “good ecological status” should be achieved within 15 years of adoption of the Directive. For water bodies that already achieve this status and those at “high ecological status” the objective is to maintain this. Some water bodies may not be capable of achieving “good”, simply because they have been heavily physically modified, for example, in the case of engineered river channels or flood defence measures. If so, a more appropriate ecological quality objective may be set – “good ecological potential”. An overview of the Directive timetable is shown below.

A derogation of the timetable and/or target could be allowed under certain circumstances – if measures to achieve the target are “disproportionately expensive,”

The passage into law of the WFD means that if polluters are affected by measures needed to achieve WFD targets, the burden of proof for appraisal and changing UK water quality standards will shift from justifying achieving a good quality target to justifying not meeting the good quality target set in the WFD on the grounds that the measures would be ‘disproportionately expensive’.

*A key outstanding issue for DETR to clarify is specification of the criteria for determining derogations from achieving good status, especially what economic information and analyses are needed to inform decisions on when measures would be ‘disproportionately expensive’?*

“River Basin Management Plans” (RBMPs) will provide the context for setting out a comprehensive programme of measures designed to achieve the objectives that have been set for water bodies. One of the key features of the Directive is its incorporation of economic considerations. For example, full cost recovery for water services, and economic analysis of water use and review of the environmental impact of human activity to support the development of the River Basin Management Plans. Consequently, public consultation plays an important part in their preparation.

##### **3.1.1 Timetable**

A simplified timetable is shown below:

2000	Adoption by Council and European Parliament
2004	Economic Analysis of water use to be submitted to the Commission
2008	River Basin Management Plans to public consultation
2009	Finalise River Basin Management Plans
2015	River Basin Management Plans updated

### **3.1.2 Parallels with Existing Practices**

The establishment of targets, with public consultation, and the need for clear plans and timetables mirrors (and could be said to codify) existing practices. The water quality planning process that is described in Annex IV is generic and applies equally well to the Water Framework Directive. For example, the assessment of "Reasons for RQO Failure" anticipates the analysis of pressures that is required as part of the implementation process for the Directive.

The Directive also calls on Member states to classify the quality of their waters, based on a scale of Excellent; Good; Fair; Poor and Bad. The precise elements of the classification have yet to be finalised, but this approach to classification has clear parallels with existing practices (see Annex IV). However, the proposed classification is in relation to ecological quality, and this will include *both* biological quality and physico-chemical elements. There are five classes for ecological quality of surface water bodies based on a calibrated scale of: high; good; moderate; poor; and bad.

The Agency has already developed a classification system for the biological quality of rivers, but it has not been implemented as a practical tool for planning in the same way as the River Ecosystem Classification has been used for chemical quality.

For the management of rivers, there are strong parallels with existing practices but there are specific gaps (such as incorporation of ecological targets into the planning process) to be filled. For the other water bodies it is likely that greater development in terms of technique and practice will be demanded.

A paper, "Economic Elements of the Water Framework Directive" is reproduced as Annex III with the kind permission of Pierre Strosser, of DG Environment, European Commission. The paper was originally presented at the conference "Europe of Water, Water of the Europeans, Integration of economic assessment in the decision making process" in Lille, 13th & 14th September 2000.

### **3.2 Heavily Modified Water Bodies - Links with Flood Defence, Recreation and Navigation**

The Water Framework Directive (Article 4) allows Member States to designate water bodies as Heavily Modified Water Bodies (HMWB) where there has been physical alterations that substantially change its character and where restoration would have a significant adverse effect on the following existing water uses:

- navigation and recreation
- water storage for drinking water supply, power generation or irrigation
- water regulation, flood protection and land drainage
- other important sustainable human development activities
- And the wider environment.

And the objectives of the physical alterations cannot reasonably be achieved by a significantly better environmental option for reasons of technical feasibility or disproportionate cost.

It appears that consideration of such significant alterations may be relevant for about half of inland waters and about 17% of upland waters. Therefore this aspect will need to be carefully addressed in the appraisal.

It is currently proposed that these waters should be appraised in the following way:

- i. Describe the physical alterations
- ii. Determine if the water body would fail to achieve good ecological status. If so, then continue with the following steps.
- iii. Appraise the economic, environmental and social impacts of alternative mitigation measures that could achieve the objectives of the physical alterations while improving the ecological quality of the water body. In particular, this will take account of their technical feasibility, costs and any adverse impacts on the water uses identified above.
- iv. In the light of the mitigation measures resulting from the above appraisal, determine the appropriate 'good ecological potential' for this HMWB, which would replace the 'good ecological quality' target in the WFD.
- v. The options for achieving this ecological potential would then need to be appraised in the same way as the options for achieving good ecological quality - see the draft outline appraisal system in Section 6, to draw up the RBMP for this HMWB.

It will be important that the system for appraising the mitigation measures (in (iv)) above is consistent with that customarily used in appraisals for each physical alteration so as to ensure that the mitigation measures identified from (iv) would actually be implemented in practice. Some of the physical alterations will concern private benefits (eg navigation), which will need to include consideration of financial costs and benefits; while others will concern public benefits (eg flood defence); and others will concern both public and private benefits (eg recreation).

It may be more efficient to carry out (iv) and (v) together. Therefore it will be important that the appraisal system for mitigation measures in (iv) is consistent with that used for options appraisal of RBMPs in (v). The partial CBA framework proposed in Section 6 for (v) aims to facilitate this.

It will also be important that step iv is carried out not only at the level of each individual water body and project (eg a flood scheme); but also at the overall programme level so as to ensure that there would be sufficient increase in overall resources for the mitigation measures to maintain existing service levels (eg flood protection levels).

It is proposed to commission case studies to work through the above appraisal system for HMWBs to demonstrate how the appraisal systems could be applied in practice and to identify gaps in data, information and knowledge and any other problems (eg how the various bits of data from the elements could be combined). It would also estimate possible levels of resources to apply this appraisal system. This will be a 'virtual' study in that it will not involve any original research but instead use assumed illustrative dummy data and the sort of information that might be generated by the proposed processes.

## **4 POSSIBLE MEASURES**

The seminar emphasised the need to set out clearly the decisions and decision context to create an appraisal process that could most help them. Consequently this section describes the possible decisions, who makes them and the level at which they are made and implemented. Section 5 sets out the responsibilities of the various bodies.

In the light of the analysis of pressures on water quality and resources (shown in Annex V), Table 4.1 identifies the possible types of measures and who is ultimately responsible for making the decisions on them and the level at which these decisions are made and the measures implemented. Some are made at a national level (e.g. AMP 4, agri-environment measures), but would be implemented at a area or catchment level. Some economic instruments such as nation-wide taxes and product regulations would be decided upon and implemented at national level, but other economic instruments such as pollution charges and tradable permits could be determined and implemented at a catchment level. All the decisions will be based in one way or another on (the collation of) a series of appraisals by the Agency of individual options for the River Basin Management Plans (see Section 6).

The high (national) level for most of the key decisions provides an important and challenging context for the development of an appropriate appraisal system, especially with regard to public involvement and economic appraisal. These are normally carried out at a local level but in this case must input into national level decision-making. We propose to tackle this by clarifying (in Section 5) the key criteria for national level decisions, and the form in which national level decision-makers require the information and then seeing how an appraisal system for RBMPs might input into and aid the national decisions.

Table 4.1 also highlights that the RBMPs under the WFD entail many more pressures and options than just the water industry measures considered under AMP 3. Accordingly, the appraisal system needs to be tailored to handle more dimensions. Key points that were made in the discussion of the specific policy measures in Table 4.1. are set out below.

### **4.1 Water industry/AMP 4/5**

The seminar suggested that as well as options for to improve effluent quality based on capital works (and therefore capital expenditure), wider options, based on operational practices (and therefore operating expenditures) should be considered. Impacts on both capital and operational expenditures must be taken fully into account when the costs of measures are being assessed.

### **4.2 Economic Instruments**

The implementation of the Water Framework Directive will entail controls on a variety of pollution sources (see Figure V.4 in Annex V) for which the costs and effectiveness of the control options can vary significantly. Some stakeholders, such as the Water Industry, are concerned that they will have to pay high control costs while other pollution sources do not.

This context may increase the potential attractiveness of economic instruments if they are structured to increase the efficiency and fairness with which the controls and their costs are allocated amongst the diverse sources. However, the prospect of realising this potential for economic instruments appears to be limited at present.

Tradeable permits are currently being considered in respect of water abstraction. In the case of water pollution, permits raise technical and implementation problems. They require clearly defined water pollution levels that can then be allocated amongst sources. They also require a clear and fair means of equating the effects on water quality levels of different point and disparate sources discharging at different parts of the water body. But these matters need to be addressed in any case for the implementation of the WFD.

Water pollution taxes are not currently being considered as policy options (although local pollution charges to target specific problems have not been ruled out). The possibility of a pesticide tax is being kept in reserve if the alternative 'voluntary' measures proposed by the crop protection association do not prove to be sufficient. It is likely that measures such as economic instruments targeting agriculture would have to be part of a package of including support/compensation in view of the current pressures on that sector.

There might be greater more possibilities for levies on polluters if tax revenues were recycled to agriculture (e.g. to finance agri-environment support measures). However, Treasury is concerned that hypothecation could mean that the tax revenues could be used for expenditures that are not worthwhile in terms of yielding sufficient benefits and value for money. Consequently, DETR/MAFF would need to provide the findings of appraisals showing that the support measures would be justified and worthwhile. The appraisals would need to include assessment of agriculture's contribution to the water pollution problems in the catchment or stretch and the costs and effectiveness of control options and any uncertainties regarding their success.

#### **4.3 Agriculture**

At present, regulatory powers are limited and it is thought that voluntary measures on their own will not be sufficient. It will be necessary to identify schemes that are appropriate at a catchment level as part of the appraisal for the RBMPs. Technical and financial assistance measures and advice programmes would be needed. However at present the agri-environment schemes are focused on enhancing natural habitats and nature conservation. Prospects for increased funding for water related measures currently appear to be limited. Proposals would require good justification as to their costs and effectiveness, especially in respect of the likelihood that the measures would actually help to reduce the water quality problems.

Consequently, the prospects for traditional measures to control agriculture's impacts on water do not look promising. However, **Figures V.4 in Annex V** shows that these impacts are significant (especially in rural areas) and their *relative* significance will increase as existing plans relating to point sources are implemented. Therefore, particular care and attention will have to be devoted to assessing the costs and effectiveness of measures relating to this sector due to their potentially significant social and economic implications.



*Table 4.1 Possible Measures to Implement Water Framework Directive*

<b>Possible Measure/sector</b>	<b>Decision-making body</b>	<b>Level of decision</b>	<b>Level of Implementation</b>
1. Requirements for water industry to implement measures to reduce abstraction and discharges under AMP 4	Secretary of State (DETR)	National	EA region/areas
2. Controls on other Direct dischargers	EA DETR re control measures for other sectors (eg MOD - Aquatrane)	RBMP & also in line with National/Agency policy on sector	EA region/areas
3. Controls on other abstractors	EA (under CAMS/abstraction licensing)	RBMP	EA areas
4 Best practice controls on pollution and abstraction at farms	EA (but, in a clear national policy context with DETR/MAFF)	RBMP & also in line with National/Agency policy on sector	EA areas
5. Controls on other indirect dischargers (eg run off from traffic on roads)	DETR (re Highways Agency and Local Authority Development Control)	Highways Agency, Local Authorities	Highways Agency, Local Authorities
6. Agri-Environment programmes (financial and technical assistance and advice to go beyond good practice)	MAFF/HMT In response to DETR submissions	National	Regional (FRCA)
7. Economic instruments	MAFF/HMT/DTI in response to DETR submissions	National	National taxes (but pollution charges and tradable permits local )
8. Product regulations	MAFF/HMT/DTI in response to DETR submissions	National	National
9. Waste min progs	EA/DETR/DTI	National	Regional

## **5 PROPOSED INSTITUTIONAL AND DECISION-MAKING FRAMEWORK AND PROCESS: ROLES AND RESPONSIBILITIES OF KEY DECISION-MAKERS**

### **5.1 EC**

The EC will review progress of Member States (MS) in implementing the Directive and may audit decisions concerning derogations. For example, if a MS is not going to achieve good quality status for its water bodies (and is seeking a derogation), the EC may scrutinise the MS' water pricing policies and ask the MS to justify them.

### **5.2 National - DETR**

DETR will be responsible for scrutinising and agreeing the content of RBMPs. This will include any proposals for derogations under the WFD for RBs that will not be able to achieve good status over the following five-year period.

The passage of the WFD into law means that in decisions concerning any derogation (from target status and/or timescales), the onus of proof is on justifying why the status or timescales *cannot* reasonably be achieved rather than justifying achieving a good quality target. This is because the legal status of the Directive confirms that Member States have accepted that its objectives are beneficial and worthwhile. If stakeholders are concerned over the costs of particular options put forward in the development of a RBMP, they will need to provide evidence of why the options of concern might be "disproportionately expensive".

DETR will need to set out clear criteria for any such derogations. This will include clear specification of what economic analyses would be needed to determine what programmes of options might be considered to be "disproportionately expensive" to achieve target status and timescales.

DETR will also need to provide guidance on how the possible measures should be appraised so as to meet these criteria. A key issue here will be to ensure that the proposed measures are cost-effective, appropriate and fair both within a sector and between the sectors and the measures identified in Table 5.1.

DETR will be responsible for decisions on the overall package of measures concerning the water industry (under AMP 4 et seq). It will also be responsible for working with other Government Departments (eg MAFF, MoD, HMT) to prepare packages of measures that these other Departments could implement as part of the concerted measures anticipated in Directive (eg regarding agriculture, defence establishments).

Many of the above measures for achieving a RBMP will thus be determined nationally and in some cases such as agricultural measures might be paid for at a national level. This has significant implications for the role of the stakeholder consultation and involvement that will need to be carried out as part of the appraisals at national and local levels (see Section 6). It will be necessary to find a means of consulting with the various relevant parties and inputting their views to aid the decision while those consulted will not actually be making the decisions.

DETR Ministers will also be responsible for deciding on appeals concerning a RBMP and the control measures underlying it (eg an individual decision on an authorisation for abstraction or discharge).

#### **5.2.1 Deadlines**

##### **WFD**

In 2004, DETR must submit preliminary economic analyses for each RBMP to the EC. By 2008, they must publish RBMP consultation drafts, with designated water quality levels and the associated detailed measures needed to achieve them.

##### **AMP 4**

The next deadline for AMP 4 is 2004. Appraisal systems for this will need to be agreed by 2002. The detailed appraisal system for WFD will not be in place in time until the AMP 5 cycle in 2008. This raises a question of what (interim) appraisal system to use for AMP 4 in 2004, especially regarding high level appraisal of the effects of different overall expenditure levels on water quality states and compliance levels in England and Wales.

#### **5.3 Environment Agency Head Office (EA HO)**

EA HO will be responsible for converting DETR's general guidelines for the appraisals (see above) into specific guidance that area teams can apply in practice. They must then review the flow of information from the appraisals and check that the appraisals of all RBMPs are being consistently applied and collate the findings of the various appraisals to submit them to the DETR (see above). They would also organise training for regional staff to carry out the appraisals.

EA HO would also monitor both the performance of the control measures identified in the RBMPs (especially where there are risks of failing to comply with good status or a derogated status) and also the outcomes in the form of observed status (and hence compliance with the WFD).

They would collate the findings from the appraisals regarding any major point sources regulated by the Agency to determine if they need to exchange any best practice information regarding these controls or prepare any national guidance or process guidance notes regarding discharges to water from these sources. This could include collation of estimates for benchmark costs of appropriate controls that are not disproportionately expensive for these sources to comply with the WFD.

EA HO could also provide forward analyses of likely economic and technological trends in the main sectors and indicate their implications for pollution levels and the cost-effectiveness of control options to inform the dynamic appraisals of RBMPs.

Finally, EA HO will also be responsible for implementing a scheme of delegation to deal with on any exceptionally contentious cases of national significance that regional managers pass up the line for resolution.

#### **5.4 Regions**

An Agency region is likely to include a small number of basins. EA regional managers will be responsible for managing and collating the appraisals for RBMPs in the basins in their region and submit them to HO and then onto DETR.

#### **5.5 Local – RBMP**

The EA area or regional teams would be responsible for carrying out the appraisals of the RBMPs for the designated river basins or for separate water bodies in the basin. They will follow HO and DETR's general guidelines whilst taking due account of their local circumstances.

They would then be responsible for implementing and enforcing the agreed controls with the point source abstractors and dischargers and liaising with FRCA about any agri-environment scheme measures selected for their basin.

#### **5.6 Outstanding Institutional Issues**

The seminar raised the following outstanding institutional issues:

- Need virtual case study in a region to characterise and differentiate any specific stretches of water bodies in the selected basins so as to identify analyses for particular stretches that could form appropriate building block elements of the appraisal (and subsequent monitoring) of the RBMPs..
- Identify outstanding institutional capability and capacity building issues that will need to be addressed to carry out the appraisals efficiently e.g. training needs of Agency staff.
- Who liases with local planning bodies and feeds their views on likely future scenarios into the appraisal process?

## **6 ELEMENTS OF A POSSIBLE APPRAISAL SYSTEM**

The discussions at the seminar identified the following linked elements of a possible outline appraisal system for each of the decision-making levels identified in Section 5. Further work will be needed to refine and work up these elements and determine their appropriate sequencing before a draft appraisal system could be developed.

### **6.1 DETR at National Level**

To support the decisions in Section 5.2 above, DETR will need a high level appraisal drawing together the findings of the Agency's appraisals on the following matters regarding the costs, effectiveness, benefits and other impacts of options for achieving various water quality states in each RBMP (see Section 6.2):

- Current water quality status
- Likely future water quality status, taking account of future developments in pressures up to the end of the six year appraisal period (in a business as usual scenario without any additional policy interventions). This should highlight whether the RB will, without further specific intervention, achieve good quality status over the appraisal period (e.g. up to 2009 and 2009 - 2015).
- If the RB will not attain good quality status, then possible measures listed in order of merit as assessed in the individual RBMP appraisal with the best/most cost-effective measures first. Each individual measure should be presented in terms of:
  - Technical feasibility
  - Their effect on discharges and water quality levels at the end of the appraisal period (eg 2009) and at the end of the next appraisal period (eg 2015). How much improvement in quality status (or reductions in risks of failing to comply with good quality status) they could achieve.
  - Costs (in a consistent, agreed format) by the end of the appraisal period
  - Costs of the option by the end of the next appraisal period
  - Who pays the costs?
  - Economic implications of the options
  - Social impacts of the options
  - Stated views/preferences of affected parties and individuals (eg findings of consultation and any stated preference survey of a larger sample of affected parties on either individual measures or (more likely) groups of measures).

If the options are considered to be disproportionately expensive, then DETR will have to assess the costs and benefits of cost-effective packages of options to achieve different water quality states to assess whether the costs are disproportionately higher than the benefits of achieving good quality status at specific RBs.

This collation of the appraisals could be designed to enable DETR advise their Ministers, for example, that:

- x kms of rivers or water bodies would fail to achieve good quality status because there are currently no technically feasible controls and hence would require a derogation.

- A further y kms of rivers or water bodies might fail to achieve good quality status. In order to achieve good quality status on these water bodies would require a derogation with proportionate controls on the water industry and non-water industry and agriculture that would amount to expenditures under AMP 4 of, say, £10bn (equivalent to £y on average annual water bills) and an agri-environment package of, say, £1bn pa. But this would still leave z kms of water bodies that would fail to achieve good quality status by 2009 and for which derogations would be needed. Achieving good quality status in all of these water bodies would entail disproportionately expensive controls, including expenditures under AMP 4 of, say, £20bn (equivalent to £z on average annual water bills) and an agri-environment package of, say, £5bn pa.
- A lower AMP 4 settlement (of say £6b or £z pa on water bills) or a lower agricultural measures (of say £500m) would mean that the rivers or water bodies which would fail to meet good quality status and would require a derogation would be much greater - an additional w kms.

In respect of those basins that would fail to achieve good quality status, the EC may also request that DETR provide an appraisal of the costs, effectiveness and feasibility of possible economic instruments to encourage compliance with good quality status both now and importantly in the future (e.g. by inducing the development and application of new technologies).

## **6.2 Appraisal of RBMPs**

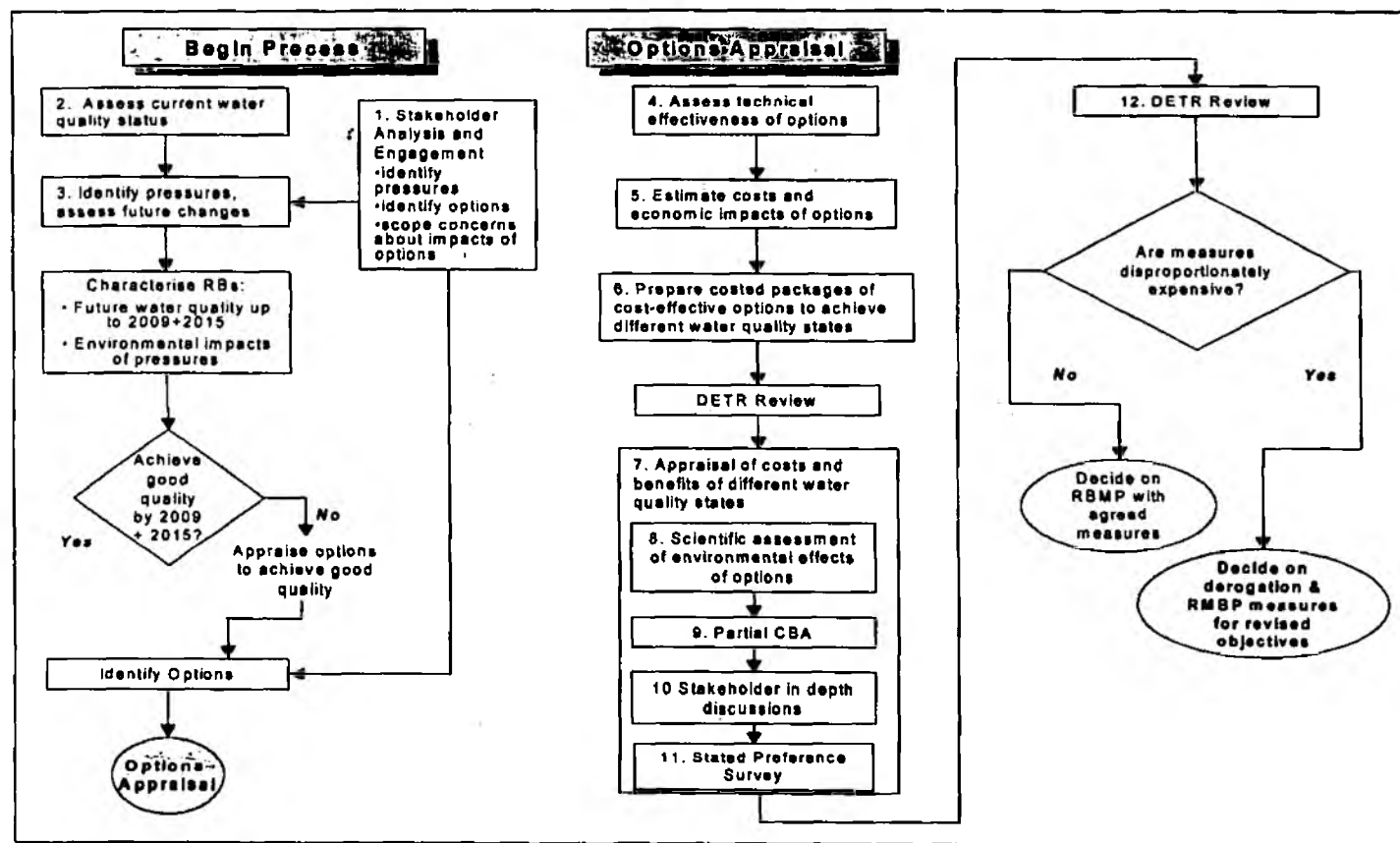
Figure 1 shows the following elements of a possible appraisal system outlined by the Seminar:

- 1) Stakeholder analysis, engagement and scoping
- 2) Assess current water quality status
- 3) Identify the pressures on water quality and assess future changes in them to indicate future water quality status (in a business as usual scenario with no additional interventions). Hence indicate whether good quality status will be achieved in the basin by the end of the appraisal period
- 4) Identify and assess effectiveness of the options and build scenarios of packages of options to achieve different water quality states
- 5) Estimate the cost of individual options: including
  - Costs to firms/operators/polluters
  - Socio-economic impactsand other costs, including life cycle analysis (LCA) of external impacts of energy and resources consumed by the control measures.
- 6) Collation of findings of elements 1-5 by the Agency's project manager, in consultation with stakeholders. These appraisals will be collated and quality assured by the Agency's Head Office and fed through to DETR for their review.

- 7) Options Appraisal of the costs and environmental benefits for the packages of options to achieve step changes in quality levels together with their risks of non-compliance. This would include as many of the following elements as are needed to appraise the packages of possible measures:
  - 8) Scientific assessment of the environmental effects of the options
  - 9) Partial Cost-Benefit analysis of the options
  - 10) In-depth discussions with stakeholders
  - 11) Stated Preference surveys of a larger sample of affected parties
- 12) Collation of findings of elements 1 - 11 by the Agency's project manager for DETR to review and decide on the quality objectives for the RB and the measures in the RBMP and determine whether or not the options for achieving good quality are disproportionately expensive and hence whether any derogations are needed.

The following sections now discuss each of these elements in turn. There are a number of examples where (some of) these elements have been successfully applied in practice. The seminar drew on best practice experience in these cases to suggest how these elements might be carried out for RBMPs.

Figure 1: Appraisal System for Implementation of Water Framework





### 6.2.1 Element 1: Stakeholder analysis and involvement

The seminar participants suggested that stakeholder analysis and engagement could be carried out to help identify pressures on water quality and options for water quality improvements and to scope issues of concern regarding the impacts of these options in the river basin. This would be partly designed to comply efficiently with article 14 of the WFD to involve actively all interested parties in the production of the RBMPs. But more importantly it also would further the Agency's practices on this subject and Central Government code of practice for modernising Government<sup>2</sup>, which both stress the importance of early consultation as a key to the success of policy initiatives and securing co-operation of the key parties involved.

This stakeholder engagement should be anchored on the policy and institutional context outlined in Sections 4 and 5 above. This showed that many of the measures regarding, for example, the water industry and agriculture will be decided upon at a national level. Consequently the aim of the stakeholder involvement is to collate and analyse their views so as to *inform* the subsequent decision-making process.

The purpose of this element is to maximise involvement, ownership and buy-in to the appraisal process to reduce, as far as possible, conflicts at a later element for example, risk of judicial review or appeal against a specific regulatory decision arising from the RBMP.

It should first elicit information on the nature of stakeholders' views about pressures on water quality and possible options and their concerns about the impacts of these options. It should ensure that the subsequent analysis will cover these concerns appropriately and use terms that can be readily understood and related to in the subsequent consultation (Element 10). The process should also create partnerships between the various stakeholders in order to seek better solutions.

The term "stakeholder" here means anyone with an interest in water or who will be affected by the options in question or who could help deliver them. It is designed to highlight the diversity of views and the differing parties affected. It includes, but is **not limited to** certain groups with an organised interest or those with a statutory interest (statutory consultees). It is partly used to avoid the term "the public" as this is considered to give a misleading impression of homogeneity amongst citizens, which can lead to confusion for the characterisation of opinions and values.

The seminar identified the following main different types of stakeholders, each of whom has an important and different contribution to make to this process and will need to be involved in one way or another:

- Professionals (eg industry)
- Local interest groups
- The public

Possible means of engaging the last category include the (local) media, schools and colleges.

---

<sup>2</sup> Cabinet Office (2000) Code of Practice on Written Consultation.

The Environment Agency will nominate a project manager to lead the stakeholder involvement and co-ordinate the information flows.

Important concerns and questions here are:

- Who are affected positively or negatively by the options? In particular who bears the costs of the options under examination and who benefits from the water quality improvement measures? In particular, are these affected parties all located within a RB or do the costs and benefits affect a wider population - as might be the case for some national measures (eg agri-environment support measures) that might be paid for by taxpayers?
- The danger of stakeholder fatigue, especially if they are already being asked to input their views (by the Environment Agency and other bodies such as DETR and local authorities) on other environmental issues and if they see their inputs into the appraisal of RBMPs as having little effect on the decisions and outcomes.
- The need to link up with existing mechanisms for consultation on environmental improvements in the river basin, especially the Agency's other environmental improvement initiatives (eg CAMS, LEAPs) and perhaps also local improvements to the quality of life (eg local planning).
- The definition and scale of a 'river basin' for a RBMP and how this geographic area relates to those for these other consultation mechanisms, especially political boundaries.

These important questions need to be examined carefully through a 'virtual study' of a basin.

The output of this element would be a report containing baseline information on the issues and the impacts of the options to be examined, the stakeholders concerned and partnerships between them. However, it may be difficult to find a practical means of structuring the various parties' diverse interpretations of the impacts and concerns into a clear and comprehensive specification of impact categories that could be analysed (in the subsequent elements) and on which information can be presented. This specification must comprehensively cover all the concerns but not allow double counting. This issue needs to be explored further in the specific context of a practical worked example.

#### **6.2.2 Element 2: Assess current water quality status in the River Basin**

This element will build on the scientific work underway at UK and European level to provide clear definition of water quality states (see Section 2.1 and Annex II). This must include providing a robust (statistical) definition of what is meant by failure to achieve a given state.

This element 2 will first specify the current state in accordance with these definitions.

#### **6.2.3 Element 3: Identify pressures on water quality**

This element will identify the pressures on water quality and reasons for (risk of) failing to achieve good quality status in the river basin at the end of the appraisal period (see Annex V). This will be in line with article 5 of the WFD. It will assess likely future developments (economic and technological developments) for these main pressures up to the end of the six year appraisal period (2015) and, if possible, the end

of the next appraisal period (2021) to see if the basin will achieve good quality status by the end of the appraisal periods. These assessments represent a business as usual scenario, that is, excluding further policy interventions.

A key technical issue here is whether it is possible to measure and quantify with sufficient accuracy the contribution to water quality levels made by all the main pressures, including in particular agricultural sources, both now and at the end of the six year appraisal period.

A policy issue here is whether the following elements (and the stakeholder analysis in Element 1) of the appraisal of RBMPs should be carried out for all cases, including those where the basin will be able to achieve good quality status or whether efforts should (first) focus on those cases where a basin might fail to achieve good quality. The following sections focus on the latter cases.

The Agency's manager will prepare a report as the **output** of these elements 1 – 3 that characterises the RB in terms of the likelihood of being able to achieve good quality by 2015 and 2021. It will set out the nature of the environmental impacts of the pressures if the basin is unable to achieve good quality. Environment Agency HO will then quality assure this and collate the assessments for review by DETR. This would then form the basis for DETR's submission by 2004 on the (characterisation and economic analyses of water use) in the river basins - in line with article 5 of the WFD. This would also form the basis for the next elements of the appraisal of options in RBMPs, which would all need to be published for public consultation by 2008 (see deadlines in Section 3).

#### **6.2.4 Element 4: Identify the options and Build Scenarios**

In this element, a Steering Group (managed by the Agency's project manager) will identify options and screen them with regard to their technical feasibility, effectiveness and applicability in the specific context of the river basin. This will be line with Article 11 of the WFD.

The Group would draw on:

- The analysis of the current and future pressures on the water body (in Element 3).
- Forward looking sectoral reviews of likely economic and technological developments in each sector that could affect its impacts on water quality over the appraisal period(s) (say up to 5 -10 years ahead).
- The views of professional stakeholders and interest groups, which should include representatives of the main parties involved in the practical implementation of measures to address the pressures identified from element 3 (eg water industry, non-water industry, agriculture).
- Reviews of available technologies (eg BAT reviews) and studies, which the Agency's Head office provide.

Assessing the effectiveness of the options raises the following important practical technical and scientific issues, which will need to be examined further in a specific case study investigation:

- How to assess the likely effects on discharges and biological water quality of specific options, especially where they focus on achieving behavioural and more qualitative changes (eg changes in farm practices).
- Effectiveness needs to be assessed in terms of reductions in the *risks* of pollution incidents arising (eg slurry run off, leaks) as well as reductions in continuous discharges. As reductions in conventional pollution from point sources improve water quality towards good quality status, then such reductions in risks of intermittent pollution incidents will become of relatively greater importance.
- Definition of good biological water quality will entail combining a number of (scientific) metrics (or criteria). Different options may have different effects on different metrics. Consequently, a form of MCA based on sound scientific advice will be needed to combine these various measures into a weighted composite index so that the relative effectiveness of the options can be assessed on a consistent basis.
- How best to measure and represent the impacts of an option on water quality and risks of failing to comply with a specified water quality status?

#### **6.2.5 Element 5: Estimating the cost of individual options**

This is a particularly important element, especially as a criterion under which derogations might be granted from achieving good status under the EC's Water Framework Directive is "because completing the improvements within the Timescales would be disproportionately expensive" (see Section 3.1). It would build on, and be closely linked to, the technical analysis in Element 4.

An important purpose of this element is to ensure an even handed treatment of measures both between sectors and within sectors. The latter consideration concerns ensuring that both capital schemes and schemes affecting operating costs and revenues are considered equally.

Consequently, the analysis of the costs and economic impacts will have to treat consistently the impacts for distinctly different sectors. This is a major challenge. Thus the non-water industry includes some sectors subject to international competition; while the UK water industry in some of its market segments is a monopoly supplier to domestic customers; . A further particularly complex case is agriculture and food processing industries, which itself comprise large operations as well as many small farms that difficult particularly difficult economic conditions.

The seminar recommended that the Environment Agency should specify simple pro-formas setting out how the industry groups should report estimates of the costs

Existing guidance on techniques to estimate the costs of control options includes:

- European Environment Agency's Guidelines for defining and documenting data on costs of possible environmental protection<sup>3</sup>;
- Annex VIII presents the Agency's draft simple pro forma for how costs should be presented to facilitate their assessment by decision-makers;

---

<sup>3</sup> European Environment Agency' (1999), Guidelines for defining and documenting data on costs of possible environmental protection measures, Technical report No 27.

- HMT's Green Book on economic appraisal.

However, the seminar concluded that the present guidance on cost estimation is insufficient for our purposes and that further guidance and pro formas tailored for the WFD will be needed, covering the following subjects:

- Estimation of the financial costs of options
- Assessing the economic impacts of options
- Appropriate and consistent discount rates for the various different sectors

The firms or sectors should then use these pro-forma to report preliminary and revised estimates of the effects of the measures on the following essential cost elements for review by OFWAT's reporters in relation to the water industry's costs and the Agency and expert bodies in respect of control options for other sources.

- Capital expenditure, along with an estimate of the expected economic life of the asset
- Operating costs
- Revenues

They should provide confidence limits for these estimates - or high, low and medium estimates (see Annex VI). These costs should be presented in terms of changes in the cost elements arising from the proposed measures as compared with the baseline condition.

The OFWAT reporters, the Agency and other expert reviewers (see above) could compare the preliminary and revised cost estimates with benchmark cost estimates and check for any double counting, omitted items and possible overestimation or underestimation of the costs and economic impacts. They would seek explanations for any differences and revisions of the cost estimates as necessary. They would screen out any options that were obviously excessively expensive. The benchmark analysis should also form part of the examination of the key cost components and their main determinants to see if the option could be refined to reduce the costs. Fuller analysis of the cost estimates may be needed for specific costs and economic impacts where these are material.

They should then convert these expenditures into discounted costs, presented as either an NPV or probably preferably an annualised cost depending on which unit the decision-makers (DETR) would prefer. This will require a decision on appropriate discount rates for sectors.

The firms or sectors should also provide qualitative descriptive information (to be included as separate additional rows in the table on costs) on the following impacts where these are material:

- The indirect costs of the measures (e.g.) if these are significant
- The wider economic impacts of the measures and intangible impacts (for example, socio-economic impacts, such as significant changes in patterns of employment).
- Who would pay the costs?
- The scale and significance of the environmental impacts from the control measures if such impacts are significant. This might include: environmental impacts from combustion and extraction of the energy and raw materials used in

the control measures, nuisance from sewage treatment works (e.g. odour) and impacts from transport of sewage sludge.

#### **6.2.6 Element 6: Reporting and Review of Elements 1-5**

The Agency's project manager, in consultation with the affected parties, will then use these technical, effectiveness and cost analyses to draw up a short list of alternative packages of options to achieve good quality state and possibly other water quality states. They would screen out any options that are not worth pursuing (either because they are too costly or ineffective). They would focus on options that tackle the major reasons why a basin might fail to achieve a good state. They would focus on the major determinants of the costs to polluters so as to seek alternative options and means of refining the options (eg changing the timescale for implementing the controls).

On the basis of the findings of elements 1-5, the Agency's project manager, in consultation with affected stakeholders, will prepare a report to EA Head Office and DETR for their review. This will be in pursuance of Articles 4 and 5 and Annex III of the WFD. It will set out:

- whether or not the RB will achieve good quality status over the six year appraisal period (from element 2) without requiring any additional measures
- the cost-effectiveness and technical feasibility of the options
- packages of cost-effective options that could achieve good quality state and possibly other scenarios of options with their associated alternative water quality states or risks of failing to achieve these quality states. This might include lower quality states if it is not technically possible or could be expensive to achieve good quality. Subject to EA Head Office and DETR's views, these packages of options will then be analysed in the next elements.
- the potential conflicts and trade-offs concerning these options and how the Agency would propose to appraise these in the further assessment elements 7-11.

The draft report will be discussed with stakeholders through, for example, a report back meeting. The report would then be submitted to the Agency's Head Office, who would quality assure and collate all the reports from all RBMPs for submission to DETR for their review.

#### **6.2.7 Element 7: Assessing the Environmental Benefits for packages of options to achieve different water quality states**

This element would focus on assessing the environmental benefits of step changes in water quality levels or changes in the risks of not achieving specific water quality levels that would arise from the packages of options developed in elements 4 and 5 for the river basin in question in the RBMP. This will be in pursuance of articles 4.4 and 4.5 of the WFD.

For those packages of options that would achieve good status, it will be up to the sectors concerned to show that the costs of the measures for them (estimated in element 5) are "disproportionately expensive".

## **Benefits Assessment**

The word "disproportionate" implies consideration of the benefits and an assessment of whether the costs are disproportionately greater than the environmental benefits to be gained. The economic appraisal and valuation of the significance of the environmental benefits will primarily be carried out as an integral part of this appraisal to ensure that it can best aid decision-making.

### **Specification of Environmental Benefits Categories**

The starting point for the benefits assessment should be the stakeholders' specification (in element 2) of the benefits of water quality improvement and their concerns about the (environmental) impacts of the options. Their concerns will need to be organised carefully into a set of environmental benefits categories that covers the stakeholders' various concerns comprehensively while not entail double counting; while also comprising categories for which scientific assessments and economic valuations can readily be provided. It will be important that the Environment Agency uses the same environmental benefits categories for appraisal of water quality, water resources and flood defence measures.

The seminar suggested that the appraisal could cover the following categories used in the MAT analysis for AMP 3 (which was based on the FWR manual<sup>4</sup>):

- informal recreation
- angling
- in-stream recreation
- agriculture
- industrial and drinking water abstraction
- amenity impacts
- Impacts on property values and regeneration
- nature conservation and impacts on the ecosystem and the natural environment.

In addition, the seminar also suggested that the following categories should be added:

- impacts on landscape
- the many complex social aspects of equity considerations, including impacts on social cohesion.

Questions still remain on how to categorise and assess other "sustainability" benefits and precisely what this 'sustainability benefits' category means in terms of specific benefits that are not already covered in the above categories.

The seminar recommended that the Environment Agency use the Quality of Life Capital approach<sup>5 6</sup> to structure the assessment of these environmental benefits in

---

<sup>4</sup> Foundation for Water Research (1996) *Assessing the Benefits of Surface Water Quality Improvements: A Manual*.

<sup>5</sup> *What Matters and Why: Quality of Life Capital: a new approach*. Available from the Countryside Agency.

terms of their services and attributes. This approach also documents their significance objectively and systematically in terms of their importance, scarcity and the extent to which the asset or services in question could be replaced. This approach was used in the "New Approach To Appraisal" (NATA) to appraise the environmental impacts of multi-modal transport strategies<sup>7</sup>. The seminar recommended that this approach and format for presenting the findings should be included in the appraisal.

#### **6.2.8. Element 8: Scientific Analysis of Environmental Effects**

The scientific assessment of the environmental effects of the options to improve water quality should form the fundamental building block for assessing the environmental benefits.

The analysis should be broken down into the following linked components:

- i. qualitative description of the nature of the impacts of the changes in the water quality states and/or the risks of changes in water quality states
- ii. quantitative description of the level of the impacts (eg changes in agricultural outputs, number or size of receptors affected such as length of river affected, indicators of numbers of people likely to benefit from or participate in activity (eg fishing, walking, informal recreation visitors etc), number of properties affected, acreage of crops affected). This element should also incorporate the information used for the scoring of the impacts in the MAT approach. This should comprise ranges of estimates for the effects (which probably more appropriately reflects knowledge (and uncertainties) on the subjects in question).
- iii. qualitative description of the importance of these receptors and the nature and significance of the impacts of changes in water quality conditions (e.g. indicators of habitat quality of stretch of river affected, conservation importance such as biodiversity action plan classification, etc).

There are considerable scientific uncertainties regarding the precise effect of a pressure and control options on water quality (See Element 4). Moreover, there are uncertainties about how to translating the effects of such subtle changes in water quality into measurable, readily discernible and meaningful impacts (items i- iii above). It was suggested at the seminar, that such uncertainties mean that the benefits of options (in terms of avoiding such possible uncertain impacts on important fundamental natural systems) should be treated in the appraisal as a 'sustainability insurance' benefit for maintaining ecosystem functions.

The seminar prompted a useful exchange between leading scientists, environmental economists and policy makers/decision-makers on this complex and important subject., on which there was a consensus that considerable multi-disciplinary research

---

<sup>6</sup> Fisher, JCD (2000) Applicability in the Environment Agency of the Quality of Life (QoL) Capital approach to Appraise Environmental Benefits and Services. NCRAOA Report No 41

<sup>7</sup> Department of the Environment, Transport and the Regions (DETR) (2000) Guidance on Methodology for Multi-Modal Studies, Volumes I and II. Report prepared by MVA for the DETR. Available from DETR Free Literature, PO Box 236, Wetherby LS23 7NB. Email [detr@twoten.press.net](mailto:detr@twoten.press.net) Fax 0870 1226 237.



is urgently needed. This research should aim both to improve the scientific analyses of impacts of changes in water quality and also to use these findings in economic assessments of the benefits of water quality improvements that explicitly take account of the uncertainties and risks. .

#### **6.2.9 Element 9: Economic analysis of the costs and benefits of different water quality states**

The seminar stressed that we need to learn from our past economic assessments of environmental benefits and improve the assessments and the process for providing and using them for the purposes of RBMPs. Moreover, it was emphasised that the assessments of the benefits should aid decision-making on RBMPs. Consequently, this subject is discussed in the options appraisal element that brings together the information on costs and benefits of the options to aid decision-making.

**Annex VII** reviews the existing available techniques for bringing together information on the environmental, economic and social impacts of the options to aid decision-making. The seminar recommended that the appraisal system should follow the Cabinet Office Guidelines on Regulatory Impact Assessment <sup>8</sup>, which entails a form of (at least partial) cost-benefit analysis.

The seminar suggested that the level and form of the appraisal should be pragmatic and **proportionate** to the potential contentiousness and scale of the decision in question. Consequently, we suggest that an integrated appraisal involving Cost-Benefit Analysis and public consultation is needed comprising the following sequential steps to aid decision-making:

- Cost-Benefit Analysis of packages of options using valuations transferred from existing studies (benefits transfer)
- Stakeholder consultation and involvement (Element 10)
- Original Stated Preference surveys of a larger sample of affected parties (Element 11)

The Environment Agency's approach to economic valuation is to assess all impacts encompassing all aspects and considerations regarding the options. This includes using monetary valuation of impacts where the valuations are valid and robust, and presenting information on the scale, nature and significance of non-monetisable impacts and aspects. The Agency may therefore use readily available valuations on marketable environmental benefits and stated preference techniques for environmental benefits if there are no markets that reflect their value to society.

Possible criteria for consideration in assessing the robustness of available monetary benefits estimates for benefits transfer of valuations include:

- the extent to which they will help provide information to input into appraisals and decisions on effective, efficient and fair control options. In particular, a key issue here is the meaningfulness and usefulness of the economic valuations to stakeholders and decision-makers;

---

<sup>8</sup> Cabinet Office (2000) The Better Regulation Guide and Regulatory Impact Assessment. Better Regulation Unit, Cabinet Office.

- the extent and adequacy of the scientific and technical information (from **Section 6.2.8**) and the links between the scientific assessments and the economic valuations. To be useful for an appraisal, it will be important that the economic appraisal and valuations allow fully for the uncertainties surrounding the impacts. This also raises issues as to how to present to decision-makers and consultees any such uncertainties concerning the scientific and economic information. In addition, the scientific and risk analysis of the options (from **Section 6.2.8**) will need to provide dose-response functions setting out the incremental environmental impacts under the various options, not just whether the pollution levels exceed threshold levels above which impacts would arise.
- the availability of estimates and data to derive monetary valuations. At this element, this criterion concerns the extent to which valuations could be readily derived or transferred from secondary source information with limited additional research and analysis (and not with major additional new research such as stated preferences surveys, which will be examined further in **section 6.2.11**).
- the adequacy of the economic valuation methods.

Monetary valuation efforts should focus on those environmental benefits that emerge as the most important – i.e. focus on the benefits that account for, say, 80% of the total benefits.

The appraisal should set out not only the summary information about the impacts (including robust monetary valuations) but also the building block information explaining how they have been derived.

The appraisal could provide the valuations in the FWR manual for the monetisable environmental benefit categories, along with the building block information explaining how they were derived (see above). It appears (from an initial examination) that the readily monetisable marketable environmental benefits might include:

- (a) impacts on marketable products such as water supply and abstractions for domestic, industrial or agricultural uses, impacts on agricultural outputs and commercial fisheries (e.g. trout and shell fisheries);
- (b) impacts on services (for which participants pay) such as fishing and other formal in-stream recreation (e.g. boating, canoeing, water sports);
- (c) impacts on property values alongside the water body and any regeneration benefits from water quality improvements. However, the seminar suggested that it can be difficult to estimate these benefits in part because of the problems of assessing the effect of water quality changes on regeneration and of estimating extent to which the increased regeneration in one area benefiting from water quality improvement could be at the expense of any displaced economic development elsewhere;
- (d) impacts on leisure services for which participants do not directly pay such as informal recreation, although it may be difficult to estimate (changes in the) numbers of beneficiaries with the different water quality states.

Owing to resource and time constraints, at this stage the appraisal should first be based on the transfer of valuations from other studies. However, the seminar emphasised dangers of transferring valuations from one area to another. Therefore, some original research may be needed to check the transferred valuations and adjust them as necessary.

In particular, research will be needed to categorise the beneficiaries of the various benefits categories (identified by the stakeholder analysis in Element 1 - see **Section 6.2.1**). This should include identifying the extent to which those affected by the environmental, economic and social impacts of the options live in the basin or come from outside the basin boundary.

Moreover, research will be needed to indicate (and if possible) quantify ranges for the numbers of these beneficiaries - the key issue in respect of the assessment of all the environmental benefit categories.

However, there are other important intangible benefit categories that are more difficult to value in monetary terms, especially using available valuations transferred from other cases. This can include impacts on natural habitats, biodiversity and the primary ecosystem, culture, heritage and equity impacts. Many participants at the seminar emphasised the importance of these benefits.

There are no markets in these assets that are likely to reflect their full value to society. Stated Preference (SP) techniques are one means of obtaining the views of a wide sample of people on the importance or value of (changes) in these assets. **Section 6.2.11** examines the use of such SP techniques in the appraisal. If SP surveys will be needed for many basins, then we will need to find a mechanism for transferring the findings from surveys in selected basins to other basins as part of the cost-benefit analysis in this element 9.

Initially at least as part of this element 9, the appraisal could give a full, clear and objective description of the nature, scale and significance of such impacts under different water quality states in terms that the decision-makers and stakeholders can readily comprehend so that they can view these impacts along the monetised benefits and costs. Such clear descriptions will be needed as part of the SP surveys in element 11. This could include information on ecological indicators and measurements of environmental quality levels and physical quantification of the environmental impacts for the different options - from the scientific assessment in **Section 6.2.8**.

If possible, the costs of achieving the ecological and biodiversity benefits associated with the options might be compared with the cost-effectiveness of existing programmes such as the Biodiversity Action Programmes as one of the tests of whether these costs are disproportionate. Therefore, if possible, the seminar suggested that it would be useful to estimate the option's net costs of achieving these benefits by deducting the estimate for the valuations of the other monetised benefits from the control costs.

In a similar vein, at the seminar, it was suggested that it would be worthwhile analysing the findings of the MAT analysis for the 900 water improvement schemes that were accepted under AMP 3 and those schemes that were rejected to determine the implicit valuations given by the decisions taken in AMP 3 for the non-monetisable environmental benefits. This would entail using the MAT analyses under AMP 3 to

derive consistent and objective indicators for the non-monetisable benefits. The basic information behind the scores in the MAT analysis could also be used to derive ranges of estimates for the monetisable benefits (as outlined for categories (a) - (d) above)). This could be deducted from the costs of the schemes to give a net costs, which could be used to indicate the cost-effectiveness of the non-monetisable benefits associated with the schemes. This might be used as another benchmark and test for whether or not the costs of the packages of options are disproportionately expensive.

#### **6.2.10 Element 10: Stakeholder consultation and involvement**

##### **Importance of Public Consultation and Involvement**

Article 14 of the Water Framework Directive requires that "Member States shall encourage the active involvement of all interested parties in the implementation of this Directive, in particular the production, review and updating of the River Basin Management Plans.... For each River Basin District, they shall publish and make available for comments to the public:

- a. a statement of the consultation measures to be taken;
- b. an interim overview of the significant water management issues identified in the river basin; and
- c. Draft copies of the River Basin Management Plan."

These requirements are in line with the Agency's needs and practices on this subject and also Central Government code of practice for modernising Government<sup>9</sup>,

Effective consultation is particularly important for the determination and use of the River Basin Management Plans as these will lead to decisions on the measures at a national level (eg AMP and agriculture) as well as the measures at the river basin/catchment level. These will then determine the individual operational measures needed at the local level (eg individual authorisations or discharge consents, specific measures etc). Therefore, it will be important that the major stakeholders (at both the local and national levels) are all consulted about and involved in the process of appraising the River Basin Management Plans to obtain 'buy in' to this process and the associated measures.

##### **Clarifying the Role of the Consultation**

The seminar emphasised the importance of clarifying *who* will make the decisions and the decision-making process. In particular, what will be the role of the consultation process. In addition, it will be necessary to clarify whether or not the stakeholders/parties affected (either positively or negatively) by the options reside in the basin.

Table 4.1 and Sections 4 and 5 highlighted that the possible measures entail a complicated mix of the following types of measures. Some measures such as controls on non-water industry discharges and abstraction could be determined in the basin by the Agency's area or regional managers. But the overall programme for many important control options such as those affecting the water industry and agriculture would be decided upon at a national level.

---

<sup>9</sup> Cabinet Office (2000) Code of Practice on Written Consultation.

For some options such as those affecting the water industry, the costs would be borne by local consumers (for example, through increases in their water company's charges) so that it would be necessary to inform national decision-makers on the local stakeholders' views on these options and their willingness to pay these costs. However, the costs of other options, for example regarding agri-environment schemes, might be borne by others (such as the exchequer - ie general tax payers). This will make it more difficult to frame the choices and their implications for stakeholders in a way which allows their views to be obtained and input into national decision-making. Therefore, in general, the consultation would not aim to achieve consensus on an agreed set of options.

Instead, the role of the consultation will be to input the views of the parties affected both positively and negatively by the options to those (mainly at national level) who would make decisions. This would include their views on the significance of the environmental, economic and social implications of the options and, more importantly, *why* they are important. The Agency's project manager, in liaison with the stakeholders, would report those aspects that specific stakeholders considered to be particularly important.

#### **Tailored Techniques for Public Consultation for RBMPs**

The prime mechanisms of the consultation processes might be through in-depth discussion of the options and issues so that the Agency's project manager can report (in qualitative terms) to DETR the views of consultees. But this will not be able to provide any quantitative or indicative assessment of the extent that the public holds these views since the groups consulted may not necessarily be representative. The Agency's manager, in consultation with the steering group of stakeholders, would use the findings of the consultation to refine options so to reduce the impacts of greatest concern, as far as possible.

Various studies and reviews have been carried out on specific techniques for public consultation and information<sup>10</sup>. This experience should be reviewed to address the following key issues:

- Who to consult? How representative are they?
- What possible consultation techniques could be appropriate to the circumstances and decision-making context described in Sections 4 and 5. This might include use of consultation papers, one-to one meetings, liaison group forum discussions and structured workshops.
- How to report the findings of the consultation to aid the decision-making process?

It will be particularly important to link the consultation processes used for RBMPs with related processes being carried out by DETR and the Agency at the local and national levels on related matters (eg regarding LEAPs) to reduce the danger of stakeholder fatigue and apathy. Stakeholder fatigue which could be a particularly important problem if the stakeholders are already being consulted (by the Environment Agency and other bodies such as DETR and local authorities) on other environmental issues, and if they believe that they do not have any real influence on the ultimate (national) decisions because they are too far removed from them.

---

<sup>10</sup> See for example, ESRU's Final Draft of the Local Outreach R&D Report

**6.2.12 Element 11: Stated Preference surveys of a larger sample of affected parties**

The consultation and deliberative processes outlined above will (almost inevitably) comprise a small group so as to enable in-depth discussion of the issues and options at that stage. But this group may not necessarily represent all the affected parties. Therefore, it will be necessary to carry out a Stated Preference survey of the views of a wider sample of affected people.

The seminar recommended that the SP techniques needed for RBMPs would have to be well-focused on the outstanding options and issues - ie respondents would be asked for their views on real, not hypothetical, (packages of) options with the real costs and environmental benefits clearly identified.

Possible Stated Preference Survey techniques include:

- i. Referendum surveys that ask people whether or not they are willing to pay the costs (estimated from the cost analyses) for the levels of environmental benefits associated with the options under examination. However, this could fail to pick up the strengths of some individuals' concerns about the impacts. It is likely that there will be some individuals with (very) strong concerns about the environmental impacts. The appraisal and survey will therefore need to address and reflect the strength of any concerns.
- ii. Consequently, it may be necessary to examine Contingent Valuation survey techniques. These have been used to assess the strengths of individuals' preferences and can provide valuations in terms of individuals' Willingness to Pay for the environmental benefits in question or Willingness to Accept compensation for some environmental impacts, or to forego the environmental benefits in question. This approach has achieved some success for readily monetisable environmental benefits such as recreation and fishing. It has been the subject of criticism and debate regarding the following issues concerning intangible benefits such as impacts on natural habitats and ecosystems, for which stated preference techniques (rather than market based and transferred values) are often suggested:
  - The difficulties of specifying clearly and in ways that respondents could readily understand the uncertain and complex impacts of water quality changes on such natural habitats and ecosystems (see Section 6.2.8 above).
  - Whether the respondents can readily understand such information on these impacts?
  - Whether the respondents are able or willing to value such intangible benefits in monetary terms, especially where they do not know enough about the environmental benefits in question?;
  - Whether individuals object to being asked directly to value the intangible benefits in monetary terms?; If so, then what to do about those who refuse to answer the WTP questions?
  - That respondents' willingness to pay may be constrained by their income.
- iii. Choice Experiment (CE) techniques (such as contingent ranking and contingent rating) focus on seeking the strengths of individual respondents' views directly on the outstanding options and their associated major trade-offs on which

decisions have to be made. A key question is the feasibility of applying such novel techniques for the types of options and their associated impacts and trade-offs likely in River Basin Management Plans.

DETR is currently preparing guidance for the performance of such SP surveys. However, these surveys can be expensive (up to about £50k each), so it is unlikely to be feasible to carry out such a survey for each basin. This highlights the following issues regarding all SP techniques:

- Are there likely to be a large number of such cases on which DETR need such SP surveys to be carried out? If so, then would it be possible to carry out SP studies for a limited set of basins and then set up systematic procedures for transferring their findings to the other basins - perhaps to form part of element 9 above?
- What specific types of information does the DETR need (from the SP surveys) in order to be able to determine whether the packages of options to achieve good water quality are disproportionately expensive?
- In particular, does DETR need surveys carried out at the river basin level (eg on whether local water consumers are willing to pay (eg in higher water bills) for the local options or does DETR need a higher national level for the nationally determined options or perhaps is some combination of the two needed?
- How to focus on the key questions regarding the outstanding options and their associated (conflicting) environmental and economic impacts?
- How to provide respondents with sufficient summary information on these (uncertain and complex) impacts and the decision-making context on the options and how their views will input to aid such decisions?
- Whether it might be possible or useful to carry out focus group discussions that are generally needed with a selected sample of respondents to determine which survey technique is most appropriate and then to define the survey accordingly.

#### **6.2.12 Element 12: Review of Findings by DETR**

EA HO would then collate the RBMP reports from the Agency managers on the findings of the analysis for the various elements above for DETR's review regarding decisions on derogations and measures that need to be decided at the national level (eg agriculture and AMP). This will be in line with articles 4, 5 and 13 of the WFD, which requires publication of the RBMPs and justifications for any derogations by 2009.

#### **6.3 Overall outstanding issues on Appraisal Techniques**

It was suggested that the Environment Agency should commission a 'virtual' appraisal study based on one of the proposed basins to explore a number of outstanding issues regarding the integrated appraisal of RBMPs. Annex X presents a draft terms of reference for this study. The basin chosen will be one that has a representative range of issues covering pollution, water resource, and navigation and flood defence issues.

In addition, the seminar raised the following outstanding issues that need to be resolved through follow up discussions and studies:

- How much time and resources would be available to carry out the appraisal? One Working Group outlined an ideal appraisal process that might take as long as 5

years. In the next iteration, it will be necessary to set out clearly bounds for the time and resources that might be available and then streamline this ideal process accordingly while maintaining its key elements.

- How the Agency can input the findings of the appraisal system to DETR and report their views back to inform the next element of the appraisal of the RBMP as necessary?
- How to assess consistently the costs and economic impacts of measures covering different sectors (eg agriculture, water industry, and non-water industries subject to international competition)? This includes not only control options, but also government expenditures on technical assistance and advisory programmes (eg agri-environment schemes)
- Could the cost-effectiveness estimates for achieving the selected water quality target in a RBMP then be used as benchmark estimates? Any appeals against decisions on individual consents needed to achieve this WQO might then focus on whether the cost-effectiveness of the controls exceed this benchmark.
- How to assess changes in the pressures on water quality up to 2009 and 2015, including not only prospective analyses of pollution sources but also other matters affecting water quality such as possible climate changes?
- How to assess and present the important non-use environmental benefits?
- What form of Stated Preference survey technique would be needed? How to carry them out and report their findings to aid decision-makers?
- How to estimate the number of beneficiaries of the water quality improvements?
- How to carry out the consultation processes and to report the findings of the consultation to aid decision-makers?
- What would be a reasonable time horizon for appraisal for our purposes that span both the Water Framework cycle (6 years) and that in AMP (currently every 5 years with a 10-year horizon), plus possibly other time horizons for other measures and sectors (eg IPPC)?
- The appraisal system for RBMPs outlined above could provide a sound system for determining water industry measures needed in a future AMP 5. Thus, the appraisal would identify and specify water industry measures that are cost-effective means of achieving specific water quality states when compared with various alternative measures. It would also provide a process to elicit the views of the key stakeholders and public on them. DETR's assessment of whether it should seek derogations (for specific water bodies) would then correspondingly identify a number of worthwhile water industry measures for inclusion in AMP 5.
- However, this also raises the question of what interim methodology to employ for AMP4, that is, before the RBMP appraisal process is completed?



## **ANNEX I: Agenda For Seminar**

### **Day 1**

0930 Coffee

1000 Welcome/introduction/objectives of seminar by chairman (Martin Griffiths (Head of Water Quality, Environment Agency))

1015 The main context of future decisions on water quality improvements. (Ashley Holt, Environment Agency).

#### Discussion

1100 Needs for an appraisal system: Outline of the issues to be discussed in first working Groups A - D, assisted by reference to a hypothetical case study of a river catchment (Jonathan Fisher and Ashley Holt (Environment Agency))

1145 Discussion on overall appraisal and issues for each group

1230 Lunch

1330 First Group discussions

A. User Decision-makers: *Chairman Martin Griffiths (Environment Agency); Rapporteur Sheila Sowerby (Environment Agency)*

B. How to scope the appraisal *Chairman Kevin Thomas (Environment Agency, Wales); Rapporteur Professor Nick Hanley (University of Glasgow)*

C. How to identify options and estimate consistently their costs *Chairman John Fraser (Environment Agency); Rapporteur Paul McMahon (Environment Agency)*

D. How to assess and report the environmental benefits? *Chairman Clive Gaskell (Environment Agency); Rapporteur Ronan Palmer (Environment Agency)*

1700 – 1830 Plenary: Report back from each Group A- D and discussion.

2000 Reception and Dinner hosted by Sir John Harman (Chairman, Environment Agency)

### **Day 2**

0900 Summary of first day's discussions (Jonathan Fisher)

Outline of issues for second group discussions (Jonathan Fisher)

Plenary discussion of these issues

0930: Group discussions: how to bring it altogether to aid decision-making.

Group E: Information and appraisal needed for policy measures at National level, *Chairman Stuart Hoggan (DETR); Rapporteur Mark Kibblewhite (Environment Agency)*

Group F: Information and appraisal needed to be collated and reviewed by Environment agency's Head office. *Chairman Martin Griffiths (Environment Agency); Rapporteur Jonathan Burney (English Nature)*

Group G: Information and appraisal system needed for River Basin Management Plans at a catchment level. *Chairman Tony Warn (Environment Agency); Rapporteur Andrej Nowosielski (Environment Agency).*

Lunch

1430 Report back from the second Group discussions  
Plenary discussions of findings of group discussions

Coffee

1630 Final report back and discussions  
Wrap up on findings and next steps (Martin Griffiths (chairman))

## **ANNEX II: Participants At The Seminar**

<b>Title</b>	<b>First Name</b>	<b>Last Name</b>	<b>Position</b>	<b>Affiliation</b>
<b>Delegates Attending</b>				
Prof	Jacque	Burgess	Department of Geography	University College London
Mr	Jonathan	Burney	Economist	English Nature
Ms	Alison	Cambray	Policy Adviser, Nutrients Branch	Ministry of Agriculture, Fisheries and Food (MAFF)
Mr	Philip	Cooper		University of East Anglia
Dr	Ian	Davidson	Head of Science Unit, Rural and Marine Environment Division	Ministry of Agriculture, Fisheries and Food (MAFF)
Mr	Ian	Dickie	Environmental Economist	Royal Society for the Protection of Birds
Dr	Michael	Doble	Senior Quality Enhancement Economist	OFWAT
Dr	Bill	Emery	Director of Costs & Performance Chief Engineer	OFWAT
Ms	Laura	Fellowes	Environment Protection Economics Division	DETR (Environmental Protection Group)
Mr	Colin	Green	Reader	Flood Hazard Research Centre, Middlesex University
Ms	Helen	Grimshaw	Senior Economist, Economics and Environment Div, EPTAC	DTI
Dr	David	Hadley	Lecturer	University of Birmingham
Mr	Nick	Haigh	Economics Resource Use Division	Ministry of Agriculture, Fisheries and Food (MAFF)
Prof	Nick	Hanley	Economics Department	University of Glasgow
Mr	Stuart	Hoggan	Director, Water Quality Division	DETR (Environmental Protection Group)
Mr	James	McTernan	Strategy Manager	East of Scotland Water
Mr	David	Newsome	Consultant	Foundation for Water Research
Dr	Dan	Osborn	CEH	Monks Wood
Prof	Judith	Petts	Deputy Director	The University of Birmingham
Prof	Nick	Pidgeon	Professor of Risk Perception and Communication	University of East Anglia
Mr	Jack	Poppleton		Hickson and Welsh Limited
Ms	Meg	Postle	Director	RPA
Mr	Stephen	Reeves	Branch Head for Water Quality Division	DETR
Mrs	Sheila	Reiter	Chairman	OFWAT National Customer Council
Ms	Ute	Roelen	Economic Assistant	DETR (Environmental Protection Group)
Mr	Ben	Smith		Orchard House
Mr	James	Spurgeon	Environmental Economist	Gibb
Mr	Pierre	Strosser	Environment Directorate	European Commission
Prof	Kerry	Turner		University of East Anglia
Ms	Rowena	Tye	Head of Quality Enhancements Team	Ofwat
Mr	Robert	Weeden	Economic Regulation Adviser	Water UK
Mr	Evan	Williams	Environmental Economist	Scottish Environment Protection Agency (SEPA)
Ms	Janet	Wright	Managing Consultant	OXERA
Mr	John	Martin	Principal Advisor, Quality and Environmental Services	Severn Trent Water

*Findings of Seminar on Integrated Appraisal for River Basin Management Plans*  
*Report No. 41, Version 0.9*

Title	First Name	Last Name	Position	Affiliation
Delegates Attending				
Environment Agency Delegates attending				
Dr	Martin	Griffiths	Head of Water Quality	Environment Agency
Mr	Stuart	Beckhurst	Senior Scientist	Environment Agency - South West Region
Dr	Jonathan	Fisher	Environmental Economist, National Centre for Risk Analysis and Options Appraisal	Environment Agency
Mr	Dave	Foster	Water Framework Directive Manager	Environment Agency
Mr	John	Fraser	Water Quality	Environment Agency
Mr	Clive	Gaskell	Water Quality Manager	Environment Agency - North West Region
Mr	Peter	Grigorey	Regional LEAP Planner	Environment Agency - South West Region
Mr	Ashley	Holt	Policy Adviser, Water Quality	Environment Agency
Mr	Hugh	Howes	Regional Strategic Planner	Environment Agency - Thames Region
Mr	Mike	Keast	PIR	Environment Agency
Dr	Mark	Kibblewhite	Head of Land Quality	Environment Agency
Dr	Paul	Leinster	Director, Environmental Protection	Environment Agency
Mr	Paul	McMahon	Business Economist, National Centre for Risk Analysis and Options Appraisal	Environment Agency
Mr	Andrzej	Nowosielski		Environment Agency - Thames Region
Mr	Ronan	Palmer	Chief Economist	Environment Agency
Mr	Geoff	Philips	Ecological quality assessor, National Centre for Risk Analysis and Option Appraisal	Environment Agency
Mr	Rob	Robinson	Agricultural Policy Manager	Environment Agency
Ms	Sheila	Sowerby	Principal Planning and Modelling	Environment Agency - North West Region
Mr	Kevin	Thomas	Water Quality Manager,	Environment Agency Wales
Mr	Roger	Vallance	Head of Regional and National Relations	Environment Agency
Dr	Tony	Warn	Water Quality	Environment Agency
Ms	Clare	Watts-Jones	Water Resources Business Analyst	Environment Agency
Attending reception/dinner				
Sir	John	Harman	Chairman	Environment Agency
Dr	Dieter	Helm	Director	OXERA

## **ANNEX III: Economic Elements Of The Water Framework Directive**

Pierre Strosser

DG Environment, European Commission

### **1 Summary**

The Water Framework Directive has been adopted by the European institution and is now moving towards its implementation phase. The present paper presents and investigates the two economic elements of this Directive, i.e. the use of prices and charges for enhancing the sustainability of water resources; and, the economic analysis of water uses to identify the most cost-effective set of measures for achieving the environmental objectives of the Directive.

### **2 Introduction**

A close look at the state of water resources in Europe reveals that the sustainability of the water system is at stake in many regions and river basins. Although several indicators show an apparent stabilisation or reduction in water stress overall in Europe, spatial and temporal differences are significant and there are many alarming situations with regards to quantity, quality and ecological aspects<sup>11</sup>.

The main pillar of water policies that will address these issues in the coming decades will be the Directive establishing a framework for Community action in the field of water policy (or so-called Water Framework Directive). This Directive, recently adopted after a very long preparatory and negotiation phase, integrates elements from past policies that have favoured the definition of emission or quality standards, and established best practices for reducing the pressure on the environment<sup>12</sup>.

At the same time, in line with similar developments in many countries and international fora, the directive gives due consideration to the economic dimension (or value) of water. More specifically, it promotes water pricing and charging as a means to modify the behaviour of economic actors to reduce the pressure on water resources. It also integrates economics into planning and decision-making. Overall, the Water Framework Directive makes operational economic principles<sup>13</sup>, economic approaches and economic instruments for future water policies. And this is a première in EU environmental policies.

This paper presents the economic elements of the Water Framework Directive. It describes their content, the history of their adoption, and it identifies some key issues for the implementation of these elements.

---

<sup>11</sup> *Environment in the European Union at the turn of the century*. European Environment Agency, 1999.

<sup>12</sup> The Water Framework Directive repeals some of the existing directives, e.g. the shellfish waters Directive 79/923/EEC. And it proposes a coherent framework for reinforcing the links and complementarity between other existing directives that will make up the baseline measures to be included in the programme of measures for each river basin (e.g. the Urban Waste Water Treatment Directive 91/271/EEC or the Nitrates Directive 91/676/EEC).

<sup>13</sup> E.g. the polluter pays principle integrated in the Amsterdam Treaty as foundation of all European environmental policies.

### **3 Economic Elements of the Framework Directive**

The new Water Framework Directive reinforces the role of economics in water policies through two key elements:

- The use of economic instruments, i.e. prices and charges, for enhancing the sustainability of water resources (Article 9);
- The economic analysis of water uses (Article 5 and Annex III) to identify the most cost-effective set of measures for achieving the environmental objectives of the Directive.

#### **3.1 Water pricing and charging <sup>14</sup>**

Article 9 of the Water Framework Directive specifies Member States shall account for the principle of recovery of the costs of water services, including environmental and resource costs. The polluter pays principle will be key in deciding who should pay for the costs of existing and future water services.

More specifically, Member States shall ensure by 2010:

- That pricing policies provide an adequate incentive for users to use water efficiently, so as to contribute to the environmental objectives of the Directive,
- An adequate contribution of the different uses (i.e. agriculture, households, industry) to the recovery of the costs of water services.

Derogation to these obligations includes: (i) the funding of particular remedial and preventive measures in order to achieve the objectives of the Directive; and, (ii) situations where proposed established pricing policies for a given water use do not compromise the environmental objectives of the Directive.

The article specifies a strict reporting obligation for Member States: the details of the application of the above mentioned principles and derogation in pricing policies will be reported in each river basin management plan.

#### **3.2 Economic analysis of water uses**

The economic analysis of water uses has two main objectives:

- To support the development of water pricing policies that comply with the requirements specified under Article 9;
- To identify the set of measures that will reach the objectives of the Directive in a cost-effective manner.

The economic analysis will make use of a wide range of information ranging from estimates of volumes, prices and costs associated to water services, to assessment of investments and costs of potential measures to be included in the programme of measures of each river basin management plan.

---

<sup>14</sup> See also Table 1 for a summary of the different clauses of Article 9.

### **3.3 Key deadlines**

The deadlines to be considered for the implementation of the economic elements of the Water Framework Directive are presented in Figure 1.

## **4 The History of Adoption**

Strangely enough, both economic elements have mostly been discussed separately during the preparation of the Water Framework Directive and the negotiations between the EU institutions of the Water Framework Directive<sup>15</sup>.

Most of the debate took place around the potential role water pricing should and can play in the context of EU water policies. The debate, however, was often rather obscure. This may be explained by the wide range of views among stakeholders and Member States, by the political pressure of economic groups benefiting from actual pricing policies, and by differences in definitions and understanding of key concepts and principles among actors participating in the discussions<sup>16</sup>. Table 1 summarises the position of the different EU institutions during the three-year negotiation period (June 1997<sup>17</sup> to June 2000<sup>18</sup>) that has led to the adoption of the Water Framework Directive.

Overall, there has been very little or no discussion on the economic annexe of the directive. The lack of interest from both the Council and the Parliament may explain the absence of discussions and eventually the poor quality of the final text of Annex III.

## **5 Issues for Implementation**

Today, the implementation of the Water Framework Directive is a priority for many Member States, stakeholders and also for the Commission that has made the implementation of its environmental legislation a key priority of its environmental strategy.

Common implementation issues relevant to both economic elements include:

- The need to agree on common definitions and means to estimate key variables such as costs, prices, uses, etc. Today, comparing levels of cost-recovery between countries remain difficult due both to the lack of information and to differences in definitions and ways to compute variables in different countries of the European Union.
- There is also a need to develop the information base that will make possible the application of Article 9 and Annex III. Which information is required, at which

---

<sup>15</sup> It is clear, however, that both elements are linked. The economic analysis clearly supports the development of pricing policies. And both the cost-effectiveness analysis and the development of pricing policies requires very similar information on costs, prices, uses, etc..

<sup>16</sup> This is illustrated, for example, by the "circular" definitions of "water services" and "water uses" that have been retained in Article 2 of the Directive.

<sup>17</sup> Proposal of the Commission COM(1997)049 - OJ C 184, 17.06.1997

<sup>18</sup> June 28, 2000: agreement between Parliament and Council on a compromise text as a result of the conciliation between the two institutions.

spatial and temporal scale, how to collect this information, how to balance information costs and accuracy levels, etc are key issues that need to be considered.<sup>19</sup>

More specific issues for each economic element are listed in the following paragraphs.

### **5.1 Economic analysis**

As it stands now, the text of Annex III is not well structured and lacks many elements and specifications vis-à-vis the economic analysis to be undertaken. Several issues will need to be addressed:

- To further clarify and agree on the objectives of the economic analysis;
- To develop methodologies for undertaking the economic analysis. In this context, there is a need to build on current (although often fragmented) practices in Member States and elsewhere with regards to economic analyses undertaken at different scales (e.g. the project scale, the river basin scale or the national scale), and to build on recent research development (e.g. evaluation/valuation of environmental costs);
- Annex III is too often considered in isolation to the bulk of activities and analyses that will enable experts to develop river basin management plans. Clearly, the development of river basin management plans that integrate pricing policies aiming at modifying water use and pollution, and that proposes the most cost-effective set of measures for achieving the environmental objectives of the directive cannot leave economics in isolation. Thus, a well-structured integration between economics and other technical and biophysical components is required for developing river basin management plans.

The current role of economics in water policies in many countries stresses the efforts still required for integration. This is likely to remain a challenge all along the implementation of the Water Framework Directive and this for at least two reasons.

- Experts from different disciplines rarely work in an integrated manner. Multi-disciplinary research remains too often a juxtaposition of disciplines far from integration, and multi-disciplinary decision making/planning is rare.
- Methodologies for the integrated analysis of water systems and for supporting policymaking are still underdeveloped and not yet fully operational.

### **5.2 Pricing**

- Experiences on pricing and charging are numerous, unlike the experiences on economic analysis. Thus, there is a need to learn from these experiences and further identify the factors that explain the success of specific water pricing

---

<sup>19</sup> High information requirements and costs are often mentioned as constraints to the development of water pricing policies that better account for the environment, and to the economic analysis. Clearly, however, most of this information is required in any case for the development of adequate river basin management plans.



structures vis-à-vis environmental objectives, but also other social, economic and development objectives.

- In this context, the sharing of information on "successful" pricing experiences should be promoted<sup>20</sup> to all stakeholders.
- There is a need to better inform stakeholders about the costs related to their water use (both from a quantitative and qualitative point of view), including environmental costs. Thus, information on the functioning of the water cycle will often be required to illustrate the link between uses and the quality of the environment. Overall, more transparent information on uses, pricing and costs will be required.
- Which role for consumers, stakeholders, public organisations in the development of new water pricing policies? For example, institutional changes may be required to associate/consult stakeholders in the development of new pricing policies. Price control is also a key issue to be considered (how, by whom).
- Too often, pricing issues are mixed up with privatisation and liberalisation issues (that are not covered by the Water Framework Directive). Privatisation of water services may indeed have an impact on water prices (e.g. as a result of the elimination of existing subsidies). However, these are separate issues.

## **6 Follow-Up and Conclusions**

Many Member States and stakeholders did not wait for the adoption of the Water Framework Directive to move towards its implementation<sup>21</sup>. In parallel, the role of economic instruments in water policies has increased during the last few years in many EU or non-EU countries<sup>22</sup>. Thus, we are today in a unique situation where we can build on the dynamics that have led to the adoption of the Water Framework Directive to start implementation at an adequate pace. The Communication entitled Pricing policies for enhancing the sustainability of water resources<sup>23</sup> was adopted in July 2000 by the Commission to clarify issues and options related to pricing, and more importantly to give some impetus in this implementation process.

For those that did not participate in the discussions and negotiations on the Water Framework Directive, and also for those that participated in these, there is now an urgent need to specify what is meant in operational terms by the economic-related articles and by Annex III. It is important also to propose practical approaches and methodologies for developing pricing policies and undertaking the economic analysis in line with the requirements of the Directive.

---

<sup>20</sup> "Different stakeholders from different countries are likely to provide different definition of "successful". From our perspective, it means pricing policies that have led to a better environment, without threatening the social and economic development of given regions or economic sectors.

<sup>21</sup> Working groups on the implementation of the WFD have been established during the past few years in several countries, workshops and conferences have been organised etc.

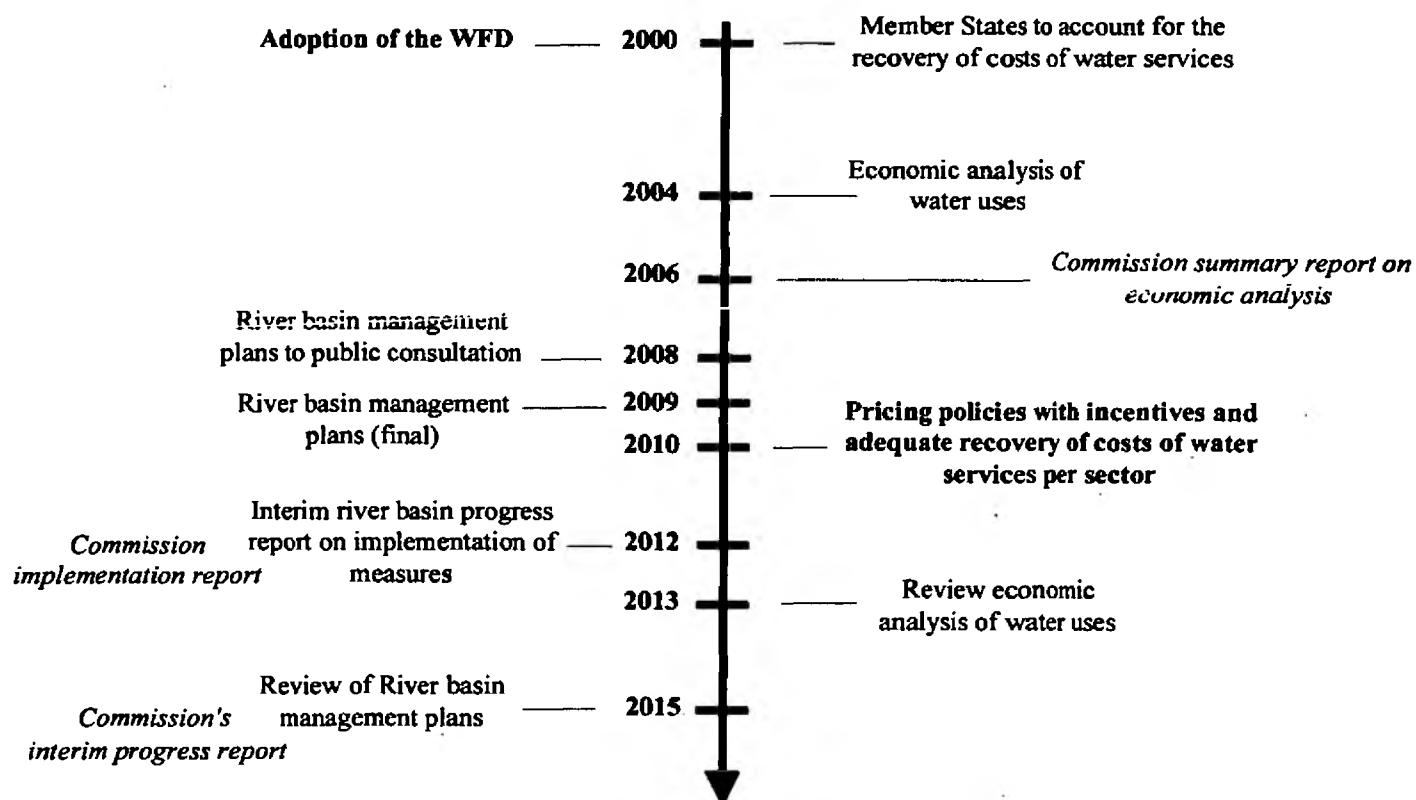
<sup>22</sup> See for example the integration of the Polluter Pays Principle in Portuguese and Italian water legislation, or the current reform of the water law undertaken by France that gives a key role to financial and economic issues and promote an enhanced use of abstraction and pollution charges.

<sup>23</sup> COM(2000)477

The above mentioned Communication is not the operational document providing these approaches and methodologies. More practical guidelines are required, both for water pricing and for the economic analysis. These guidelines should be developed by experts with input from stakeholders. They should be tested in a limited number of river basins in Europe. And they should be validated by experts, potential users and stakeholders. Many activities indeed for the very short time period available (four years...) for finalising the economic analysis of water uses in each river basin!

Importantly, these activities need to involve experts and stakeholders from Central and Eastern Europe that will soon be joining the European Union<sup>24</sup>. This will ensure a smoother accession process and will enhance coherence in future European water policies.

**Figure 1.** Deadlines related to the implementation of the economic elements of the Water Framework Directive



<sup>24</sup> In this context, see for example the Conference entitled *Economic instruments and water policies in Central and Eastern Europe - Issues and Options* co-organised in Budapest by the Regional Environmental Centre for Central and Eastern Europe and DG Environment of the European Commission, September 28 and 29 2000.

Table 1. The positions of the EU institutions vis-a-vis the different clauses of Article 9 of the Water Framework Directive

Issues	Commission's Proposal	EP first reading	Common Position	EP second reading	Adopted text
<b>Incentive pricing</b>	No reference to incentive pricing	Indirectly specified with regards to situations where it is not possible/practical to evaluate environmental and resource costs	No reference to incentive pricing	Adequate incentive for efficient use required	Adequate incentive for efficient use required
<b>Cost recovery</b>					
1. Financial costs	1. Full recovery	1. Full recovery	1. & 2. Both costs to be accounted for, no obligation of cost recovery	1. & 2. Costs not differentiated, "adequate" cost recovery as objective	1. & 2. Costs not differentiated, "adequate" cost recovery as objective
2. Environmental costs	2. Need for further proposal by the Commission	2. Recovery when possible or practical			
3. Recovery per economic sector (agriculture, industry, households)	3. Yes	3. Yes	3. No	3. Yes	3. Yes
<b>Legally binding article</b>	Yes	Yes	No	Yes	Yes
<b>Deadlines</b>	2010	2010, 2012 to reflect environmental and resource costs into prices	No date	2010	2010
<b>Derogations</b>					
1. Affordability	1. Yes	1. Yes	1. to 3. General clause to consider the economic, social and environmental effects of cost recovery	1. to 3. General clause to consider the economic, social and environmental effects of recovery	1. to 3. General clause to consider the economic, social and environmental effects of recovery
2. EU financial support to environmental projects	2. Yes	2. Yes			
3. Regional development (Objective 1, 5b, 6 of the structural funds)	3. Yes	3. Yes, but stricter derogation			
4. Derogation for funding preventive/remedial measures to achieve the objectives of the WFD	4. No	4. No	4. Yes	4. No	4. Yes
5. Derogation for a given use if environmental objectives of the WFD not compromised	5. No	5. No	5. No	5. No	5. Yes

## **ANNEX IV Current Water Quality Planning In The Environment Agency**

The Environment Agency's work in planning for water quality is a process comprising of a number of distinct steps. Figure 1 provides an overview of the process. Overall it combines to form a classic pressure-state-response model. However since it has specific goals, analysis of the pressures that contribute to the observed state leads to the planning of a specific response. The elements in the overall process, as it applies to a specific water body or location, are as follows.

### ***1. Identify relevant standards or objectives***

Standards arise from a variety of sources, some directly from EC legislation, others from domestic statutory instruments, still others from guidance or direction from the Secretary of State. Most standards are related directly to either protection of the ecosystem or of particular "uses", such as a fishery or drinking water. Standards may be expressed in the form of concentrations of specific substances that should not be exceeded, or in the form of classifications in which several substances or measurements are associated together according to address a specific pollution issue.

The primary example of the classification approach is the River Ecosystem Classification. In this system, a graded "ladder" of increasing quality is defined, with five distinct quality categories. The target for a water body is determined by the expected use of the receiving water. For example, only waters in the highest quality classes could sustain a salmon fishery. The target then becomes part of the planned "objective" for the water body.

In general, targets may carry different degrees of flexibility with respect to their level and/or timetable for implementation. If there is little or no flexibility because the standard and deadline for compliance has been set by a higher authority, the task falling to the body responsible for implementation (DETR, Agency) is to establish and pursue the most cost-effective means to achieve it. If there is some flexibility, then it is advisable (and a duty for the Agency under S.39 of the Environment Act) to carry out an appraisal of the environmental, economic and social impacts of the options to determine an appropriate target and/or establish a reasonable timetable. The WFD is clearly an example of this latter approach.

### ***2. Undertake monitoring and assess ambient quality***

The Environment Agency directs considerable resource and effort to obtain samples that provide a realistic and fair picture of ambient quality. Effort is directed to standardise and quality-assure the taking and subsequent analysis of samples and measurements to avoid the misdirection of subsequent work and analysis because of poor or misleading data.

### ***3. Assess compliance***

All standards used by the Environment Agency for planning purpose are expressed as summary statistics. These form clear criteria by which it is possible to judge whether a particular standard has been breached. In order to avoid possible misdirection of resources, a standard of proof is applied. The normally accepted standard is that an observation (for example, that a standard has not been met) is not proven unless we can be certain at the level of 95% confidence. In other words, we accept the risk that 1 time in 20 our judgement based on the data is wrong.

#### **4. Compliance status**

A standard may, logically, be passed or failed. If it is failed, the Agency must determine the cause (or contributory causes) of the failure in order to identify possible actions to correct it.

If the standard is passed there is normally no further action. However, in some cases (for example, in accordance with requirements of EC Legislation) an upward revision of the target may be considered. In this case, as with action to correct failure, the initial action is to account for the factors contributing to the existing observed level of quality.

Due to the quantity and quality of data collected, it is also possible to identify cases where we believe the standard is not yet failing but may be at risk. Environmental data can only form an initial trigger for concern in such cases, however analysis of contributing factors allows assessment of the likelihood of the risk being realised and judgement as to whether pre-emptive action would be justified.

Taken together, these three cases may be likened to the "red, amber and green" familiar from traffic lights.

#### **5. Appraisal of Options for Action**

Depending on the nature and relative contributions from the factors affecting the observed ambient quality and compliance status, options can be developed for courses of action. A number of issues may be relevant in considering what, if any, action to take. For example;

- Is revision of the target justified?
- Does the risk of failure justify action?
- What is the most effective course of action? (for example, balancing cost effectiveness and certainty of outcome)
- When should the action start and finish?

#### **6. Outcome**

The appraisal may lead to one or a combination of outcomes. One conclusion may be that further investigation is needed to enable a decision to be reached. If the action is one which the Agency can successfully undertake alone it can be included in business plans and resources allocated. In other cases, it may be clear from appraisal that the best course of action is one that cannot be mounted at local or regional levels. In that case, the action may be to seek support at National level (say to change a policy, or to lobby for measures such as economic instruments).

Other outcomes may require co-operation or negotiation with other bodies. A particular example of this is the asset management process (AMP) for water companies undertaken as part of OFWAT's Periodic Review of water company prices. In this process the environmental impact of all the water company discharges is considered and a national list compiled. Figure 2 illustrates this.

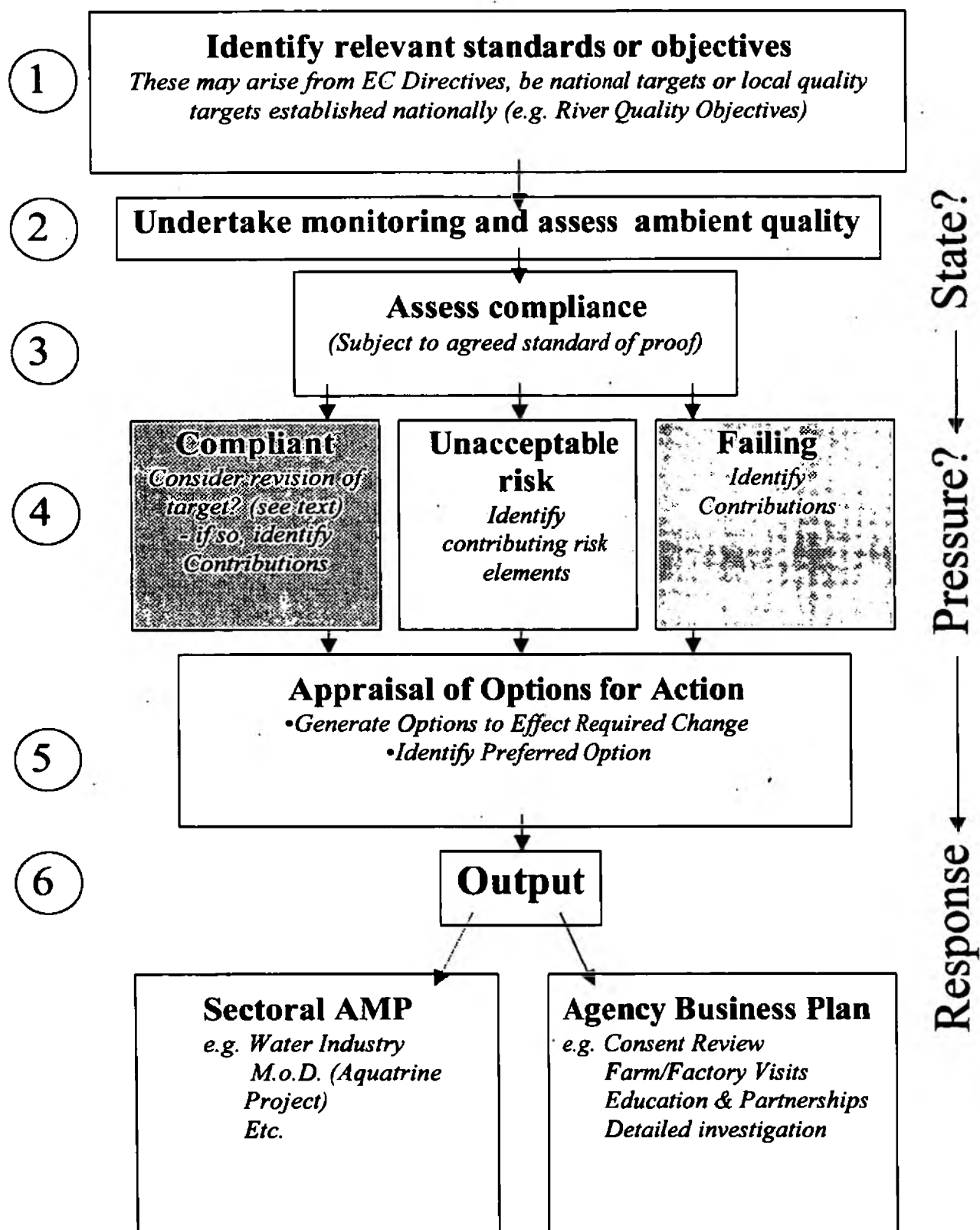
#### **Consultation and Transparency**

The main means used by the Agency to engage with the public and other stakeholders is through LEAPs (Local Environment Agency Plans). However when it has become clear that specific interests are affected it is normal practice to engage in dialogue additional to the LEAPs process. The advent of the Water Framework Directive further reinforces the need to operate transparently since it requires consultation on and publication of "River Basin Management Plans".

The Environment Agency is an executive branch of Government, established as a non-departmental public body. As such, it is responsible for implementing actions that may relate to decisions made by its Board, for legislation or direction given by Government and in the case of EC Directives, Government direction concerning their implementation. These different tiers of decision making constrain the flexibility the Agency has with regard to environmental targets to varying degrees (as described above). There is in effect a cascade of decision making, with greatest flexibility at the higher levels and far less at the lowest. At each tier in this cascade, costs and benefits are considered, it follows that it will be with a 'broad – brush' at the high level, and detailed at the lowest. This cascade is illustrated in Figure 3 below. Each of these levels is examined in section 6.

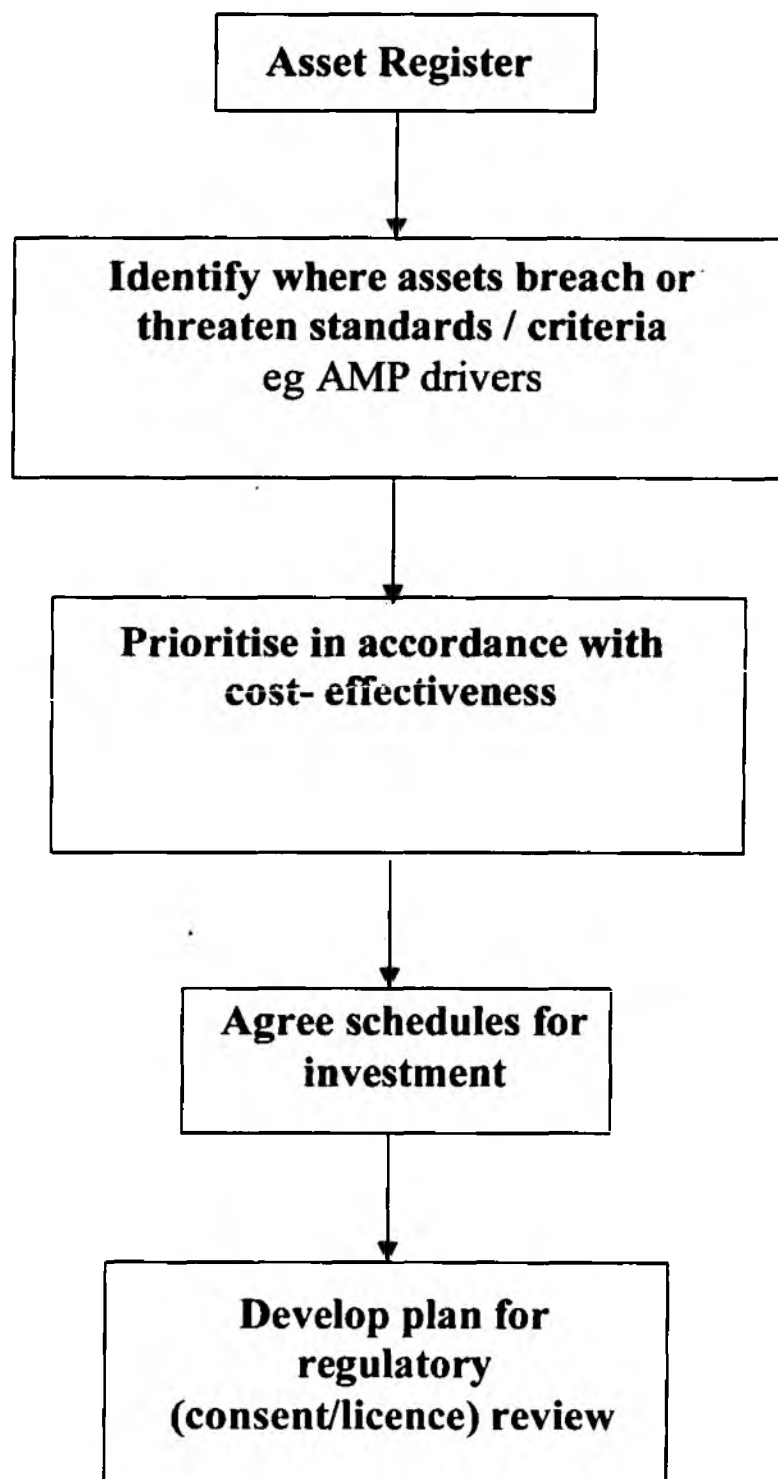
Figure 2

## The Water Quality Planning Process



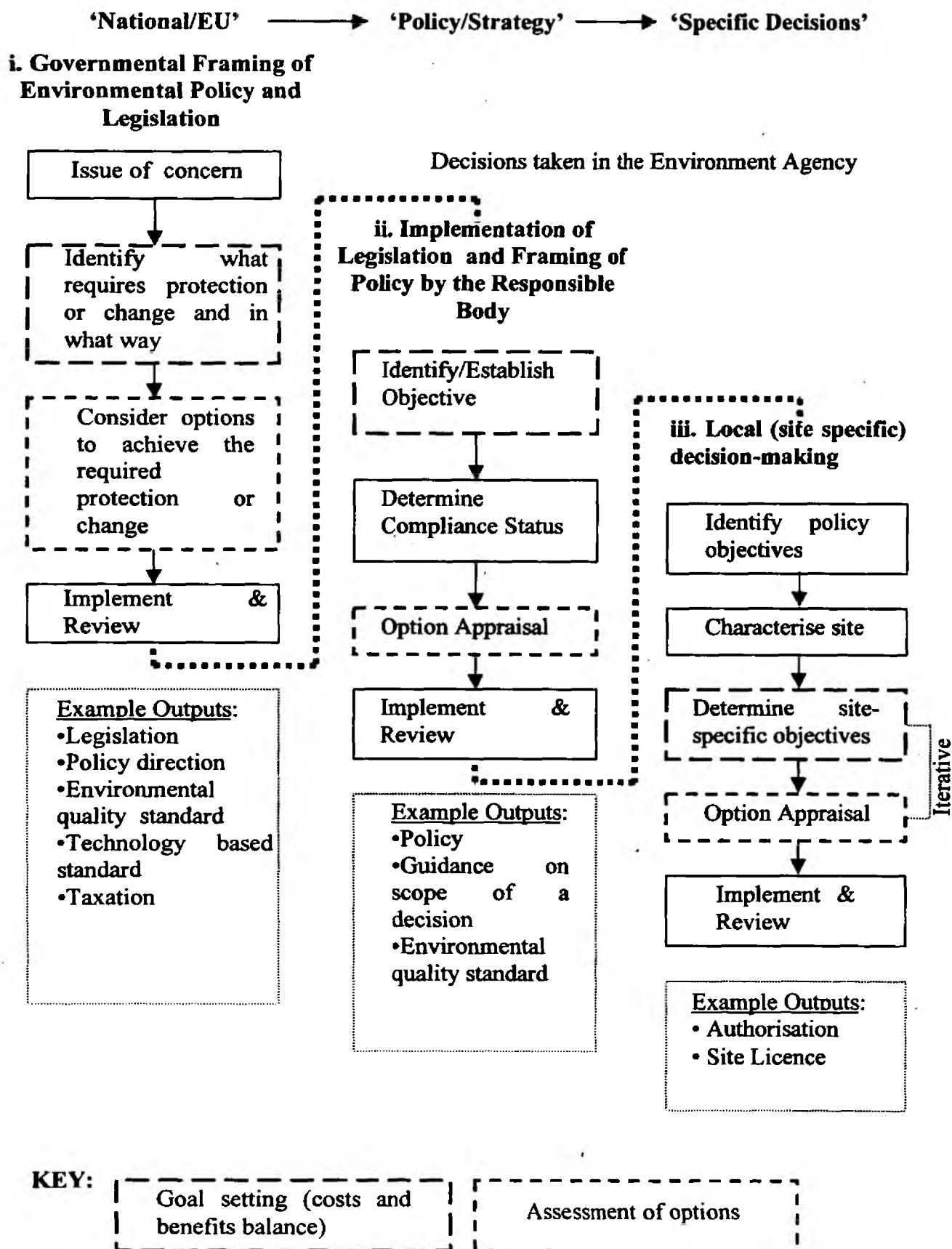
**Figure 3**

## **Sectoral Asset Management Planning Process**





**Figure 3 Model of Regulatory Decision-Making**



## ANNEX V: "Reasons For Failure" – Examples From The Agency's Current Work With River Quality Objectives

The Government has established River Quality Objectives under the River Ecosystem Classification for river stretches, which cover approximately 33,000 kms of rivers. The specific targets set vary locally in accordance with what quality the river can reasonably be expected to achieve at each location and the uses made of the river.

Compliance with the targets is tested annually. In 1997, 82% of rivers met their target, this rose to 87% in 1999. Figure V.1 below shows the proportion of rivers in England and Wales in each target class. The red portion of each bar is the proportion that failed their targets in 1997. The sum of all the red components is 18%.

**Figure V.1**

*Text Description of River Ecosystem Classes:*

**RE1:** Water of very good quality suitable for all fish species.

**RE2:** Water of good quality suitable for all fish species.

**RE3:** Water of fair quality suitable for high class coarse fish populations.

**RE4:** Water of fair quality suitable for coarse fish populations.

**RE5:** Water of poor quality, which is likely to limit coarse fish populations.

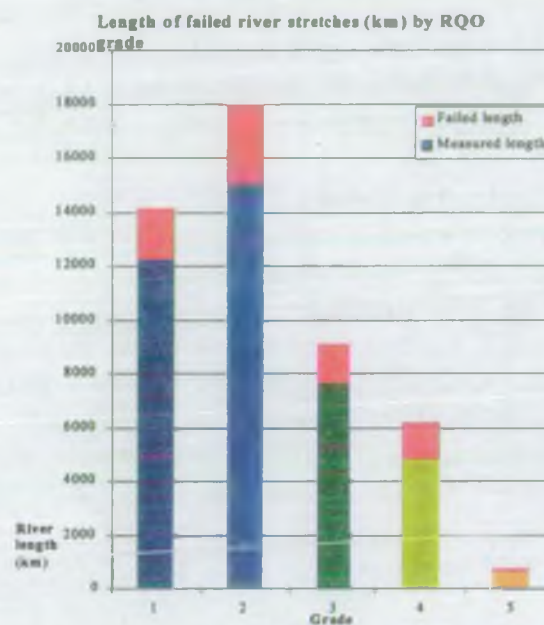


Figure V.1 shows the targets as they apply across England and Wales.

The Government has asked the Environment Agency to plan so that at least 91% of targets are met by the end of 2005 (the close of the AMP3 period). To facilitate planning to achieve this target, an analysis of the reasons for failure in 1997 (the 18%) has been undertaken and a database set up to classify these and allow the exercise to be repeated in succeeding years.

The classification is as follows:

### A. Licensed Abstractions and Point Source Discharges

Failures identified under these headings are those where there is a direct causal linkage between the failure and a specific and readily identifiable licensed activity – for example disposal of wastewaters subject to Consent or Authorisation, or water abstractions subject to a Licence. This group therefore includes those failures capable of control through the exercise of the Agency's existing regulatory powers alone. The categories indicate the specific causes.

**A1: Industrial** (*Discharges made under WRA 1991 Trade Effluent Consents and IPC Authorisations*)



- A2: Private sewage treatment works**
- A3: Water PLC sewage treatment works**
- A4: Intermittent discharges** (*combined storm overflows, storm tanks, pumping stations, emergency overflows associated with sewerage networks*)
- A5: Associated with current/past waste disposal licence**
- A6: Abstraction**

## **B. Multiple Source and Land Use**

Failures identified under this heading are likely to be remedied only through concerted action by the Agency and others. They may be addressed in part by the exercise of the Agency's existing powers, but other actions will also need to be taken, for example, changes in working practices. They are failures that are difficult to remedy due to practical considerations and/or difficulties in identifying a means to gain concerted action. In the case of managed water flows in canals, failure is always likely to occur due to slow water movement however this is a characteristic of that type of managed water body.

- B1: Agricultural run-off**
- B2: Urban run-off** (*contaminated surface water, site drainage, and misconnections*)
- B3: Contaminated Land**
- B4: Old Mineworkings**
- B5: Land drainage practices** (*where the flow of the watercourse is managed or detained for particular purposes and flows are not natural, for example canals*)
- B6: Acidification** (*including the impacts of forestry and /or acid rain*)
- B7: By-product of eutrophication** (*including low dissolved oxygen caused by dieback of plants and algae, and elevated pH due to algal growth*)

## **C. Natural Processes**

This includes those failures that are attributable only to natural effects, that is, although a failure is recorded, pollution was not the cause and there is therefore no action for the Agency so long as the failure is clearly identified and understood. The need for this category reflects that the River Quality Objectives are primarily used to identify and remedy pollution and it is therefore necessary to identify where pollution is not implicated in a failed result.

- C1: Low flow** (*drought and low flows not directly ascribable to abstraction*)
- C2: Natural Mineralisation** (*metals and acid geology*)
- C3: Natural plant activity** (*including low dissolved oxygen caused by die-back of plants and algae, and elevated pH due to algal growth*)

## **D. Other**

- D1: Identified pollution incidents** (*where the failure is directly attributable to a single pollution event, which has been remedied*)
- D2: Unknown** (*where the Agency needs to undertake further work to understand the reason for failure*)
- D3: Other**
- D4: Misleading chemical test results** (*where the method of testing and assessment leads to a misleading conclusion, but there are sufficient grounds to discount the indicated failure*)

Approximately 1/3 of river stretches that fail do so for more than one reason. Analysis of this is planned. However, for the present a series of pie charts have been produced which simply show the number of times each category is implicated in a failure. They therefore provide a realistic view of the pressures on the water environment from different causes and sectors.

Figure V.3 below shows the view for England and Figure V.4 that for Wales. The data can also be produced for smaller aggregations and this has been done for each of the Agency's eight regions (Figure V.5). The resulting plots show some considerable variation reflecting the geography (both physical and human) of the region concerned.

This analysis anticipates characterisation of pressures on water bodies that will be required as part of the implementation of the Water Framework Directive. Taken as a whole it demonstrates that different packages of measures and actions will be required in each region (notwithstanding some broad similarities that could be grouped as "the South and East", "Wales and the West" and "the North").

The further value in the analysis is that taken at the National aggregate level, they can promote a debate about what could and should be done. This anticipates the sort of information that would be required to support development of "Supplementary Measures" under the Water Framework Directive. "Supplementary Measures" are optional measures that can be employed by Member States to achieve the Directive's environmental objectives and include measures such as economic instruments.

Figure V.2

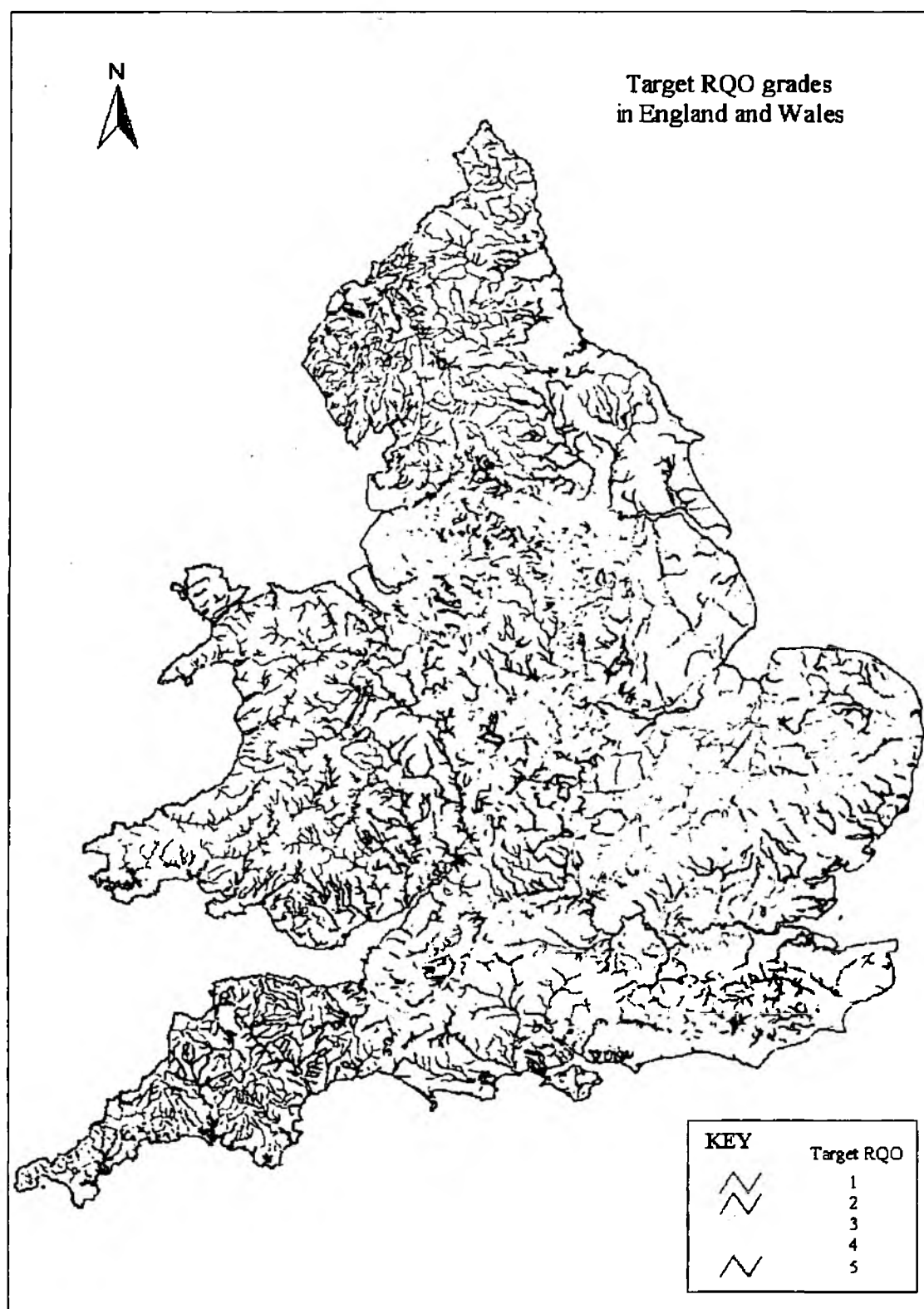
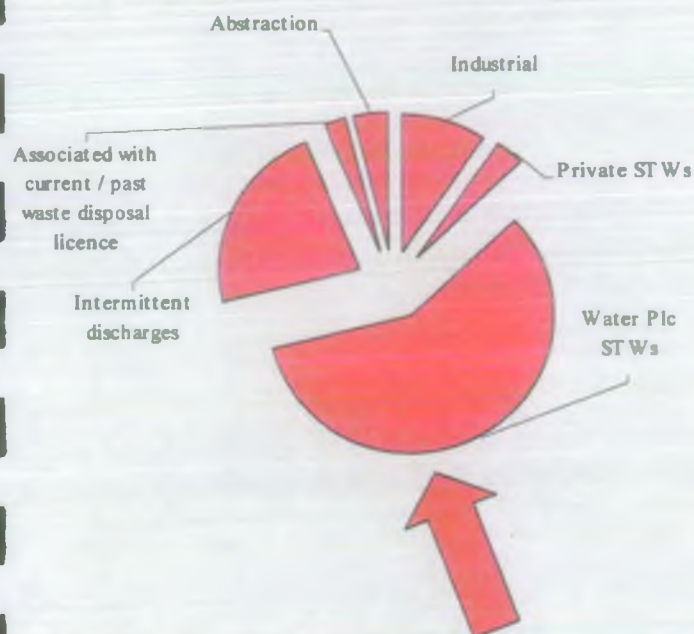


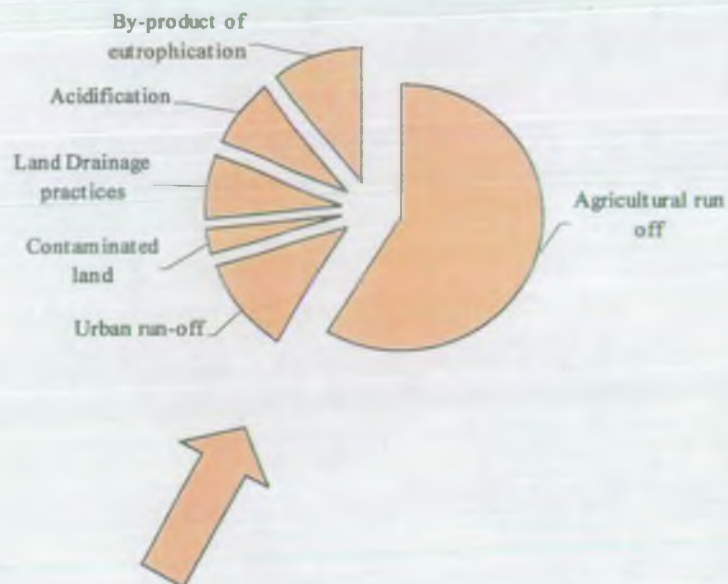


Figure V.3

Licensed Abstractions and Point Source Discharges



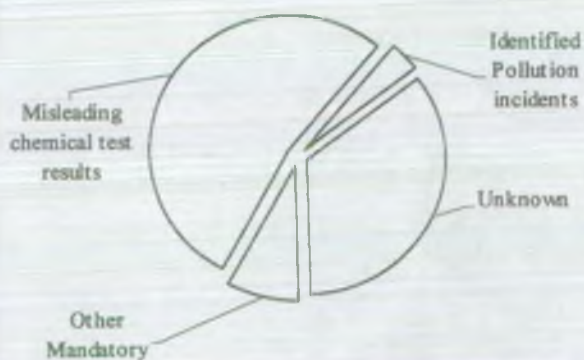
Multiple Source and Land Use



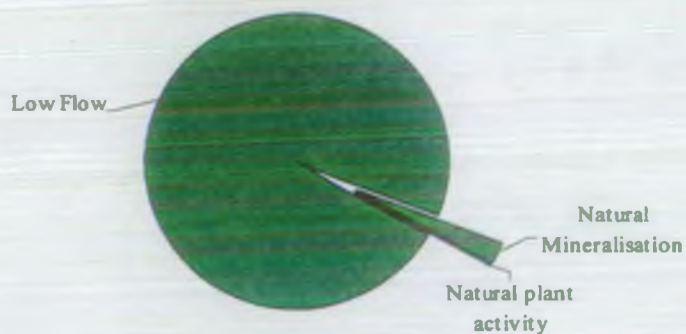
RQO Reasons for failure for England 1997



Other

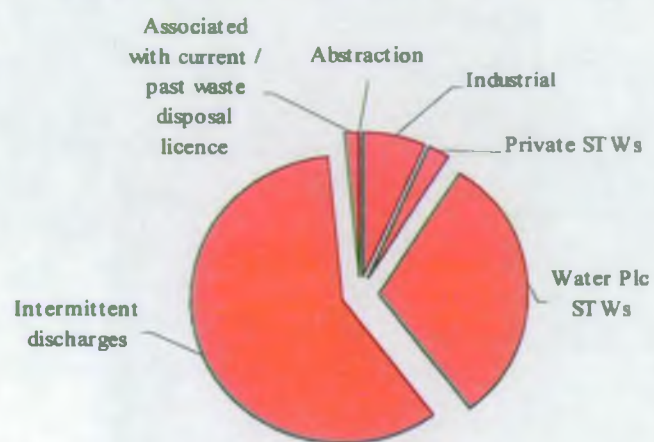


Natural Processes

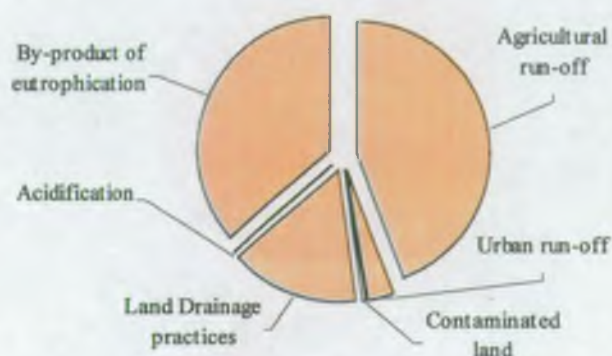


**Figure V.4**

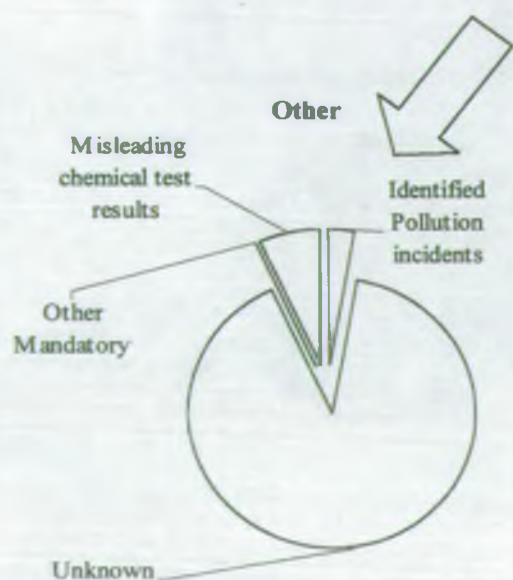
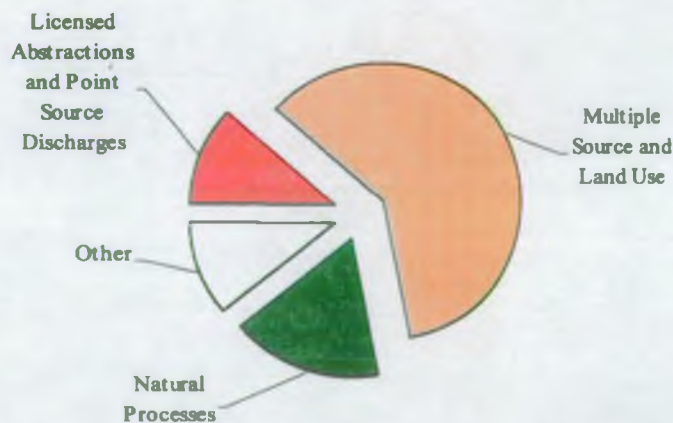
**Licensed Abstractions and Point Source Discharges**



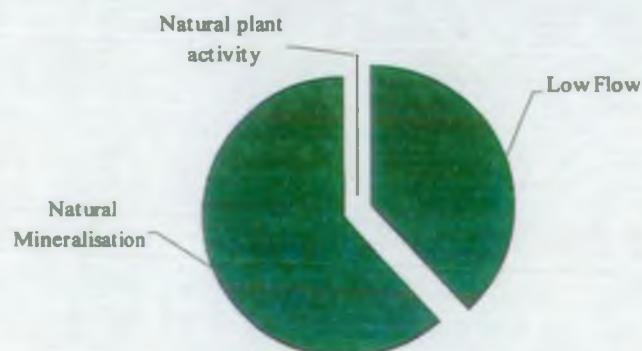
**Multiple Source and Land Use**



**RQO reasons for failure in Wales 1997**



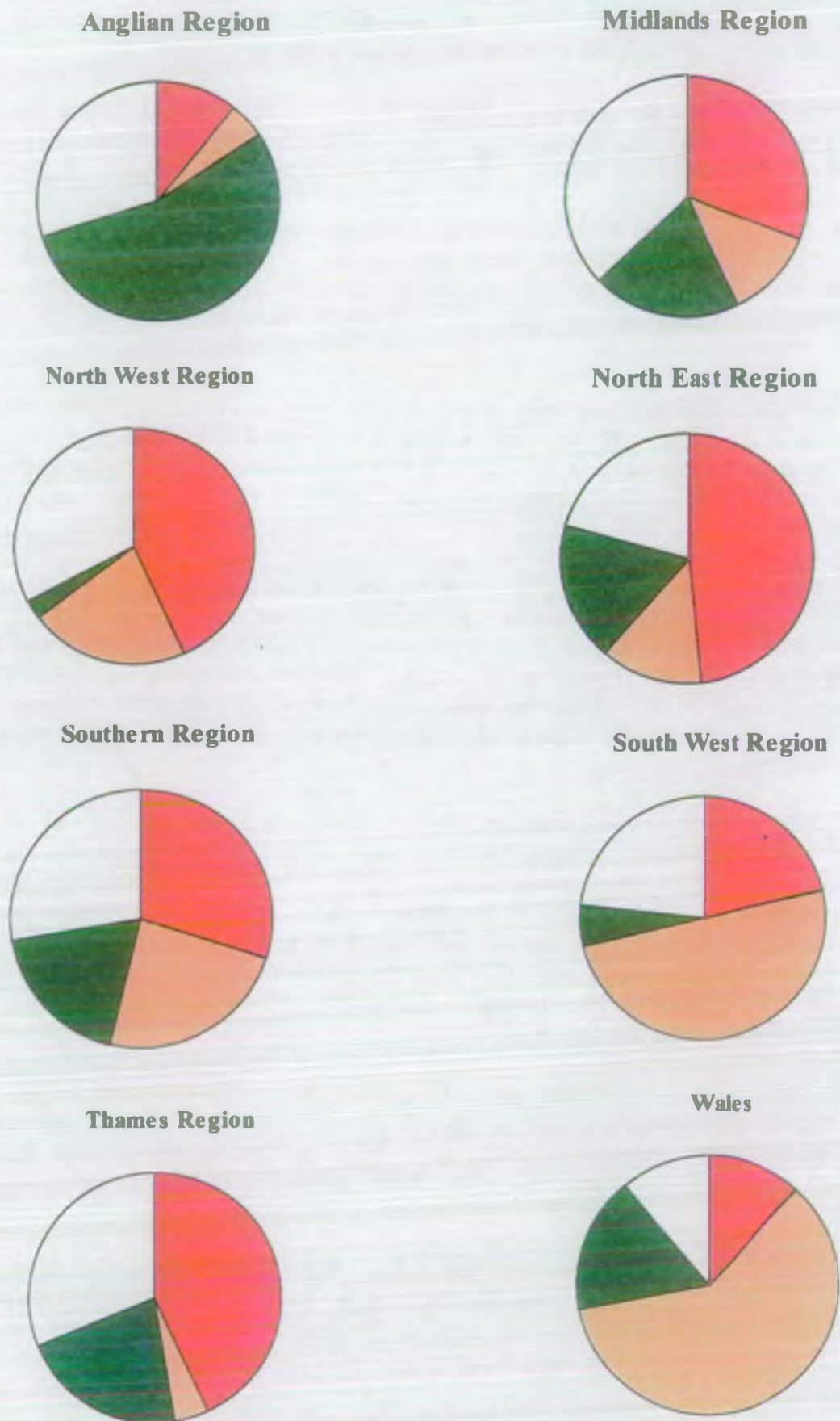
**Natural Processes**





**Figure 4.5**

**RQO Regional Reasons for Failure 1997**





## **ANNEX VI: Illustrative Example Of A Water Quality Management Case**

*This section is included as an illustration of the appraisal questions that may face Water Quality Managers rather than as a case study. We hope that it will provide a context for discussions concerning scoping and appraisal of costs, and benefits.*

The River Yeo flows, in its lower reaches, through the city of Yeochester. This is a historic town having been a centre of trading for its mainly agricultural hinterland and its (now unnavigable) port since Roman times.

The 19th Century saw a period of rapid growth, following completion of a canal link inland. Coal was carried by canal to the city and from there by ship to other ports. This period also saw a growth in engineering and manufacture, initially as a spin-off from the commerce and with the advent of mechanised farming, as a centre of fabrication of tools and farm machinery.

The town's engineering background led to it becoming a centre for arms manufacture during the Second World War and it suffered from bombing at that time. Following the war, the city centre was heavily redeveloped and although the port had long since become unviable due to siltation, engineering continued to sustain the town until the mid 1980s when a number of firms closed.

Fortunately, the city council recognised the need for change and embarked on a programme involving Yeochester University in a series of projects to attract new business enterprises. This has culminated in the development of a Business Park on the southern fringes of the town and together with a small amount of "E-business" the service sector is now established as a key component of the city's economy. Other major businesses include two (competing) breweries, some remaining light engineering firms, and the manufacturer of a nationally known brand of chocolate.

The town is served by 2 sewage treatment works (STW), which receive and treat trade effluent discharges and domestic sewage. "STW 1" was built in 1890 and has been modified and expanded a number of times since. It serves most of the parts of town not rebuilt following the Second World War, and receives flow from 110,000 people plus trade waste from the larger of the two breweries and the chocolate manufacturer. There are a number of storm overflows on the sewerage network on the Northern bank, which feeds to STW1. Approximately 2/3 of these have been identified as unsatisfactory due to premature operation and/or inadequate screening.

STW 2 was originally built in 1926 it receives flows from the smaller breweries, the town's main retail centre and housing, by now accounting 3/4 of the total sewage flows. The sewerage network on the Southern bank is more modern and in better repair than that on the North, and although there are a larger number of storm overflows only 1/3 of these are believed to be unsatisfactory.

There are a number of crossings and the Yeo remains a prominent part of the cityscape however, it is not in the best quality class. The RQO target for the River is currently Class 4, but it has failed to meet this target for 3 out of the past 5 years. Upstream of STW 1 the River would comply consistently with a Class 3 target.

The river is accessible or visible for most of its length throughout the town, and downstream there is some limited fishing and boating activity.

The primary influence on water quality is sewage flows either treated or untreated through storm overflows. The two STWs (and failings in their associated storm overflows) account for almost all pollution loadings to this river.

The City Council, as part of its strategy to encourage new business, has been lobbying for water quality improvements, as one of the attractions of the town is quality of life and amenity.

***How should a question concerning investment to achieve a target RQO of class 3 be approached? The Water Framework Directive may require a quality equivalent to RQO2 in future unless a derogation option is pursued. What are the issues for the appraisal of the options in this case?***

The Avon is a relatively minor tributary to the Yeo not far above the Yeo's tidal limit. It is in part of Yeochester's agricultural hinterland. It rises at the base of an escarpment in an area supporting dairying and mixed farming. In this area, some farmers have recently diversified to 'outdoor pigs'.

The Avon flows through the old market town of Avonford, but prior to that receives a direct trade discharge from Avonford Creamery. Downstream of the town there is a discharge from STW 3 which as well as domestic flows from Avonford takes flows from Yupsham (a 'commuter village') and trade flows from a market and abattoir. There are a few storm overflow outlets in the town, most of which are considered to be satisfactory.

Downstream of this discharge, the river flows through the grounds of Avonford House (now owned by the National Trust), that boasts the additional attraction of an arboretum.

A paper mill is situated further downstream, and this both abstracts and discharges water, the plant as a whole being sufficiently large to fall within the scope of IPC regulation. The plant manufactures premium quality papers and is dependent on a good quality of abstracted water. Unfortunately, over recent years there have been a number of episodes when production has had to cease due to poor quality river water (caused by soil erosion and pollution incidents from farms in the upper catchment).

Polluting loads are from the following sources:

- 1/3 STW3 and storm overflows
- 1/3 'Diffuse' loading from disposal of agricultural wastes to land, and occasional water pollution incidents from the dairy and mixed farms and the outdoor pigs (together with soil erosion impacts)
- 1/3 Discharges from the creamery and paper mill.

The target RQO for the River Yeo is 3 throughout its length. During the last five years it has failed this target once and continues to hover between the 50-95% confidence of failure band.

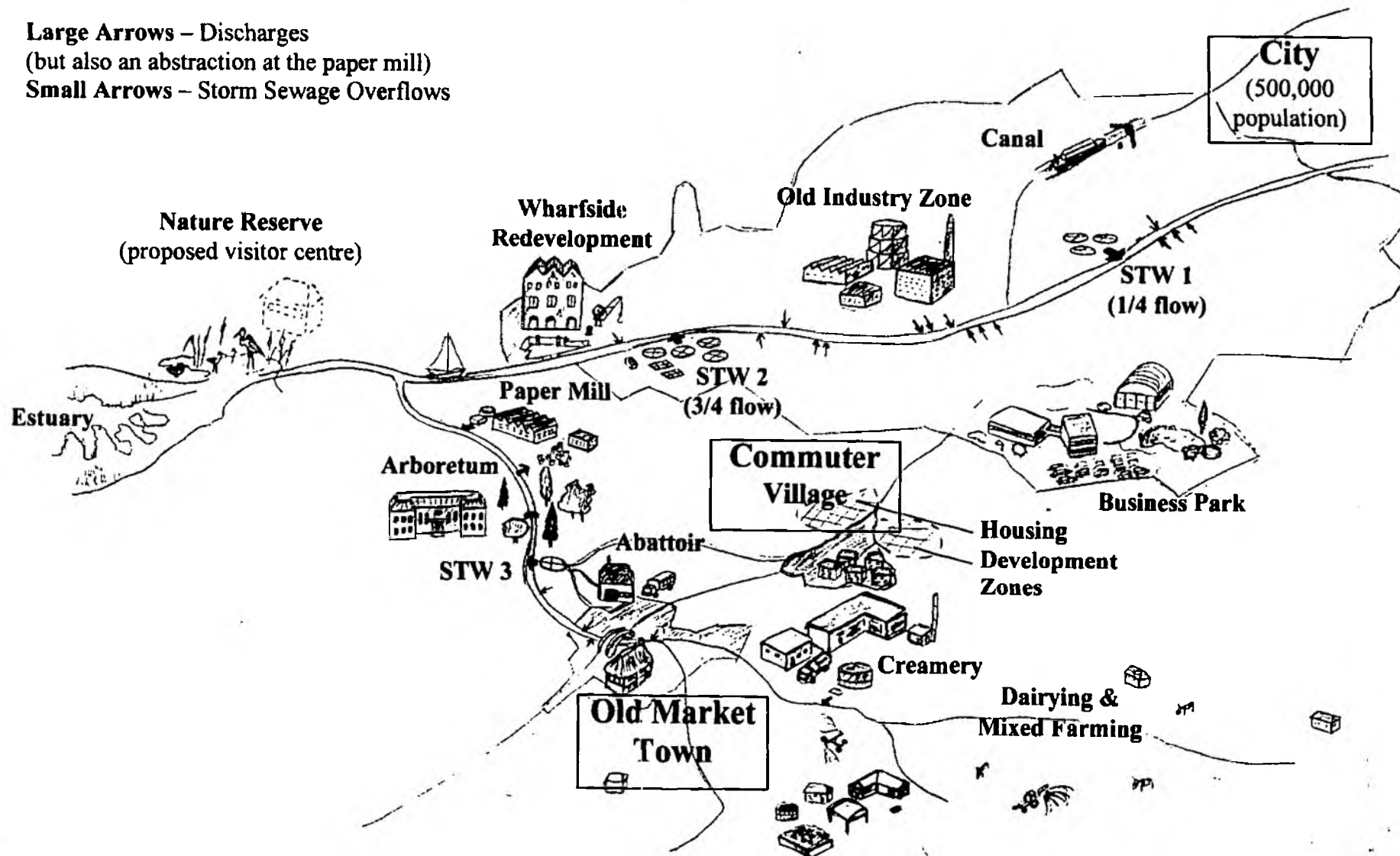
Yupsham has been identified as an area for new housing development in the local plan, and there is concern that this will further exacerbate problems at STW3 which is already at its design load capacity (the water company having already introduced a number of short-term measures to try to keep the discharge inside its consent).

The River Avon would fully comply with RQO class 2 in the tributaries upstream of the creamery, and complies with class 3 at a level better than 50% confidence of failure upstream of the town. Thereafter it is as previously stated, compliant, (but at a level between 50 and 95% confidence of failure) for the remainder of its length.

***If the target RQO (class 3) is to continue to be met, a number of interventions may be required. Moreover, if the good quality class 2 target is to be achieved, even wider ranging and stricter interventions may be needed. How should they be identified, developed, appraised, determined and implemented?***

# Example Catchment

Large Arrows – Discharges  
(but also an abstraction at the paper mill)  
Small Arrows – Storm Sewage Overflows



## **ANNEX VII: Questions for a Stakeholder Analysis**

This Annex VII outlines a set of illustrative questions that might be included by a WQ manager in their analysis of stakeholders' concerns.

### **Stakeholders:**

- Who will be affected by the impacts of changes in WQOs, positively/negatively?
- Who will promote the process, provided they are involved?
- Who could obstruct the process if they are not involved?
- Who has been involved in the past – to what effect?
- Who had not been involved up to now – but should have been?
- Who is influential in the area, community or organisation?
- Consider relationships between groups/individuals

### **7.1 Issues**

- What are the issues for each stakeholder?
- What is important to them and why?
- What has been stated publicly?
- What is the historical background to the situation?

### **7.2 Appraisal and Decision-making Process**

- Are there appraisal processes already in place?
- How well are they working?
- How well are they perceived to be working?

It was concluded at the seminar that the WQ managers could carry out this stakeholder analysis themselves, unless the options raise novel and complex issues in which case a facilitated discussion with these novel stakeholders might be necessary. For such facilitated discussions, the WQ manager should provide the participants with information on:

- the options regarding river quality objectives for the river in question;
- the Agency's process for assessing and tackling these problems and the role of the stakeholder discussions and subsequent meeting and possibly also survey in assisting in this process.

It will be important not to raise unachievable expectations with the stakeholders.



## ANNEX VIII: Illustrative Pro Forma for Presenting Data on the Costs of Pollution Control

7. CAPITAL COSTS			
Cost component	Cost (£'000's)		
	Low estimate	Medium estimate	High estimate
<b>8 POLLUTION CONTROL EQUIPMENT COSTS</b>			
Primary pollution control equipment			
Auxiliary equipment			
Instrumentation			
Modifications to existing equipment			
Other (please specify)			
Total pollution control equipment costs			
<b>9 INSTALLATION COSTS</b>			
Land costs			
General site preparation			
Buildings and civil works (eg foundations/ supports, electrical, piping, insulation etc)			
Labour and materials (engineering, construction and field expenses)			
Other (please specify)			
Total Installation costs			
<b>10 OTHER CAPITAL COSTS</b>			
Project definition, design and planning			
Testing and start-up costs			
Contingency			
Working capital			
End of life clean up costs			
Miscellaneous			
Total other capital costs			
Total capital costs			

CHANGE IN OPERATING COSTS (INC. REVENUE CHANGES)					
Cost component	Quantity of units	Cost per unit	Annual costs (£'000's p.a.)		
			Low est.	Medium est.	High est.
10.1 Change in operating costs					
Additional labour for operation and maintenance					
Water/sewerage					
Fuel/energy costs (specify energy/fuel type)					
Reagent costs					
Waste treatment and disposal					
Other materials and parts (please specify)					
Change in operating costs of any additional pollution abatement equipment operation					
Insurance					
Taxes on property					
Environmental tax/charge					
Other general overheads (please specify)					
Total additional operating costs					
Change in revenues					
By-products recovered/sold					
Other (please specify)					
Total revenues					
10.1.1 Net change in operating costs					

<b>TOTAL COSTS – PRESENT VALUE or EQUIVALENT ANNUAL COST</b>			
Cost component	Option 1	Option 2	Option n
Total capital costs			
Net change in operating costs			
Economic assumptions			
- Economic life of equipment (years)			
- discount rate (%)			
Net present value or Equivalent annual cost			

Source: National Centre for Risk Analysis and Options Appraisal, Environment Agency

## **ANNEX IX: Assessment Of The Economic, Social And Environmental Impacts Of The Options: Review Of Existing Approaches And Techniques**

This annex reviews the existing techniques for bringing together information on the environmental, economic and social impacts of options to aid decision-making on options.

**Cost-Effectiveness Analysis (CEA)** compares options for achieving an already specified statutory target so as to achieve this target at the lowest cost. Unlike CBA (see below), the level of benefit is treated as an externally given. CEA is generally applicable where the Agency has to achieve statutory binding targets or Directives that have already been determined by DETR at the national level or at an international level (eg by the EC). Examples include the EC's Habitats Directive or the overarching goals in the Water Framework Directive. Nevertheless, an issue here is how to incorporate into the appraisal allowance for the caveats to these directives such as 'unless overriding public interest' in the case of the Habitats Directive or 'unless disproportionately expensive' in the case of the WFD. This may entail use of (some combination of) the following appraisal techniques.

Where the Agency has some discretion regarding the setting of its targets and determining actions, then it has to go beyond CEA and take account of the costs and benefits of the options, which may entail use in one way or another of some of the following techniques and approaches. The extent and manner in which this should be done for the implementation of the WFD will depend on DETR and the EC's precise definition of what is meant by the disproportionate costs in respect of the criteria for derogations under the WFD.

**Cost-Benefit Analysis (CBA)** provides a well established framework that entails the rigorous, systematic and consistent appraisal of the diverse impacts of options in a common unit – of money – so as to facilitate assessment and comparison of the significance of the implications of the options. However, it can be difficult to derive robust monetary valuations for some environmental impacts.

**Partial Benefit-Cost Analysis** may therefore be applicable in such cases to appraise rigorously those costs and benefits that can be readily monetised, as under a CBA above. However, in addition, it includes information on the scale, nature and significance of certain important intangible (or non-monetisable) costs and benefits so as to cover the full costs and benefits of the options. A partial cost-benefit was applied in the NATA appraisal of road schemes. This approach is also being developed in other applications<sup>25</sup>. It might also be extended to indicate the relative importance of such intangible impacts compared with the monetisable costs and benefits.

Full and Partial Benefit-Cost analysis focus on questions of efficiency and normally do not easily allow for impacts on equity. Consequently, such equity considerations need to be considered separately. **Multi-Criteria Analysis (MCA)** or **Multi-Attribute Analysis (MAT)**<sup>26</sup> can explicitly allow for such additional criteria such as equity, alongside the monetisable and non-monetisable environmental, social and economic impact categories. It

---

<sup>25</sup> *Environment Agency Research and Development Report Technical Report P278; "Costs and Benefits Associated with Remediation of Contaminated Groundwater", (Komex Clarke Bond Ltd. & EFTEC Ltd).*

<sup>26</sup> Strictly speaking, MCA relates to the use of many criteria (eg equity as well as efficiency or costs and benefits); while MAT relates to the use of many different types of benefit categories or attributes (see those listed in Section 6.4). But the terms MCA and MAT are used interchangeably in this report.



monetisable and non-monetisable environmental, social and economic impact categories. It can also incorporate important intangible environmental and social impacts. Moreover, it also provides a means of integrating these various impact and considerations into a single measure by assigning weights or rankings to the various criteria and their associated impact categories. However, the criteria and impact categories and their associated weights need to be rigorously and carefully specified so that there is no double counting or omission of some considerations. Since MCA/MAT combines categorisation of impacts from a variety of economic, social and environmental perspectives, there is potential for such double counting. An important issue here is whether it is possible to define precisely and rigorously the special value added dimensions that each specific consideration or category contributes to the appraisal and thereby avoid such problems of double counting. A further issue concerns how the weights are derived, especially the representativeness of the sample of people in any such exercise.

The MAT scoring and weighting system was used satisfactorily to assess consistently and systematically the cost-effectiveness and environmental priority ranking of 900 water quality improvement measures for the water industry under AMP 3. The MAT system effectively ranked diverse schemes in terms of their cost-effectiveness of achieving diverse environmental benefits. However, in the absence of considering costs in the MAT appraisal, a MAT score for just the environmental benefits (of, say 200) on its own, does not indicate whether an expenditure of, say, £500m is 'worthwhile'. The costs of a scheme would need to be included in the criteria to be weighted for the MAT to give an indicator of the 'net worth' of a scheme.

## **ANNEX X: Integrated Appraisal For River Basin Management Plans: Terms Of Reference For A Virtual Scoping Study**

### **Context**

The EC 's Water Framework Directive (WFD) was passed in 2000. It will require appraisal of measures to achieve good quality status in river basins. The Environment Agency held a seminar in November 2000 to discuss integrated appraisal for water management, with a particular focus on how to appraise such measures so as to aid decision-making for the implementation of the WFD.

As an initial follow up to this seminar and a precursor to specific research projects, the Environment Agency (and DETR) wish to carry out a virtual scoping study of the appraisal that would be needed to implement the WFD at a particular river basin.

### **Aims and objectives**

The aim of the study is to scope out how the economic appraisals of measures to achieve good water quality status and consultation on them could be carried out so as to aid decision-making on these measures and identify and investigate any issues and problems regarding such appraisals.

### **Issues**

The specific issues to be examined include:

- Characterise and differentiate the various stretches of water bodies in the selected basin so as to identify bodies of water for which objectives must be set and measures identified and appraised,
- Characterise the various possible measures to achieve good quality status in terms of the level (eg national or local) at which decisions have to be taken on them and the level at which these measures have to be implemented.
- Characterise the diverse parties affected positively or negatively by the impacts of these various possible measures to achieve good quality status so as to help inform (in subsequent research) how their views could be input to decision-makers.
- How best to use the available information given by existing scientific, risk assessment and economic appraisal systems on the environmental, economic or social impacts of the possible measures so as to aid decision-making on them. What are the key gaps in technical expertise and information that need to be addressed to undertake cost-effectiveness and cost-benefit analysis?
- Identify outstanding staff resourcing and capability issues. For example, are there sufficient numbers of trained staff at regional level and centrally to co-ordinate data collection and economic analysis?

- Identify outstanding specific research issues that need to be addressed in subsequent studies.

### **Specific Tasks to be carried out**

1. Characterise and differentiate the various stretches of water bodies in the selected basin so as to identify the appraisals needed for particular stretches of water for which objectives must be set and measures identified. These could form appropriate separate building block elements of the appraisal (and subsequent monitoring) of measures in the RBMPs. This might characterise the main different types of water bodies in the basin in respect of, for example:
  - Their different water quality states and the extent to which individual water bodies now fail to achieve good status and will fail to achieve good status by 2015 and 2021;
  - the pressures on water quality now and in the future;
  - the different types of options to achieve good status;
  - The scale of costs and complexity involved in these measures (and hence the extent of the appraisals (of varying degrees of complexity/depth) that will be neededThe study will need to extrapolate the findings for the selected basin to the Agencies' other basins to give a qualitative and approximate assessment of the various depths of appraisals that would be needed for all basins by the Agency.
2. The consultants should devise a simple schematic way of presenting information from the appraisal of individual RBMPs in a way that can be aggregated to aid decision-making at the national level.
3. Characterise the various possible measures to achieve good quality status in terms of the level (eg national or local) at which decisions have to be taken on them and the level at which these measures have to be implemented (build on Table 4.1 in attached report on the seminar).
4. Characterise the parties affected positively or negatively by the environmental, economic or social impacts of the options, especially who benefits and who pays for the costs of the options? In particular specify whether they live within the basin. Investigate how this geographical characterisation of the parties affected could relate to the level at which the possible measures are decided upon and implemented (see above).
5. Identify what information is needed regarding the consultation needed for the effective implementation of the WFD under article 14. This should take account of the complex mix of local and national decisions and parties affected by them - see above - and the need for the consultation to input views rather than determine the decisions (especially at national level) - see S. 6.2.10 of the seminar report. This is needed so that the Agency can incorporate this analysis in its current examination of its consultation procedures so as to co-ordinate them with a view to reducing any problems of stakeholder fatigue. This should draw on the findings of recent reviews of the Agency's existing consultation procedures at local and national levels regarding the options (eg the local outreach project and the Agency's current research on a register of existing strategic management plans and stakeholders relevant to the preparation of RBMPs for the implementation of the WFD).

6. Review the availability of scientific, risk assessment and economic information on the environmental, economic or social impacts of the options and show how these could best be used in the economic appraisals and to present information on the impacts of options for the consultation. Show how to present clearly the findings and their assumptions and limitations? Identify what additional information, analysis and appraisal processes are needed and how could these best be provided?
7. Show how to present information on measures and combinations of measures to show costs, benefits (where appropriate) and other factors where relevant
8. Identify what information (in what form) is needed on the costs and economic impacts of the various types of measures (see (3) above) covering the different sectors (water industry, non-water industry, agriculture and other). Review the availability of this information for each sector.
9. Identify where improvements are needed in the available valuations that could be readily transferred for readily monetised environmental benefits categories (eg which bits of the FWR manual need to be improved for the appraisal of the environmental benefits). The DETR is carrying out a separate companion scoping study on Stated Preference surveys needed for the WFD.
10. Indicate how much time and resources would be available to carry out the appraisal of measures in the basin? Estimate how much time and resource would be required to carry out an appraisal at the various types of basins. Identify or seek means of reconciling the likely imbalance between needs and available resources (eg streamline the appraisal process while maintaining its key elements).
11. Identify specific research subjects and pilot RBMP studies that will then be needed to research in depth and clarify particular outstanding issues and problems regarding the practical application of the various elements of the appraisal.

### **Outputs from the Study**

The intended outputs from the study include:

- Show what information (in what form) is needed to inform decision-making (at which level and for which decisions) on the various types of options
- Show how the various elements of the appraisal system could best generate this information and how this information could fit together well in practice.
- Identify key information gaps and specific research needs and priorities, especially regarding the development and application of economic appraisal and analysis tools and techniques. This would then form the basis and terms of reference for specific follow up work (eg to improve specific tailored economic appraisal techniques).

### **Study Form**

This is essentially a scoping and ground clearing study anchored in a specific basin.

It will entail consultants reviewing the available material (eg on water quality states and Reasons for Failure, available economic information, Agency reports on existing consultation procedures, etc).

They would then seek out and analyse the views and knowledge of experts (eg from the Agency) on how they could carry out hypothetically (or virtually) in a specific basin an appraisal of the measures in the RBMPs. They could, for these exploratory investigations, note the initial elements of a possible appraisal system that were highlighted in the Agency's recent seminar and which will subsequently be refined in the light of this and other further work (see Section 6.2 of the report on the seminar attached). They could also note current methods used for presenting for public purposes trunk road assessments.

This virtual study will involve no original research and the consultants should not get bogged down in any detailed investigations. Thus, where data are not currently available, the consultants should use assumed illustrative dummy data and plausible information that might be generated by the available sources and appraisal processes to give a virtual illustration of how the appraisal systems could be applied in practice - ie use assumptions and judgement to report the type of outputs from each element rather than do any actual data collection as such.

The consultants would interview (probably by telephone) the appropriate experts and prepare a review and issues paper. They will organise a 2-day brainstorming workshop with key experts (mostly from the Agency but also relevant Government departments and the devolved administrations) to work through and thrash out the issues concerned with carrying out the appraisals - as set out in this TOR.

There is the option of holding a briefing presentation on the findings to the Agency and relevant Government Departments.

There will be close links between this study and the other scoping studies and research that the Agency and DETR will be carrying out. This includes DETR's scoping study on Stated Preference surveys, and the Agency's current research on: a registry of existing strategic management plans and stakeholders relevant to the preparation of RBMPs for the implementation of the WFD); case studies on Heavily Modified Water Bodies and its studies on scientific aspects such as specification of water quality objectives and monitoring and characterisation of river basins.

### **Specification of the Basin for the Study**

A river basin is defined in article 2(13) of the Directive. This virtual study will focus on a basin with a variety of stretches of rivers/catchments/water bodies that exhibit well the range of water management problems and issues that will need to be addressed in the appraisal of measures in RBMPs. This should include a mix of water pollution, water resource, flood defence, navigation, recreation concerns etc; mix of important chalk streams and dirty rivers, plus some catchments subject to growth/development pressure or eutrophication stresses).

This study will be based on the Ribble basin (including the Darwen tributary) in the Agency's North West Region