

SHANNON RIVER BASIN DISTRICT PROJECT

Alan G Barr, BSc PhD CSc CEng MCIWEM MICE MIEI
Director, RPS Kirk McClure Morton, Consulting Engineers
and Enda Thompson, MSc MCIWEM
Shannon RBD Project Co-ordinator, Limerick County Council

Key Words: Water Framework Directive, Article V Characterisation Report, Shannon River Basin District

ABSTRACT

December 22, 2000, will remain a milestone in the history of water policies in Europe: on that date, the EU Water Framework Directive (WFD) was published in the Official Journal of the European Communities and thereby entered into force. The WFD establishes a framework for the protection of all waters including rivers and lakes, estuaries, coastal waters and groundwater with the overall objective of achieving good water status for all waters by 2015.

In Ireland, the main vehicle for delivering the objectives of the WFD is through the establishment of major River Basin District Projects, funded by the Irish National Development Plan, and outsourced to experienced Consultants. This paper outlines Ireland's approach to the implementation of the WFD at River Basin District level through the Shannon River Basin District Project. The Shannon is Ireland's largest river basin and is a nominated pilot River Basin District in which the EU Common Implementation Strategy is being tested.

The WFD requires the preparation of an Article V Characterisation Report for every EU River Basin District by December 2004. This paper focuses on the key issues relating to the Shannon Characterisation Report including Ireland's approach to the delineation of water bodies and undertaking risk assessments.

INTRODUCTION

“Water, water, everywhere.....but not a drop to drink.” The importance of water for life and as a key to development is becoming increasingly clear. Not convinced? Just stop to think for a few moments how your life would change without an adequate supply of clean water. As the demand for water for domestic, industrial, and recreational purposes increases so also does the need to protect it to ensure an adequate supply of clean water for all of us and for the various wildlife and their habitats also dependent on it.

LEGISLATION

The Water Framework Directive

In response to the increasing threat of pollution and the increasing demand from the public for cleaner rivers, lakes, beaches, the EU has developed the Water Framework Directive (WFD 60/2000/EC). This Directive is unique in that, for the first time, it establishes a framework for the protection of all waters including rivers and lakes, estuaries, coastal waters and groundwater, and their dependent wildlife/habitats under one piece of environmental legislation.

Specifically the WFD aims to:

- protect/enhance all waters, surface, ground and coastal waters
- achieve "good status" for all waters by December 2015
- manage water bodies based on river basins (or catchments)
- "combined approach" of emission limit values and quality standards
- get the public involved
- streamline legislation.

Irish Water Policy Regulations

Ireland completed the first step in implementing the WFD in December 2003 by making the European Commission (Water Policy) Regulations, (S.I. No. 722 of 2003) which transposed the WFD into Irish Law. These Regulations appoint the Environmental Protection Agency (EPA) and the relevant Local Authorities as the competent authorities for the Directive's implementation.

THE IMPLEMENTATION OF THE WATER FRAMEWORK DIRECTIVE IN IRELAND

A key component of the WFD is the management of water resources based on catchments or river basin districts. Ireland has already taken the necessary steps to divide the country into a series of river basin districts.

Eight River Basin Districts have been identified within the island of Ireland. The Shannon is Ireland's largest RBD covering an area of over 18,000km² (Figure 1). The Shannon is an international RBD with a small portion of the catchment draining from County Fermanagh in Northern Ireland.

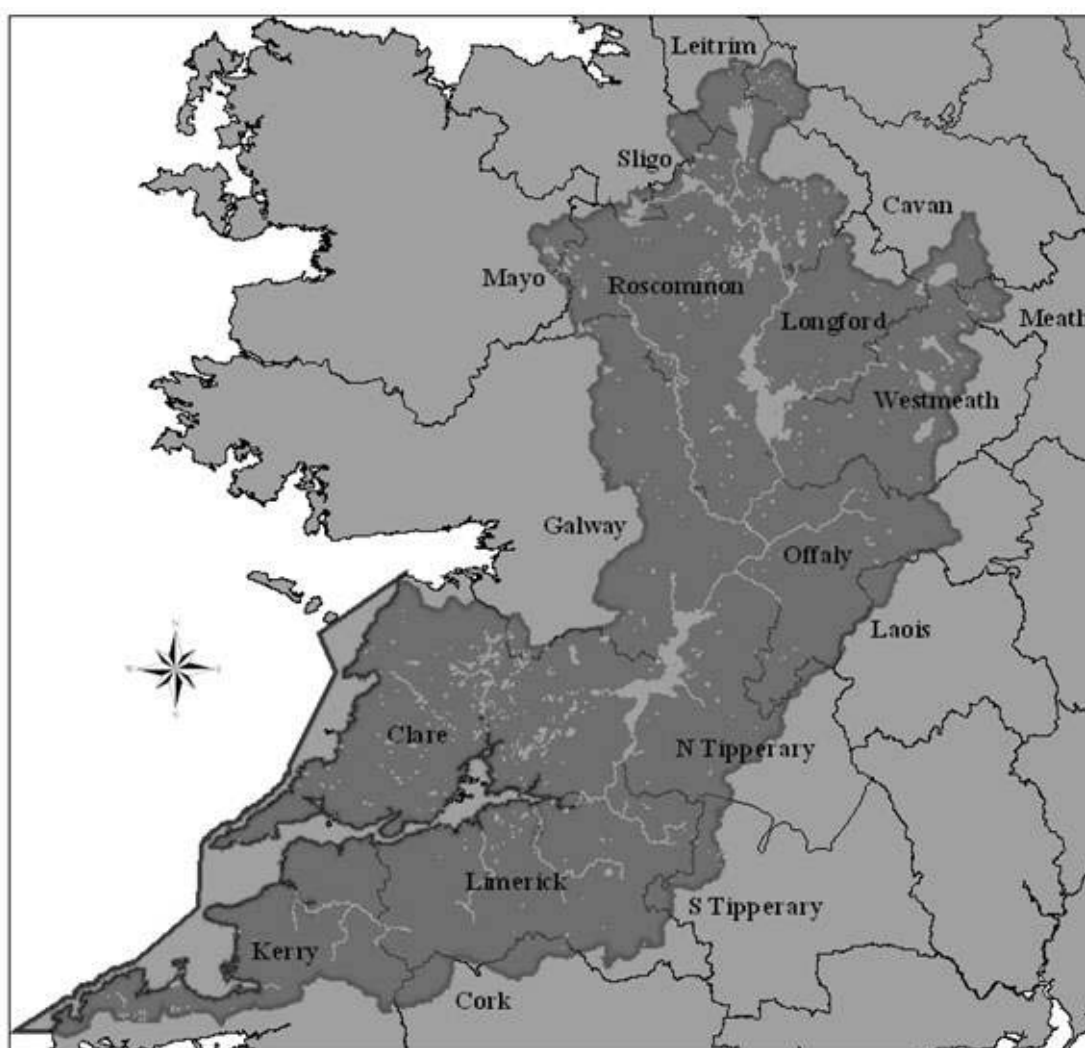


Figure 1 The Shannon RBD

The Shannon RBD is also Ireland's nominated pilot River Basin District in which the EU Common Implementation Strategy is being tested. The work being undertaken within the Shannon will therefore have a significant influence on how the WFD is implemented across all Member States.

A management strategy for the Shannon River Basin District, incorporating a programme of measures, will be developed to deliver the objectives of the WFD within the set timeframe. This will

require an integrated approach being adopted among Government Departments, the EPA, Local Authorities, sectoral interest groups and the general public to ensure its effective implementation on a catchment-wide basis.

THE SHANNON RIVER BASIN DISTRICT PROJECT

The Shannon River Basin Management Project is the main vehicle for delivering the objectives of the WFD within the Shannon River Basin District between January 2003 and December 2006. The project will provide the basis for an integrated River Basin Management System that will be achieved by the following:

1. Collection and analysis of background information;
2. Characterisation of the District in accordance with the WFD;
3. Development of a river basin management system including;
 - a comprehensive water quality monitoring system for all waters within the river basin district
 - a computerised (GIS) Management System
 - a programme of appropriate abatement measures
 - public awareness and consultation programme
 - an Environmental Management System (EMS)
4. Implementation of the River Basin Management System;
5. Preparation of a River Basin Management Strategy.

The Shannon River Basin Management Project is funded by the Department of the Environment, Heritage and Local Government through the National Development Plan and is jointly led by Limerick, Clare and Roscommon County Councils. All 18 Local Authorities whose jurisdictions lie within the Shannon River Basin District are actively participating in the Project together with all State agencies with relevant statutory duties.

RPS Kirk McClure Morton, Consulting Engineers and Environmental Scientists, have been appointed to develop the River Basin Management System building on their experiences in successfully delivering the Lough Derg and Lough Ree Catchment Monitoring and Management System.

There is an important role to be played by Non Government Organisations (NGOs), sectoral interest groups and the general public in the implementation of the WFD. This is recognized in the Directive which states “the success of the WFD relies on close co-operation and coherent action at Community, Member State and local level as well as on information, consultation and involvement of the public including users”. Elected representatives throughout the Shannon River Basin District will be kept informed of all aspects of the project as it proceeds. In addition, the public including farmers and other stakeholders will be kept abreast of the principal issues emerging through a process of direct consultation and media usage.

Since the four year project began in January 2003 legislation and background reports for the Shannon have been prepared and are available from the public download area of the project’s website (www.shannonrbd.com).

ARTICLE V CHARACTERISATION REPORT

The WFD requires an Article V Characterisation reports to be prepared for each RBD by December 2004. The key outputs of the characterisation process will be:

- Identification of main pressures;
- Identification of water bodies at risk of failing to achieve at least good status by 2015;
- Identification of the need for further characterisation, including environmental monitoring, as a basis of planning the programme of measures;

- Establishment of the economic background for planning the programme of measures.

There are currently many growing driving forces and pressures on waters resources in the Shannon RBD. The Shannon project is undertaking a characterisation study of the RBD to identify the human activities that pose a potential threat to water status. A programme of measures to redress the effects of these activities will be drawn up as part of a management plan for the district. These measures will, therefore, be designed specifically to respond to the particular pressures occurring in the Shannon RBD.

The key issues in the Shannon RBD are considered to be:

- River and Lake Chemical and Ecological Quality
- Groundwater Chemical Quality and Quantity
- Coastal waters and Estuaries Chemical and Ecological Quality
- Chemical and Ecological Quality Objectives and Standards
- Monitoring and Management Systems
- Risk assessment of key activities:
 - domestic sewage
 - water abstraction
 - urban drainage
 - septic tanks
 - farming practices
 - intensive agricultural enterprises
 - industry
 - forestry
 - peat abstraction
 - mining
 - rural drainage
 - leisure activities
 - dredging, shipping
- Public participation
- Pollution Abatement Strategies.

WATERBODY DELINEATION

The implementation of the WFD also entails a series of specialist studies which require input from development studies and scientific research projects. The first step in the characterisation process - waterbody delineation, requires that all waters are assigned to a category (eg river, lake, transitional, coastal or ground waters) and then differentiated according to type which is dependant on physical attributes.

The Shannon RBD contains some 1,700 lakes, over 16,000 km of rivers (stream order 1-7), almost 1,500 km² of coastal and marine waters and around 100 groundwater bodies. Waterbody delineation and typology studies are currently being undertaken at a national level by organisations including the Environmental Protection Agency, Geological Survey of Ireland, Marine Institute with input from various academic groups and the River Basin District Projects.

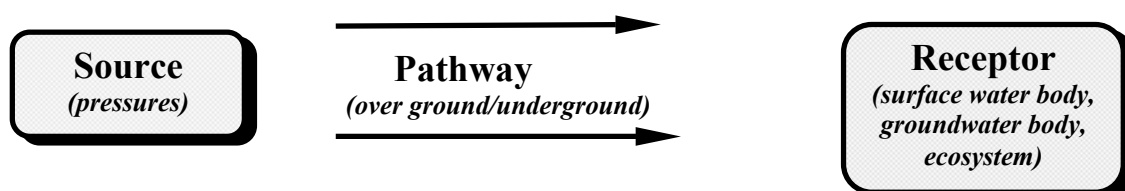
These supporting activities are guided by WFD National Working Groups which deal with general implementation approaches, as well as providing technical guidance. This structure is intended to streamline WFD implementation across all River Basin Districts in Ireland.

The Irish authorities are also collaborating in the North-South Technical Advisory Group (NS-TAG) with the United Kingdom which shares the same land and marine eco-regions, and participating with other European Member States under various WFD initiatives such as the intercalibration exercise.

RISK ASSESSMENTS

The next step in the characterisation process requires consideration of significant pressures which might place waterbodies “at risk” of failing to achieve their water quality objectives.

The ‘risk’ concept (including both risk assessment and management) is at the heart of effective river basin planning. The risk concept can provide a rigorous, structured and systematic framework for analysis, decision-making and communication. The approach being adopted in Ireland is in essence, basic and simple, and uses the source-pathway-receptor/target model for environmental management:



The Shannon River Basin District project, is compiling relevant information for risk assessment analysis to be undertaken using a GIS.

The risk assessment process involves background, source, pathway and receptor factors, undertaken in a series of steps and combined together to give the required outcomes.

Initial Factors

- Delineation, evaluation and description of water bodies.
- Development of a ‘conceptual understanding’ of the river basin as a 3-dimensional entity, where emphasis is placed on the interconnection and interdependencies between the various components of the water cycle.
- Assessment of existing monitoring data. Where data are adequate to enable conclusions on impact and/or trends, classify water body into the appropriate category – either ‘at risk’, ‘potentially at risk’ or ‘not at risk’.

Source (pressure magnitude) Factors

- Identification of pressures.
- Estimation of pollutant loading (quantity and concentration) for main pollutant types (e.g. mobile inorganic (NO₃) and less mobile inorganic (PO₄) constituents).
- Development of threshold values for particular pressure magnitudes and pollutant types, in the form of matrices (e.g. more than a certain number of livestock units/ha could be categorised as a high pressure magnitude for both NO₃ and PO₄).

Pathway (both over ground and underground) Factors

- Compilation and characterisation of relevant elements, such as soils, subsoils, aquifers, vulnerability, wind direction.
- Classification of pathway information as ‘pathway susceptibility’ for the main pollutant types (e.g., the pathway susceptibility of NO₃ and PO₄ will differ) into 4/5 groups, varying from ‘extremely high’ to ‘low’. (‘Pathway susceptibility’ is a measure of the degree of attenuation between source and receptor.)

Receptor Factors

- Evaluation of the sensitivity of different receptors to pressures (pollutants and/or abstraction), e.g. fens are more sensitive than raised bogs to groundwater abstraction but are less sensitive to nutrients.

Integrating Source, Pathway and Receptor Factors

- Where impact/monitoring data for the receptor are adequate to determine the water body risk category, combining the factors enables a sufficient conceptual understanding to provide the basis for designing the monitoring network and deciding on the Programme of Measures.
- Where impact data are inadequate, combining the factors will enable the risk category to be determined and will provide the basis for designing the monitoring network and deciding on the Programme of Measures. Existing monitoring data can be used to refine the analysis and confirm the risk category.

The WFD requires that for groundwater waterbodies “at risk” from quantitative and qualitative (ie point source and diffuse source pollution pressures) are identified in the Article V Report.

Surface waters, in accordance with the Directive, must be assessed with regard to abstraction, morphological, point source, diffuse source and other pressures. Other pressures include such impacts as land use change, invasive or “alien” species and fishing pressures.

A risk assessment scoping study has been undertaken to identify the key pressures on Irish water bodies and conclude which might require a GIS based Risk Assessment approach. Identified issues include nutrient and organic pollution of all waters, abstraction from inland waters and acidification of inland surface waters.

A sub group of the WFD National Technical Co-ordination Group has been established to develop Irish Risk Assessment methodologies for implementation by River Basin District Projects. The group has agreed to adopt the following guiding principles with regard to the risk assessment process:

- The process & the results of the analysis should be transparent, comprehensible & all data & information should be made available to the public
- Risk analysis is not classification of status
- The results of the risk analysis will be used to help identify & prioritise the appropriate & iterative follow-up actions for the next stages of the planning process
- The analysis will ensure harmonised application of the key issues such as the baseline scenario & the identification of heavily modified water bodies
- Lack of relevant data should not be an excuse - demonstrate that you tried - make a “gap analysis”

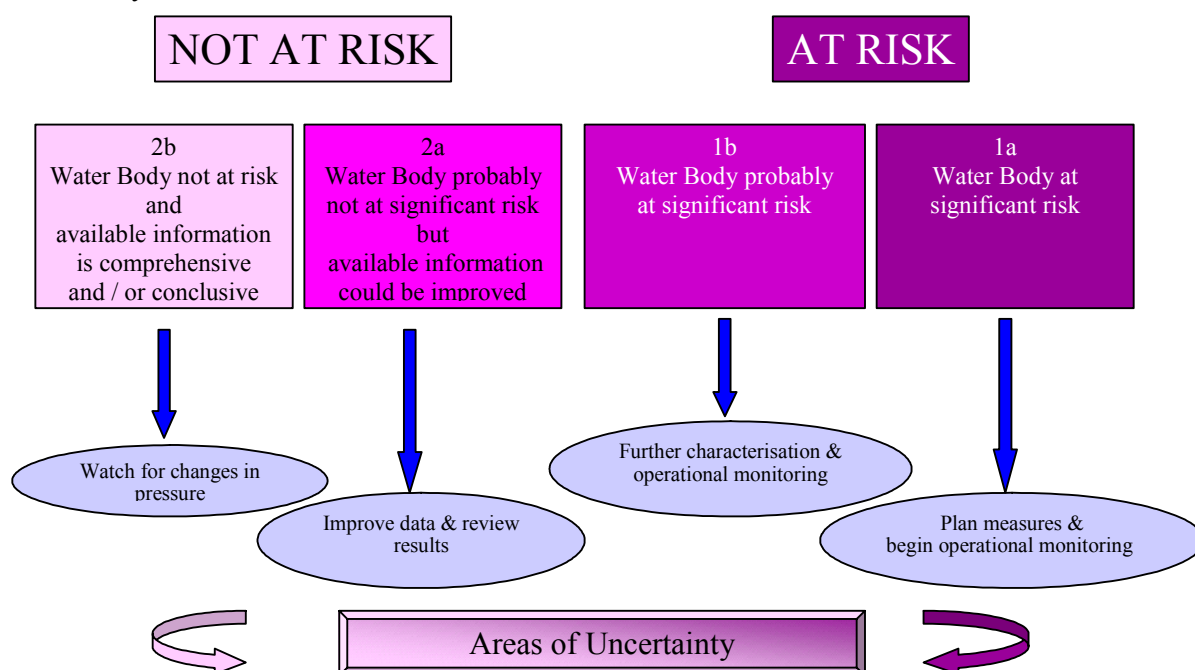


Figure 2 Risk Assessment Categories

The framework presented in Figure 2 will be used to assign risk category and to plan monitoring and development of programmes of measures after submission of the Article V report.

The presentation will elaborate on these factors by demonstration of trial analyses of the various risk assessments on surface and groundwater bodies within the Shannon RBD.

CONCLUSION

The implementation of WFD has presented EU Member States with a number of technical challenges, particularly the preparation of the Article V characterisation report by the end of this year. Ireland has made significant progress through the establishment of the river basin district projects.

ACKNOWLEDGEMENT

The risk assessment information contained in the paper and presentation is based on a draft report "Pressures and Impacts Assessment Methodology" (August, 2003), prepared by a sub-committee of the Irish WFD Working Group on Characterisation and Reporting, chaired by Micheál Lehane, EPA. The sub-committee members included: Donal Daly, Grace Glasgow, Garrett Kilroy, Martin McGarrigle, Jim Bowman, Francis O'Beirn, Thomas Quinlivan and Paul Mills.