

Implementing the Water Framework Directive in the Irish Eastern River Basin District: Executing a Revolutionary Policy with Leading-Edge Applications

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Abstract

The transposition of the Water Framework Directive (WFD) into Irish law is a significant milestone in the development of water resources management policy in Ireland's river basin districts. Implementation of the WFD in the Eastern River Basin District (ERBD), which harbours the Greater Dublin City area, is particularly challenging in that the ERBD has a relatively high concentration of water-dependent activities – many having both negative impacts on waterbody status while having significantly positive impacts on Ireland's economic development. In March 2005, Ireland met a major WFD reporting milestone in the completion of its comprehensive waterbody characterisation, the major component of which was a risk assessment. But much work remains in eliminating the uncertainties in these waterbody risk characterisations, and the ERBD Project has taken the lead in developing the methodologies needed for this task. Likewise, the ERBD Project has formulated an approach for conducting the economic analysis required under the WFD that substantially involves key stakeholders in the data collection process and in the final production of analytical outputs. Consistent with the ERBD Project's leading-edge biophysical and socioeconomic scientific applications, the Project's strategy to develop the District's river basin management plan is equally progressive with respect to its extensive public consultation component.

Keywords

EU Water Framework Directive; river basin management; waterbody characterisation; water resource economics; stakeholder involvement; public consultation

INTRODUCTION

The European Union (EU) Water Framework Directive (WFD) 2000/60/EC is currently the central focus and harmonizing instrument for all EU member states in addressing the management of their water resources. The WFD was transposed into Irish law in December 2003 by the Water Policy Regulations SI No. 722 of 2003 which announced a central role for the Environmental Protection Agency (EPA) as competent authority in coordinating the scientific and technical issues including geographic information systems (GIS) and research. The Department of the Environment, Heritage and Local Government (DEHLG) retains overall policy and budgetary control and is steering the implementation of the WFD in Ireland and its supporting economic analysis by working in harmony with all of the 25 member states and Norway and the full suite of Irish stakeholders. Ireland's Local Authorities have been officially notified to the EU as competent authorities under Article 3 of the WFD. Dublin City Council is the lead Local Authority for the Eastern River Basin District (ERBD) Project which comprises four hydrometric areas and 12 local authorities supporting a population of approximately two million.

The ERBD and other Irish RBD Projects have participated fully at the EU level in contributing to the development of the Common Implementation Strategy (CIS) and has submitted all required notifications and reports as scheduled to date to the European Commission (EC). In particular a national report entitled "The Characterisation and Analysis of Ireland's River Basin Districts" was submitted to Brussels by the deadline of 22nd March 2005. All competent authorities and state agencies in the eight RBDs which encompass the entire island of Ireland collaborated in producing a single report. For each of the RBDs, the report includes:

- an analysis of biophysical waterbody characteristics;
- a review of the impact of human activity on the status of waterbodies; and
- an economic analysis of water use.

Stakeholders and the public were encouraged to contribute and comment at various draft stages via a range of methods including various websites (e.g.: www.wfdireland.ie) where the latest versions of key reporting materials are being posted. The successful and timely completion of the Characterisation and Analysis Task required under Article 5 of WFD and section 7(2) and 7(3) of SI 722 of 2003 has afforded Ireland the firm baseline needed to begin the next phase of the process of integrated river basin management – developing programmes of measures aimed at achieving and maintaining ‘good status’ for all waters by 2015. The ERBD Project has taken a lead role in Ireland in this collaborative endeavour.

This novel approach integrates the information from the biophysical characterisation of all water bodies (rivers, lakes, canals, reservoirs, groundwater, transitional, coastal) with the economic characterisation of all key water-using economic subsectors (agricultural, industrial, domestic) on all waterbodies, and it does so in a manner that substantially involves stakeholders and transparently informs the general public.

The ERBD Project’s integrated river basin management approach is described in some detail in the following two sections of this paper on 1) Waterbody Characterisation and 2) Stakeholder Involvement and the Role of Public Consultation.

WATERBODY CHARACTERISATION

The National Article 5 Characterisation Report is based on readily available information and collates for 7 RBDs a description of basin characteristics and an assessment of waterbody risk based on identified pressures and impacts arising from human activity. (One RBD is entirely in Northern Ireland and accordingly not addressed in the National Report.) The Report consists of an Executive Summary and six chapters (Introduction, Analysis of RBD Characteristics, Review of the Environmental Impacts of Human Activities, Artificial and Heavily Modified Waterbodies, Economic Analysis of Water Use and Summary/Conclusions). It is a key first step toward the development of statutory River Basin Management Plans (RBMP) for each RBD by 2009.

The characterisation process is constantly being refined and at any time is only an estimate of risk based on current best data and methods. Currently, there is a lot of inherent uncertainty in the characterisations, and the process does not purport at this stage to assign classification or status to water based on any formally adopted standard or threshold. Reference conditions established for each surface water type describe ‘unimpacted’ conditions and together with an EU-wide intercalibration exercise, will provide the basis for establishing classification systems for surface waters in June 2006.

The risk assessment procedure generally involves a combination of both predictive (pressure) and impact assessments with a range of agreed tests being applied to each waterbody as delineated. Fundamentally, all waters have been grouped into types (e.g., different types of lakes) and then further divided into individual management units called ‘waterbodies’. Nationally, the identified range of individual waterbodies includes 383 groundwater bodies, 4,465 rivers segments, 217 lake waterbodies (> 50 ha), 197 transitional waterbodies and 107 coastal waterbodies. Groundwater Dependent Terrestrial Ecosystems or Groundwater Dependent Surface Waters have been found to be associated with 283 of the groundwater bodies.

The current national initiative for monitoring and modeling of water bodies is aimed at reducing uncertainties in the risk assessment (i.e., the risk of any waterbody not achieving good status by 2015) and providing a more reliable scientific basis for the deployment of resources and initiation of actions within the framework of a targeted and integrated programme of water maintenance and remediation measures. This programme of measures is a reserved function for adoption by locally elected representatives and accordingly must strike a balance between the compelling science and the socio-economic realities of communities dependent in one way or another on the waterbody in question. The monitoring programme must be operational in January 2007 and the draft programmes of measures must be published alongside a draft RBMP by 22nd June 2008.

The status of waters under WFD will be determined by water pollution indicators from point and diffuse sources plus a wide range of new criteria based on pressures and impacts arising from aspects such as abstractions, hydromorphological alterations (e.g., navigation, hydropower, flood control), commercial marine fishing activities and invasive aquatic alien species. A number of tests have been adopted for each criterion at the State level. The interpretation of test results and ultimately reference conditions are expected to vary enormously across the EU.

Waters are assessed as being at risk if it is projected that they will not comply with all of the criteria (i.e., fail the associated tests) for good status by 2015 in the absence of remedial management measures. This onerous and precautionary initial assessment does not address future changes in pressure management such as investment in wastewater treatment facilities or Agricultural Sector reform. As the availability and detail of information improves during the river basin management process the implications of future changes in pressures and management measures will be taken into account. A national summary of risk designations for all waters in Ireland is shown in Table 1 below:

Table 1. National summary of risk designations for all waters in Ireland

Risk Category	Groundwater Bodies %	River Waterbodies %	Lake Waterbodies %	Transitional Waterbodies %	Coastal Waterbodies %
At Risk	2	29	24	21	17
Probably at Risk	54	35	38	18	7
Total At Risk	56	64	61	39	24
Probably Not At Risk	24	20	30	19	8
Not At Risk	19	16	8	42	65

In general terms, the ERBD (which includes Dublin City and Port, arterial drainage and intensive agricultural areas in the Boyne, Liffey, Nanny/Delvin and Varty/Avoca Catchments) contains the highest proportion of waterbodies across all water types at risk from pressures, especially from diffuse pollution sources and morphological alterations. The latter includes channel drainage associated with rivers, impoundments on lakes and port activities in transitional and coastal waters. Point source pollution of groundwaters and abstraction pressures on lakes were also identified as significant risk categories.

Diffuse pollution of surface waters and groundwaters has now been formally characterised and officially reported to the EU, and the next phase of the river basin management planning cycle will focus on further characterisation of waterbodies at risk to improve information and increase confidence in the risk assessment.

Due to the creation of new waterbodies and the physical alterations to existing waterbodies in the past (e.g., construction of canals, ports, flood protection structures, navigation channels) 26 provisional AWBs and 31 provisional HMWBs have been identified. If these provisional derogations are justified by further investigation, appropriate environmental quality objectives will be established in keeping with their current physical nature.

Certain groundwater bodies have been identified as possibly requiring less stringent objectives (LSO) on the basis that they are likely to be so heavily impacted by human activity that the achievement of good status might not be technically feasible or might be disproportionately expensive. These include GWBs associated with 19 coalfield areas / significant mines, 11 affected by contaminated lands and GWBs associated with 5 major urban centres.

Alongside the emerging scientific applications related to biophysical characterisations, an economic analysis that draws upon an extensive process of stakeholder involvement and public consultation must be factored into the decision making process regarding the management measures and special waterbody designations.

STAKEHOLDER INVOLVEMENT AND THE ROLE OF PUBLIC CONSULTATION

The WFD requires each RBD to respond to the results of its waterbody characterisations with a set of remedial management measures for each at-risk waterbody. These sets of measures – called programmes of measures – are required not only to be adequate for the attainment and maintenance of good water status by the Year 2015, but they are also required to be ‘cost-effective’, at least to the extent that political/social considerations will allow. In other words, subject to constraints imposed pursuant to efforts to equalise cost impacts on the various economic subsectors that bear the costs of the programmes of measures, the total costs of any combination of management measures that comprise a programme of measures must be demonstrated to be the least-cost combination of measures. Further, if the total costs associated with a cost-effective programme of measures can be shown to be highly disproportionate to the benefits derived from attaining good status by 2015, derogation on time or water status objective can be petitioned.

In essence, this requirement to analyse the costs and costs distributions of alternative combinations of management measures via cost-effectiveness analysis and cost-incidence/impact analysis, respectively, along with the requirement to compare the total costs and benefits of programmes of measures via cost-benefit analysis, comprise the post-characterisation economic reporting requirements of the WFD. And this economic analysis is required to incorporate an extensive degree of key stakeholder involvement and an aggressive strategy for general water-using public consultation and transparency.

Figure 1 graphically depicts the ERBD Project’s approach to conducting the economic analyses required under the WFD. It is grounded heavily in stakeholder input. The top box of the diagram represents the current position in which the ERBD Project finds itself in 2005. The limited resources available to complete the economic analyses required by the WFD are being rationed into one of the four tracks (labeled 1, 2, 3(a&b), and 4(a&b) in Figure 1) based on the extent to which preliminary determinations of cost-effective programmes of measures are anticipated to invoke stakeholder disagreements regarding the equities and justifications of the cost impacts brought about by the programmes of measures. From left to right in the diagram, the analytical costs associated with conducting the necessary economic analyses increase significantly – hence the need to ration analytical resources on a waterbody basis.

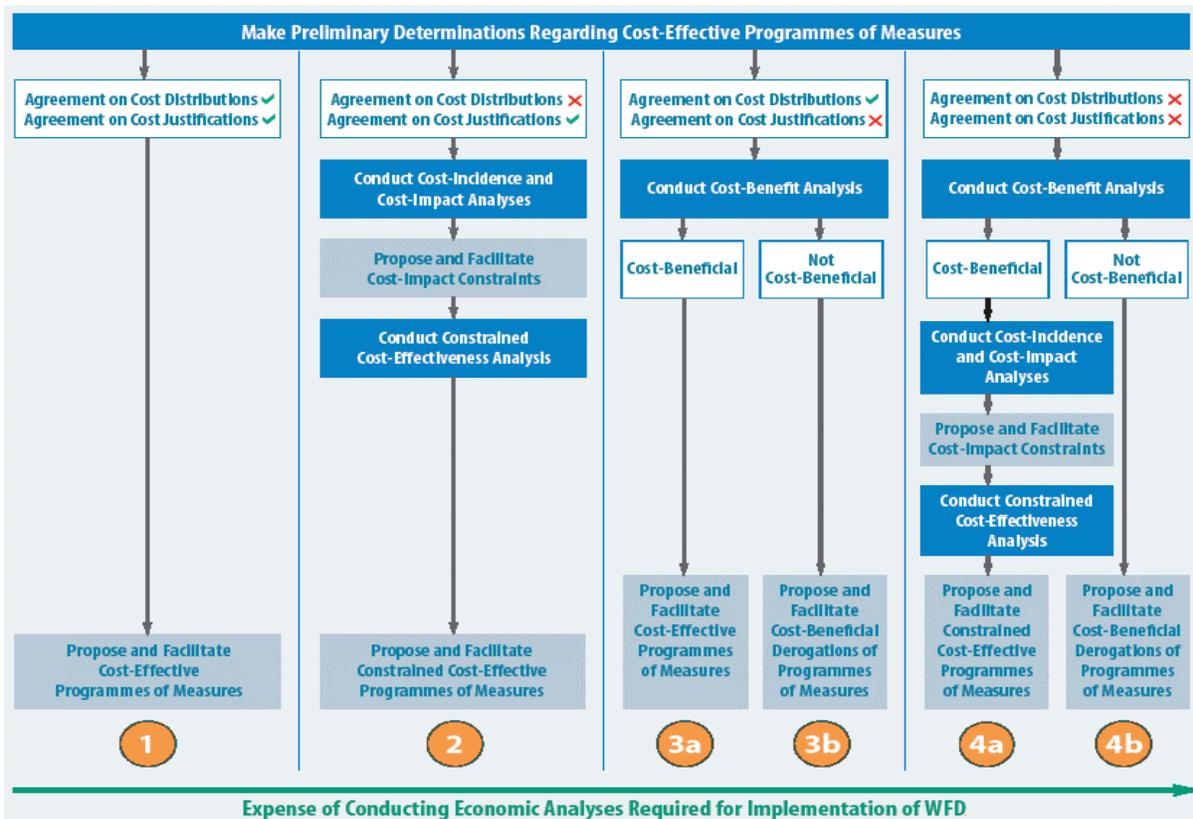


Figure 1. ERBD Project’s approach to stakeholder-based economic analysis of programmes of measures

To develop cost-effective, cost-equitable, cost-beneficial, and politically/socially-acceptable programmes of measures, four general types of economic analysis will be conducted:

- Cost-effectiveness Analysis – A method that considers the implementation costs of individual measures that can potentially be employed to achieve a predetermined water status objective and that reveals the combination of those measures that will achieve the objective at the least cost.
- Cost-incidence Analysis – A measure of ‘who *really* pays’ under various policy applications of the user/polluter pays principle.
- Cost-impact Analysis – A measure of the economic consequences associated with a change in policy that has the effect of redistributing real costs among stakeholders.
- Cost-benefit Analysis – A method that aims to estimate an appropriate level of additional public expenditure (i.e. one that is consistent with establishing benefits greater than or equal to the costs incurred).

The inputs to these analyses lie with the key stakeholders and the general water-using public in the ERBD. As such, the ERBD Project’s stakeholder-based economic analysis approach includes the following:

- 1) Solicitation of cost estimates associated with implementation of each potentially applicable management measure from representatives of each economic subsector that will potentially bear the costs of programmes of measures;
- 2) Surveys of subcatchment populations (general water-using public) to determine the monetary values these communities place on bringing their at-risk waterbodies to good status (i.e., benefits of WFD implementation);
- 3) Categorisation into one of the four major economic analysis pathways detailed in Figure 1 (i.e., (1) cost-effectiveness analysis only; (2) cost-effectiveness and cost incidence/impact analysis; (3) cost-effectiveness analysis and cost-benefit analysis; or (4) cost-effectiveness analysis, cost incidence/impact analysis and cost-benefit analysis) based on the stakeholder input regarding their anticipated total costs, costs distributions, and benefits associated with preliminary determinations of cost-effective programmes of measures for each waterbody;
- 4) Engineering estimates of costs and literature-based estimates of benefits;
- 5) Conductance of cost-effectiveness analysis, cost-incidence/impact analysis, and cost-benefit analysis as warranted by economic information needs for each waterbody;
- 6) Reconciliation of stakeholder-solicited estimates of costs and benefits with those generated by ERBD Project economists via cost-effectiveness analysis, cost-incidence/impact analysis, and cost-benefit analysis using engineering and literature-based inputs; and
- 7) Proposition, final general public consultation, and final negotiation and implementation of programmes of measures.

The economic analyses required by the WFD must be effective in communicating to stakeholders the nature and distributions of costs and benefits associated with alternative programmes of measures. It cannot, however, be effective if it's conducted in a vacuum. The preliminary, focused, and final stages of the stakeholder-based economic analysis, as illustrated in Figure 2, must be integrated into technical activities such as monitoring and modeling and must be incorporated along with that information into decision support systems – those that can process large amounts of different types of information and produce easily understood results. Integrating all WFD implementation activities, including the economic analyses, into advanced communication and accounting tools such as web-based geographic information systems and environmental management systems, such as will be done as a part of the ERBD project, will add to the likelihood of arriving at effective and durable key stakeholder and general public agreements on programmes of measures.

Vesting key stakeholders and informing the general water-using public early in this integrated process and sustaining that participation and attention until WFD objectives are achieved, and then beyond, is the most critical element of a successful WFD river basin management system. As such, as illustrated in Figure 2, the ERBD Project approach for integrating stakeholder-based economic analysis into the WFD implementation process involves stakeholder engagement and public consultation at all stages of river basin management plan development.

CONCLUSIONS

Implementation of the WFD in Ireland is a significant challenge on at least three major fronts:

- The scientific applications to maximise certainty in waterbody risk characterisations;
- The economic analyses to minimise costs, stakeholder disagreements over cost distributions, and inefficient programmes of measures; and
- A river basin management planning process to ensure substantive public consultation.

The ERBD Project is leading the way in Ireland on all three. The ERBD Project is taking the lead in developing the methodologies needed for reducing the uncertainty in the waterbody risk characterisation. The Project is also executing an approach for conducting its economic analysis that substantially involves key stakeholders in the data collection process and in the final production of its analytical outputs. Finally, rounding out the ERBD Project's leading-edge scientific and economic applications, the Project is developing the District's river basin management plan in a manner which is providing for the most extensive level of public consultation.

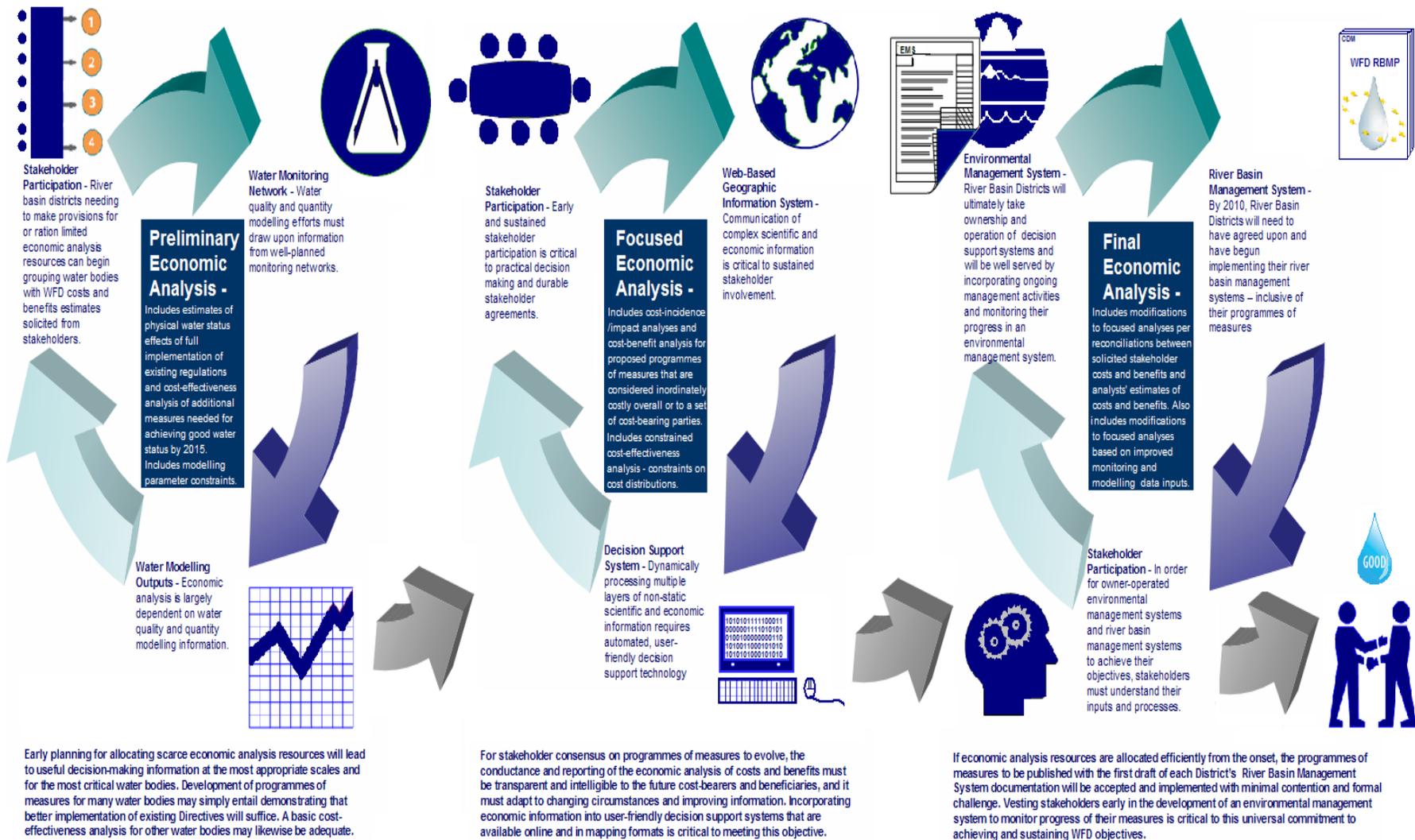


Figure 2. ERBD Project’s approach to integrating stakeholder-based economic analysis into the public’s river basin management planning process