



Phosphorus Regulations National Implementation Report, 2001



PHOSPHORUS REGULATIONS NATIONAL IMPLEMENTATION REPORT, 2001

Under the Local Government (Water Pollution) Act 1977 (Water Quality Standards for Phosphorus) Regulations, 1998 (S.I. 258 of 1998).

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil
P.O. Box 3000, Johnstown Castle Estate, Co. Wexford, Ireland.

Telephone : +353-53-60600 Fax : +353-53-60699
e-mail: info@epa.ie Website: www.epa.ie

© Environmental Protection Agency 2001

All or part of this publication may be reproduced without further permission, provided the source is acknowledged.

Although every effort has been made to ensure the accuracy of the material contained in this publication, complete accuracy cannot be guaranteed. Neither the Environmental Protection Agency nor the author(s) accept any responsibility whatsoever for loss or damage occasioned or claimed to have been occasioned, in part or in full, as a consequence of any person acting, or refraining from acting, as a result of a matter contained in this publication.

Phosphorus Regulations National Implementation Report, 2001

Under the Local Government (Water Pollution) Act 1977 (Water Quality Standards for Phosphorus) Regulations, 1998 (S.I. 258 of 1998).

Published by the Environmental Protection Agency, Ireland.

Authors:

Dr Conor Clenaghan, Ms Cairtriona Collins and Dr Matthew Crowe

Acknowledgements:

Thanks to all Agency staff who provided assistance with the preparation of this document, particularly Ms Margaret Morrissey, Mr Gerry Carty, Mr Martin McGarrigle, Mr John Lucey, Mr Kevin Clabby, Mr Michael Neill, Mr Michael Flanagan, Ms Maeve Quinn, Dr Jim Bowman, Mr Liam Ó Súilleabháin and Ms Yvonne Doris.

ISBN 1-84095-073-0

Price Ir£20.00 / €25.40

07/01/1000

Contents

Executive Summary	.1
Introduction	.3
Implementation Reports - General Information	.7
Water Quality Review	.11
Review of Measures Implementation	.27
Planning, Control and Enforcement Measures	.30
Monitoring Measures	.35
Consultative and Co-operative Measures	.36
Public Education and Advisory Measures	.36
Other Agri-environmental and Miscellaneous Measures	.36
Issues Raised	.39
Conclusions	.41
Recommendations	.43
References	.45
Appendix 1 Additional Water Quality Review Data	.49
Appendix 2 EPA Implementation	.63
Appendix 3 Local Authority Implementation	.67
Carlow County Council	.70
Cavan County Council	.72
Clare County Council	.74
Cork County Council	.77
Cork Corporation	.78
Donegal County Council	.80
Dublin Corporation	.83
Dun Laoghaire-Rathdown County Council	.84
Fingal County Council	.85
South Dublin County Council	.86
Galway County Council & Galway Corporation	.88
Kerry County Council	.90
Kildare County Council	.92
Kilkenny County Council	.94
Laois County Council	.96
Leitrim County Council	.98
Limerick Corporation	.101
Limerick County Council	.102
Longford County Council	.104
Louth County Council	.106
Mayo County Council	.108

Meath County Council	110
Monaghan County Council	112
Offaly County Council	114
Roscommon County Council	116
Sligo County Council	118
Tipperary NR County Council	121
Tipperary SR County Council	122
Waterford Corporation	125
Waterford County Council	126
Westmeath County Council	128
Wexford County Council	130
Wicklow County Council	132

List of Tables

Table 1	Phosphorus Regulations target values for Irish rivers	.4
Table 2	Phosphorus Regulations target values for Irish lakes	.4
Table 3	Reporting Obligations under the Phosphorus Regulations	.5
Table 4	Information included in local authority Implementation Reports	.9
Table 5	Baseline number of local authority river stations in each biological quality rating	.15
Table 6	Number of local authority river stations in each Q-value or median MRP level category in surveys undertaken in the 1998-2000 period and the number of stations compliant with the Phosphorus Regulations	.16
Table 7	Number of local authority river stations in each biological quality status rating in the 1998-2000 survey and the number of stations meeting the biological targets of the Regulations	.17
Table 8	Target number of local authority river stations in each biological quality rating or median MRP level category	.18
Table 9	Baseline number of local authority lakes of each trophic status	.23
Table 10	Current water quality information for lakes reported on by the EPA or local authorities in 1998-2000 period	.24
Table 11	Target number of local authority lakes of each trophic status or average total phosphorus level category	.25
Table 12	Measures being implemented or proposed to be implemented by local authorities	.28
Table 13	Selected actions undertaken by local authorities in 1999-2000 period to improve water quality	.31
Table 14	Local authority implementation of agricultural bye-laws as reported in local authority Implementation Reports.	.32
Table 15	Main provisions of agricultural bye-laws introduced by local authorities.	.34
Table 16	Local authority implementation of nutrient management planning as reported in Implementation Reports.	.35

List of Figures

Figure 1	Generalised environmental management systems approach adapted to requirements of the Regulations8
Figure 2	Percentage of local authority river stations compliant with the Phosphorus Regulations in 1998-2000 and percentage of local authority river stations meeting biological targets of the Regulations19
Figure 3	National baseline, 1998-2000 and target data based on Q-values and MRP levels at all river monitoring stations20
Figure 4	National baseline, 1998-2000 and target data based on Q-values only at all river monitoring stations20
Figure 5	Percentage of local authority river stations with satisfactory biological or MRP water quality in 1998-2000 survey and percentage of local authority river stations with satisfactory biological water quality21
Figure 6	Percentage change in both number of river stations with satisfactory MRP or biological water quality, and number of river stations with satisfactory biological water quality only, in 1998-2000 survey, compared to the baseline biological survey.22

List of Maps

Map 1	Baseline River Quality in County Carlow	.71
Map 2	Target River Quality in County Carlow	.71
Map 3	Baseline River and Lake Quality in County Cavan	.73
Map 4	Target River and Lake Quality in County Cavan	.73
Map 5	Baseline River and Lake Quality in County Clare	.75
Map 6	Target River and Lake Quality in County Clare	.75
Map 7	Baseline River and Lake Quality in County Cork	.79
Map 8	Target River and Lake Quality in County Cork	.79
Map 9	Baseline River and Lake Quality in County Donegal	.81
Map 10	Target River and Lake Quality in County Donegal	.81
Map 11	Baseline River Quality in County Dublin	.87
Map 12	Target River Quality in County Dublin	.87
Map 13	Baseline River and Lake Quality in County Galway	.89
Map 14	Target River and Lake Quality in County Galway	.89
Map 15	Baseline River and Lake Quality in County Kerry	.91
Map 16	Target River and Lake Quality in County Kerry	.91
Map 17	Baseline River Quality in County Kildare	.93
Map 18	Target River Quality in County Kildare	.93
Map 19	Baseline River Quality in County Kilkenny	.95
Map 20	Target River Quality in County Kilkenny	.95
Map 21	Baseline River Quality in County Laois	.97
Map 22	Target River Quality in County Laois	.97
Map 23	Baseline River and Lake Quality in County Leitrim	.99
Map 24	Target River and Lake Quality in County Leitrim	.99
Map 25	Baseline River Quality in County Limerick	.103
Map 26	Target River Quality in County Limerick	.103
Map 27	Baseline River and Lake Quality in County Longford	.105
Map 28	Target River and Lake Quality in County Longford	.105
Map 29	Baseline River Quality in County Louth	.107
Map 30	Target River Quality in County Louth	.107
Map 31	Baseline River and Lake Quality in County Mayo	.109
Map 32	Target River and Lake Quality in County Mayo	.109
Map 33	Baseline River and Lake Quality in County Meath	.111
Map 34	Target River and Lake Quality in County Meath	.111
Map 35	Baseline River and Lake Quality in County Monaghan	.113
Map 36	Target River and Lake Quality in County Monaghan	.113
Map 37	Baseline River Quality in County Offaly	.115
Map 38	Target River Quality in County Offaly	.115
Map 39	Baseline River and Lake Quality in County Roscommon	.117
Map 40	Target River and Lake Quality in County Roscommon	.117
Map 41	Baseline River and Lake Quality in County Sligo	.119
Map 42	Target River and Lake Quality in County Sligo	.119
Map 43	Baseline River and Lake Quality in County Tipperary	.123
Map 44	Target River and Lake Quality in County Tipperary	.123

Map 45 Baseline River Quality in County Waterford127

Map 46 Target River Quality in County Waterford127

Map 47 Baseline River and Lake Quality in County Westmeath129

Map 48 Target River and Lake Quality in County Westmeath129

Map 49 Baseline River Quality in County Wexford131

Map 50 Target River Quality in County Wexford131

Map 51 Baseline River and Lake Quality in County Wicklow133

Map 52 Target River and Lake Quality in County Wicklow133

EXECUTIVE SUMMARY

This is the second report by the Environmental Protection Agency (EPA) on the implementation of the Phosphorus Regulations. It is prepared under Article 4(4) of the Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998 (S.I. 258 of 1998). The report has been prepared from information and water quality data submitted by local authorities in their Implementation Reports and from water quality data collected by the Agency.

The Phosphorus Regulations require that water quality be maintained or improved by reference to the baseline biological quality rating (rivers) or trophic status (lakes) assigned by the Agency in the 1995-97 review period or at the first occasion thereafter. In the case of rivers, this Report analyses progress made in achieving the targets set in the Regulations, both nationally and at a local authority level, using current (i.e. 1998-2000 period) biological quality ratings (Q-ratings) and current median molybdate reactive phosphorus (MRP) levels, at river stations which have been assigned a baseline Q-rating. Similarly, in the case of lakes, this Report analyses progress made in achieving the targets set in the Regulations, both nationally and at a local authority level, using current trophic status measurements and current total phosphorus levels at lakes which have been assigned a baseline trophic status. Water quality targets set in the Regulations must be met by 2007 at the latest for waters surveyed by the EPA in the 1995-97 period and within a maximum of ten years for waters first surveyed after 1997.

Under the Regulations, the local authorities were required to submit a Measures Report to the Agency by July 1999, setting out the measures to be taken to meet the prescribed standards. This was to be followed up by the submission of an Implementation Report to the Agency by July 2000 and every two years thereafter until 2008. The Agency hosted a workshop in May 1999 to facilitate preparation of local authority Measures Reports. As a follow up to the workshop, the Agency issued a Guidance Note to local authorities on preparation and submission of the Measures Report (EPA, 1999). The Agency hosted a second workshop in June 2000 to facilitate preparation of local authority Implementation Reports. At this workshop, the Agency issued a Guidance Note to local authorities on preparation and submission of the Implementation Reports (EPA, 2000a). Following the workshop, each local authority was supplied with a list of river stations and lakes in their functional area, which are to be maintained / improved under the Regulations. The Agency also published a *Synthesis Report of the Measures Reports* (Clenaghan *et al.*, 2000) to assist implementation of the Regulations. The Agency must publish a National Report on Implementation of the Regulations every two years from 2001 to 2009.

Current monitoring indicates that, in the case of rivers, the water quality at 60 per cent of the monitoring stations nationally is compliant with the Regulations i.e. the water quality at these stations meets the biological and/or the phosphorus targets set in the Regulations. A total of 58 per cent of river stations meet the biological targets of the Regulations.

Local authorities with a relatively high level of compliance (> 70 per cent of river stations compliant) with the Regulations are Sligo, Mayo, Kerry and Clare. Local authorities with a relatively low level of compliance (< 50 per cent of river stations compliant) with the Regulations are Dun Laoghaire-Rathdown, Fingal, Kildare, Meath, Dublin Corporation, Westmeath and Longford.

Current monitoring indicates that, nationally, 63 per cent of river stations have satisfactory water quality based on the biological and/or the phosphorus standards specified in the Regulations. A total of 62 per cent of river stations are of satisfactory water quality when biology alone is considered. A total of 60 per cent of river stations were satisfactory in the baseline survey. Further analyses, just comparing water quality at stations sampled in both the 1995-97 and 1998-2000 surveys, confirm that there has been an increase in number and percentage of satisfactory stations. Current monitoring also indicates a decline in the percentage of river stations with moderately or seriously polluted water.

Despite these improvements, current monitoring indicates that there has been a marked decline in the number and percentage of river stations of highest biological water quality (Q5) between the 1995-97 and 1998-2000 monitoring periods (down from 4.6 per cent of stations to 3.1 per cent of stations respectively when comparing stations sampled in both periods). Similar analysis also reveals a decline of 0.5 per cent in stations of

Q4-5 status between these two monitoring periods.

Marked increases in percentage of river monitoring stations with satisfactory biological water quality are apparent in Carlow, Galway, Tipperary NR, Kilkenny, Fingal, Wexford, Westmeath and Longford. However, marked declines in the percentage of stations with satisfactory biological water quality have been recorded in Dun Laoghaire-Rathdown, South Dublin, Cavan and to a lesser extent in Waterford, Cork and Wicklow.

Current data on lakes is more limited, with updated water quality information available on only 35 of the 120 lakes monitored in the baseline survey. Current monitoring indicates that Lough Derg, Lough Ree and Lough Leane have improved in trophic status and now meet the criteria set in the Regulations. Other unsatisfactory lakes reported on have not improved (Lough Sheelin and Acres Lake), whereas all but one (Knappaghbeg Lake in Mayo) of the thirty satisfactory lakes reported on have maintained or improved their status.

A wide range of measures is being implemented or is proposed by the local authorities. The individual measures for planning, control and enforcement, monitoring, consultation and co-operation, public education and other agri-environmental measures are listed and described in this report. Progress has been made by a number of local authorities in implementing proposed measures, e.g., in the introduction of agricultural bye-laws, in reviewing discharge licences, in conducting farm surveys and misconnection surveys etc. Actions undertaken by the EPA and each local authority to ensure compliance with the targets set in the Regulations are documented in this report.

Issues raised to date in implementation of the Regulations and future recommendations are presented. It is still too early to assess the effectiveness of most measures, however, the installation of phosphorus removal at certain inland wastewater treatment plants has proved successful in improving water quality. The ongoing collection of biological and chemical water quality data over the coming years will provide a clearer picture of the effectiveness of the measures being implemented by the local authorities and the EPA. The success of these measures will be evaluated in future National Implementation Reports.

INTRODUCTION

EPA reports have clearly documented that surface water quality in Ireland continues to decline (Lucey *et al.*, 1999; Stapleton *et al.*, 2000). Long-term monitoring of 2900km of river channel has shown a steady reduction in the length of unpolluted waters from 84 per cent in 1971 to 51 per cent in the 1995-97 review period. More recent monitoring of a larger, considerably more representative baseline of 13,200 km indicates that the length of unpolluted river channel has declined from 77 per cent in 1987-90 to 67 per cent in the 1995-97 review period. The Agency has identified eutrophication as the major threat to water quality in Ireland, with the basic cause in most cases likely to be excess phosphorus inputs.

In 1997, the Government published a strategy document *Managing Ireland's Rivers and Lakes – A Catchment Based Strategy Against Eutrophication* (DoE, 1997) which set out Ireland's pollution reduction programme in respect of phosphorus. The Strategy identified a long-term target of improving all unsatisfactory waters in rivers and lakes to a level consistent with the beneficial uses of the water. Interim quality standards were also identified, which are to be achieved generally over a ten-year time frame. In order to give effect to these interim quality standards and to meet, in part, the requirements of the Dangerous Substances Directive (CEC, 1976), the Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998, were introduced. These Regulations are unique in Europe in their inclusion of direct ecological assessment of the impact of eutrophication (Lucey *et al.*, 1999). This ecological approach has foreshadowed the introduction of the EU Water Framework Directive (CEC, 2000), which strongly emphasises ecological assessment and sets a target of good ecological quality for all of the Community's surface waters.

The Regulations require that water quality be maintained or improved by reference to the biological quality rating (rivers) or trophic status (lakes) assigned by the Agency in the 1995-97 review period or at the first occasion thereafter. This represents the baseline water quality data. Where water quality is deemed unpolluted (i.e. a river biological quality rating of Q4, Q4-5 or Q5, or an oligotrophic / mesotrophic lake status has been assigned by the Agency), the Regulations require that the existing water quality be maintained. Where quality has been found to be unsatisfactory, the Regulations require that the water be improved by 2007 at the latest for waters surveyed by the EPA in the 1995-97 period and within a maximum of ten years for waters first surveyed after 1997. The degree of improvement required is based on the baseline quality and on the standards prescribed by the Regulations. For more seriously polluted lakes and rivers, the targets set, if attained, may not necessarily ensure that these waters are of satisfactory quality. This takes into account the fact that recovery may take a long time in some catchments, e.g., where high soil phosphorus levels are contributing to water quality deterioration.

In the case of rivers, the standards prescribed in the Regulations may be met by achieving either the target biological quality rating or the target median molybdate-reactive phosphorus (MRP) concentration (Table 1). In the case of lakes, the standards prescribed in the Regulations may be met by achieving either the target trophic status classification or the target average total phosphorus concentration (Table 2). A six year extension to the period allowed to reach compliance with the Regulations is permissible in exceptional circumstances.

The target river standards specified in the Regulations are based on a well-established relationship between ecological quality in Irish rivers and phosphate levels. Examination of measurements recorded at river stations in surveys since 1983 have revealed a strong statistical relationship between biological Q-ratings and MRP concentrations in Irish rivers in general (McGarrigle *et al.*, 1992; Lucey *et al.*, 1999). The empirical relationship suggests that, once annual median MRP values exceed 30 µg P/l, there is a strong statistical likelihood that the river stretch in question will have a significant eutrophication problem. Thus it is likely that the ecology of such stretches will be adversely affected, with altered floral and faunal communities. Typical effects include excessive algal and macrophyte growth with consequent reduced dissolved oxygen values during the hours of darkness and the loss of sensitive macroinvertebrate species, including certain mayflies and stoneflies. Salmonid fish populations are generally not sustainable in such eutrophic rivers. Lakes into which such rivers flow will be at risk of algal blooms. However, as this statistical relationship has relatively wide confidence limits, individual stations with annual median MRP concentrations greater than 30 µgP/l will not necessarily show these biological effects in every case (Lucey *et al.*, 1999).

The target lake standards are based on the Agency's classification for lakes which, in turn, is derived from a scheme proposed by the OECD (OECD, 1982). The baseline trophic status of the water body, which determines the target to be achieved, is defined solely by a biological parameter, in this case annual maximum chlorophyll *a* concentration. The chlorophyll concentration is a measure of the planktonic algal biomass, the feature primarily affected by eutrophication in most lakes. The target total phosphorus concentrations that are required for mesotrophic, eutrophic and hypertrophic lakes are more onerous than the corresponding values for mesotrophic and eutrophic lakes proposed in the OECD scheme.

The Regulations require that the Agency and the local authorities take all such steps as may be appropriate in discharge of their functions to secure compliance with the quality standards specified in the Regulations. The local authorities were required to submit a Measures Report to the Agency by 31 July 1999, setting out the measures to be taken to meet the prescribed standards. This was to be followed up by the submission of an Implementation Report to the Agency by 31 July 2000 and every two years thereafter until 2008. The Agency published a Synthesis Report of the local authority Measures Reports (Clenaghan *et al.*, 2000). Although the Synthesis Report was not required by the Regulations, the Agency considered that it would provide useful information for the successful implementation of the Regulations. This report is the first of a series of National Reports on the Implementation of the Regulations, which the Agency must publish every two years until 2009 (Table 3).

TABLE 1: PHOSPHORUS REGULATIONS TARGET VALUES FOR IRISH RIVERS

If	Then	
The existing Q-value ¹ falls into the category below:	Either The minimum Q-value ¹ to be achieved is:	Or The median molybdate-reactive phosphate concentration ² (µgP/l) to be achieved is:
Unpolluted		
5	5	15
4-5	4-5	20
4	4	30
Polluted		
3-4	4	30
3	3-4	50
2-3	3	70
≤2	3	70

¹Biological Quality Rating (Q-value) as assessed by EPA staff during National River Monitoring Programmes.

²Molybdate-Reactive Phosphate (MRP) median concentration to be determined as a minimum of 10 samples taken at intervals of four weeks or longer in any twelve consecutive month period. Where the requisite number of samples has not been taken within such a period, the median concentration shall be determined from sampling conducted over such period, being a period not exceeding 24 months, as required to obtain a minimum of 15 samples taken at intervals of four weeks or longer.

TABLE 2: PHOSPHORUS REGULATIONS TARGET VALUES FOR IRISH LAKES

If	Then	
The Existing Trophic Status ¹ is:	Either The minimum target Trophic Status ¹ to be achieved is:	Or The average total phosphorus concentration ² (µg P/l) to be achieved is:
Satisfactory		
Ultra-Oligotrophic	Ultra-Oligotrophic	<5
Oligotrophic	Oligotrophic	>5<10
Mesotrophic	Mesotrophic	>10<20
Unsatisfactory		
Eutrophic	Mesotrophic	>10<20
Hypertrophic	Eutrophic	>20<50

¹Trophic status means the trophic status for any part of a lake assigned by the Agency during National Lake Monitoring Programmes.

²Average total phosphorus concentration to be determined as a minimum of 10 samples taken at intervals of four weeks or longer in any twelve consecutive month period. Where the requisite number of samples has not been taken within such a period, the average concentration shall be determined from sampling conducted over such period, being a period not exceeding 24 months, as required to obtain a minimum of 15 samples taken at intervals of four weeks or longer.

TABLE 3: REPORTING OBLIGATIONS UNDER THE PHOSPHORUS REGULATIONS

Local Authority Reports	EPA Reports
31 July 1999 (Measures)	Synthesis Report of Measures Reports (not a statutory requirement) (Clenaghan <i>et al.</i> , 2000)
31 July 2000 (Implementation)	30 April 2001 (National Implementation)
31 July 2002 (Implementation)	30 April 2003 (National Implementation)
31 July 2004 (Implementation)	30 April 2005 (National Implementation)
31 July 2006 (Implementation)	30 April 2007 (National Implementation)
31 July 2008 (Implementation)	30 April 2009 (National Implementation)



IMPLEMENTATION REPORTS - GENERAL INFORMATION

The Measures and Implementation Reports submitted by the local authorities are generally divided into a number of sections based on the recommendations of the EPA Guidance Notes (EPA, 1999, 2000a). The Measures Reports are reviewed in the Synthesis Report (Clenaghan *et al.*, 2000). The Implementation Reports consisted of sections on current water quality in the local authority functional area; an update on implementation of measures proposed in the Measures Report (presented in tabular format); and a description of progress to date. It was recommended that any problems encountered in implementation of the Regulations, and future plans or new directions that the local authority considered necessary, should also be addressed in their reports.

There was considerable slippage on the statutory submission date of Implementation Reports by most local authorities, with five local authorities – Limerick Corporation, Dun Laoghaire-Rathdown, Louth, Meath and Waterford County Councils – not submitting reports (Table 4). The EPA Guidance Note was used as a template for the majority of Implementation Reports. This helped to ensure consistency of reporting and that relevant information would be included in the reports. The local authorities generally supplied the information requested (Table 4).

A number of Implementation Reports were only partially completed (e.g., Laois, Leitrim, Wicklow) (Table 4). In other cases partial reports were submitted as the local authorities referred to the fact that part of the functional area of the local authorities concerned were covered by water quality monitoring and management systems (Longford, Roscommon) or by water quality management plans (Lough Gill in Sligo / Leitrim). Reports generated by the water quality monitoring and management systems, and the various catchment management plans referred to, may provide very useful information and recommendations, which will assist local authority implementation of the Phosphorus Regulations (e.g., KMM, 1999; MCOS, 2000; KMM and Pettit, 2000; Thompson *et al.*, 1998). However, as stated in the Synthesis Report, it is unclear from reports other than Implementation Reports, which measures are being implemented or proposed by the relevant local authority. In cases where reports other than Implementation Reports were submitted these were not considered further. The Agency considers that submission of water quality monitoring and management system reports or water quality management plans alone for all or part of the functional area of a local authority is not acceptable. The Regulations require submission of Implementation Reports and individual local authorities must take responsibility for submitting reports for all of their functional area.

Under Article 3(9) of the Regulations, the period set for compliance (i.e. 2007) may be extended for a period not exceeding six years for any part of a river or lake, if, but only if, the relevant local authority or, as the case may be, the Agency is satisfied that certain exceptional circumstances exist, as laid out in the Regulations. Four local authorities state that they may or will need Article 3(9) extensions to comply with the Regulations. These are Cork, Dublin Corporation, Limerick and Monaghan. Cork has stated that Article 3(9) extensions may be required at 40 river stations identified in the Implementation Report and at Iniscarra Lake. Monaghan has stated that it needs an Article 3(9) extension for the entire county for six years. Limerick has stated that it requires an Article 3(9) extension for all unsatisfactory stations in the county for six years. Dublin Corporation has stated that it requires Article 3(9) extensions at all stations in its functional area (time period not specified). The reasons for these time extensions are set out in the relevant local authority Measures and Implementation Reports.

All of the local authorities that submitted Measures and Implementation Reports have endorsed the environmental management systems approach to the implementation of the Regulations as recommended in the EPA Guidance Notes. This approach operates on the basic principle of **continual improvement**, which is at the heart of the Regulations and the overall national strategy to combat eutrophication. The common principles underpinning an environmental management system are outlined in Figure 1, adapted to the requirements of the Regulations.

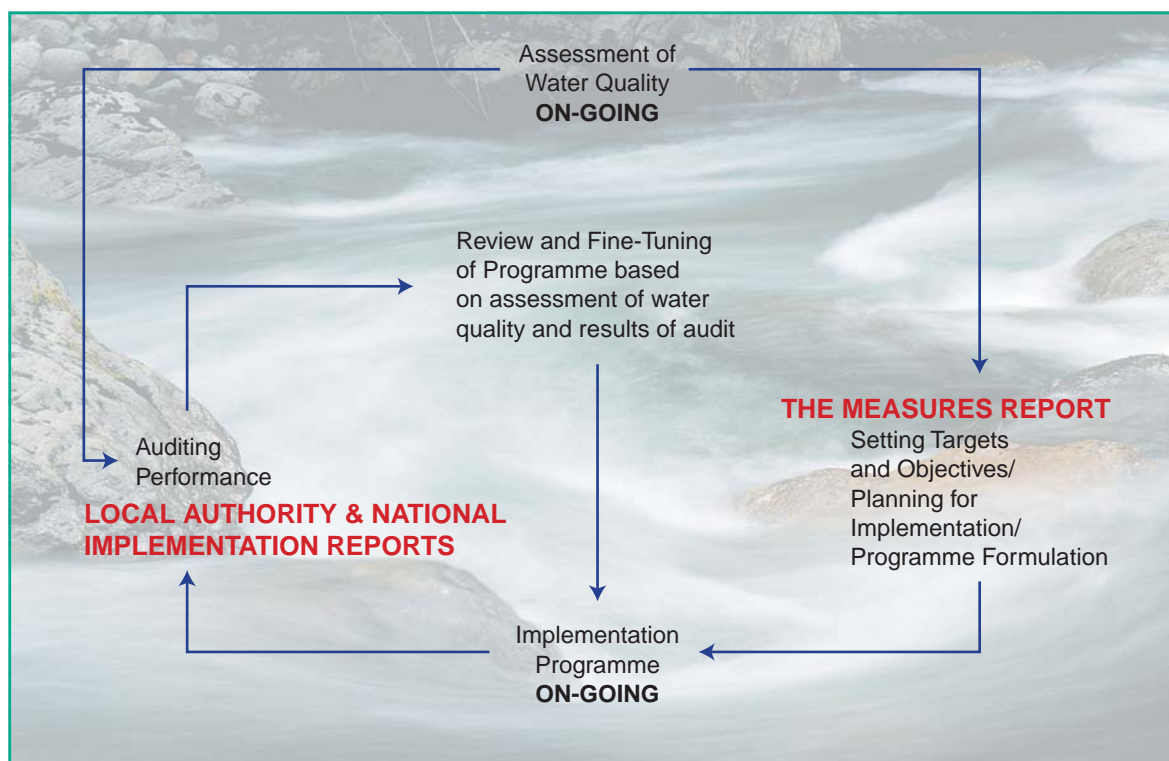


FIGURE 1: GENERALISED ENVIRONMENTAL MANAGEMENT SYSTEMS APPROACH ADAPTED TO REQUIREMENTS OF THE REGULATIONS

On an operational level the environmental management system consists of:

- initial review (i.e. reviews of physical background, water quality, pressures on water resources, monitoring programmes etc. as carried out for the Measures Reports);
- formulation of measures and targets;
- formulating an environmental management programme or, in this case, an implementation programme for achieving the targets;
- assigning responsibility for achieving targets and implementing actions;
- implementing the programme;
- auditing the performance of the programme; and
- review and fine tuning of the programme until the standards are met.

The environmental management programme is often described as the engine for continual improvement. However, targets will only be met by keeping the system dynamic and subjecting the system to periodic auditing to assess the relative success of measures chosen for meeting the targets. Auditing, in turn, provides information that can be used for reviewing and fine tuning the system so that changes or modifications can be made where necessary.

The Regulations are particularly suited to an environmental management systems approach given the requirement that local authorities must report every two years to the Agency on the implementation of the Regulations. The Agency recommends that a system audit be conducted prior to preparation of each Implementation Report so that any changes or modifications necessary to meet the standards can be included in the updated report. New measures are likely to emerge over the coming years, for instance, through new legislation or the creation of new initiatives. Each local authority will need to keep abreast of changes and developments that might impact on the implementation of the Regulations.

TABLE 4: INFORMATION INCLUDED IN LOCAL AUTHORITY IMPLEMENTATION REPORTS

Local Authorities	Carlow	Cavan	Clare	Cork	Cork Corp.	Donegal	Dublin Corp.	Dublin South	DLR	Fingal	Galway Co./ Corp.	Kerry	Kildare	Kilkenny	Laois	Leitrim
Date Implementation Report Received by EPA	27/11/00	8/8/00	11/1/01	6/12/00	29/3/01	15/11/00	18/12/00	15/2/01	N	7/12/00	20/2/01	23/3/01	15/2/01	31/1/01	23/3/01	14/2/01
Water Quality																
River biological water quality information provided	Y	Y	Y	Y	N/A	Y	Y	Y	N	Y	Y	Y	Y	Y	N	
River MRP information provided	Y	Y	Y	Y	N/A	N	Y	Y	N	Y	Y	Y	Y	Y	N	N
Lake trophic status information provided	N/A	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	Y	Y	N/A	N/A	N/A	Y
Lake total phosphorus information provided	N/A	Y	N	Y	Y	Y	N/A	N/A	N/A	N/A	N	Y	N/A	N/A	N/A	Y
Implementation Programme Summary																
County Implementation Programme Table	Y	Y	N	Y	N/A	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
River Implementation Programme Table	Y	Y	Y	Y	N/A	Y	Y	Y	N	Y	Y	N	Y	Y	N	N
Lake Implementation Programme Table	N/A	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	Y	P	N/A	N/A	N/A	N
Description of Progress to Date																
Progress During Reporting Period	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N
Description of Problems Encountered	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	N
Future Plans / New Directions	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N
Do Article 3(9) extensions apply?				Y			Y									

Y = included, P = partially included, N/A = not applicable, N = information not submitted

TABLE 4: (CONTINUED) INFORMATION INCLUDED IN LOCAL AUTHORITY IMPLEMENTATION REPORTS

Local Authorities	Limerick	Limk. Corp.	Longford ¹	Louth	Mayo	Meath	Monaghan	Offaly	Roscommon ²	Sligo	Tipp. NR	Tipp. SR	Water-ford	Water-ford Corp.	Westmeath	Wexford	Wicklow
Date Implementation Report Received by EPA	20/2/01	N	21/2/01	N	9/11/00	N	16/2/01	16/2/01	4/8/00	14/2/01	17/10/00	25/8/00	N	2/10/00	14/8/00	29/11/00	16/3/01
Water Quality																	
River biological water quality information provided	Y	N/A	N	N	Y	N	Y	Y	P	Y	Y	Y	N	N/A (Y)	Y	Y	Y
River MRP information provided	Y	N/A	N	N	Y	N	N	Y	P	Y	Y	N	N	N/A (Y)	N	Y	Y
Lake trophic status information provided	N/A	N/A	N	N/A	Y	N	N	N/A	N	Y	Y	N/A	N/A	N/A	Y	N/A	N
Lake total phosphorus information provided	N/A	N/A	N	N/A	Y	N	N	N/A	N	N	Y	N/A	N/A	N/A	N	N/A	N
Implementation Programme Summary																	
County Implementation Programme Table	Y	N	N	N	Y	N	N	Y	N	N	Y	Y	N	Y	N	Y	Y
River Implementation Programme Table	Y	N	N	N	Y	N	N	Y	P	Y	Y	Y	N	Y	N	Y	N
Lake Implementation Programme Table	N/A	N	N	N/A	Y	N	N	N/A	N	P	Y	N/A	N/A	N/A	N	N/A	N
Description of Progress to Date																	
Progress During Reporting Period	Y	N	N	N	Y	N	Y	Y	P	Y	Y	Y	N	Y	Y	Y	N
Description of Problems Encountered	Y	N	N	N	Y	N	Y	Y	P	Y	Y	Y	N	N	N	Y	N
Future Plans / New Directions	Y	N	Y	N	Y	N	Y	Y	P	Y	Y	Y	N	N	Y	Y	N
Do Article 3(9) extensions apply?	Y					Y											

Y = included, P = partially included, N/A = not applicable, N = information not submitted ¹ Longford submitted a letter only; ² The Roscommon Implementation Report is for the Cloonfad River only

WATER QUALITY REVIEW

Before discussing current trends in water quality at river and lake monitoring stations a number of important points need to be stressed.

Firstly, all of the analyses of river water quality in this report are based on biological data collected by the EPA at river monitoring stations since 1 January 1995 and published in subsequent reports (Doris *et al.*, 1999; Clabby *et al.*, 1999, 2000, 2001); and on current median MRP data collected at these monitoring stations (by the EPA and local authorities) which meets the sampling criteria specified in the Regulations. In certain cases, where median MRP data were not provided in local authority Implementation Reports, these data were obtained from published EPA reports (Flanagan, 1999a, b, c, 2000a, b, c, 2001a, b, c; Neill, 2001; Quinn, 2001a, b, c, d).

Secondly, in order to simplify assessment of local authority compliance with water quality standards for ‘parts of rivers’, as required by the Regulations, the results presented in this report are based on trends in water quality **at the monitoring stations**. In previous *Water Quality in Ireland* reports published by the Agency, trends in river water quality were also analysed based on interpolation of conditions **between monitoring stations** i.e. based on calculations of length of river channel in each water quality class. This approach is not used in this report given the complexity of calculating trends at a local authority level using this method. Therefore the definitive account of national and regional trends in water quality, based on channel length analyses, will be published in the forthcoming *Water Quality in Ireland 1998-2000* report (McGarrigle *et al.*, in prep.).

Thirdly, the review of water quality at river monitoring stations in this report is based on the various categories of Q-values and MRP levels specified in the Regulations (Table 1). The review of water quality based on these categories, and the approach of using the better of either the biological or phosphorus monitoring results to determine water quality status, differs somewhat from previous EPA analysis in *Water Quality in Ireland* reports (e.g., Lucey *et al.*, 1999), which has primarily been based on biological data. Similar differences exist between this report and previous *Water Quality in Ireland* reports in analyses of trends in lake water quality. Previous reports primarily utilise information on chlorophyll *a* to determine lake water quality. In this report, the better of either the chlorophyll *a* or phosphorus monitoring results are used to determine lake water quality status, as required by the Regulations. However, updated information on lake water quality in this report is more limited.

The responsibility for meeting the targets set in the Regulations lies principally with the local authorities, therefore the focus in this report is primarily on trends in water quality at river monitoring stations or lakes in each local authority functional area, as well as on national trends. The baseline status of river water quality at monitoring stations in each local authority area is presented in Table 5. It is important to note that the baseline data is based on Q values only, as required by the Regulations. The baseline now comprises data from 3341 stations. It should be noted that this exceeds the number of stations sampled in the 1995-97 period as new stations are added to the baseline the first time the Agency samples these stations after the 1 January 1995. In the baseline data, approximately 60 per cent of stations are classified as satisfactory (i.e. Q4 or better). A total of 18.5 per cent of stations are classified as slightly polluted (Q3-4), 19.6 per cent of stations are classified as moderately polluted (Q3 and Q2-3) and 2.3 per cent of stations are classified as seriously polluted (Q≤2).

Current monitoring data from the 1998-2000 period is presented based on the Q or MRP values, depending on which is of higher quality (Table 6) as required by the Regulations. Approximately 10 per cent of stations monitored in the 1998-2000 survey were monitored for MRP in accordance with the Regulations (Appendix 1.1). For comparison purposes with the baseline data, current monitoring data from the 1998-2000 period is also presented based on Q-values only (Table 7). The target river water quality to be attained at most stations (or ‘parts of rivers’) by 2007 is presented in Table 8 (those stations first assigned a biological quality rating after 1997 have ten years to meet the target set in the Regulations).

Discussion of local authority water quality and compliance with the Regulations in this report is primarily

based on the data in Tables 5-8. However, a total of 118 stations sampled in the 1995-97 survey were not re-sampled in the 1998-2000 survey for either biology or phosphorus; and 131 stations were not re-sampled for biology. In addition, 172 stations were assigned a baseline status for the first time in the 1998-2000 survey (Appendix 1.1)¹. Therefore, analyses of the **trends** in water quality at monitoring stations between 1995-97 and the 1998-2000 periods has also been carried out with these stations removed from the analyses. Similarly, assessment of national and local authority compliance with the Regulations based on the 1998-2000 surveys has also been carried out without including the 172 new stations. In most cases, the trends and levels of compliance with or without these stations in the analyses are very similar. Therefore, for clarity, results from the latter analyses are presented in the Appendices. Analyses of the trends in water quality at monitoring stations based on a comparison of those stations sampled in the 1995-97 biological survey with the same stations sampled in the 1998-2000 biological and / or MRP surveys are presented in Appendices 1.2-1.5. Analyses of the trends in water quality at monitoring stations based on a comparison of those stations sampled in the 1995-97 biological survey with the same stations sampled in the 1998-2000 biological survey are presented in Appendices 1.6-1.9.

The analyses in this report focus on both the number and percentage of stations in each local authority and nationally which are **compliant** with the Regulations; and the number and percentage of stations in each local authority and nationally which are of satisfactory status, as defined by the Regulations i.e. biological status of Q4 or better or MRP $\leq 30 \mu\text{g P/l}$. Both approaches are used as it is possible for water quality at a station to be compliant with the Regulations but of unsatisfactory status, e.g., if the water quality has improved from Q3 to Q3-4. Equally, it is possible for the water quality at a station to be satisfactory but not compliant, e.g., if the water quality has declined from Q5 to Q4-5.

Compliance of river water quality at monitoring stations with the Phosphorus Regulations may be based on the better of either the biological water quality or the MRP levels. Nationally, 60 per cent of river monitoring stations are currently deemed compliant with the Regulations (Table 6, Figure 2). A total of 58 per cent of stations nationally meet the biological targets in the Regulations (Table 7, Figure 2). A high percentage (>70 per cent) of stations in Sligo, Mayo, Kerry and Clare are already compliant with the Regulations (Table 6, Figure 2). A large number of river stations (>50) in Cork, Donegal, Galway, Kerry, Kildare, Limerick, Mayo, Meath and Tipperary SR require improvement under the Regulations (Table 6). A high percentage of river stations (>50 per cent) require improvement under the Regulations in Dun Laoghaire-Rathdown, Fingal, Kildare, Meath, Dublin Corporation, Westmeath and Longford (Table 6 and Figure 2). It is worth noting also that considerably fewer stations meet the biological targets in the Regulations in Cavan, Monaghan, Dublin Corporation and South Dublin (Table 7, Figure 2). These local authorities have achieved compliance with the Regulations at a relatively large proportion of their river monitoring stations based on MRP levels.

Nationally, 63 per cent of river stations have satisfactory water quality based on either the biological or phosphorus limits specified in the Phosphorus Regulations (Table 6). A total of 62 per cent of river stations are satisfactory nationally based on Q values alone (Table 7). A total of 60 per cent of river stations were of satisfactory biological status in the baseline survey. This apparent increase in stations of satisfactory water quality is confirmed by further analyses using only stations sampled biologically in both the 1995-97 survey (where satisfactory stations comprise 60 per cent) (Appendix 1.6) and 1998-2000 survey (where satisfactory stations comprise 62 per cent) (Appendix 1.7). However, further analyses of water quality trends based on channel lengths are necessary to provide a definitive comparison with previous surveys and these will be presented in the forthcoming *Water Quality in Ireland 1998-2000* report (McGarrigle *et al.*, in prep.).

Closer analyses of national trends in water quality at river monitoring stations reveal a decline in the number and percentage of high quality Q5 stations. In the baseline data Q5 stations comprise 4.7 per cent of the total (Table 5). The percentage of stations with either a Q5 value or MRP $\leq 15 \mu\text{g P/l}$ is 4.5 per cent in the current survey (Table 6, Figure 3). However, the percentage of stations with a Q5 value alone is 3.1 per cent in the current survey (Table 7, Figure 4). Further analyses, using only stations sampled biologically in both the 1995-97 survey (where Q5 stations comprise 4.6 per cent, 141 stations) and 1998-2000 survey (where Q5 stations comprise 3.1 per cent, 95 stations), confirm this marked decline in number of Q5 stations (Appendices

¹River stations are added or removed from biological surveys due to logistical reasons. It should be noted that although there are variations in the precise stations sampled, the river stretches surveyed and the overall length of river channel surveyed does not vary significantly.

1.6-1.9). This decline in number of river stations of highest ecological quality has been noted in previous Agency reports (e.g., Bowman *et al.*, 1996). Many of these stations represent potentially pristine conditions and their protection is crucial to the survival of increasingly rare species and important diverse and balanced invertebrate communities. These stations may also be very important as reference sites in the context of implementation of the Water Framework Directive.

The Q4-5 stations comprise 20.8 per cent of stations in the baseline biological survey (Table 5). River stations with best status either Q4-5 or MRP 16-20 µg P/l comprise 21.4 per cent (or 20.7 per cent based on Q values alone) of the total in the 1998-2000 survey (Tables 6 and 7). However, further analyses using only stations sampled biologically in both the 1995-97 survey (where Q4-5 stations comprise 21.2 per cent, 644 stations) and 1998-2000 survey (where Q4-5 stations comprise 20.7 per cent, 628 stations) reveal a slight decline in the number of Q4-5 stations (Appendices 1.6-1.9). This decline, taken in conjunction with the decline in Q5 stations, represents a further eroding of stations of high biological water quality. Stations rated Q5 and Q4-5 are primarily found in river stretches with low levels of catchment pressures. These waters provide dilution for downstream rivers and lakes and are vital in maintaining high water quality. The decline in the quality of these waters may deleteriously affect attempts to improve the quality of polluted waters downstream. It is very important that local authorities take the necessary measures to protect and conserve these high quality water resources.

On the positive side, there is an increase in the percentage of Q4 stations in the current survey. The percentage of stations of Q4 status in the baseline data is 34.1 per cent (Table 5). The percentage of stations with best status either Q4 or MRP 21-30 µg P/l is 37.5 per cent in the current survey (38.0 per cent based on Q4 values alone) (Tables 6 and 7, Figures 3 and 4). This apparent increase in Q4 stations is confirmed by further analyses using only stations sampled biologically in both the 1995-97 survey (where Q4 stations comprise 34.0 per cent) and 1998-2000 survey (where Q4 stations comprise 38.2 per cent) (Appendices 1.6-1.9).

In addition, there has been a decline in the number of stations with moderately or seriously polluted water. The percentage of stations with best status either Q3 or MRP 51-70 µg P/l is 14.3 per cent in the current survey (15.4 per cent based on Q values alone) - whereas Q3 stations comprise 16.8 per cent of the baseline. The percentage of stations with best status Q2-3 (and MRP >70 µg P/l where data exists) is 2.5 per cent in the current survey (2.6 per cent based on Q values alone) - whereas Q2-3 stations comprise 2.8 per cent of the baseline. The percentage of stations with best status ≤Q2 (and MRP >70 µg P/l where data exists) is 1.6 per cent in the current survey (and 1.6 per cent based on Q values alone) - whereas stations ≤Q2 comprise 2.3 per cent of the baseline (Tables 5-7, Figures 3 and 4). All of these trends are confirmed through further analyses, using just stations sampled biologically in both the 1995-97 and 1998-2000 surveys (Appendices 1.6-1.9).

Current monitoring clearly indicates that all local authorities have water quality problems. Based on current biological and MRP results all local authorities have over 14 per cent of their river stations polluted and ten local authorities have over half of their river stations polluted (Table 6 and Figure 5). When biological water quality is considered alone, the number of local authorities with over half of their river stations polluted increases to 14 (Table 7 and Figure 5). Apart from Wicklow, counties with a high percentage of unpolluted river stations (>70 per cent) occur in the west of the country.

Analysis of percentage change in number of river monitoring stations with satisfactory (biological or MRP) water quality, between the 1998-2000 survey and the baseline biological data, reveals marked declines in Dun Laoghaire-Rathdown and South Dublin, and to a lesser extent in Waterford, Cork and Wicklow (Figure 6). However, marked increases in percentage of river monitoring stations with satisfactory biological or MRP water quality are apparent in Carlow, Galway, Dublin Corporation, Tipperary NR, Kilkenny, Fingal, Wexford, Westmeath, Longford and Monaghan. It should be noted that percentage changes in satisfactory water quality at monitoring stations of the Dublin local authorities (i.e. Dublin Corporation, Dun Laoghaire-Rathdown, Fingal and South Dublin) must be treated with some degree of caution, as there are very few monitoring stations in their functional areas (<20), thus changes in water quality at a few stations can result in large percentage changes. Comparison of the percentage of river monitoring stations with satisfactory biological water quality in the 1998-2000 survey and the baseline biological data reveals similar trends to those described above (Figure 6). However, a relatively significant decline in the number of stations with satisfactory biological water quality is apparent in Cavan and the increase in stations of satisfactory water quality in

Dublin Corporation and Monaghan is not as significant. All of these trends are confirmed through further analyses using just stations sampled in both the 1995-97 and 1998-2000 surveys (Appendix 1.10).

The baseline status of lake water quality in each local authority area is presented in Table 9. Of the 120 lakes examined in the baseline survey, 97 were classified as either oligotrophic or mesotrophic and the trophic status of these lakes must be at least maintained. Of the 23 remaining lakes, 18 were classified as eutrophic and 5 as hypertrophic and the water quality of these lakes must be improved to the specified standards (all of these lakes are listed in Lucey *et al.*, 1999). Counties with a significant number of lakes (>2) requiring improvement were Cavan, Clare, Cork and Monaghan.

Current lake monitoring results are available on 35 lakes (Table 10) from information supplied in the local authority Implementation Reports or published by the Agency (Bowman, 2000). Most of the lakes which were deemed satisfactory from the baseline survey have maintained or improved their trophic status. Current monitoring indicates that water quality has improved at a number of lakes on the Shannon system (Bowman, 2000). Lough Derg and Lough Ree were reported as being of unsatisfactory quality in the baseline survey. However, despite the fact that total phosphorus concentrations in these lakes remain well in excess of the target value in the Regulations, current monitoring (in 1999) indicates that both of these lakes have improved from eutrophic to mesotrophic status and now satisfy the requirements of the Regulations. It is thought that the infestation of the Shannon system with the Zebra mussel *Dreissena polymorpha* is primarily responsible for reducing the lake chlorophyll concentrations on which the trophic status determinations are made (Bowman, 2000).

The water quality in Lough Leane in Kerry is reported to have improved from eutrophic to mesotrophic. Lough Sheelin and Acres Lake remain eutrophic, and Knappaghbeg Lake has deteriorated in quality from mesotrophic to eutrophic. These latter three lakes require improvement. The definitive report on lake water quality in the 1998-2000 period will be published in the forthcoming *Water Quality in Ireland 1998-2000* report (McGarrigle *et al.*, in prep.). The target status of lake water quality in each local authority area is presented in Table 11. It should be noted that even if the interim targets contained in the Regulations are achieved, five lakes may remain of unsatisfactory quality and may require improvement in the longer term.

A number of local authorities reported elevated MRP levels in groundwater in their Measures and Implementation Reports. Whilst groundwater is not specifically covered in the Regulations, it may contribute to eutrophication of surface waters where elevated MRP levels exist.

Thus it is apparent from current river, lake, and groundwater monitoring data that all local authorities will need to make a considerable effort to improve water quality in their functional area and to meet the requirements of the Phosphorus Regulations. Clearly significant challenges lie ahead.

TABLE 5: BASELINE NUMBER OF LOCAL AUTHORITY RIVER STATIONS IN EACH BIOLOGICAL QUALITY RATING

Either MRP Target (µg P/l) Or Q-value Target Baseline Status	15 Must retain Q5	20 quality or improve Q4-5	30 Q4	30 Improve to Q4 Q3-4	50 Improve to at least Q3-4 Q3	70 Improve quality to at least Q3 Q2-3	70 quality to at least Q3 Q≤2	Total	% Satisfactory (biology)*
Carlow	1	13	19	19	14	1	0	67	49
Cavan	7	25	29	24	21	4	0	110	55
Clare	16	28	79	20	22	8	1	174	71
Cork	6	121	171	59	24	3	1	385	77
Donegal	33	95	72	21	21	5	13	260	77
Dublin Corporation	0	0	0	0	3	1	3	7	0
Dublin South	0	4	5	0	3	2	1	15	60
Dun Laoghaire Rathdown	1	0	2	1	4	0	1	9	33
Fingal	0	0	2	2	11	3	2	18	0
Galway	14	42	88	36	48	13	5	246	59
Kerry	12	71	76	28	17	1	3	208	76
Kildare	0	1	16	35	27	6	7	92	18
Kilkenny	2	3	35	32	24	1	2	99	40
Laois	3	13	35	33	18	2	3	107	48
Leitrim	10	29	34	10	5	2	0	90	81
Limerick	6	12	43	28	31	7	4	131	47
Longford	1	2	12	14	8	0	2	39	38
Louth	0	7	12	9	15	1	0	44	43
Mayo	15	70	103	28	29	5	4	254	74
Meath	0	0	20	39	32	4	6	101	20
Monaghan	1	13	9	11	33	4	3	74	31
Offaly	5	8	35	32	21	5	4	110	44
Roscommon	0	12	58	16	29	9	4	128	55
Sligo	3	41	34	11	10	1	1	101	77
Tipperary NR	5	10	30	35	29	3	1	113	40
Tipperary SR	2	14	56	19	23	3	1	118	61
Waterford	2	25	30	10	8	1	0	76	75
Westmeath	0	4	15	36	12	1	4	72	26
Wexford	0	11	35	34	28	4	2	114	40
Wicklow	18	34	35	13	14	0	3	117	74
Preliminary Total	163	708	1188	655	584	100	81	3479	
Revised Total**	158	695	1140	617	560	95	76	3341	
% of Revised Total	4.7	20.8	34.1	18.5	16.8	2.8	2.3	100	60

*River stations Q4, Q4-5 or Q5; **Correcting for river stations bordering two local authority areas.

TABLE 6: NUMBER OF LOCAL AUTHORITY RIVER STATIONS IN EACH Q-VALUE OR MEDIAN MRP LEVEL CATEGORY IN SURVEYS UNDERTAKEN IN THE 1998-2000 PERIOD AND THE NUMBER OF STATIONS COMPLIANT WITH THE PHOSPHORUS REGULATIONS

Either Current MRP value (µg P/l) Or Current Q-value	15 Q5	20 Q4-5	30 Q4	50 Q3-4	70 Q3	Q2-3	Q≤2	Total	% Satisfactory (biology or MRP)*	No. of Stations Compliant with Regulations	% of Stations Compliant with Regulations
Carlow	1	14	28	14	7	0	0	64	67	42	66
Cavan	16	15	31	28	14	2	2	108	57	59	55
Clare	16	38	72	10	20	8	1	165	76	117	71
Cork	4	86	191	66	33	3	0	383	73	242	63
Donegal	19	89	78	20	24	8	11	249	75	147	59
Dublin Corporation	0	0	1	1	1	1	3	7	14	3	43
Dublin South	1	3	4	4	1	1	1	15	53	10	67
Dun Laoghaire Rathdown	1	0	0	2	5	1	0	9	11	1	11
Fingal	0	0	2	1	10	4	1	18	11	4	22
Galway	8	43	121	21	31	6	2	232	74	160	69
Kerry	21	65	75	26	15	1	0	203	79	148	73
Kildare	0	4	13	27	35	5	5	89	19	28	31
Kilkenny	0	4	46	33	14	1	0	98	51	57	58
Laois	1	27	23	37	11	1	2	102	50	57	56
Leitrim	3	32	34	7	7	2	1	86	80	55	64
Limerick	5	12	48	22	32	6	2	127	51	68	54
Longford	0	2	16	10	7	0	2	37	49	18	49
Louth	0	8	10	13	10	1	0	42	43	23	55
Mayo	12	76	104	24	18	5	0	239	80	175	73
Meath	0	0	19	38	30	7	3	97	20	35	36
Monaghan	1	13	15	18	22	2	0	71	41	39	55
Offaly	9	8	32	33	19	3	3	107	46	59	55
Roscommon	1	13	60	20	18	6	5	123	60	78	63
Sligo	11	39	32	4	10	1	0	97	85	76	78
Tipperary NR	2	23	34	32	17	1	1	110	54	67	61
Tipperary SR	1	16	52	22	17	3	4	115	60	60	52
Waterford	0	15	37	16	5	0	1	74	70	40	54
Westmeath	1	2	21	24	15	2	0	65	37	30	46
Wexford	1	20	35	28	22	3	1	110	51	61	55
Wicklow	13	35	32	12	18	0	2	112	71	64	57
Preliminary Total	148	702	1266	613	488	84	53	3354	-	2023	-
Revised Total**	144	689	1210	588	460	81	51	3223	-	1945	-
% of Revised Total	4.5	21.4	37.5	18.2	14.3	2.5	1.6	100	63	-	60

*River stations Q4, Q4-5 or Q5 or median MRP ≤30µg P/l; **Correcting for river stations bordering two local authority areas.

TABLE 7: NUMBER OF LOCAL AUTHORITY RIVER STATIONS IN EACH BIOLOGICAL QUALITY STATUS RATING IN THE 1998-2000 SURVEY AND THE NUMBER OF STATIONS MEETING THE BIOLOGICAL TARGETS OF THE REGULATIONS

Current Q-value Status	Q5	Q4-5	Q4	Q3-4	Q3	Q2-3	Q≤2	Total	% of Stations Satisfactory (biology only)*	No. of Stations Meeting Biological Targets of Regulations	% of Stations Meeting Biological Targets of Regulations
Carlow	1	14	28	14	7	0	0	64	67	42	66
Cavan	4	20	28	29	20	3	2	106	49	45	42
Clare	13	32	77	12	21	8	1	164	74	112	68
Cork	4	86	191	66	33	3	0	383	73	242	63
Donegal	19	89	78	20	24	8	11	249	75	147	59
Dublin Corporation	0	0	0	0	3	1	3	7	0	1	14
Dublin South	1	2	3	2	3	2	2	15	40	5	33
Dun Laoghaire Rathdown	1	0	0	2	5	1	0	9	11	1	11
Fingal	0	0	2	1	10	4	1	18	11	4	22
Galway	6	43	116	24	34	6	2	231	71	155	67
Kerry	10	61	84	27	18	1	0	201	77	140	70
Kildare	0	4	13	27	35	5	5	89	19	28	31
Kilkenny	0	4	46	32	13	1	0	96	52	57	59
Laois	1	17	28	42	11	1	2	102	45	52	51
Leitrim	1	33	35	7	7	2	1	86	80	54	63
Limerick	5	11	48	22	33	6	2	127	50	67	53
Longford	0	2	16	10	7	0	2	37	49	18	49
Louth	0	7	11	13	10	0	0	41	44	23	56
Mayo	10	74	102	25	22	5	0	238	78	169	71
Meath	0	0	19	38	30	7	3	97	20	35	36
Monaghan	0	9	14	11	32	3	0	69	33	25	36
Offaly	2	10	35	34	20	3	3	107	44	54	50
Roscommon	1	13	60	20	18	6	5	123	60	78	63
Sligo	7	42	31	5	10	2	0	97	82	74	76
Tipperary NR	2	19	35	34	18	1	1	110	51	64	58
Tipperary SR	1	16	52	20	18	4	4	115	60	58	50
Waterford	0	15	37	14	6	1	1	74	70	38	51
Westmeath	0	1	22	25	15	2	0	65	35	29	45
Wexford	1	19	33	30	22	3	1	109	49	58	53
Wicklow	13	35	32	12	18	0	2	112	71	64	57
Preliminary Total	103	678	1276	618	523	89	54	3341	-	1939	-
Revised Total**	100	664	1220	595	494	85	52	3210	-	1867	-
% of Revised Total	3.1	20.7	38.0	18.5	15.4	2.6	1.6	100	62	-	58

*River stations Q4, Q4-5 or Q5; **Correcting for river stations bordering two local authority areas.

TABLE 8: TARGET NUMBER OF LOCAL AUTHORITY RIVER STATIONS IN EACH BIOLOGICAL QUALITY RATING OR MEDIAN MRP LEVEL CATEGORY

Either MRP Target (µg P/l) Or Q-value Target	15 Q5	20 Q4-5	30 Q4	50 Q3-4	70 Q3	Total	% Satisfactory (biology or MRP)*
Carlow	1	13	38	14	1	67	78
Cavan	7	25	53	21	4	110	77
Clare	16	28	99	22	9	174	82
Cork	6	121	230	24	4	385	93
Donegal	33	95	93	21	18	260	85
Dublin Corporation	0	0	0	3	4	7	0
Dublin South	0	4	5	3	3	15	60
Dun Laoghaire Rathdown	1	0	3	4	1	9	44
Fingal	0	0	2	11	5	18	11
Galway	14	42	124	48	18	246	73
Kerry	12	71	104	17	4	208	90
Kildare	0	1	51	27	13	92	57
Kilkenny	2	3	67	24	3	99	73
Laois	3	13	68	18	5	107	79
Leitrim	10	29	44	5	2	90	92
Limerick	6	12	71	31	11	131	68
Longford	1	2	26	8	2	39	74
Louth	0	7	21	15	1	44	64
Mayo	15	70	131	29	9	254	85
Meath	0	0	59	32	10	101	58
Monaghan	1	13	20	33	7	74	46
Offaly	5	8	67	21	9	110	73
Roscommon	0	12	74	29	13	128	67
Sligo	3	41	45	10	2	101	88
Tipperary NR	5	10	65	29	4	113	71
Tipperary SR	2	14	75	23	4	118	77
Waterford	2	25	40	8	1	76	88
Westmeath	0	4	51	12	5	72	76
Wexford	0	11	69	28	6	114	70
Wicklow	18	34	48	14	3	117	85
Preliminary Total	163	708	1843	584	181	3479	
Revised Total**	158	695	1757	560	171	3341	
% of Revised Total	4.7	20.4	53.0	16.8	5.2	100	78

*River stations Q4, Q4-5 or Q5 or median MRP ≤30µg P/l; **Correcting for river stations bordering two local authority areas.

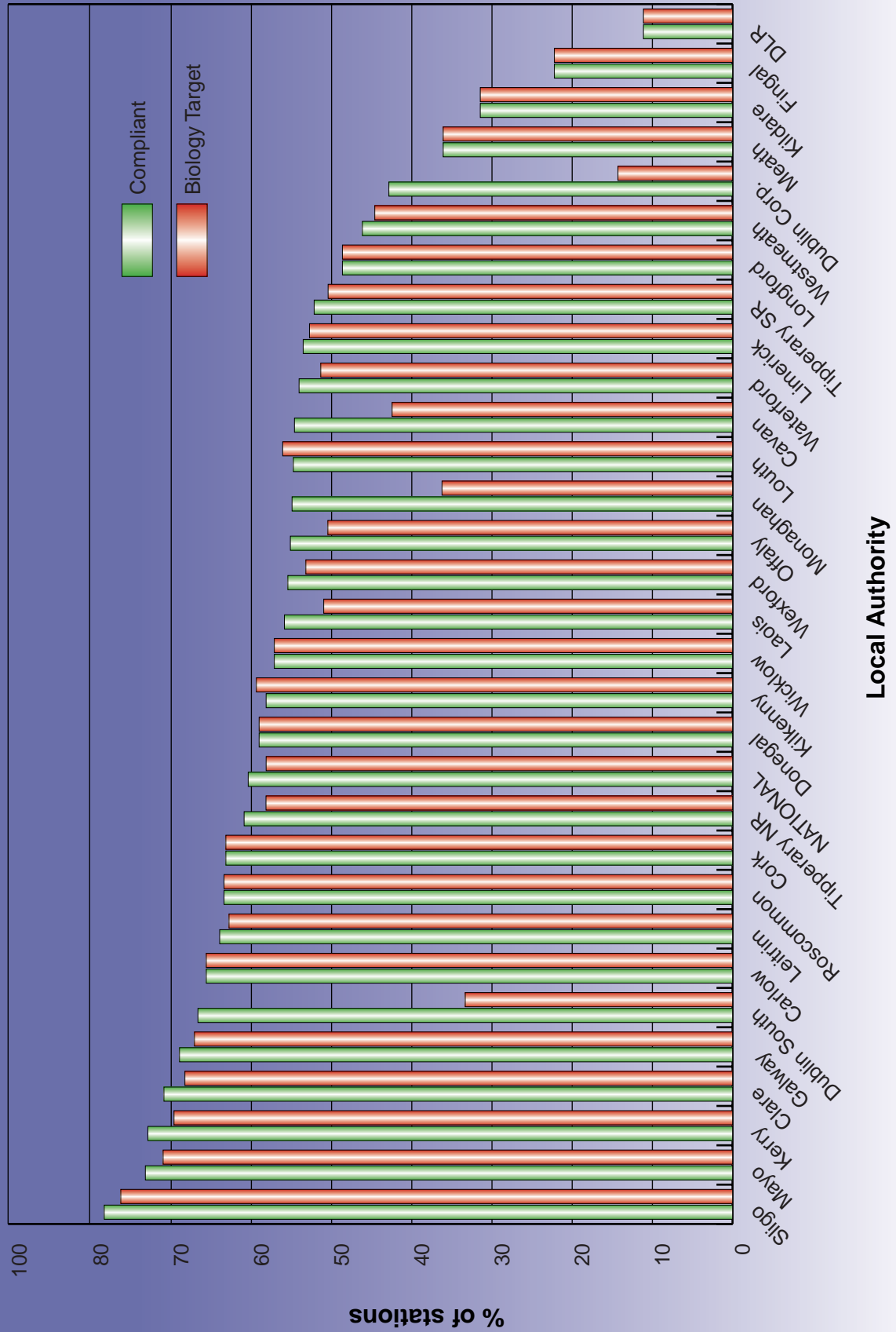


FIGURE 2: PERCENTAGE OF LOCAL AUTHORITY RIVER STATIONS COMPLIANT WITH THE PHOSPHOROUS REGULATIONS IN 1998-2000, AND PERCENTAGE OF LOCAL AUTHORITY RIVER STATIONS MEETING BIOLOGICAL TARGETS OF THE REGULATIONS.

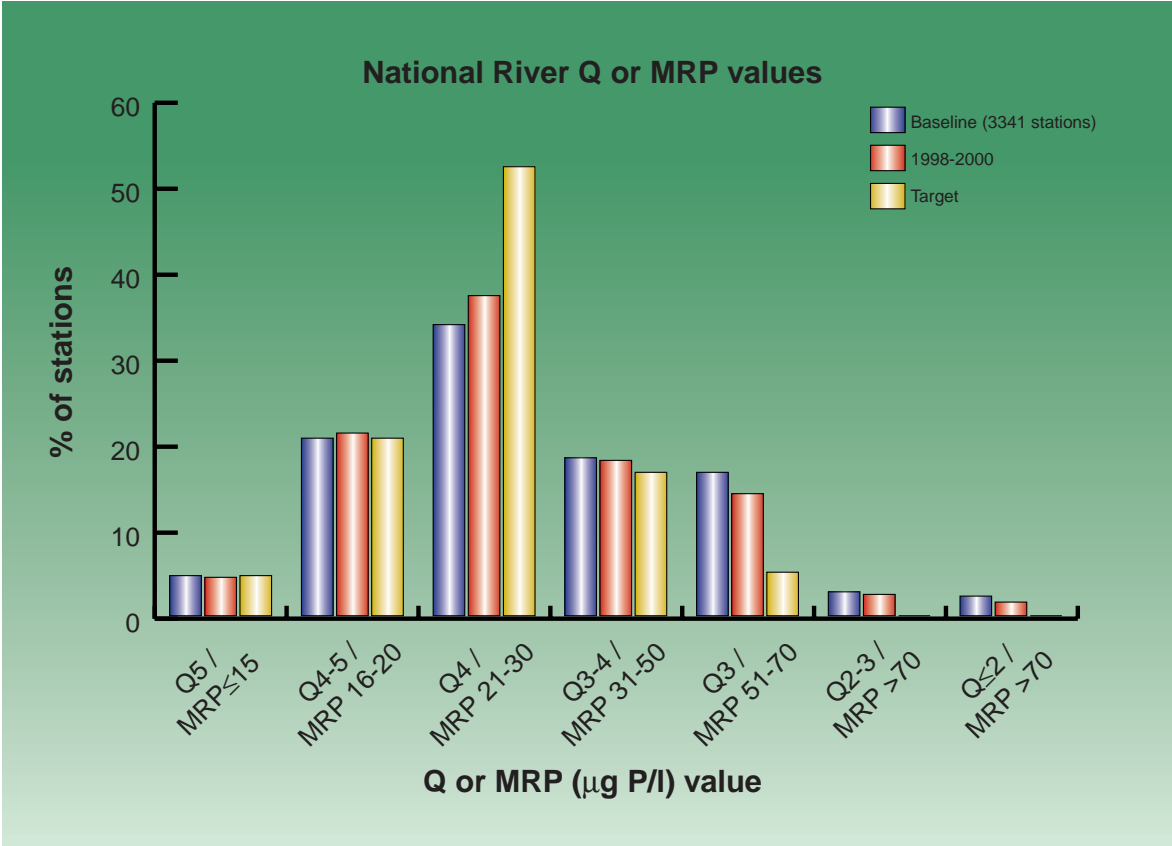


FIGURE 3: NATIONAL BASELINE, 1998-2000 AND TARGET DATA BASED ON Q-VALUES AND MRP LEVELS AT ALL RIVER MONITORING STATIONS

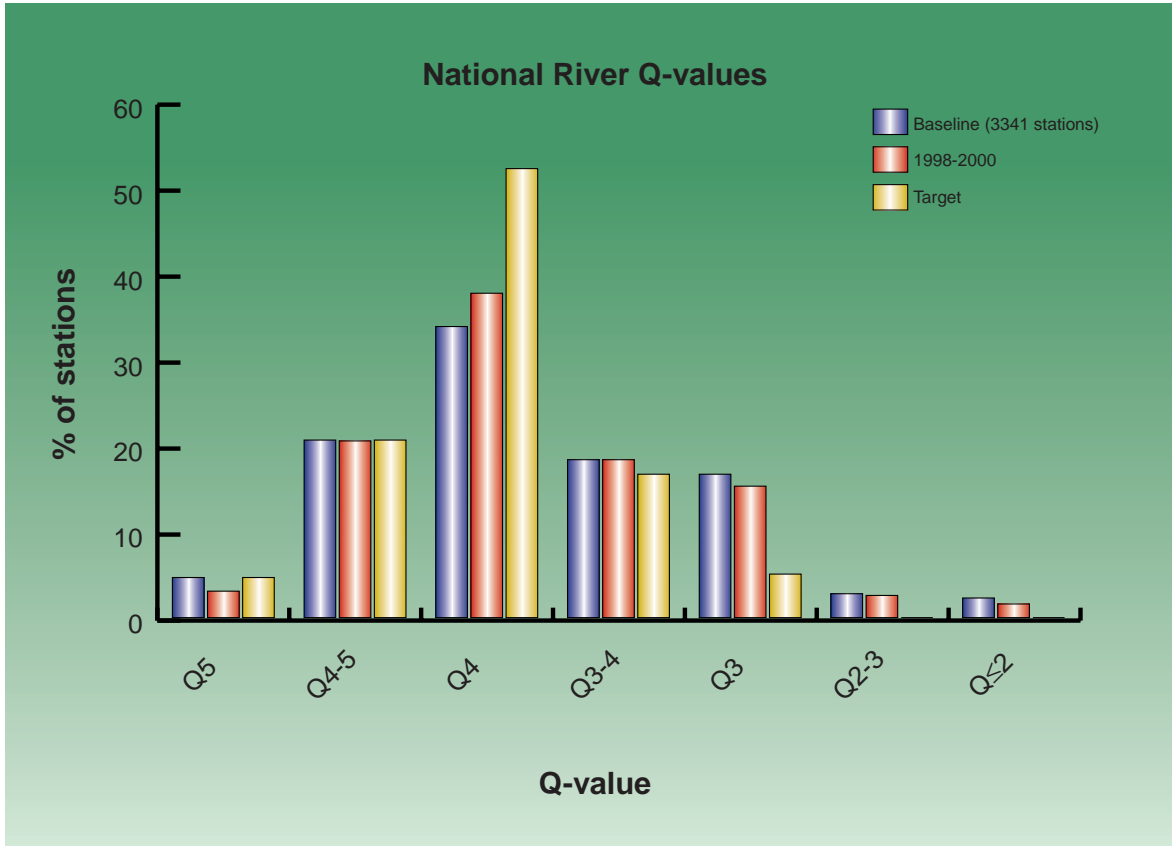


FIGURE 4: NATIONAL BASELINE, 1998-2000 AND TARGET DATA BASED ON Q-VALUES ONLY AT ALL RIVER MONITORING STATIONS

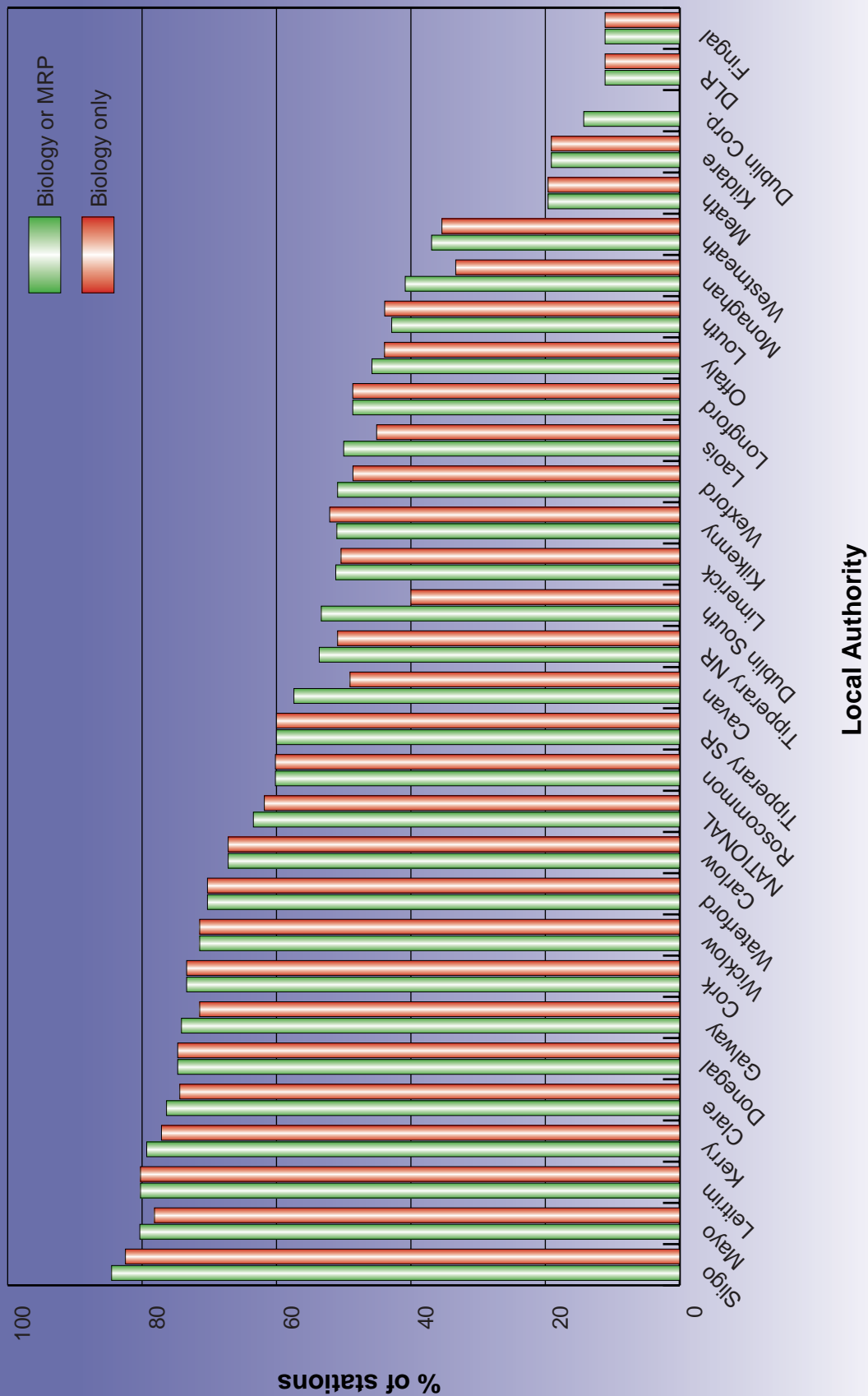


FIGURE 5: PERCENTAGE OF LOCAL AUTHORITY RIVER STATIONS WITH SATISFACTORY BIOLOGICAL OR MRP WATER QUALITY IN 1998-2000 SURVEY; AND PERCENTAGE OF LOCAL AUTHORITY RIVER STATIONS WITH SATISFACTORY BIOLOGICAL WATER QUALITY.

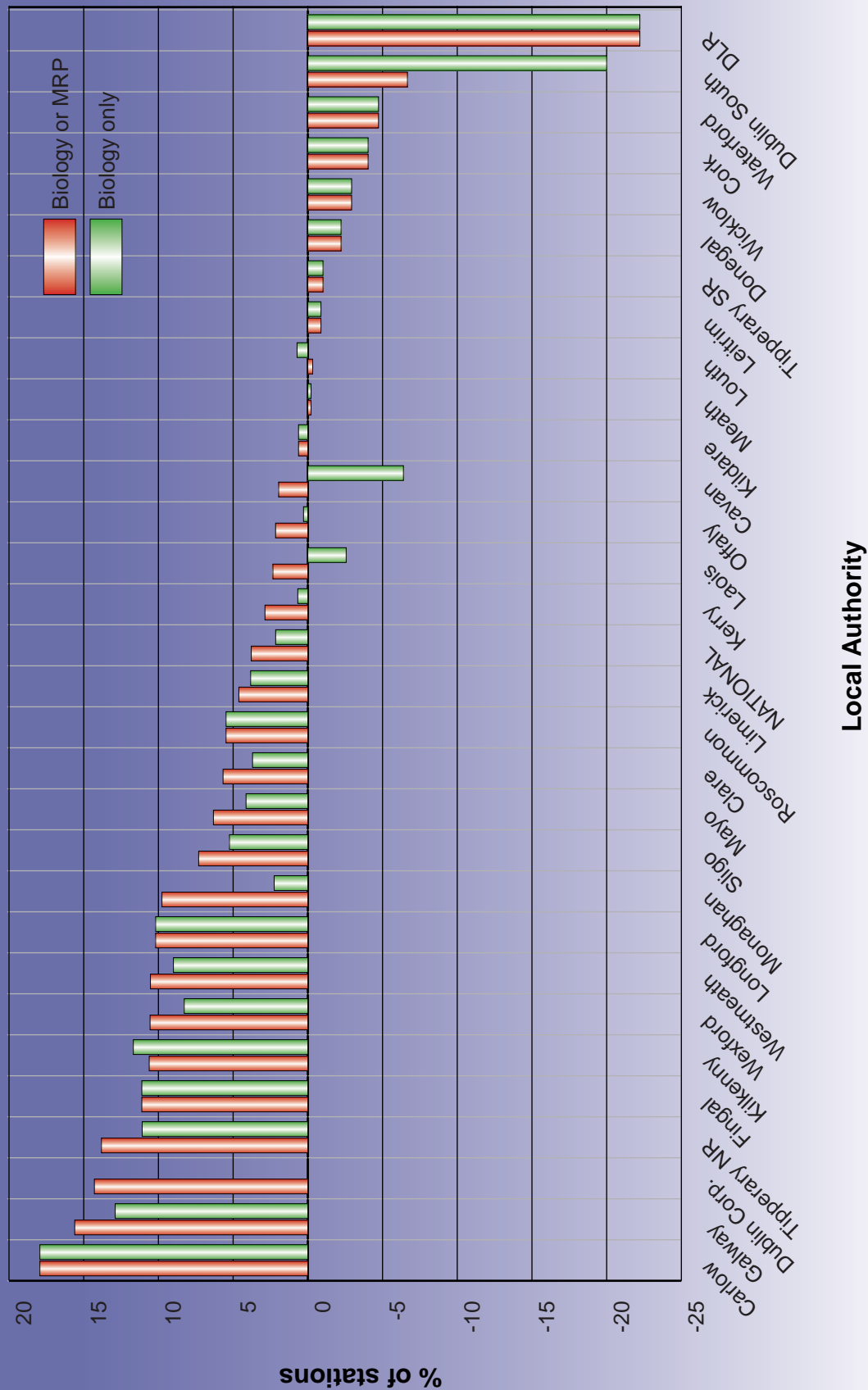


FIGURE 6: PERCENTAGE CHANGE IN BOTH NUMBER OF RIVER STATIONS WITH SATISFACTORY MRP OR BIOLOGICAL WATER QUALITY, AND NUMBER OF RIVER STATIONS WITH SATISFACTORY BIOLOGICAL WATER QUALITY ONLY, IN 1998-2000 SURVEY, COMPARED TO THE BASELINE BIOLOGICAL SURVEY.

TABLE 9: BASELINE NUMBER OF LOCAL AUTHORITY LAKES OF EACH TROPHIC STATUS

Total Phosphorus target (µg P/l)	≤ 5 Ultra-oligotrophic	>5 ≤ 10 Oligotrophic	>10 ≤20 Mesotrophic	>10 ≤20 Mesotrophic	>20 ≤ 50 Eutrophic	>20 ≤ 50 Eutrophic	Total	% Satisfactory*
Carlow	0	0	0	0	0	0	0	-
Cavan	0	1	1	3	3	3	8	25
Clare	0	2	3	6	0	0	11	45
Cork	0	0	1	3	0	0	4	25
Cork Corporation	0	0	1	0	0	0	1	100
Donegal	0	6	0	0	0	0	6	100
Dublin Corporation	0	0	0	0	0	0	0	-
Dublin South	0	0	0	0	0	0	0	-
Dun Laoghaire Rathdown	0	0	0	0	0	0	0	-
Fingal	0	0	0	0	0	0	0	-
Galway	0	34	8	1	0	0	43	98
Kerry	0	3	1	1	0	0	5	80
Kildare	0	0	0	0	0	0	0	-
Kilkenny	0	0	0	0	0	0	0	-
Laois	0	0	0	0	0	0	0	-
Leitrim	0	3	1	1	0	0	5	80
Limerick	0	0	0	0	0	0	0	-
Longford	0	1	3	2	0	0	6	67
Louth	0	0	0	0	0	0	0	-
Mayo	0	5	6	0	0	0	11	100
Meath	0	0	0	1	0	0	1	0
Monaghan	0	0	1	1	2	0	4	25
Offaly	0	0	0	0	0	0	0	-
Roscommon	0	1	8	1	0	0	10	90
Sligo	0	3	2	0	0	0	5	100
Tipperary NR	0	0	0	1	0	0	1	0
Tipperary SR	0	0	0	0	0	0	0	-
Waterford	0	0	0	0	0	0	0	-
Westmeath	0	0	7	2	0	0	9	78
Wexford	0	0	0	0	0	0	0	-
Wicklow	0	3	1	2	0	0	6	67
Preliminary Total	0	62	44	25	5	5	136	
Revised Total**	0	59	38	18	5	5	120	
% of Revised Total	0.0	49.2	31.7	15.0	4.2	4.2	100.0	81

*Oligotrophic and mesotrophic lakes; **Correcting for lakes occurring in more than one local authority area.

TABLE 10: CURRENT WATER QUALITY INFORMATION FOR LAKES REPORTED ON BY THE EPA OR LOCAL AUTHORITIES IN 1998-2000 PERIOD

Lake Name	EPA Lake Code	Local Authority Responsible	Baseline Trophic Status	Current Trophic Status	Standard to be Achieved by 2007 (Trophic Status)	Current Total Phosphorus Value ug P/l	Standard to be Achieved by 2007 (Total Phosphorus ug P/l)	Has Either Standard Been Achieved?
Shreelin	110	Cavan, Meath, Westmeath	E	E	M	36	20	No
Akibbon	4	Donegal	O	O	O	20	10	Yes
Barra	24	Donegal	O	U	O	10	10	Yes
Dunlewy	50	Donegal	O	U	O	10	10	Yes
Gartan	58	Donegal	O	U	O	10	10	Yes
Nacung	91	Donegal	O	U	O	<10	10	Yes
Veagh	115	Donegal	O	U	O	<10	10	Yes
Mask	85	Galway, Mayo	M	M	M		20	Yes
Caragh	32	Kerry	O	O	O		10	Yes
Gill (Kerry)	60	Kerry	M	M	M		20	Yes
Gultane	68	Kerry	O	O	O	<10	10	Yes
Leane	79	Kerry	E	M	M	15	20	Yes
Muckross	89	Kerry	O	O	O	<10	10	Yes
Across	2	Leitrim	E	E	M		20	No
Allen	5	Leitrim, Roscommon	O	O	O		10	Yes
Garadice	118	Leitrim	M	M	M	23	20	Yes
Ree	108	Longford, Roscommon, Westmeath	E	M	M	34	20	Yes
Carra	33	Mayo	M	O	M		20	Yes
Carrowmore	34	Mayo	M	M	M		20	Yes
Conn	35	Mayo	M	M	M		20	Yes
Cullin	39	Mayo	M	M	M		20	Yes
Knappaghbeg	77	Mayo	M	E	M		20	No
Boderg	25	Roscommon, Longford	M	O	M		20	Yes
Bofin (Shannon)	26	Roscommon, Longford	M	O	M		20	Yes
Drumharlow	49	Roscommon	M	O	M		20	Yes
Key	74	Roscommon	M	M	M		20	Yes
Oakport	101	Roscommon	M	O	M		20	Yes
Derg	42	Tipperary NR, Clare, Galway	E	M	M	32	20	Yes
Ballykeeran	20	Westmeath	M	M	M	20	20	Yes
Coosan	36	Westmeath	M	M	M	10	20	Yes
Derravaragh	43	Westmeath	M	M	M		20	Yes
Ennell	53	Westmeath	M	M	M		20	Yes
Killinure	75	Westmeath	M	O	M	12	20	Yes
Lene	80	Westmeath	M	M	M		20	Yes
Owel	104	Westmeath	M	M	M		20	Yes

U = Ultra-oligotrophic; O = Oligotrophic; M = Mesotrophic; E = Eutrophic; H = Hypertrophic

TABLE 11: TARGET NUMBER OF LOCAL AUTHORITY LAKES OF EACH TROPHIC STATUS OR AVERAGE TOTAL PHOSPHORUS LEVEL CATEGORY

Either Total Phosphorus target (µg P/l) Or Trophic status target	≤ 5 Ultra-oligotrophic	>5 ≤ 10 Oligotrophic	>10 ≤ 20 Mesotrophic	>20 ≤ 50 Eutrophic	Total	% Satisfactory*
Carlow	0	0	0	0	0	-
Cavan	0	1	4	3	8	63
Clare	0	2	9	0	11	100
Cork	0	0	4	0	4	100
Cork Corporation	0	0	1	0	1	100
Donegal	0	6	0	0	6	100
Dublin Corporation	0	0	0	0	0	-
Dublin South	0	0	0	0	0	-
Dun Laoghaire Rathdown	0	0	0	0	0	-
Fingal	0	0	0	0	0	-
Galway	0	34	9	0	43	100
Kerry	0	3	2	0	5	100
Kildare	0	0	0	0	0	-
Kilkenny	0	0	0	0	0	-
Laois	0	0	0	0	0	-
Leitrim	0	3	2	0	5	100
Limerick	0	0	0	0	0	-
Longford	0	1	5	0	6	100
Louth	0	0	0	0	0	-
Mayo	0	5	6	0	11	100
Meath	0	0	1	0	1	100
Monaghan	0	0	2	2	4	50
Offaly	0	0	0	0	0	-
Roscommon	0	1	9	0	10	100
Sligo	0	3	2	0	5	100
Tipperary NR	0	0	1	0	1	100
Tipperary SR	0	0	0	0	0	-
Waterford	0	0	0	0	0	-
Westmeath	0	0	9	0	9	100
Wexford	0	0	0	0	0	-
Wicklow	0	3	3	0	6	100
Preliminary Total	0	62	69	5	136	
Revised Total**	0	59	56	5	120	
% of Revised Total	0.0	49.2	46.7	4.2	100	96

*Oligotrophic and mesotrophic lakes; **Correcting for lakes occurring in more than one local authority area)



REVIEW OF MEASURES IMPLEMENTATION

Implementation programmes were requested from local authorities for:

- a) the functional area as a whole and
- b) each river/lake catchment

The EPA Guidance Notes (EPA, 1999, 2000a) list an array of measures that are available to local authorities to protect and improve water quality. The measures proposed by the local authorities are separated into five major categories (Table 12):

- Planning, control and enforcement measures including water quality management planning; planning and control measures for point sources; planning and control measures for non-point sources and general enforcement measures
- Monitoring measures
- Consultative and Co-operative measures
- Public education and advisory measures
- Other agri-environmental and miscellaneous measures

A total column is calculated in Table 12 to indicate the number of local authorities proposing to apply a particular measure. The Implementation Reports enable local authorities to provide an update on the implementation of measures proposed in the Measures Reports. The Implementation Reports also allow local authorities to re-evaluate proposed measures and alter these, or propose new measures, where experience dictates that the original measures are either no longer necessary or practical. Ultimately, the success or otherwise of measures implemented will be determined by the water quality monitoring results. The local authorities have provided updates on the implementation of a wide range of proposed measures and the main points are discussed below.

TABLE 12: MEASURES BEING IMPLEMENTED OR PROPOSED TO BE IMPLEMENTED BY LOCAL AUTHORITIES

Local Authorities	Carlow	Cavan	Clare	Cork	Cork Corp.	Donegal	Dublin Corp.	DLR	Fingal	Galway	Kerry	Kildare	Kilkenny	Laois	Leitrim	Limerick	Longford	Louth
Planning, Control and Enforcement Measures																		
a) Water quality management planning																		
Prepare/implement/review catchment management plans	O	O	O	O	O	O	O	NS	NS	O	O	O	O	O	S	O	O	
Groundwater / aquifer protection plans	M		O	O				NS				NS	S	S	NS			L
Implement Source Protection Plans	O		O	O	S													
Implement Waste Management Plan				O	O	O					NS		O					
Incorporate water quality plans in County Development Plan			M	S		O									L			
Improved integration of planning and water quality functions			O	NS				NS		S	O			S	L			S
Establish Environmental Information Management System	NS	L	O	S				NS		O						NS		
b) Planning and Control Measures - point source discharges																		
Issue / Review Section 4 licenses	S	M		S			O	S	O	O	O	O	S	S	M	O		S
Issue / Review Section 16 licenses	S	M		S			O	S	O	O	O	O	S	S	M	O		S
Upgrade/construct WWTP/sewerage schemes	O	O	S	O		O	O	M	M	O	O	NS	O	L	S	O		O
Upgrade surface water and foul sewer misconnections	M		S	S		O	O	S	M	O	S	O	S	S	O	O		O
Inspection of non-licensed discharges								NS	M	O	O	S			L	O		S
Improve controls on septic tanks	O	O	S	S				NS				S	O	O	L	O		O
Review abstractions									S	O	O	S	O	O	L	O		O
Farm surveys	O	M	O	O		O												
Use of wetlands to control phosphorus	O	O	O	S			NS	NS		NS	O	O	O	O	O			
Upgrade municipal waste facilities	O	M	O	NS		O												
c) Planning and Control Measures - non-point source discharges																		
Agricultural Bye-laws	S	O	O	O						S	M		?		?	S	S	
Nutrient Management Planning	S	O	S	O		?		?	?	S	S	?	?	?	?	O		
Improve controls on forestry	O		O	S		O					O			S		O		
Controls on peat extraction industry																		
LA to review licenced landspreading																		
d) General Enforcement Measures				S														
Active enforcement of Water Pollution Acts	O	M	O	O	O	O	O		M	O	O	O	O	O	O	O		
Monitoring Measures																		
Increase hydrometric monitoring programme																		
Increase chemical/biological river monitoring	O	O	O	O	O	O	O	O	O	NS	O	O	O	S	S	O		S
Increase lake monitoring programme		O	O	O	L	O				O	O							
Increase groundwater monitoring	S	O	O	O										S				
Increase point source monitoring (of WWTPs/industry etc.)	O	O	O	O		O	O	S	S	O	O	NS		S		S		S
Improve monitoring/laboratory equipment/procedures	S	O	O	O		S			O	O	O	O			O	O		
Establish catchment phosphorus budgets	L			S			L		S		O							
Undertake pilot / hot spot catchment studies	O	O	O								O	O						
Undertake intensive chronic pollution investigations	L	O	O	S		O		NS	O	O	O			S		O		
Establish database of soil P levels for county	S	M									O							
Conduct soil surveys of county	L																	
Development/use of GIS for catchment management	O	O	O	NS			O	NS	NS		O	O				O		S
e) Consultative and Cooperative Measures																		
Participation in catchment management committees	O		O	O		O	O				O	O	O	O	O	O	O	
Establish liaison with other parties EPA/LAs/ragas/farmers/fisheries etc.	O	O	O	O	L	O	O	NS	O	S	O	O	O	O	O	O	O	O
Public Education and Advisory Measures																		
General public education campaigns	O	O	O	O				NS			O	O	O	S	O	O		
Sectoral education programmes	O	O	O	O						NS	O	O		S				S
Encourage use of phosphorus free detergents							O				O					O		
Appoint environmental Education Officer/Public awareness Officer		S	O	S		O					O		S					
Other National Agri-Environmental and Miscellaneous Measures																		
Research relating to agricultural waste management / water quality	O	M		O				NS				NS			S			
Promote Agri-environment schemes (REPS, CFP etc.)	O	O	O			O				O	O	O			L	O		
Maximise local sources of funding for catchment management								NS							M			
Appoint additional staff for Regulations implementation	O	O	O	O			NS	NS			NS			S		O		

O = ongoing; S = short term, by 2002; M = medium term, by 2004; L = long term, after 2004; NS = timescale not stated; ? = assessing need for measure.

TABLE 12 CONTINUED: MEASURES BEING IMPLEMENTED OR PROPOSED TO BE IMPLEMENTED BY LOCAL AUTHORITIES

Local Authorities	Mayo	Meath	Monaghan	Offaly	Roscommon	Sligo	South Dublin	Tipperary NR	Tipperary SR	Waterford	Waterford Corp.	Westmeath	Wexford	Wicklow	Total
Planning, Control and Enforcement Measures															
a) Water quality management planning															
Prepare/implement/review catchment management plans	O	O	M	O	O	O		O	O	O	L	O		O	28
Groundwater / aquifer protection plans		O	S			NS		S	O	O			L	O	17
Implement Source Protection Plans															3
Implement Waste Management Plans						O			O						5
Implement sludge management plan	O					O		O		NS					10
Incorporate water quality plans in County Development Plan															4
Improved integration of planning and water quality functions						O							O	O	15
Establish Environmental Information Management System			O			O			O						3
b) Planning and Control Measures - point source discharges															
Issue / Review Section 4 licenses		S	O	O		S	L	O	O	S	O	O	O	O	26
Issue / Review Section 16 licenses			O	O		S		O	O	S	O	O	O	L	23
Upgrade/construct WWTP/sewerage schemes	O	O	O	O	O	O	O	O	O	O	O	M	O	L	28
Upgrade surface water and foul sewer misconnections		S					O	O			S				11
Inspection of non-licensed discharges		S		O			S		O	NS			S	L	21
Improve controls on septic tanks		S			O	S	O							NS	18
Review abstractions	NS	S	S	S		S	?	O	O	S		O	S	O	25
Farm surveys					O								O		7
Use of wetlands to control phosphorus											S				12
Upgrade municipal waste facilities															
c) Planning and Control Measures - non-point source discharges															
Agricultural Bye-laws	S			S		NS	?	O	?	?		O			12
Nutrient Management Planning	S	S		NS		NS	?	O	?		S	O	NS	NS	16
Improve controls on forestry	O	S		NS	NS	NS		S	O					NS	15
Controls on peat extraction industry		S	NS	O		S			O					NS	2
LA to review licensed landspreading		S													6
d) General Enforcement Measures															
Active enforcement of Water Pollution Acts		S	O	O		O	O	O	O	S	O	O	O	O	25
Monitoring Measures															
Increase hydrometric monitoring programme		O	O				O		O						9
Increase chemical/biological river monitoring	O	O	O	O	O	S		O	O	S	S		O	NS	29
Increase lake monitoring programme	O		O			S									11
Increase groundwater monitoring							NS				S		O		8
Increase point source monitoring (of WWTPs/industry etc.)	NS	S	S			M	O	S	O	S	S		O	O	25
Improve monitoring/laboratory equipment/procedures		S	O			O			NS	S					15
Establish catchment phosphorus budgets		S	O			S				S				L	10
Undertake pilot / hot spot catchment studies			NS			S			O						8
Undertake intensive chronic pollution investigations		S				O	O	S		NS	O		O	L	18
Establish database of soil P levels for county			S						L						5
Conduct soil surveys of county			NS												2
Development/use of GIS for catchment management		O	O			O		O	O	NS			O	M	19
Consultative and Cooperative Measures															
Participation in catchment management committees	O	O	O	O		S		O	O			O			19
Establish liaison with other parties EPA/LAs/teagasc/farmers/fisheries etc.		O		O		S	O			S	S	O		O	25
Public Education and Advisory Measures															
General public education campaigns	NS	S	O		NS	O	O	O	O		S	O		L	22
Sectoral education programmes		S	O			S	NS				S		O	L	11
Encourage use of phosphorus free detergents		S										O			6
Appoint environmental Education Officer/Public awareness Officer	S	O			NS	S		O	S					O	13
Other National Agri-Environmental and Miscellaneous Measures															
Research relating to agricultural waste management / water quality		S	O			NS			O						10
Promote Agri-environment schemes (REPS, CFP etc.)		O		O	O			O	O			O	O	NS	17
Maximise local sources of funding for catchment management		S													3
Appoint additional staff for Regulations implementation	S		S	O		O		O	O					O	16

O = ongoing; S = short term, by 2002; M = medium term, by 2004; L = long term, after 2004; NS = timescale not stated; ? = assessing need for measure.

PLANNING, CONTROL AND ENFORCEMENT MEASURES

Water quality management planning is a key measure available to local authorities in the implementation of the Phosphorus Regulations. It is now widely accepted that a catchment-based approach to water quality management is appropriate as set out in Government policy and in the EU Water Framework Directive. All of the local authorities are or will be involved in water quality management planning through implementation of the Water Framework Directive. This Directive, which came into force in December 2000, requires Member States to draw up River Basin Management Plans by 2009. The aim of these plans will be to provide a holistic approach, within each River Basin District, to management of surface inland, estuarine and coastal waters; groundwaters; and terrestrial environments dependant on the aquatic environment. The general aim of the Directive is to prevent deterioration of water status and achieve good water status (as defined) by 2015. River Basin Management (RBM) Projects are to be established in each River Basin District in the near future. The Government launched a £6.5 million RBM Project in the South-East in April 2001. Local authorities will play a key role in managing these RBM Projects, which should ultimately provide the information for developing RBM Plans, as required by the Directive. In some cases, local authorities have delayed implementation of proposed measures until the relevant RBM Projects are set up. Many local authorities are already involved in the ongoing Water Quality Monitoring and Management Systems (WQMMS) established for Lough Derg / Lough Ree, the Three Rivers Project (for the Suir, Liffey and the Boyne) and Lough Leane (Kerry). Information derived from the WQMMS will ultimately be incorporated into the new RBM Projects. A number of local authorities are also continuing to draw up, compile or implement water quality management plans for catchments within their own functional area.

Seventeen local authorities propose the preparation / implementation of groundwater protection plans and three local authorities propose the preparation / implementation of source protection plans. Five local authorities indicate that they are currently implementing waste management plans and ten local authorities propose the preparation or implementation of sludge management plans. Fifteen local authorities propose closer integration of the planning process with responsibilities for protecting water quality generally, through strengthening the referral process between the Planning and Environment sections of the local authority. Four local authorities indicate that water quality management plans will be included in the County Development Plan.

The majority of local authorities specifically indicate that they will make greater use of powers under the Water Pollution Act in issuing, enforcing and reviewing section 4 and section 16 discharge licences, and in issuing and enforcing section notices to prevent pollution. Many local authorities have already made progress in reviewing discharge licences (Table 13). Some local authorities have issued a significant number of Section 12 notices, though relatively few local authorities have reported taking legal action against polluters (Table 13). Twenty-one local authorities have proposed carrying out surveys for unlicensed discharges.

TABLE 13: SELECTED ACTIONS UNDERTAKEN BY LOCAL AUTHORITIES IN 1999-2000 PERIOD TO IMPROVE WATER QUALITY (BASED ON NUMERICAL DATA SUBMITTED IN LOCAL AUTHORITY IMPLEMENTATION REPORTS)

Local Authorities	Carlow	Cavan	Clare	Cork	Dublin Corp.	Galway	Kerry	Kildare	Limerick	Offaly	Roscommon	Sligo	Tipp. NR	Tipp. SR	Waterford Corp.	Westmeath	Wexford	Wicklow
Section 4s Issued			3		2									2				
Section 4s Reviewed		1				80	3			5+				1	4	7		1
Section 10s Issued																		
Section 16s Issued					27									28				
Section 16s Reviewed					17		4	1+	1	4			361	1		24	11	
Farm Surveys			223	1049		48								139				
Section 12 Warnings Issued	5		33	343														
Section 12s Issued	2		29	49		3	21	23		10		16	5	10				
Section 23s Issued			3	4									3					
Legal action			3				1					5		1				
Septic tanks surveyed																		
Nutrient Management Plans requested	1								1+									
Misconnections/connections surveys					2079						20							
Other investigations			54									105				18		

Almost all local authorities propose the construction or upgrading of wastewater treatment plants (WWTPs), with most of these proposing the installation of phosphorus removal facilities at a number of plants in their functional area. The construction and upgrading of many plants throughout the country is now taking place on a Design Build Operate basis in accordance with recent DELG policy. Reduction in water quality due to discharges from ineffective WWTPs remains a problem in many areas. Analysis of the performance of WWTPs shows that upgrading of plants can result in the elimination of serious pollution relatively rapidly (Lucey *et al.*, 1999). However, eutrophication may remain a problem in many rivers unless phosphorus removal facilities are incorporated in the plants. For example, the Castlebar River remained moderately polluted, despite upgrading of the Castlebar WWTP, until phosphorus removal facilities were installed in 1997. This development appears to have been highly successful and monitoring results indicate that the lower section of the river has been restored to a fully satisfactory condition (though some problems remain immediately downstream of the treatment works, probably mainly due to storm overflows) (Clabby *et al.*, 1999; Lucey *et al.*, 1999). Phosphorus reduction at Tuam WWTP has also led to significant reductions in orthophosphate levels in the Clare River, Co. Galway, below the WWTP discharge and is contributing, at least in part, to improvements in the biological quality of the river (Clabby *et al.*, 2001). Thus, there is a strong case for the incorporation of phosphorus removal on all significant treatment plants discharging to inland waters (Toner, 2000; Stapleton and Clenaghan, 2000).

Eleven local authorities propose to survey and upgrade surface water and foul sewer drainage systems to effectively manage urban runoff and to rectify misconnections. Dublin Corporation report significant progress in the implementation of this measure (Table 13). Eighteen local authorities have proposed controlling septic tanks mainly through the planning process and through survey and assessment. It should be noted that the EPA has recently published new guidance on Treatment Systems for Single Houses (EPA, 2000b). Twelve local authorities indicate that they are currently upgrading or propose to upgrade their municipal waste facilities. Only two local authorities have proposed reviewing water abstractions. Given that water abstraction may reduce the capacity of a surface water body to dilute polluting matter, this is a measure that may need consideration by other local authorities.

Four local authorities (Cavan, Cork, Tipperary NR and Westmeath) have introduced bye-laws under Section 21 of the Local Government (Water Pollution) (Amendment) Act, 1990, to control agricultural activities (Table 14). Bye-laws may be adopted for individual catchments or for the entire county as required. Agricultural bye-laws adopted by the four local authorities to date relate to specific listed townlands. A further eight local authorities have proposed introducing agricultural bye-laws and five additional local authorities are assessing the need for them (Table 14).

TABLE 14: LOCAL AUTHORITY IMPLEMENTATION OF AGRICULTURAL BYE-LAWS AS REPORTED IN LOCAL AUTHORITY IMPLEMENTATION REPORTS.

Ongoing	By 2002	By 2004	By 2007	Timeframe not stated	Assessing need for Bye-laws
Cavan, Cork, Tipperary NR, Westmeath	Carlow, Galway, Limerick, Longford, Offaly, Mayo	Kerry		Sligo	Kilkenny, Leitrim, South Dublin, Tipperary SR, Waterford

The main provisions contained in the published agricultural bye-laws vary somewhat between local authorities (Table 15). The Cork bye-laws were introduced over a year before the bye-laws in Cavan, Tipperary NR and Westmeath and have significantly different requirements. However, marked differences exist between the bye-laws of the latter three counties as well. For example, different winter storage capacities are required for manure in each county, varying from three months in Cork to up to 24 weeks in Cavan. The timing restrictions on landspreading of this manure also vary between local authority area.

The information to be included in nutrient management plans under the Cavan, Tipperary NR and Westmeath bye-laws is more detailed than the information specified in the Cork bye-laws. The former three local authorities require information on matters such as:

- current and proposed land use;
- estimate of nutrients to be applied annually to land;

- c) soil nutrient levels;
- d) specification of maximum quantities of organic and chemical fertiliser that ought to be used on the land;
- e) times when organic and chemical fertiliser ought or ought not to be applied to land; and
- f) the keeping of monthly records relating to livestock, the production, treatment, receipt from or transfer to another person of organic fertiliser, and the types, quantities, timing locations and rates of application of chemical fertiliser.

Cavan, Tipperary NR and Westmeath also require reports on farm effluent storage capacity and detailed reports similar to that outlined above from intensive agricultural enterprises (IAEs). Under the Cork bye-laws information is required on soil nutrient tests and organic and chemical fertiliser use only. Whereas the application of nutrients to land is dependant on the farm nutrient management plan (after one year) in Cavan, Tipperary NR and Westmeath, the Cork bye-laws actually specify the soil nutrient conditions under which phosphorus may be applied to lands (Table 15). The soil testing regime is specified in the Cork bye-laws, but only applies to farms in excess of 20 ha in size and to smaller farms which are IAEs. The bye-laws of the other three local authorities state that the soil testing regime is to be specified by the local authorities concerned but there is no size limit on the farms to be tested. The Cork bye-laws contain additional provisions for a phosphate sales register by retailers, controls on nitrogen fertiliser and the provision that the local authority must be notified before organic fertiliser is imported on to a farm. Burial of animals is controlled under the Westmeath bye-laws. In Cavan, Tipperary NR and Westmeath enterprises with Integrated Pollution Control licences or farmers engaged in REPS are exempt from the agricultural bye-laws.

TABLE 15: MAIN PROVISIONS OF AGRICULTURAL BYE-LAWS INTRODUCED BY LOCAL AUTHORITIES.

Provision	Cavan	Cork	Tipperary NR	Westmeath
Date of issue	1 Jan 2001	15 Oct 1999	1 Jan 2001	1 March 2001
Livestock manure storage	24 weeks storage within 3 years	Three months storage – with immediate effect	16 weeks storage within 3 years	20 weeks storage within 3 years
Report on farm effluent storage capacity to LA	Within 6 months		Within 12 months	Within 6 months (extended to 12 months due to foot and mouth)
Controls on farmyard effluents	Yes	Yes	Yes	Yes
Landspreading of manure	50% by 31 July All by 30 Sept	All by 31 Oct	50% by 1 July All by 30 Sept	50% by 1 July All by 30 Sept
Controls on application of fertiliser	Buffer zones specified for use of organic and chemical fertilisers Additional areas / times specified for prohibition of fertiliser use	Buffer zones specified for use of organic fertilisers	Buffer zones specified for use of organic and chemical fertilisers Additional areas / times specified for prohibition of fertiliser use	Buffer zones specified for use of organic and chemical fertilisers Additional areas / times specified for prohibition of fertiliser use
Phosphate Sales Register		Retail outlets selling P fertilisers in bags ≥ 50 kgs		
Nutrient Management Plans	Detailed plan required. Within 9 months	Records to be made of organic and chemical fertiliser use. With immediate effect	Detailed plan required. Within 12 months	Detailed plan required. Within 6 months (extended to 12 months due to foot and mouth)
Nutrient Management Plan requirements	Farmer shall not apply nutrients after one year save in accordance with NMP	Chemical phosphate application prohibited on lands where Morgans P ≥ 15 mg/l or where Morgans P ≥ 30 mg/l on peat soils. Imported organic fertiliser prohibited on lands where Morgans P ≥ 15 mg/l	Farmer shall not apply nutrients after one year save in accordance with NMP	Farmer shall not apply nutrients after one year save in accordance with NMP
Nutrient Management Plans records	Detailed records required.	Records to be made of organic and chemical fertiliser use.	Detailed records required.	Detailed records required.
Soil testing	All farms. Rate to be determined by LA	For all farms >20 ha and all IAEs Rate generally ≤ 4 ha / sample (or ≤ 12 ha / sample if soil uniform)	All farms. Rate to be determined by LA	All farms. Rate to be determined by LA
Intensive Agricultural Enterprises (IAE)	Farmer shall not apply nutrients from IAE after one year save in accordance with NMP	Imported organic fertiliser prohibited on lands where Morgans P ≥ 15 mg/l	Farmer shall not apply nutrients from IAE after one year save in accordance with NMP	Farmer shall not apply nutrients from IAE after one year save in accordance with NMP
Intensive Agricultural Enterprises (IAE) records	Detailed records required.	Records to be made of organic and chemical fertiliser use.	Detailed records required.	Detailed records required.
Controls on importation of organic fertiliser		Yes – must notify LA		
Controls on application of organic and chemical nitrogen		Yes – timing and rate of application specified		
Burial of animals				LA consent required

Sixteen local authorities propose using nutrient management planning to tackle water quality problems, while a further ten local authorities are assessing the need for using this measure (Table 16). Nutrient management planning is an assessment of the quantities of manure, slurry or inorganic fertiliser that should be applied to a field area, based on nutrient status of the soil, crop to be grown and the nutrient content of the proposed fertiliser, so that target crop yields are achieved and losses to the environment are minimised. Guidelines on the preparation of nutrient management plans have been issued to local authorities (DELG, 1998). Teagasc promotes nutrient management planning through its Farm Advisory Service. Local authorities have statutory powers under Section 21A of the Water Pollution Act to require farmers to prepare nutrient management plans where these are considered necessary to protect water quality. Some local authorities are implementing nutrient management planning through the introduction of agricultural bye-laws (see above). Nutrient management planning is being applied through REPS and it is obligatory in respect of EPA licensed intensive pig and poultry units.

The Agency considers that effective nutrient management planning is a key measure to meet the targets set in the Regulations. This is because many soils in the State are believed to contain phosphorus levels that would be considered excessive and likely to pose a threat to water quality. It has been estimated that over 40,000 tonnes of phosphorus accumulates in Irish soils each year due to the fact that national inputs are approximately double national outputs (Tunney, 1990; Tunney *et al.*, 1996). It is also estimated that approximately £25 million a year is spent on unnecessary chemical fertiliser application. Problems also arise through the over application of animal manure slurries, and their misapplication, e.g., by spreading during wet weather, which poses a direct threat to water quality. Teagasc has issued nutrient advice on appropriate phosphorus application (Teagasc, 1998) and codes of good agricultural practice have been published (DAFF and DoE, 1996; DAFRD, 2000). Nutrient Management Planning takes time to implement and it may be a number of years before measurable improvements in water quality are achieved through this measure.

TABLE 16: LOCAL AUTHORITY IMPLEMENTATION OF NUTRIENT MANAGEMENT PLANNING AS REPORTED IN IMPLEMENTATION REPORTS.

Ongoing	By 2002	By 2004	By 2007	Timeframe not stated	Assessing need for NMP
Cavan, Cork, Limerick, Tipperary NR, Westmeath	Carlow, Clare, Galway, Kerry, Mayo, Meath, Waterford Corp.			Offaly, Sligo, Wexford, Wicklow	Donegal, Dun Laoghaire- Rathdown, Fingal, Kildare, Leitrim, Laois, Kilkenny, South Dublin, Tipperary SR, Waterford

Farm surveys to locate point and non-point sources of pollution are proposed by twenty-five local authorities. These surveys will generally be used to determine high risk farms / activities and to focus appropriate measures in these areas. Cork County Council, Tipperary NR and Tipperary SR all report significant progress in the implementation of this measure (Table 13). Fifteen local authorities have proposed measures to assess and control the impact of forestry on water quality. In certain cases, these measures include, significantly, prohibiting or discouraging aerial fertilisation of forest plantations. It is worth noting in this context that a National Forest Standard has recently been published. This Standard includes a Code of Best Forest Practice, embracing Forestry Guidelines (on fisheries, landscape, biodiversity, harvesting etc.) and criteria for sustainable forest management (Forest Service, 2000). Two local authorities propose measures to control the impact of the peat extraction industry on water quality. Seven local authorities propose wetland/reedbed construction to tackle pollution from point and non-point sources.

MONITORING MEASURES

At present the EPA, the local authorities and the fisheries boards carry out the bulk of water quality monitoring in Ireland. Many local authorities already have well established monitoring programmes in place. The EPA carry out physico-chemical monitoring of rivers on behalf of certain local authorities. However, almost all local authorities have suggested developing and/ or reviewing their existing catchment monitoring

programmes, primarily for phosphorus. Many of these local authorities have indicated that they will seek to integrate their monitoring programmes more closely with that of the EPA. Twenty-nine local authorities have increased or propose to increase their monitoring for rivers, eleven for lakes and eight for groundwaters. New river monitoring stations have been proposed by a number of local authorities and liaison with the EPA is ongoing. Nine local authorities propose to upgrade their hydrometric monitoring programme. Fifteen local authorities propose upgrading laboratory / monitoring equipment or quality assurance / control procedures.

Twenty-five local authorities aim to monitor phosphorus loads from point sources such as WWTPs or industry. Ten local authorities aim to establish phosphorus budgets for catchments in their functional area, with eight local authorities carrying out intensive pilot/hot-spot catchment studies to monitor and assess the impact of implementing specific measures. Eighteen local authorities are undertaking or will undertake investigations to determine the cause of chronic pollution of specific rivers/lakes within their functional area.

Nineteen local authorities propose the establishment and use of Geographical Information Systems (GIS) for storage and analysis of water quality and other relevant data, to aid water quality management. The Local Government Computer Services Board is currently developing the *Catchment Envisage* computer package, which is being introduced to a number of local authorities. This package comprises a series of databases linked to a GIS that will store, manage and maintain data for catchment management purposes. The *Catchment Envisage* package is to be used by all participants in the Lough Derg / Ree project, as well as the Three Rivers Project. Only five local authorities have proposed the establishment of a database of soil phosphorus levels in their county and two local authorities propose full soil surveys.

CONSULTATIVE AND CO-OPERATIVE MEASURES

The EPA considers that the setting up of consultative and co-operative structures that involve all stakeholders is essential to the successful management of a catchment. This is particularly important where diffuse inputs are primarily responsible for deterioration in water quality. A range of actions across all sectors is necessary to reduce diffuse losses and it is therefore important to include all stakeholders in catchment management initiatives. Stakeholders can be viewed as those who either contribute to the water quality problem, and therefore need to be involved as part of the solution, or those that are beneficiaries of improvements in water quality, as well as statutory bodies with responsibilities for the protection and improvement of water quality. Nineteen local authorities are involved in multi-sectoral catchment management groups to tackle water quality problems in their areas and almost all local authorities have established liaison with other interested parties such as the EPA, Teagasc, industry, fisheries, farming organisations, general public etc.

PUBLIC EDUCATION AND ADVISORY MEASURES

Twenty-two local authorities propose public education campaigns, which may include activities such as the production of environmental newsletters, leaflets on water pollution and schools education programmes. Six local authorities specifically state that they are encouraging the use of phosphorus free detergents. The implementation of this measure has been considerably assisted by the recent voluntary agreement between the Government and the Irish Detergents and Allied Products Association to effectively provide for the phasing-out of phosphate based domestic laundry detergent products by the end of 2002. Eleven local authorities propose the establishment of a sectoral education programme, primarily for the agricultural sector. A number of local authorities state that they are actively promoting best farm management practices and the Code of Good Agricultural Practice (DAFF and DoE, 1996). In this context, it is worth noting that a preliminary code of 'good farming practice' has been published to which all farmers in receipt of EU aid under CAP or under the Structural Funds must adhere (DAFRD, 2000). The DAFRD have stated that they will prepare a more detailed publication on 'good farming practice'. In the future, agri-environmental payments will only apply to measures over and above 'good farming practice', as required by recent EU Regulations. Thirteen local authorities state that they have appointed or propose to appoint an environmental education officer or public awareness officer.

OTHER AGRI-ENVIRONMENTAL AND MISCELLANEOUS MEASURES

Seventeen local authorities propose to actively promote the Rural Environment Protection Scheme (REPS) and/or the Control of Farm Pollution (CFP) Scheme in their functional areas. It is expected that the number

of farmers participating in REPS will continue to increase following the recent introduction of REPS II. Through the implementation of nutrient management planning requirements, REPS constitutes one of the primary methods for tackling water quality problems arising from agricultural sources. However, the effect of REPS is likely to be limited in intensive farming areas where water quality is generally under greatest pressure, due to the limited uptake of REPS by these farmers. A recent evaluation of REPS found that inorganic phosphorus and nitrogen fertiliser usage was lower in REPS farms as compared to non-REPS farms, without any loss of productivity (McEvoy and Ryan, 2000). REPS is believed to be contributing positively to water quality improvements in the Kilcrow River, Co. Galway (KMM, 1999). However, more extensive monitoring and evaluation of the environmental benefits of REPS is required (Clenaghan and Crowe, 2000). It has been noted that REPS II appears to allow for higher application rates of phosphorus fertiliser to silage ground (J. Brogan, EPA, pers comm.) than is recommended by current Teagasc nutrient advice (Teagasc, 1998).

The reintroduction of the CFP scheme in 1999 and the recent introduction of the Farm Waste Management Scheme (which supersedes the CFP scheme) should enable more farmers to avail of grant aid to improve farm infrastructure, deficits in which are widespread throughout the country. Funding under these schemes is often of critical importance to farmers to enable them to put in place the infrastructure that will reduce the likelihood of pollution, and meet environmental requirements, e.g., of agricultural bye-laws.

Local authorities may wish to consider the use of bioengineering solutions for improving the biological status of rivers where phosphorus control proves difficult, for example due to extremely low dilution of effluents. Such solutions may include provision of bank-side shading to prevent algal growths, raking of gravels, installation of aeration weirs or even artificial aeration during critical low-flow periods (Lucey *et al.*, 1999).

Ten local authorities are supporting or propose to support research into agricultural waste management or water quality issues. Sixteen local authorities have appointed or propose to appoint additional staff for implementation of the Regulations. Three local authorities propose to maximise financial support for catchment management either through targeted use of fines or measures to gain support from local businesses for water quality management. Almost all local authorities have stated that additional financial support from central government is required to successfully implement their programme of measures.



ISSUES RAISED

The EPA Guidance Note advised local authorities to identify problems encountered by them in implementation of the Regulations in their Implementation Reports. These and other issues identified through implementation of the Regulations include:

- Shortage of staff and finance to implement measures - many of the measures proposed by the local authorities, as necessary to tackle water quality issues in their functional area, are resource intensive.
- It is difficult at this early stage to assess the relative merit of particular measures. Many measures are at an early stage of implementation and, in any case, it is likely that there would be some time lag before the effects of the measures implemented would be apparent from water quality monitoring results.
- River biological monitoring on a national scale takes place on a three year cycle. This means that there will be two more complete biological monitoring periods before 2007 (i.e. 2001-2003 and 2004-2006). Within the timescale of the Regulations, this may limit the biological information available to local authorities in gauging whether or not measures implemented are successful. Many local authorities are also tracking changes in water quality through monitoring of phosphorus.
- Investigative work is required in many areas to identify those inputs that are having the greatest impact on water quality in order to prioritize measures.
- Tools to aid catchment management, such as GIS, are at an early stage of development in many local authorities.
- Some local authorities are focussing measures mainly on unsatisfactory river reaches / lakes.
- The possible location of a number of river monitoring stations within the mixing zones of direct discharges may present difficulties in achieving compliance with the Regulations.
- Increased monitoring and licence enforcement of local authority licensed facilities may be required.
- Q and MRP values at certain stations are 'mismatched' i.e. low MRP levels have been recorded at stations with poor Q values or high MRP levels at stations with good biological quality. This is not unexpected, as although there is a strong statistical relationship between Q-values and MRP levels, this may not be apparent at each individual station. Low Q values may be recorded at stations with low MRP levels for a variety of reasons, e.g., where extensive algal growths are taking up all the MRP for growth or where factors other than eutrophication are affecting the biology, such as habitat destruction. High MRP levels may be recorded at stations with good biological quality due to a number of factors, e.g., where plant growth is limited by variables other than phosphorus, such as shade or depth.
- Much of the phosphorus data gathered throughout the country by the EPA and local authorities is not compliant with the Phosphorus Regulations in relation to sampling frequency. In addition, some of the phosphorus monitoring is not at EPA river stations from which baseline water quality status has been assigned to 'parts of rivers' under the Regulations, which increases the difficulty in assessing compliance with the Regulations.
- Difficulties have arisen during consultation with sectoral interests – it has been suggested that certain sectors have adopted a narrow sectoral viewpoint or have shown lack of interest. In other cases, establishing effective consultation with householders as a group during misconnection surveys has been problematic.

- Specific problems stated by local authorities include:
 - lack of wastewater collection system infrastructure within built-up areas,
 - inefficient phosphate removal at certain WWTPs,
 - lack of nutrient removal at many inland WWTPs,
 - an acute deficit in slurry storage capacity,
 - discharges into rivers during periods of heavy rain,
 - organic and chemical fertiliser being spread on over-enriched land or under unsuitable weather and soil conditions,
 - exemptions under planning law for smaller slurry based livestock and poultry units and silage pits
 - impacts of forestry not clearly understood,
 - potential over-fertilisation of forestry areas,
 - limited notification of forestry development,
 - overgrazing by sheep,
 - the reluctance of people to desludge septic tanks,
 - failure of percolation areas to perform satisfactorily,
 - low compliance with SR6 / EPA on site treatment system guidelines,
 - unprecedented development due to economic boom.
- The Divisional nature of certain local authorities and the number of Departments and sections within local authorities can cause difficulties in effective communication and implementation of the Regulations.
- Problems have arisen in implementation of the Regulations which may be effectively out of direct local authority control including:
 - the potential effects of EPA licensed facilities on water quality,
 - polluted water entering the county from other local authority areas, and
 - the impact of the weather on water quality (though catchment managers should have controls in place that can deal with dry / wet weather).
- Unsuccessful requests for information from the Department of Agriculture, Food and Rural Development have negatively affected the implementation of local authority measures, including agricultural bye-laws. Requests for lists of active farmers in bye-law areas have reportedly been unsuccessful. This information is necessary so that the local authorities can enter into correspondence with, and subsequently visit, these farmers so that the bye-laws can be effectively implemented.
- Concern was expressed regarding delays in the reintroduction of REPS and other grant aid for farmyard pollution control. The provision of grant aid for farm pollution control is seen as very important for bye-law implementation. Previous grant aid / subsidies have often encouraged intensification – though farmers will have to apply ‘good farming practice’ to qualify for future aid under CAP or under the Structural Funds. It has been noted that REPS II appears to allow for higher application rates of phosphorus fertiliser to silage ground (J. Brogan, EPA, pers comm.) than is recommended by current Teagasc nutrient advice (Teagasc, 1998).
- The lack of grant aid to upgrade or install small sewage treatment schemes / WWTPs.
- It has been suggested that the recommended buffer zone of 1.5m for artificial fertiliser applications in DAFRD publications and used in nutrient management plans should be revised upwards.
- It has been suggested that more extensive use of designations under the EU Freshwater Fish Directive (CEC, 1978) could be considered.

CONCLUSIONS

- The information requested by the EPA for inclusion in the Implementation Reports was generally submitted. However, in certain cases, Implementation Reports were either not submitted (Limerick Corporation, Louth, Meath, Waterford County Council and Dun Laoghaire-Rathdown) or were incomplete.
- The Measures and Implementation Reports prepared under the Regulations are serving to bring together data and information on a range of water quality issues in a positive and co-ordinated manner.
- The process of compiling reports under the Regulations is serving to highlight those waters under pressure from eutrophication and waters in need of protection due to their current high quality, on a local authority basis.
- EPA and local authority monitoring indicates that 60 per cent of river stations nationally are currently compliant with the Regulations, based on 1998-2000 biological and MRP surveys. A total of 58 per cent of river stations nationally currently meet the biological targets in the Regulations.
- Local authorities with a relatively high level of compliance (>70 per cent of river stations compliant) with the Regulations are Sligo, Mayo, Kerry and Clare. Local authorities with a relatively low level of compliance with the Regulations (< 50 per cent of river stations compliant) are Dublin Corporation, Dun Laoghaire-Rathdown, Fingal, Kildare, Longford, Meath and Westmeath.
- Nationally, 63 per cent of river stations have satisfactory water quality (or 62 per cent based on Q values alone). This represents a slight improvement from 60 per cent of river stations satisfactory in the baseline survey.
- There has been a decline in the number and percentage of river stations of high water quality, which is particularly marked when biological water quality at stations is considered alone.
- There has been a decline in the number and percentage of river stations with moderately or seriously polluted water.
- Apart from Wicklow, counties with a high percentage of unpolluted river stations are located in the west of the country.
- Marked declines in the percentage of stations with satisfactory (biological or MRP) water quality have been recorded in Dun Laoghaire-Rathdown and South Dublin, and to a lesser extent in Waterford, Cork and Wicklow.
- Marked increases in percentage of river monitoring stations with satisfactory (biological or MRP) water quality are apparent in Carlow, Galway, Dublin Corporation, Tipperary NR, Kilkenny, Fingal, Wexford, Westmeath, Longford and Monaghan.
- Analysis of biological data alone reveals a similar pattern to that described above, except that there is a relatively significant decline in number of stations with satisfactory biological water quality in Cavan and the increase in stations of satisfactory biological water quality in Dublin Corporation and Monaghan is not significant. Further analyses, using only biological data from river stations sampled in both the 1995-97 and 1998-2000 surveys, confirm the trends outlined above.
- It is evident from EPA and local authority river monitoring results that apparent water quality at certain individual stations may vary considerably depending on whether biological or phosphorus data is used. This is not unexpected as even though a high correlation has been demonstrated between the biological Q rating and MRP levels (e.g., Bowman *et al.*, 1996; Lucey *et al.*, 1999), for a variety of reasons this relationship may not be apparent at every individual station (see Issues Raised above). It is important to note that the standards set in the Phosphorus Regulations are interim targets only. The recently introduced Water Framework Directive requires that good water status must be achieved in rivers and lakes through

meeting chemical, hydromorphological *and* biological targets by 2015.

- Current data on lakes are more limited. However, monitoring indicates that Lough Derg, Lough Ree and Lough Leane have improved in trophic status and now meet the criteria set in the Regulations. Other unsatisfactory lakes reported on have not improved (Lough Sheelin and Acres Lake), whereas all but one (Knappaghbeg Lake) of the thirty satisfactory lakes reported on have maintained or improved their status.
- The range of measures being implemented and proposed by the local authorities has been documented. The individual measures for planning, control and enforcement, monitoring, consultation and co-operation, public education and other agri-environmental measures are listed and described.
- Local authorities have a wide array of tools available to protect and improve water quality including powers to introduce bye-laws and mandatory nutrient management planning which compliment powers under Section 12 of the Water Pollution Act. It is still too early to assess the effectiveness of most of the measures implemented by local authorities to date, although notable improvements in water quality have been achieved through the installation of phosphorus removal at a number of wastewater treatment plants. The development of a GIS-based approach to water quality management will provide useful additional information in pinpointing 'hot-spot' areas from which much of the diffuse pollution is arising. Resources may then be more effectively deployed in these areas to achieve the aims of the Regulations. The ongoing collection of biological and MRP water quality data over the coming years will provide a clearer picture of the effectiveness of the measures implemented by the local authorities. The success of these measures will be evaluated in future National Implementation Reports.
- The Environmental Management Systems based approach to the Regulations, adopted by most local authorities, should serve to focus measures implementation and prioritisation of resources and thus enable continual improvement of water quality.
- The work carried out under the Phosphorus Regulations should serve as a very valuable contribution towards preparing for, and meeting the requirements of, the Water Framework Directive.

RECOMMENDATIONS

- It is essential for successful implementation of the Regulations that adequate resources are available to local authorities and the EPA to implement those measures considered necessary for water quality protection.
- The principal emphasis of work carried out under the Regulations should be on implementation of measures to improve/maintain water quality.
- Specific measures being implemented should be subjected to periodic auditing by local authorities to assess the relative success of measures chosen by them for meeting the targets. This will provide local authorities with important information to review and fine tune the various measures being implemented by them.
- Some local authorities have suggested focussing measures on unsatisfactory river reaches. Given that current monitoring indicates that high quality Q5 stations are still declining at a significant rate, it is important that local authorities also focus on measures to maintain water quality where it is of high quality.
- Agricultural bye-laws implemented by different local authorities vary in their requirements. There may be a case for standardising some of these requirements, subject to local conditions. Local authorities that are considering or are in the process of developing bye-laws should avail of the experience gained to date by local authorities that have already introduced bye-laws.
- The development of a standard approach to nutrient management planning should be considered.
- Given that the Regulations now set standards for MRP throughout the country, it would be highly desirable that current MRP monitoring would meet the sampling requirements of the Regulations, to provide an indication of whether these standards are being met. In addition, it is preferable that, where possible, phosphorus monitoring would take place at Agency monitoring stations from which baseline water quality status has been assigned for 'parts of rivers' under the Regulations. Where local authorities wish to monitor new river stations for phosphorus, it is recommended that this is communicated to the Agency, so that a baseline biological status may be assigned under the Regulations, where possible.
- It is recommended that, in so far as is possible, all biological monitoring stations assigned a baseline quality under the Regulations, be monitored in each three-yearly biological monitoring period. This will aid assessment of the effectiveness of measures implemented and of local authority compliance with the Regulations. This is particularly important where these stations are not part of a phosphorus monitoring programme.
- The cornerstone of European and national policy to tackle eutrophication is the adoption of a catchment based approach to water quality management. Whilst the Regulations focus responsibility on individual local authorities to achieve water quality targets, all local authorities are affected by water entering their counties from other local authority areas, by sectoral activities and by the activities of Government Agencies such as the EPA. Therefore it is strongly recommended that local authorities manage water quality on a catchment basis which may be done, for example, through the establishment of multi-sectoral catchment management groups that meet regularly and set and meet targets for phosphorus reduction. These groups should have all relevant local authorities, Government bodies and sectoral interests represented. Issues relevant to water quality management may be addressed within such a forum and addressed in a co-ordinated manner. This co-operative approach to water quality management has yielded some success in reducing phosphorus loss to water, for example, in the cases of Lough Conn and Lough Mask, Co. Mayo (Lucey *et al.*, 1999). Unless this targeted, cross-sectoral, catchment based approach is taken, it is likely that water quality will continue to deteriorate in many areas.
- At a local authority level, effective co-ordination and consultation regarding the Regulations, both within local authorities and with outside parties, will be required to meet the targets of the Regulations.

Consideration should be given to setting up a Phosphorus Regulations Steering Committee within each local authority and Operational Working Groups involving key sectoral interests. Dedicated teams within local authorities, set up to implement measures proposed under the Regulations, have proved beneficial.

- It is important that close liaison is established between the local authorities and interested parties to involve relevant sectoral interests in the implementation of the Regulations. Many local authorities are already actively involved in sectoral consultation. Public education campaigns, through advertising, leaflet drops and public presentations, may also be needed. Raising environmental awareness can be a slow process, and consequently long-term strategies may be required.
- Planning decisions can often have significant implications for water quality. It is recommended that all local authorities adopt a more integrated approach to planning / environmental matters.
- Given that agriculture plays such a critical role in water quality management, it is very important that, as far as possible, local authorities have access to relevant information available to Government Departments.

REFERENCES

- Bowman, J.J., Clabby, K.J., Lucey, J., McGarrigle, M.L. and Toner, P.F., 1996. *Water Quality in Ireland 1991-1994*. Environmental Protection Agency, Ireland.
- Bowman, J.J., 2000. *River Shannon Lake Water Quality Monitoring 1998 & 1999*. Environmental Protection Agency, Ireland.
- Bowman, J.J. and Toner, P.F., 2001. *National Lake Water Quality Monitoring Programme – A Discussion Document*. Environmental Protection Agency, Ireland.
- CEC (Council of the European Communities), 1976. *Council Directive of 4 May 1976 on the pollution caused by certain substances discharged into the aquatic environment of the Community (76/464/EEC)*. O.J. L 129/23.
- CEC (Council of the European Communities), 1978. *Council Directive of 18 July 1978 on the quality of fresh waters needing protection or improvement in order to support fish life (78/659/EEC)*. O.J. L 222/1.
- CEC (Council of the European Communities), 2000. *Council Directive of 23 October 2000 establishing a framework for Community action in the field of water policy (2000/60/EC)*. O.J. L 327/1.
- Clabby, K.J., Lucey, J. and McGarrigle, M.L., 1999. *Interim Report on the Biological Survey of River Quality. Results of the 1998 Investigations*. Environmental Protection Agency, Ireland.
- Clabby, K.J., Lucey, J. and McGarrigle, M.L., 2000. *Interim Report on the Biological Survey of River Quality. Results of the 1999 Investigations*. Environmental Protection Agency, Ireland.
- Clabby, K.J., Lucey, J. and McGarrigle, M.L., 2001. *Interim Report on the Biological Survey of River Quality. Results of the 2000 Investigations*. Environmental Protection Agency, Ireland.
- Clenaghan, C. and Crowe, M., 2000. *Managing and Protecting the Environment*. In: *Ireland's Environment. A Millennium Report*. (eds L. Stapleton, M. Lehané & P. Toner). Environmental Protection Agency, Ireland.
- Clenaghan, C., Morrissey, M., Crowe, M. & Carty, G., 2000. *Synthesis Report of the Measures Reports*. Environmental Protection Agency, Ireland.
- DAFF and DoE, 1996. *Code of Good Agricultural Practice to Protect Waters from Pollution by Nitrates*. Department of Agriculture, Fisheries and Food and Department of the Environment, Dublin.
- DAFRD, 2000. *CAP Rural Development Plan for Ireland 2000-2006*. Stationery Office, Dublin.
- DELG, 1998. *Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998 (S.I. No. 258 of 1998)*. Government Supplies Agency, Dublin.
- DELG, 1998. *Protecting our Freshwaters – Nutrient Management Planning Guidelines for Local Authorities*. Department of Environment and Local Government, Dublin.
- DELG, EPA, GSI, 1999. *Groundwater Protection Schemes*. Department of Environment and Local Government, Environmental Protection Agency, Geological Survey of Ireland.
- DoE, 1997. *Managing Ireland Rivers & Lakes: a Catchment-Based Strategy Against Eutrophication*. Department of Environment, Dublin.
- Doris, Y., McGarrigle, M.L., Clabby, K.J., Lucey, J., Neill, M., Flanagan, M., Quinn, M.B., Sugrue, M. and Lehané, M., 1999. *Water Quality in Ireland 1995-97. Statistical Compendium of River Quality Data*. Environmental Protection Agency, Ireland.

- EPA, 1997. *Environmental Quality Objectives and Environmental Quality Standards. The Aquatic Environment. A Discussion Document.* Environmental Protection Agency, Ireland.
- EPA, 1999. *Guidance Note to Local Authorities on Preparation and Submission of the Measures Report.* Environmental Protection Agency, Ireland.
- EPA, 2000a. *Guidance Note to Local Authorities on Preparation and Submission of the Implementation Reports.* Environmental Protection Agency, Ireland.
- EPA, 2000b. *Wastewater Treatment Manuals. Treatment Systems for Single Houses.* Environmental Protection Agency, Ireland.
- EPA, 2000c. *The Quality of Drinking Water in Ireland. A report for the year 1999 with a review of the period 1997-1999.* Environmental Protection Agency, Wexford.
- EPA, 2001. *Parameters of Water Quality. Interpretation and Standards.* Environmental Protection Agency, Ireland.
- Fanning, A., Crowe, M., Carty, G. & Clenaghan, C. 1999. *Water Quality Management Planning in Ireland.* Environmental Protection Agency, Wexford.
- Flanagan, M.J., 1999a. *A Report on River Water Quality in County Galway – 1998.* Environmental Protection Agency, Ireland.
- Flanagan, M.J., 1999b. *A Report on River Water Quality in County Sligo – 1998.* Environmental Protection Agency, Ireland.
- Flanagan, M.J., 1999c. *A Report on River Water Quality in County Mayo – 1998.* Environmental Protection Agency, Ireland.
- Flanagan, M.J., 2000a. *A Report on River Water Quality in County Galway – 1999.* Environmental Protection Agency, Ireland.
- Flanagan, M.J., 2000b. *A Report on River Water Quality in County Sligo – 1999.* Environmental Protection Agency, Ireland.
- Flanagan, M.J., 2000c. *A Report on River Water Quality in County Mayo – 1999.* Environmental Protection Agency, Ireland.
- Flanagan, M.J., 2001a. *A Report on River Water Quality in County Galway – 2000.* Environmental Protection Agency, Ireland.
- Flanagan, M.J., 2001b. *A Report on River Water Quality in County Sligo – 2000.* Environmental Protection Agency, Ireland.
- Flanagan, M.J., 2001c. *A Report on River Water Quality in County Mayo – 2000.* Environmental Protection Agency, Ireland.
- Forest Service, 2000. *Code of Best Forest Practice – Ireland.* Forest Service, Department of Marine and Natural Resources, Dublin.
- KMM, 1999. *Management Proposals – Lough Derg and Lough Ree Catchment Monitoring and Management Systems.* Kirk McClure and Morton, Dublin.
- KMM and Pettit, 2000. *A Catchment based approach for reducing nutrient inputs from all sources to the Lakes of Killarney.* Kirk McClure and Morton, Dublin and Pettit Project Design and Management, Kerry.

- Laurence, D. and Carty, G. (2000). *Report on Waste Licensing 1995-97*. Environmental Protection Agency, Ireland.
- Lucey, J., Bowman, J.J., Clabby, K. J., Cunningham, P., Lehane, M., MacCárthaigh, M., McGarrigle, M. L. and Toner, P.F., 1999. *Water Quality in Ireland 1995-1997*. Environmental Protection Agency, Ireland.
- McEvoy, O. and Ryan, E., 2000. *Impact of REPS – analysis from the 1999 Teagasc National Farm Survey*. Conference Proceedings on REPS 2 "A Continuation...", 28th November, Portlaoise. Teagasc, Ireland.
- McGarrigle, M.L., Lucey, J. and Clabby, K. J. 1992. *Biological Assessment of River Water Quality in Ireland. In: River Water Quality, Ecological Assessment and Control*. (eds P.J. Newman, M.A. Piavaux and R.A. Sweeting). EUR 14606 EN-FR, Commission of the European Communities, Luxembourg.
- McGarrigle, M.L., Bowman, J.J., Clabby, K. J., Cunningham, P., Lehane, M., Lucey, J., MacCárthaigh, M. and Toner, P.F., (in prep.). *Water Quality in Ireland 1998-2000*. Environmental Protection Agency, Ireland.
- MCOS, 2000. *Preliminary Report. Three Rivers Project Water Quality Monitoring and Management*. M.C. O'Sullivan Consulting Engineers, Dublin.
- Neill, M., 2001. *River Water Quality in the South-East Region, Year 2000. A Report to the County Councils of Carlow, Kilkenny, Laois, Tipperary NR & SR, Waterford and Wexford and to Waterford Corporation*. Environmental Protection Agency, Ireland.
- NSAI (National Standards Authority of Ireland), 1991. *Septic Tank Systems Recommendations for Domestic Effluent Treatment and Disposal from a Single Dwelling House (S.R.6.)*. EOLAS, Ireland.
- OECD (Organisation for Economic Co-operation and Development), 1982. *Eutrophication of Waters, Monitoring, Assessment and Control*. OECD, Paris.
- O'Leary, G., Fanning, A. & Carty, G., 2000. *Urban waste water discharges in Ireland. A report for the years 1998 and 1999*. Environmental Protection Agency, Wexford.
- O'Mongain, E., Collins, A., Green, S., O'Riain, G. and Caffrey, J., 1999a. *Remote Sensing of Lakes - Improved Chlorophyll Calibration and Data Processing. Synthesis Report*. Environmental Protection Agency, Ireland.
- O'Mongain, E., Collins, A., Green, S., O'Riain, G. and Caffrey, J., 1999b. *Remote Sensing of Lakes - Improved Chlorophyll Calibration and Data Processing. Literature Review*. Environmental Protection Agency, Ireland.
- O'Mongain, E., Collins, A., Green, S., O'Riain, G. and Caffrey, J., 1999c. *Remote Sensing of Lakes - Improved Chlorophyll Calibration and Data Processing. Final Report*. Environmental Protection Agency, Ireland.
- Quinn, M., 2001a. *A Report on River Water Quality in County Louth – 1999*. Environmental Protection Agency, Ireland.
- Quinn, M., 2001b. *A Report on River Water Quality in County Louth – 2000*. Environmental Protection Agency, Ireland.
- Quinn, M., 2001c. *A Report on River Water Quality in County Monaghan – 1999*. Environmental Protection Agency, Ireland.
- Quinn, M., 2001d. *A Report on River Water Quality in County Monaghan – 2000*. Environmental Protection Agency, Ireland.
- Stapleton, L. and Clenaghan, C., 2000. *Future Outlook*. In: *Ireland's Environment. A Millennium Report*. (eds L. Stapleton, M. Lehane & P. Toner). Environmental Protection Agency, Ireland.

Stapleton, L., Lehané, M. & Toner, P. (eds), 2000. *Ireland's Environment. A Millennium Report*. Environmental Protection Agency, Ireland.

Stephens, A., 2001. *A Survey of Dangerous Substances in Surface Freshwaters 1999-2000*. Environmental Protection Agency, Ireland.

Teagasc, 1998. *Nutrient advice for phosphorus and potassium fertiliser*. Teagasc, Johnstown Castle, Wexford.

Thompson, E., Ryan, S. and Cotton, D.C.F., 1998. *Management Plan for the Lough Gill Catchment*. Sligo County Council, Ireland.

Toner, P., 2000. *Ireland's Environment: The Main Issues*. In: *Ireland's Environment. A Millennium Report*. (eds L. Stapleton, M. Lehané & P. Toner). Environmental Protection Agency, Ireland.

Tunney, H., 1990. *A note on the balance sheet approach to estimating the phosphorus fertiliser needs of agriculture*. Irish Journal of Agricultural Research 29, 149-154.

Tunney, H., Carton, O. and Magette, B., 1996. *Trends in phosphorus fertiliser use, soil reserves, animal manures and management strategies to reduce loss to water*. In: *Disturbance and Recovery in Ecological Systems* (eds P.S. Giller and A.A. Myers). pp 155-163. Royal Irish Academy, Dublin.

Tunney, H., Coulter, B., Daly, K., Kurz, I., Coxon, C., Jeffrey, D., Mills, P., Kiely, G. and Morgan, G., 2000a. *Quantification of Phosphorus Loss from Soil to Water: Final Report and Literature Review*. Environmental Protection Agency, Ireland.

Tunney, H., Coulter, B., Daly, K., Kurz, I., Coxon, C., Jeffrey, D., Mills, P., Kiely, G. and Morgan, G., 2000b. *Quantification of Phosphorus Loss from Soil to Water: Synthesis Report*. Environmental Protection Agency, Ireland.

Appendix 1:
ADDITIONAL WATER QUALITY REVIEW DATA

APPENDIX 1.1: INFORMATION ON NUMBER OF STATIONS NOT RESAMPLED IN 1998-2000, NUMBER OF NEW STATIONS ADDED IN 1998-2000 AND NUMBER OF STATIONS SAMPLED FOR MRP IN 1998-2000 SURVEYS, IN ACCORDANCE WITH THE REGULATIONS									
Local Authority	Baseline number of stations	No. of stations sampled for biology / MRP in 1998-2000	No. stations sampled for biology in 1998-2000	No. of stations not resampled for biology / MRP in 1998-2000	No. of stations not resampled for biology in 1998-2000	No. of new stations added in 1998-2000	No. of stations sampled for MRP in 1998-2000	Percentage of current biological / chemical stations sampled for MRP	
Carlow	67	64	64	3	3	4	11	17	
Cavan	110	108	106	2	4	6	40	37	
Clare	174	165	164	9	10	25	23	14	
Cork	385	383	383	2	2	0	1	0	
Donegal	260	249	249	11	11	21	0	0	
Dublin Corporation	7	7	7	0	0	0	7	100	
Dublin South	15	15	15	0	0	1	11	73	
Dun Laoghaire Rathdown	9	9	9	0	0	1	0	0	
Fingal	18	18	18	0	0	0	16	89	
Galway	246	232	231	14	15	28	14	6	
Kerry	208	203	201	5	7	1	35	17	
Kildare	92	89	89	3	3	15	5	6	
Kilkenny	99	98	96	1	3	6	17	17	
Laois	107	102	102	5	5	6	18	18	
Leitrim	90	86	86	4	4	3	2	2	
Limerick	131	127	127	4	4	3	5	4	
Longford	39	37	37	2	2	0	0	0	
Louth	44	42	41	2	3	3	13	31	
Mayo	254	239	238	15	16	11	26	11	
Meath	101	97	97	4	4	1	1	1	
Monaghan	74	71	69	3	5	6	30	42	
Offaly	110	107	107	3	3	6	19	18	
Roscommon	128	123	123	5	5	4	0	0	
Sligo	101	97	97	4	4	3	17	18	
Tipperary NR	113	110	110	3	3	3	14	13	
Tipperary SR	118	115	115	3	3	8	20	17	
Waterford	76	74	74	2	2	0	8	11	
Westmeath	72	65	65	7	7	4	2	3	
Wexford	114	110	109	4	5	5	7	6	
Wicklow	117	112	112	5	5	9	1	1	
Preliminary Total	3479	3354	3341	125	138	183	363		
Revised Total*	3341	3223	3210	118	131	172	336	10	

*Correcting for river stations bordering two local authority areas.

APPENDIX 1.2: NUMBER OF LOCAL AUTHORITY RIVER STATIONS IN EACH BIOLOGICAL QUALITY RATING IN 1995-1997 PERIOD WHICH WERE ALSO SAMPLED IN 1998-2000 PERIOD FOR BIOLOGY AND/OR MRP									
Either MRP Target (µg P/l) Or Q-value Target 1995-1997 Status	15 Q5	20 Must retain quality or improve Q4-5	30 Q4	30 Improve to Q4 Q3-4	50 Improve to at least Q3-4 Q3	70 Improve quality to at least Q3 Q2-3	70 Q3 Q≤2	Total	% Satisfactory (biology)*
Carlow	1	12	16	17	13	1	0	60	48
Cavan	7	23	27	23	18	4	0	102	56
Clare	14	21	63	18	17	6	1	140	70
Cork	6	121	169	59	24	3	1	383	77
Donegal	29	83	66	20	18	5	7	228	78
Dublin Corporation	0	0	0	0	3	1	3	7	0
Dublin South	0	4	5	0	2	2	1	14	64
Dun Laoghaire Rathdown	1	0	2	0	4	0	1	8	38
Fingal	0	0	0	2	11	3	2	18	0
Galway	12	34	75	34	34	12	3	204	59
Kerry	12	71	73	27	15	1	3	202	77
Kildare	0	0	11	31	20	5	7	74	15
Kilkenny	2	3	32	29	23	1	2	92	40
Laos	3	11	32	28	17	2	3	96	48
Leitrim	8	28	30	10	5	2	0	83	80
Limerick	6	11	38	28	31	7	3	124	44
Longford	1	2	11	13	8	0	2	37	38
Louth	0	7	10	8	13	1	0	39	44
Mayo	13	66	89	26	25	5	4	228	74
Meath	0	0	20	36	30	4	6	96	21
Monaghan	1	10	7	9	31	4	3	65	28
Offaly	4	8	31	30	20	4	4	101	43
Roscommon	0	12	55	15	26	9	2	119	56
Sligo	3	38	31	11	9	1	1	94	77
Tipperary NR	5	9	26	35	28	3	1	107	37
Tipperary SR	2	12	52	18	21	2	0	107	62
Waterford	2	25	29	10	7	1	0	74	76
Westmeath	0	4	11	29	12	1	4	61	25
Wexford	0	9	33	29	28	4	2	105	40
Wicklow	14	33	31	11	12	0	2	103	76
Preliminary Total	146	657	1075	606	525	94	68	3171	
Revised Total*	141	645	1036	573	504	89	63	3051	
% of Revised Total	4.6	21.1	34.0	18.8	16.5	2.9	2.1	100	60

*River stations Q4, Q4-5 or Q5; **Correcting for river stations bordering two local authority areas.

APPENDIX 1.3: NUMBER OF LOCAL AUTHORITY RIVER STATIONS IN EACH Q-VALUE OR MEDIAN MRP CATEGORY IN 1998-2000 SURVEYS AND THE NUMBER OF STATIONS COMPLIANT WITH PHOSPHORUS REGULATIONS - ADJUSTED TO ONLY TAKE ACCOUNT OF THOSE STATIONS SAMPLED IN 1995-1997 ALSO

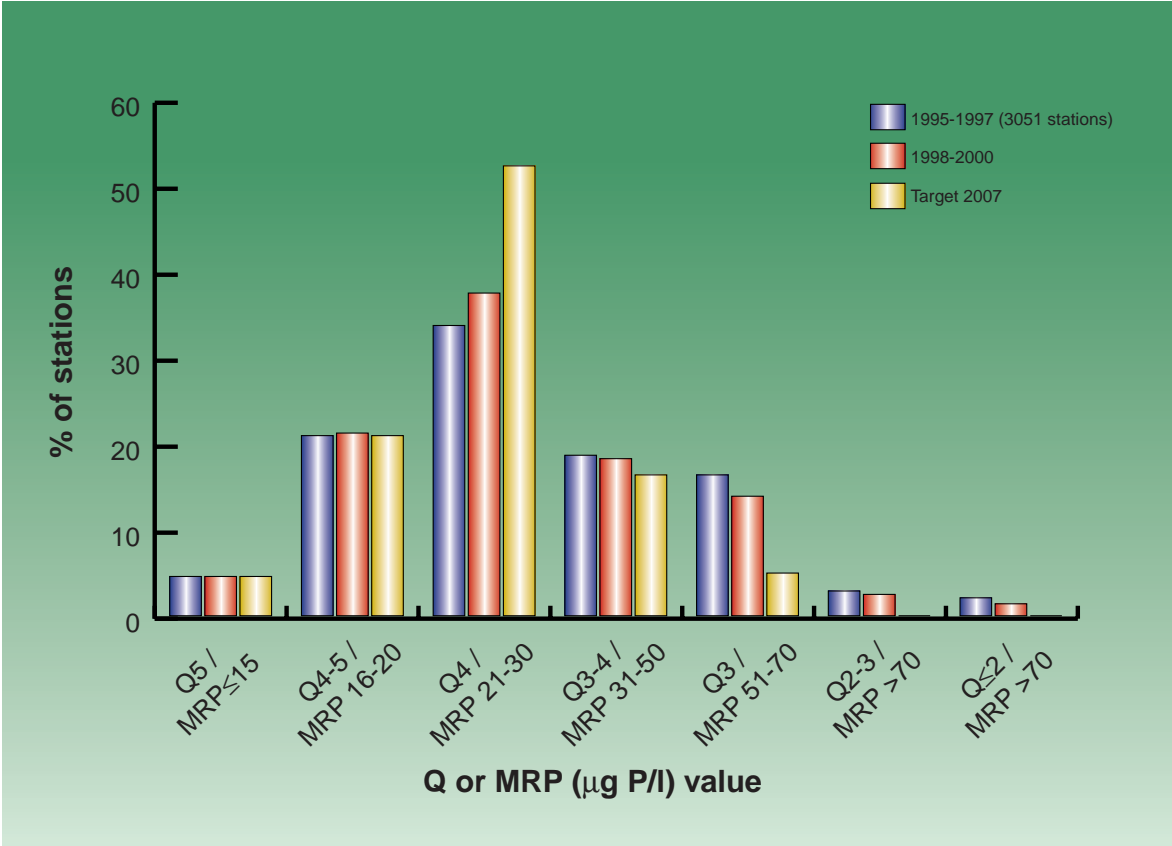
Either MRP value (µg P/l) Or Q-value	15 Q5	20 Q4-5	30 Q4	50 Q3-4	70 Q3	Q2-3	Q≤2	Total	% Satisfactory (biology or MRP)*	No. of stations Compliant with Regulations	% of stations Compliant with Regulations
Carlow	1	14	26	13	6	0	0	60	68	40	67
Cavan	16	13	30	27	12	2	2	102	58	56	55
Clare	15	31	63	9	15	6	1	140	78	100	71
Cork	4	86	191	66	33	3	0	383	73	242	63
Donegal	18	80	74	19	22	8	7	228	75	133	58
Dublin Corporation	0	0	1	1	1	1	3	7	14	3	43
Dublin South	1	3	4	4	0	1	1	14	57	10	71
Dun Laoghaire Rathdown	1	0	0	1	5	1	0	8	13	1	13
Fingal	0	0	2	1	10	4	1	18	11	4	22
Galway	7	38	112	19	22	5	1	204	77	145	71
Kerry	21	65	75	25	15	1	0	202	80	148	73
Kildare	0	3	8	24	30	4	5	74	15	22	30
Kilkenny	0	4	43	30	14	1	0	92	51	54	59
Laois	1	25	22	35	10	1	2	96	50	54	56
Leitrim	3	31	32	7	7	2	1	83	80	52	63
Limerick	5	11	47	22	32	6	1	124	51	66	53
Longford	0	2	16	10	7	0	2	37	49	18	49
Louth	0	8	9	12	9	1	0	39	44	22	56
Mayo	12	73	96	24	18	5	0	228	79	164	72
Meath	0	0	19	37	30	7	3	96	20	35	36
Monaghan	1	12	14	16	20	2	0	65	42	37	57
Offaly	9	8	29	32	18	2	3	101	46	56	55
Roscommon	1	13	59	19	17	6	4	119	61	77	65
Sligo	11	38	30	4	10	1	0	94	84	73	78
Tipperary NR	2	23	32	32	16	1	1	107	53	65	61
Tipperary SR	1	14	50	21	16	2	3	107	61	56	52
Waterford	0	15	37	16	5	0	1	74	70	40	54
Westmeath	1	2	19	22	15	2	0	61	36	28	46
Wexford	1	19	34	25	22	3	1	105	51	59	56
Wicklow	11	34	29	12	16	0	1	103	72	58	56
Preliminary Total	143	665	1203	585	453	78	44	3171	-	1918	-
Revised Total*	139	653	1152	562	428	75	42	3051	-	1846	-
% of Revised Total	4.6	21.4	37.8	18.4	14.0	2.5	1.4	100	64	-	61

*River stations Q4, Q4-5 or Q5 or median MRP ≤30µg P/l; **Correcting for river stations bordering two local authority areas.

APPENDIX 1.4: TARGET NUMBER OF LOCAL AUTHORITY RIVER STATIONS IN EACH BIOLOGICAL QUALITY RATING OR MRP LEVEL CATEGORY - ADJUSTED TO ONLY TAKE ACCOUNT OF THOSE STATIONS SAMPLED IN BOTH 1995-1997 BIOLOGICAL SURVEY AND 1998-2000 BIOLOGICAL AND/OR MRP SURVEY

Either MRP Target (µg P/l) Or Q-value Target	15 Q5	20 Q4-5	30 Q4	50 Q3-4	70 Q3	Total	% Satisfactory (biology or MRP)*
Carlow	1	12	33	13	1	60	77
Cavan	7	23	50	18	4	102	78
Clare	14	21	81	17	7	140	83
Cork	6	121	228	24	4	383	93
Donegal	29	83	86	18	12	228	87
Dublin Corporation	0	0	0	3	4	7	0
Dublin South	0	4	5	2	3	14	64
Dun Laoghaire Rathdown	1	0	2	4	1	8	38
Fingal	0	0	2	11	5	18	11
Galway	12	34	109	34	15	204	76
Kerry	12	71	100	15	4	202	91
Kildare	0	42	42	20	12	74	57
Kilkenny	2	3	61	23	3	92	72
Laos	3	11	60	17	5	96	77
Leitrim	8	28	40	5	2	83	92
Limerick	6	11	66	31	10	124	67
Longford	1	2	24	8	2	37	73
Louth	0	7	18	13	1	39	64
Mayo	13	66	115	25	9	228	85
Meath	0	0	56	30	10	96	58
Monaghan	1	10	16	31	7	65	42
Offaly	4	8	61	20	8	101	72
Roscommon	0	12	70	26	11	119	69
Sligo	3	38	42	9	2	94	88
Tipperary NR	5	9	61	28	4	107	70
Tipperary SR	2	12	70	21	2	107	79
Waterford	2	25	39	7	1	74	89
Westmeath	0	4	40	12	5	61	72
Wexford	0	9	62	28	6	105	68
Wicklow	14	33	42	12	2	103	86
Preliminary Total	146	657	1681	525	162	3171	
Revised Total*	141	645	1609	504	152	3051	
% of Revised Total	4.6	20.7	53.0	16.6	5.1	100	78

*River stations Q4, Q4-5 or Q5 or median MRP ≤30µg P/l; **Correcting for river stations bordering two local authority areas.



APPENDIX 1.5: NATIONAL TRENDS IN WATER QUALITY AT MONITORING STATIONS BASED ON STATIONS MONITORED IN BOTH 1995-97 (FOR BIOLOGY) AND 1998-2000 (FOR BIOLOGY OR MRP) .

APPENDIX 1.6: NUMBER OF LOCAL AUTHORITY RIVER STATIONS IN EACH BIOLOGICAL QUALITY RATING IN 1995-1997 PERIOD WHICH WERE ALSO SAMPLED IN 1998-2000 PERIOD FOR BIOLOGY

Either MRP Target (µg P/l) Or Q-value Target 1995-1997 Status	15 Q5	20 Q4-5	30 Q4	30 Improve to Q4 Q3-4	50 Improve to at least Q3-4 Q3	70 Improve quality to at least Q3 Q2-3	70 Q3-4	Total	% Satisfactory (biology)*
Carlow	1	12	16	17	13	1	0	60	48
Cavan	7	23	27	22	17	4	0	100	57
Clare	14	21	62	18	17	6	1	139	70
Cork	6	121	169	59	24	3	1	383	77
Donegal	29	83	66	20	18	5	7	228	78
Dublin Corporation	0	0	0	0	3	1	3	7	0
Dublin South	0	4	5	0	2	2	1	14	64
Dun Laoghaire Rathdown	1	0	2	0	4	0	1	8	38
Fingal	0	0	0	2	11	3	2	18	0
Galway	12	34	75	34	34	11	3	203	60
Kerry	12	70	73	26	15	1	3	200	78
Kildare	0	0	11	31	20	5	7	74	15
Kilkenny	2	3	31	28	23	1	2	90	40
Laos	3	11	32	28	17	2	3	96	48
Leitrim	8	28	30	10	5	2	0	83	80
Limerick	6	11	38	28	31	7	3	124	44
Longford	1	2	11	13	8	0	2	37	38
Louth	0	7	10	8	12	1	0	38	45
Mayo	13	66	88	26	25	5	4	227	74
Meath	0	0	20	36	30	4	6	96	21
Monaghan	1	10	7	9	29	4	3	63	29
Offaly	4	8	31	30	20	4	4	101	43
Roscommon	0	12	55	15	26	9	2	119	56
Sligo	3	38	31	11	9	1	1	94	77
Tipperary NR	5	9	26	35	28	3	1	107	37
Tipperary SR	2	12	52	18	21	2	0	107	62
Waterford	2	25	29	10	7	1	0	74	76
Westmeath	0	4	11	29	12	1	4	61	25
Wexford	0	9	33	28	28	4	2	104	40
Wicklow	14	33	31	11	12	0	2	103	76
Preliminary Total	146	656	1072	602	521	93	68	3158	
Revised Total*	141	644	1033	569	500	88	63	3038	60
% of Revised Total	4.6	21.2	34.0	18.7	16.5	2.9	2.1	100	

*River stations Q4, Q4-5 or Q5; **Correcting for river stations bordering two local authority areas.

APPENDIX 1.7: NUMBER OF LOCAL AUTHORITY RIVER STATIONS OF EACH Q-VALUE RATING IN 1998-2000 SURVEY AND THE NUMBER OF STATIONS MEETING BIOLOGICAL TARGETS OF THE PHOSPHORUS REGULATIONS - ADJUSTED TO ONLY TAKE ACCOUNT OF STATIONS SAMPLED IN 1995-97 SURVEY ALSO

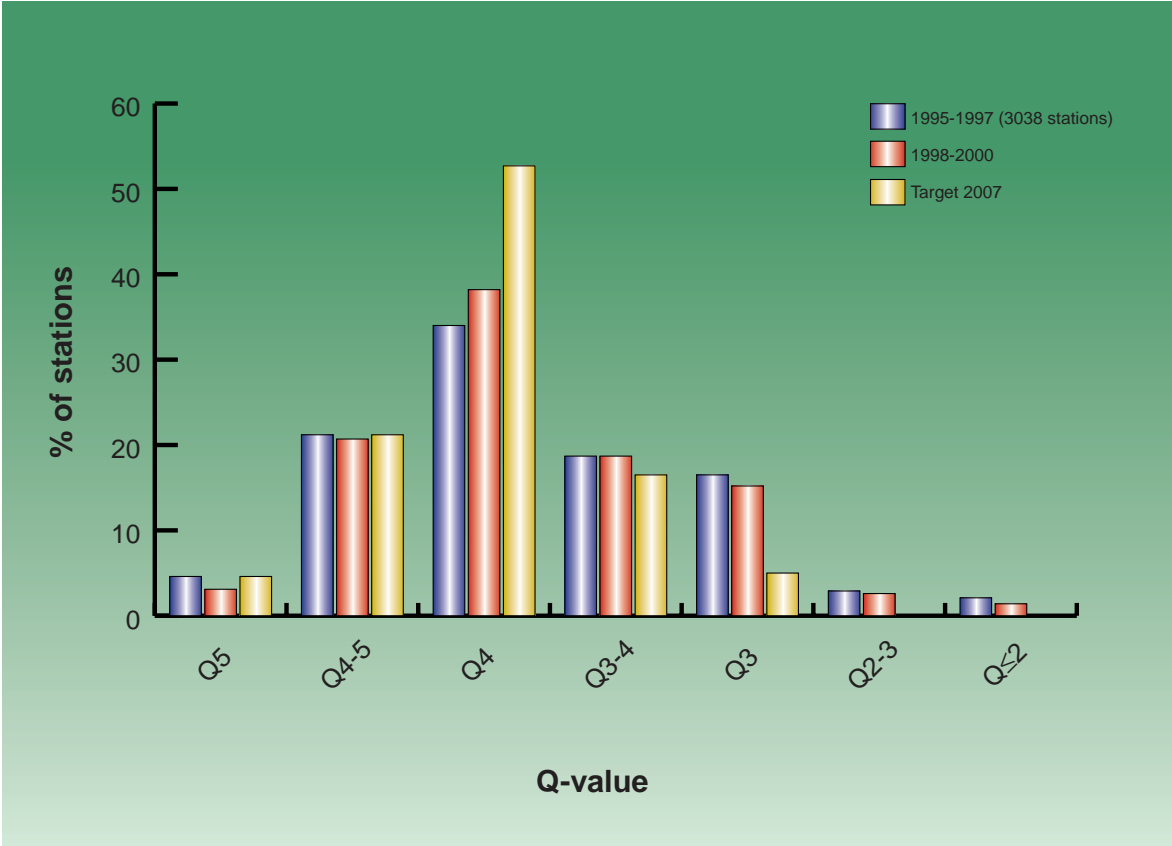
Existing Q-value Status	Q5	Q4-5	Q4	Q3-4	Q3	Q2-3	Q2	Total	% of Stations Satisfactory (biology only)*	No. of stations meeting Biological Targets of Regulations	% of stations meeting Biological Targets of Regulations
Carlow	1	14	26	13	6	0	0	60	68	40	67
Cavan	4	18	27	28	18	3	2	100	49	42	42
Clare	12	25	68	11	16	6	1	139	76	95	68
Cork	4	86	191	66	33	3	0	383	73	242	63
Donegal	18	80	74	19	22	8	7	228	75	133	58
Dublin Corporation	0	0	0	0	3	1	3	7	0	1	14
Dublin South	1	2	3	2	2	2	2	14	43	5	36
Dun Laoghaire Rathdown	1	0	0	1	5	1	0	8	13	1	13
Fingal	0	0	2	1	10	4	1	18	11	4	22
Galway	5	38	107	22	25	5	1	203	74	140	69
Kerry	10	61	84	26	18	1	0	200	78	140	70
Kildare	0	3	8	24	30	4	5	74	15	28	38
Kilkenny	0	4	43	29	13	1	0	90	52	54	60
Laois	1	15	27	40	10	1	2	96	45	49	51
Leitrim	1	32	33	7	7	2	1	83	80	51	61
Limerick	5	10	47	22	33	6	1	124	50	65	52
Longford	0	2	16	10	7	0	2	37	49	18	49
Louth	0	7	10	12	9	0	0	38	45	22	58
Mayo	10	71	94	25	22	5	0	227	77	158	70
Meath	0	0	19	37	30	7	3	96	20	35	36
Monaghan	0	8	13	9	30	3	0	63	33	23	37
Offaly	2	10	32	33	19	2	3	101	44	51	50
Roscommon	1	13	59	19	17	6	4	119	61	77	65
Sligo	7	41	29	5	10	2	0	94	82	71	76
Tipperary NR	2	19	33	34	17	1	1	107	50	62	58
Tipperary SR	1	14	50	19	17	3	3	107	61	54	50
Waterford	0	15	37	14	6	1	1	74	70	38	51
Westmeath	0	1	20	23	15	2	0	61	34	27	44
Wexford	1	18	32	27	22	3	1	104	49	56	54
Wicklow	11	34	29	12	16	0	1	103	72	58	56
Preliminary Total	98	641	1213	590	488	83	45	3158	-	1840	-
Revised Total*	95	628	1162	569	462	79	43	3038	-	1774	-
% of Revised Total	3.1	20.7	38.2	18.7	15.2	2.6	1.4	100	62	-	58

*River stations Q4, Q4-5 or Q5; **Correcting for river stations bordering two local authority areas.

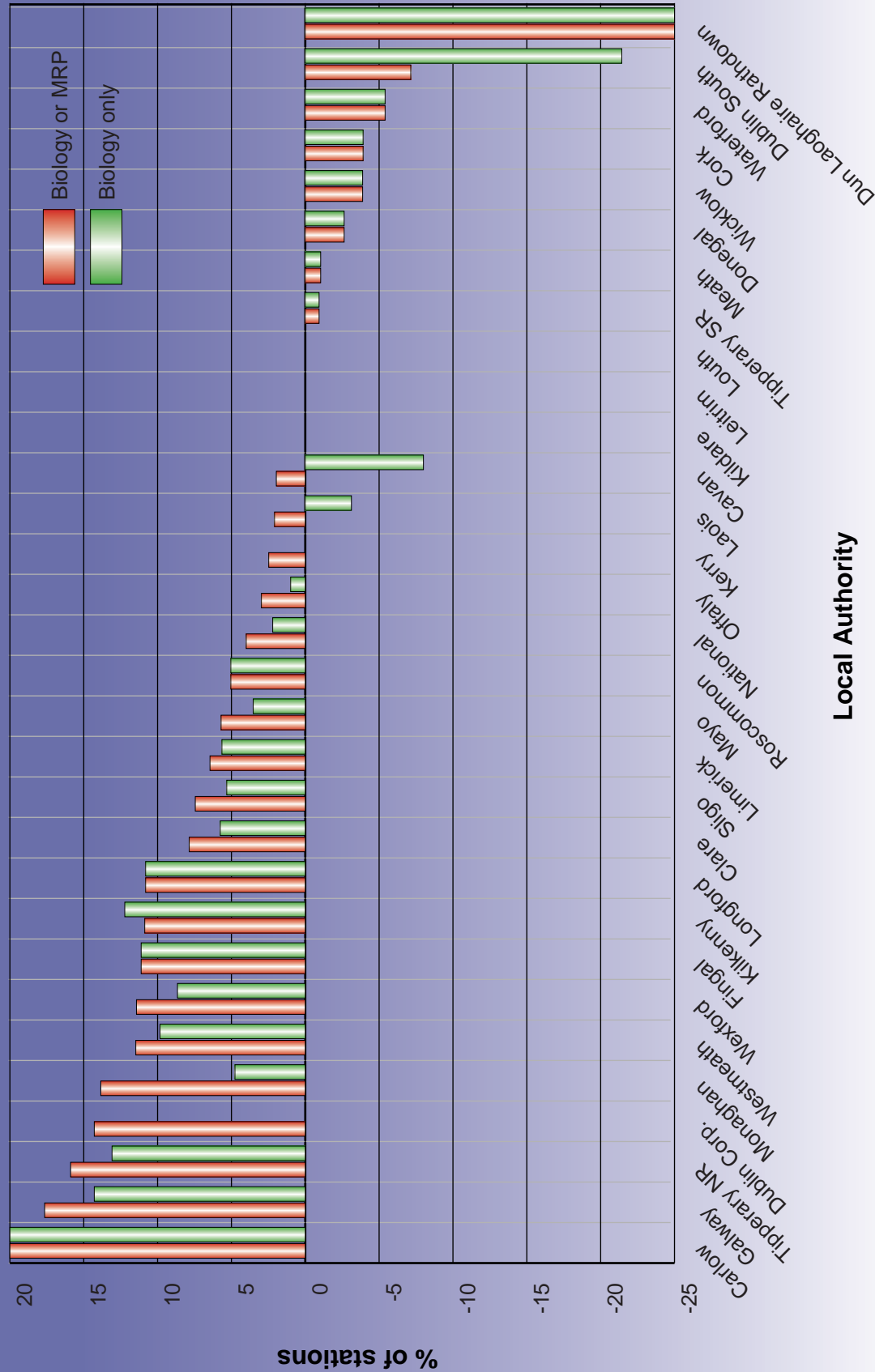
APPENDIX 1.8: TARGET NUMBER OF LOCAL AUTHORITY RIVER STATIONS IN EACH BIOLOGICAL QUALITY RATING OR MRP LEVEL CATEGORY - ADJUSTED TO ONLY TAKE ACCOUNT OF THOSE STATIONS SAMPLED IN BOTH 1995-1997 AND 1998-2000 BIOLOGICAL SURVEYS

Either MRP Target (µg P/I) Or Q-value Target	15 Q5	20 Q4-5	30 Q4	50 Q3-4	70 Q3	Total	% Satisfactory (biology or MRP)*
Carlow	1	12	33	13	1	60	77
Cavan	7	23	49	17	4	100	79
Clare	14	21	80	17	7	139	83
Cork	6	121	228	24	4	383	93
Donegal	29	83	86	18	12	228	87
Dublin Corporation	0	0	0	3	4	7	0
Dublin South	0	4	5	2	3	14	64
Dun Laoghaire Rathdown	1	0	2	4	1	8	38
Fingal	0	0	2	11	5	18	11
Galway	12	34	109	34	14	203	76
Kerry	12	70	99	15	4	200	91
Kildare	0	0	42	20	12	74	57
Kilkenny	2	3	59	23	3	90	71
Laois	3	11	60	17	5	96	77
Leitrim	8	28	40	5	2	83	92
Limerick	6	11	66	31	10	124	67
Longford	1	2	24	8	2	37	73
Louth	0	7	18	12	1	38	66
Mayo	13	66	114	25	9	227	85
Meath	0	0	56	30	10	96	58
Monaghan	1	10	16	29	7	63	43
Offaly	4	8	61	20	8	101	72
Roscommon	0	12	70	26	11	119	69
Sligo	3	38	42	9	2	94	88
Tipperary NR	5	9	61	28	4	107	70
Tipperary SR	2	12	70	21	2	107	79
Waterford	2	25	39	7	1	74	89
Westmeath	0	4	40	12	5	61	72
Wexford	0	9	61	28	6	104	67
Wicklow	14	33	42	12	2	103	86
Preliminary Total	146	656	1674	521	161	3158	
Revised Total*	141	644	1602	500	151	3038	
% of Revised Total	4.6	20.8	53.0	16.5	5.1	100	78

*River stations Q4, Q4-5 or Q5 or median MRP ≤30µg P/I; **Correcting for river stations bordering two local authority areas.



APPENDIX 1.9: NATIONAL TRENDS IN WATER QUALITY AT MONITORING STATIONS BASED ON BIOLOGICAL DATA ONLY FROM STATIONS MONITORED IN BOTH THE 1995-97 AND 1998-2000 SURVEYS.



APPENDIX 1.10: PERCENTAGE CHANGE IN BOTH NUMBER OF STATIONS WITH SATISFACTORY Q AND MRP VALUES, AND NUMBER OF STATIONS WITH SATISFACTORY Q VALUES ONLY, IN 1998-2000 SURVEY, COMPARED TO 1995-1997 SURVEY – ADJUSTED TO ONLY CONSIDER STATIONS SAMPLED IN BOTH SURVEYS.

APPENDIX 1.11: PERCENTAGE OF LOCAL AUTHORITY RIVER STATIONS COMPLIANT WITH PHOSPHORUS REGULATIONS STANDARDS FOR 2007, BASED ON 1998-2000 MRP AND BIOLOGICAL SURVEYS.

River Monitoring Stations Compliant									
0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
	Dun Laoghaire-Rathdown	Fingal	Kildare, Meath	Dublin Corp, Longford, Westmeath	Cavan, Donegal, Kilkenny, Laois, Limerick, Louth, Monaghan, Offaly, Tipperary SR, Waterford, Wexford, Wicklow	Carlow, Cork, South Dublin, Galway, Leitrim, Roscommon, Tipperary NR	Clare, Kerry, Mayo, Sligo		

APPENDIX 1.12: PERCENTAGE OF LOCAL AUTHORITY RIVER STATIONS MEETING BIOLOGICAL TARGETS OF THE PHOSPHORUS REGULATIONS, BASED ON 1998-2000 SURVEY.

River Monitoring Stations Meeting Biological Targets									
0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
	Dublin Corp, Dun Laoghaire- Rathdown	Fingal	South Dublin, Kildare, Meath, Monaghan	Cavan, Longford, Tipperary SR, Westmeath, Offaly	Donegal, Kilkenny, Laois, Limerick, Louth, Tipperary NR, Waterford, Wexford, Wicklow	Carlow, Clare, Cork, Galway, Kerry, Leitrim, Roscommon	Mayo, Sligo		

APPENDIX 1.13: PERCENTAGE OF LOCAL AUTHORITY RIVER STATIONS WITH SATISFACTORY WATER QUALITY, BASED ON 1998-2000 BIOLOGICAL AND MRP SURVEYS.
(Local authorities in bold are those where a decline in percentage of monitoring stations with satisfactory biological / MRP water quality has been recorded in the 1998-2000 survey, compared to stations also sampled in 1995-97 biological survey).

River Monitoring Stations Satisfactory									
0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
	Dublin Corp, Dun Laoghaire-Rathdown, Fingal, Kildare, Meath		Westmeath	Laois, Longford, Louth, Monaghan, Offaly	Cavan, South Dublin, Kilkenny, Limerick, Roscommon, Tipperary NR, Tipperary SR, Wexford	Carlow, Waterford	Clare, Cork, Donegal, Galway, Kerry, Leitrim, Mayo, Wicklow	Sligo	

APPENDIX 1.14: PERCENTAGE OF LOCAL AUTHORITY RIVER STATIONS WITH SATISFACTORY WATER QUALITY BASED ON 1998-2000 BIOLOGICAL SURVEYS ONLY.
(Local authorities in bold are those where a decline in percentage of monitoring stations with satisfactory biological water quality has been recorded in the 1998-2000 survey, compared to stations also sampled in 1995-97 biological survey).

River Monitoring Stations Satisfactory									
0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
Dublin Corp	Dun Laoghaire-Rathdown, Fingal, Kildare, Meath		Monaghan, South Dublin, Westmeath	Cavan, Laois, Limerick, Longford, Louth, Offaly, Wexford	Kilkenny, Roscommon, Tipperary NR, Tipperary SR	Carlow, Waterford	Clare, Cork, Donegal, Galway, Kerry, Leitrim, Mayo, Wicklow	Sligo	

APPENDIX 1.15: PERCENTAGE OF LOCAL AUTHORITY LAKES WITH SATISFACTORY WATER QUALITY, BASED ON 1995-97 SURVEYS.

Lakes Satisfactory									
0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
Meath, Tipperary NR		Cavan, Cork, Monaghan		Clare		Longford, Wicklow	Kerry, Leitrim, Westmeath	Roscommon	Cork Corp., Donegal, Galway, Mayo, Sligo

Appendix 2

EPA IMPLEMENTATION

Environmental Protection Agency

Under the EPA Act, 1992 and the Waste Management Act, 1996 a wide range of functions are allocated to the Agency which relate to the protection of water quality. These functions include the provision of support and advisory services for local authorities; the licensing, regulation and control of activities, primarily relating to industrial and waste management activities; monitoring of water quality and establishment of databases of same; and the promotion and co-ordination of research into water quality issues.

Support and Advisory Services

Phosphorus Regulations

The Agency hosted a workshop in May 1999 to facilitate preparation of local authority Measures Reports. As a follow up to the workshop, the Agency issued a Guidance Note to local authorities on preparation and submission of the Measures Reports (EPA, 1999). The Agency hosted a second workshop in June 2000 to facilitate preparation of local authority Implementation Reports. At this workshop, the Agency issued a Guidance Note to Local Authorities on Preparation and Submission of the Implementation Reports (EPA, 2000a). Following the workshop, each local authority was supplied with a list of river stations and lakes in their functional area, which are to be maintained / improved under the Regulations. The Agency also published a Synthesis Report of the Measures Reports (Clenaghan *et al.*, 2000). The Agency must publish National Reports on Implementation of the Regulations every two years from April 2001 to 2009.

Other Support and Advisory Services

The Agency, in conjunction with the DELG, County and City Managers Association and the County and City Engineers Association, is developing a management system for identifying and assessing local authority performance of statutory environmental protection functions. This system is currently being piloted with three local authorities, with a view that a digitised system will be made available to all local authorities on an incremental basis in 2001 and 2002.

The Agency has recently published guidance and reports on a number of issues relevant to water quality protection including publications on the state of the environment (Stapleton *et al.*, 2000); national water quality monitoring (Lucey *et al.*, 1999); urban wastewater (O'Leary *et al.*, 2001); water quality management planning (Fanning *et al.*, 1998); water quality objectives and standards (EPA, 1997); parameters of water quality (EPA, 2001); dangerous substances (Stephens, 2001); groundwater (DELG, GSI & EPA, 1999); and drinking water (EPA, 2000c). The Agency has also published a series of BATNEEC notes on integrated pollution control (IPC) licensing of industry; a series of landfill manuals; and regular reports on EPA licensing of industrial and waste facilities.

Licensing and Control of Waste and Industrial Facilities

Waste Management

Pollution of ground and surface waters may arise from waste disposal and recovery activities. The Waste Management (Licensing) Regulations, 1997 and 1998, brought into force the system of waste licensing under the Waste Management Act. All local authorities and private companies that are engaged in significant waste disposal and recovery activities are required to apply for a licence from the EPA. The EPA has received 157 such applications (including 5 applications for licence review) with 75 licences (including 3 reviewed licences) granted to date.

The EPA has produced a series of Landfill Manuals (1995-2001) which provide guidance on the selection, management, operation and termination of use of landfill sites. The licensing system administered by the EPA will ensure that all significant waste management activities are operated to the appropriate environmental standards, using an environmental management systems approach. Licensing of waste facilities is based on the application of an integrated approach, and the use of BATNEEC (Best Available Technology Not Entailing Excessive Costs) principles as required in the legislation, thus minimising potential impacts on all media, including surface and groundwaters. All waste licenses are issued and reviewed taking account of the phosphorus standards set in the Regulations. Licensees are required to operate an Environmental Management Systems approach, which should result in the minimisation of emissions. The Agency recently published a report on waste licensing (Laurence and Carty, 2000).

Industry

Industrial activities may have a significant impact on surface and ground water quality. Under the EPA Act, 1992, the Agency is responsible for the licensing of large or complex activities with significant polluting potential on the basis of integrated pollution control and the use of BATNEEC. The Agency has published some 40 BATNEEC guidance notes, to facilitate applicants preparing license applications, and publishes annual reports on the environmental performance of industrial activities regulated by the Agency. All industrial licenses are issued and reviewed taking account of the phosphorus standards set in the Regulations. Licensees are required to operate an Environmental Management Systems approach, which should result in the minimisation of emissions. The EPA has received 615 applications with 503 licences granted to date.

The Agency reviews the environmental performance of all its licensees to ensure compliance on an ongoing basis, and takes appropriate enforcement action and/or reviews licences as required. In particular, the Agency closely reviews the performance of Integrated Pollution Control (IPC) facilities in managed catchments, having due regard to the Phosphorus Regulations and the recommendations of Catchment Monitoring & Management reports.

The Agency has not found it necessary to specifically review any of the IPC licence discharges under the EPA (Licensing) Regulations 1994 in light of the Phosphorous Regulations. Discharge conditions pertaining to phosphorus emissions may, however, be revised in the course of reviews arising from other issues.

IPC licensing of industry has resulted in significant environmental benefits for waters in terms of pollution and waste reduction, and rationalisation of water use. For example, substantial improvements have been noted in the Dalgan and Clare Rivers, Co. Galway, through the IPC licensing of a large meat processing plant operating in the Dalgan River catchment (Clabby *et al.*, 2001). Intensive agricultural enterprises involving pig and poultry production above a minimum threshold size are subject to IPC licensing. Ultimately, all new and existing industrial and manufacturing facilities in the State with a significant pollution generating capacity will be subject to IPC licensing.

Monitoring

At present water quality and quantity data in the State arise mainly from the monitoring programmes undertaken by the EPA, the local authorities and OPW, supplemented by the work of the fishery agencies in specific fishery waters.

Hydrometric Network

Flows in the river system are measured at some 1427 locations using either continuous level recorders (546 locations) or staff gauges (881). Of the 546 continuous recorders, the OPW operate 300, which were originally intended to provide information for flood control and drainage, the ESB operate 36, primarily in relation to the operation of the hydroelectric stations and to dam safety, while the local authorities operate 188, to assist water pollution control measures. The local authorities operate the bulk of the 881 staff gauges. The EPA's eight regional teams of hydrometric technicians undertake the checking and updating of the water level/flow relationships at all of the local authority gauges and also carry out additional checks at the OPW gauges. Processing of water levels data to produce flow statistics is carried out by the EPA for the local authority gauges while the other bodies process their own data. The EPA maintains a register of all gauges and produces periodic reports on flow statistics. In addition to the foregoing, the Agency also records groundwater levels in some 350 boreholes on an ongoing basis and is incorporating similar data from earlier measurements made by the GSI into the resulting database.

River Water Quality

Most of the monitoring to date has been concentrated on the rivers, where over 13,000 km of channel are currently subject to regular chemical and/or biological sampling. The biological surveys are carried out by the EPA at some 3,200 locations over a three year cycle. Samples for chemical analysis are taken by local authorities or by the EPA on their behalf at approximately 1,600 locations, the sampling frequency mostly varying from six to twelve times per annum. Most of the measurements are designed to detect the effects of organic pollution (e.g., from sewage and farm wastes) and there is limited monitoring for potentially toxic substances.

Lake Water Quality

Only some 120 of the estimated 6,000 lakes over 1 ha are regularly surveyed for water quality status, although this includes most of the larger water bodies. While the number of lakes monitored is small surveys carried out in the 1995-97 period covered approximately 60 per cent of the total lake surface area with 23 of the 25 largest lakes/reservoirs monitored. Most of these are important fishery waters that are monitored by the Central Fisheries Board. The Shannon lakes and representative acid-sensitive lakes are monitored by the EPA while several of the local authorities monitor lakes in their functional areas either directly or with the assistance of outside agencies. The measurements made are mainly intended to detect the presence of eutrophication. A review of the National Lake Monitoring Programme has recently been published (Bowman and Toner, 2001).

Groundwater Quality

The EPA initiated a national monitoring programme for groundwaters, covering some 300 representative locations, in 1995. Previous investigations were mainly of a local nature and were undertaken by the Geological Survey and other parties. The measurements made, e.g., of faecal coliform bacteria and nitrates, are mainly those which are of interest in assessing the suitability of the groundwaters as sources of domestic and industrial supply

Tidal Water Quality

In relation to tidal waters, 21 estuaries are currently monitored annually by the EPA for general water quality conditions and, in particular, for signs of eutrophication. The Marine Institute operates a number of measurement programmes to assess the levels of potentially toxic contaminants in the marine environment, particularly in commercial species of fish and shellfish. Other monitoring programmes in tidal waters deal with the quality of bathing waters, which is undertaken by the local authorities, and the incidence of toxic algal blooms, operated by the Marine Institute.

Databases

The Agency is currently involved in a project to facilitate the collation of data between the river basin management systems being established throughout the country, under the Water Framework Directive, and the various organisations involved in environmental monitoring and reporting. It is envisaged that the standards and procedures developed as part of this project will also help in ongoing work within the Agency to improve environmental data collection, collation and dissemination, including monitoring information obtained from licensees.

Research

The Agency is responsible for developing, supporting, implementing and promoting a national programme of environmental research. Several research projects have been supported which apply directly to water quality protection and management. These include projects on lake monitoring (e.g., O'Mongain *et al.*, 1999a, 1999b, 1999c), soil nutrients (e.g., Tunney *et al.*, 2000a, 2000b), eutrophication and on the Water Framework Directive.

Appendix 3

LOCAL AUTHORITY IMPLEMENTATION

Appendix 3 - Explanatory Note.

In Appendix 3, a summary is presented of water quality status in each local authority area; of the progress made in measures being implemented; and of the additional measures proposed by each local authority. In relation to river water quality, a graph is presented for each local authority of the baseline (biological data), 1998-2000 (better of biology or MRP) and target water quality (biology or MRP), based on the requirements of the Phosphorus Regulations. River water quality is generally discussed in relation to this information and also on a comparison of biological information from the baseline, 1998-2000 and target data (see also Tables 5-8, main report). Where further analyses, based on just comparing biological data from river stations which were sampled in both 1995-1997 and 1998-2000 (see Appendices 1.6-1.8), yield a significantly different result from the above, this is also referred to in the text. Lake water quality is discussed based on information presented in the main report (Tables 9-11). Maps are presented for each county on baseline and target river and lake water quality. It is possible that, for certain counties, not all river monitoring stations may be shown as work is ongoing within the Agency on GIS development and on verifying river station locations using Geographical Positioning Systems. Summary information is provided for each local authority on progress made in measures being implemented and on additional measures proposed. These summaries are based on information contained in local authority Measures and Implementation Reports.

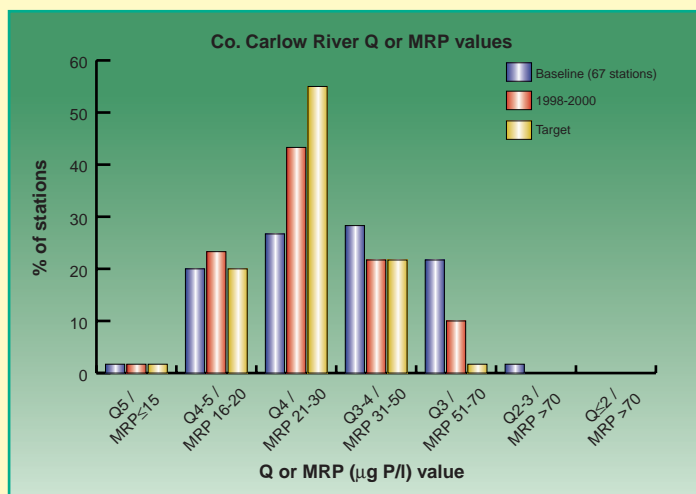
Carlow County Council

SUMMARY OF WATER QUALITY STATUS

- There has been a marked recent improvement in river water quality at monitoring stations in Co. Carlow.
- Of stations monitored in 1998-2000, 66 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 67 per cent of stations are now of satisfactory quality, while 67 per cent are satisfactory based on Q values only. A total of 49 per cent of stations were satisfactory in the baseline biological survey.

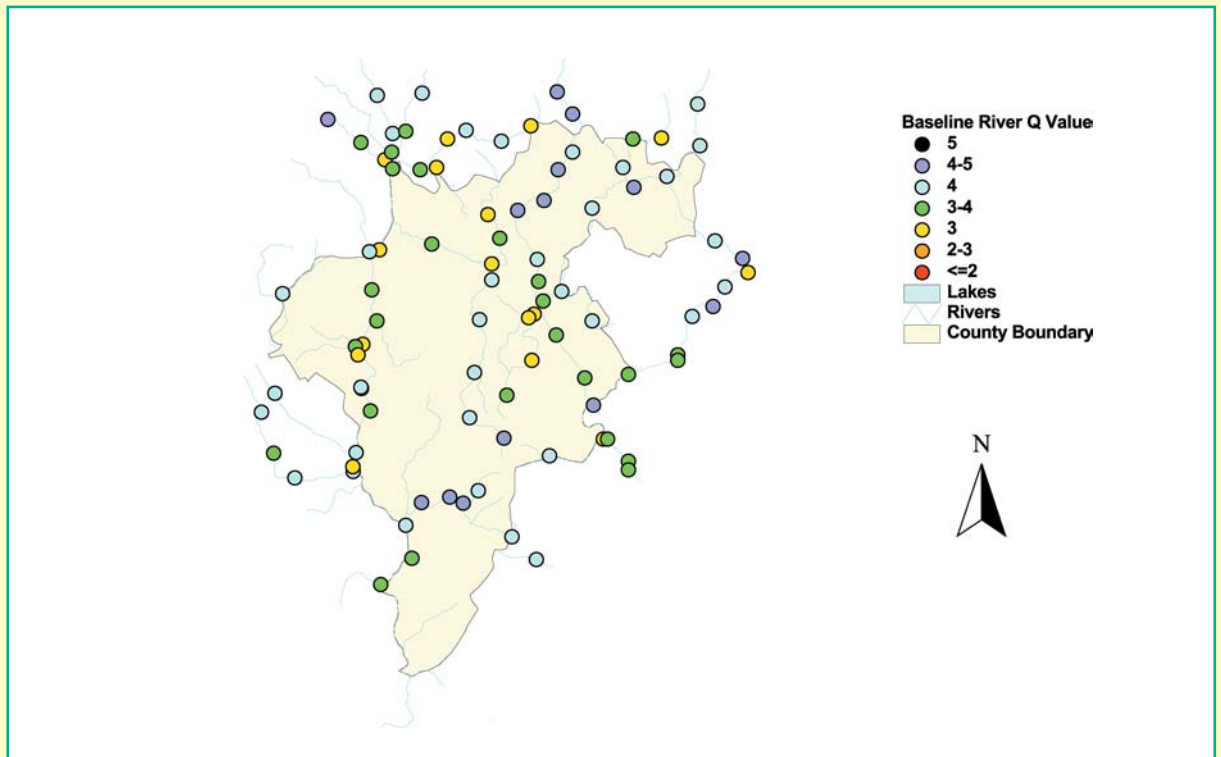
PROGRESS IN MEASURES BEING IMPLEMENTED

- Consultant engaged to do study of nutrient levels in Barrow catchment.
- Study of discharges to River Barrow near Carlow Town carried out.
- Groundwater discharges from small-scale treatment systems limited by various measures.
- Source protection plan for Muinebheag completed.
- Farm surveys carried out on River Lerr following fish kill.
- Since January 2000 two Section 12 Notices and five warning notices issued to high risk farms.
- Liaison has been carried out with Coillte and the Forestry Service to control phosphorus loss from forestry.
- Increase in farms in REPS to 420 farms (up 38). Increase in farms in Control of Farm Pollution Scheme expected.
- Funding secured for upgrade of Mortarstown and Leighlinbridge WWTPs.
- EPA licence granted for Powerstown landfill.
- GIS technicians appointed.

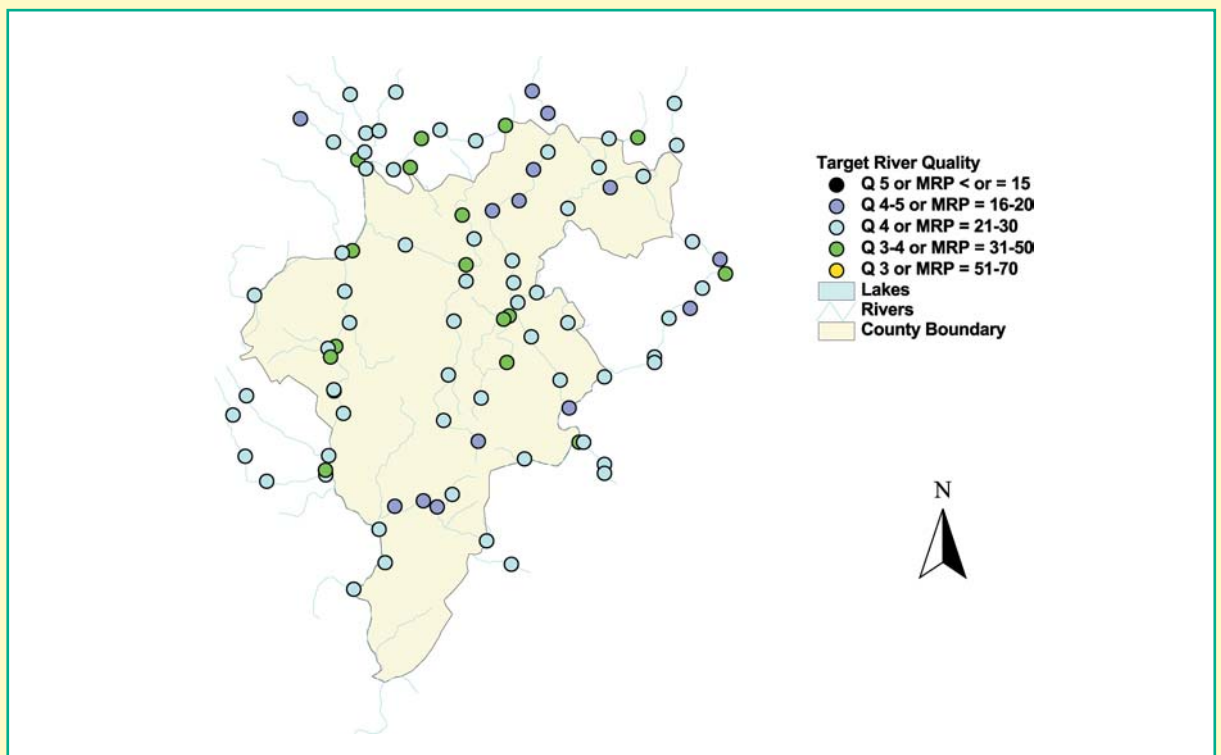


ADDITIONAL MEASURES PROPOSED

- River Basin Management Project to be established for Southeastern River Basin District at a cost of £6.5m. It is proposed that this will include groundwater protection plan and Barrow and Slaney water quality management plans.
- Extend groundwater and surface water monitoring programmes.
- Existing Section 4 and 16 discharge licences will be reviewed and phosphorus loadings determined.
- Existing discharges which do not come under Section 4 or 16 control at present to be surveyed to examine phosphorus loadings.
- Improvements to wastewater treatment plants proposed, including tertiary treatment for Mortarstown and Muinebheag (and possibly Tullow), and secondary treatment for Leighlinbridge.
- Conduct farm surveys in selected catchments. Use Section 12 Notices where necessary.
- Introduce agricultural bye-laws in selected sub-catchments (Burren and Douglas sub-catchments of the Barrow and Slaney respectively).
- All intensive agricultural enterprises will be subject to Nutrient Management Planning.
- It is proposed to continue with the Barrow Catchment Management Committee.
- Conduct study of phosphorus budgets in Burren and Douglas sub-catchments.
- Establish GIS for Barrow and Slaney catchments.
- Public education through website, environmental awareness campaign and provision of technical advice.
- Support financial measures (e.g., REPS, Control of Farm Pollution Scheme).



Map 1 Baseline River Quality in County Carlow



Map 2 Target River Quality in County Carlow

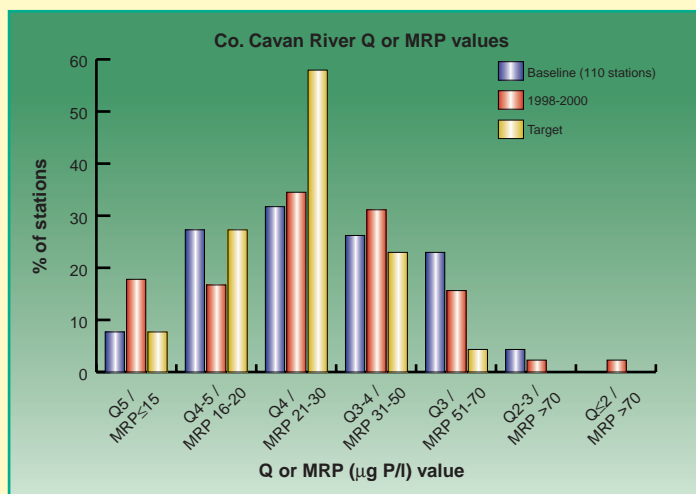
Cavan County Council

SUMMARY OF WATER QUALITY STATUS

- The trend in river water quality at monitoring stations in Co. Cavan in the 1998-2000 surveys is equivocal.
- Of stations monitored in 1998-2000, 55 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 57 per cent of stations are now of satisfactory quality, while 49 per cent are satisfactory based on Q values only. A total of 55 per cent of stations were satisfactory in the baseline biological survey.
- Whilst the number of stations recording either a Q5 value or an $\text{MRP} \leq 15 \mu\text{g P/l}$ in 1998-2000 is greater than the number of Q5 stations in the baseline survey, the actual number of Q5 stations has fallen from seven to four.
- The number of seriously polluted sites has risen.
- Six of the eight lakes monitored in the baseline survey were of unsatisfactory quality (Loughs Gowna, Mullagh, Oughter, Ramor, Sheelin and Sillan). Current monitoring of Lough Sheelin indicates that it is still of unsatisfactory quality.

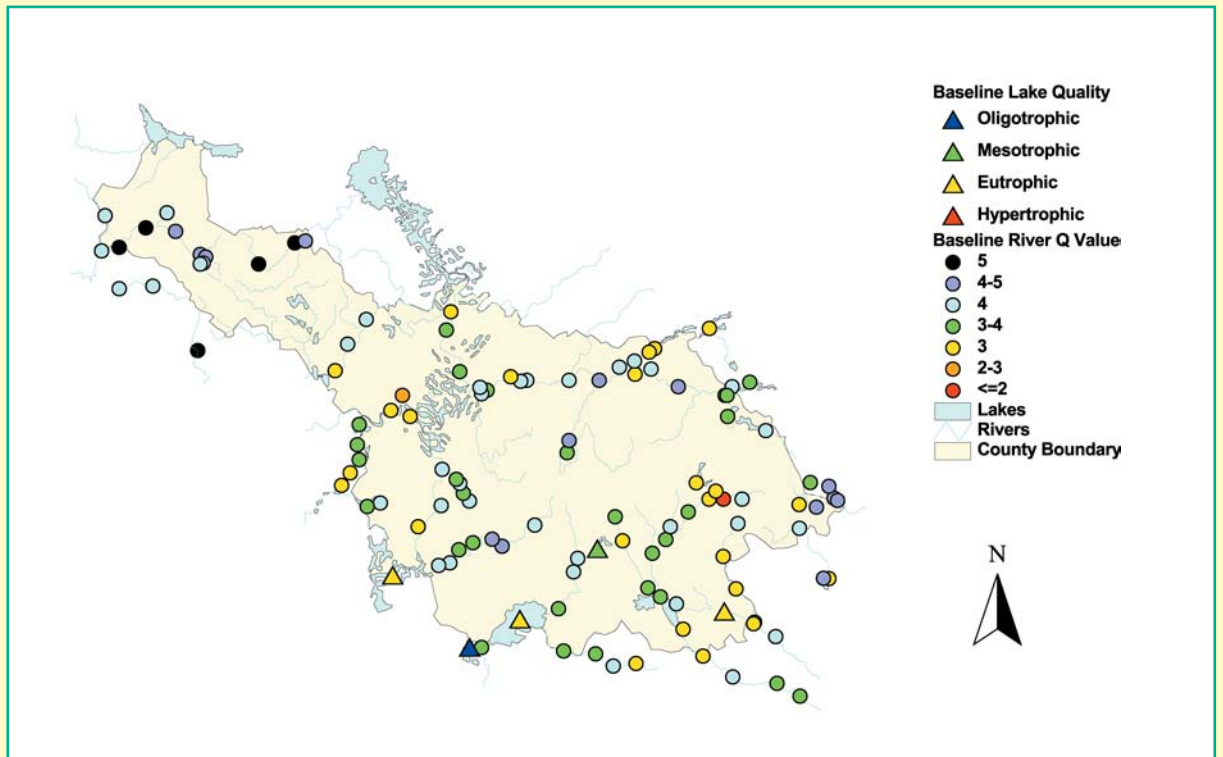
PROGRESS IN MEASURES BEING IMPLEMENTED

- Planning controls on small-scale sewage treatment works introduced.
- Construction/upgrading of Cavan, Cootehill, Belturbet, Bellanagh, Virginia, Killashandra and Ballyjamesduff WWTPs completed or underway, with positive results noted downstream of Ballyjamesduff.
- Sewerage schemes sought/underway for Redhills, Stradone, Crosskeys and Mountnugent.
- Collection systems being upgraded in Latt and Swellan in Cavan and in Virginia.
- Four landfill licences applied for, including extension to Corranure site.
- Agricultural bye-laws introduced in the Sheelin catchment on 1 January 2001, following extensive consultation. Bye-laws may be extended to other areas if successful.
- Publicity and public education from bye-law introduction.
- Liaison with EPA on IPC facilities and with other local authorities ongoing.
- Involvement in Erne Sustainable Wetlands Project.
- River and lake monitoring programmes reviewed and expanded.
- Considerable investment in lake monitoring equipment (£50K).
- 'Hot spot' area study for Lough Sillane, Lough Ramor, and Rag River catchments initiated.
- Monitoring downstream of certain industries commenced. REPS participation and good agricultural practice encouraged.
- Approval obtained for three additional staff in Environment Section including an environmental scientist.

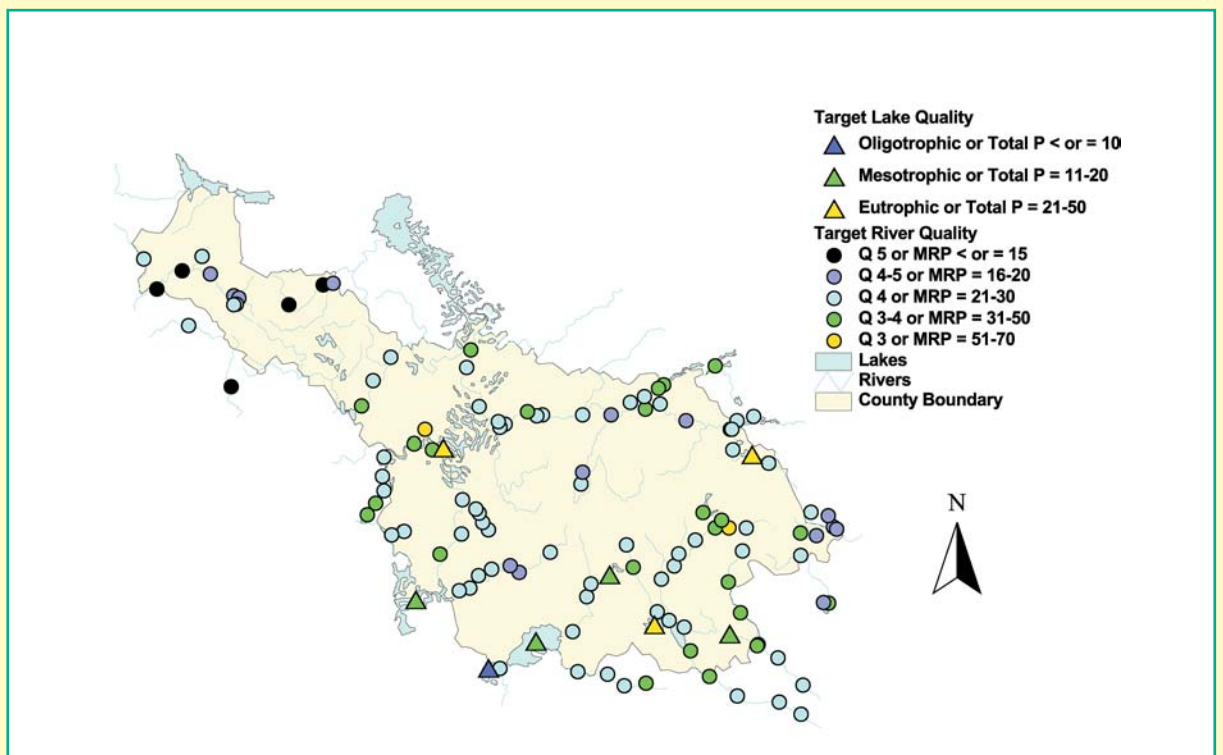


ADDITIONAL MEASURES PROPOSED

- Increased public information and education programme proposed.
- Harmonisation of river monitoring with that of the EPA.
- Licence conditions for significant industries will be reviewed and non-compliant discharges targeted.
- Upgrade wastewater collection and treatment throughout County including phosphorus removal at selected WWTPs.
- Identify areas where significant numbers of septic tanks and unsewered discharges exist, quantify their effects on water quality and make proposals for adequate treatment of the discharges.
- Provide information on maintenance of septic tanks and other treatments.
- Concentrate resources initially on "high risk" areas identified from GIS.
- Investigate sources of diffuse agricultural pollution to a number of rivers/lakes through farm surveys and apply Section 12 procedure where necessary.
- Refine agricultural non-point source model.
- Undertake soil survey of county and review soil testing procedures.
- Develop forecasting system for slurry spreading.
- Provide for implementation of Lough Ree/Derg Management Proposals in Shannon catchment.
- Seek approval for project co-ordinator to lead project on alternative technologies to deal with agricultural waste.



Map 3 Baseline River and Lake Quality in County Cavan



Map 4 Target River and Lake Quality in County Cavan

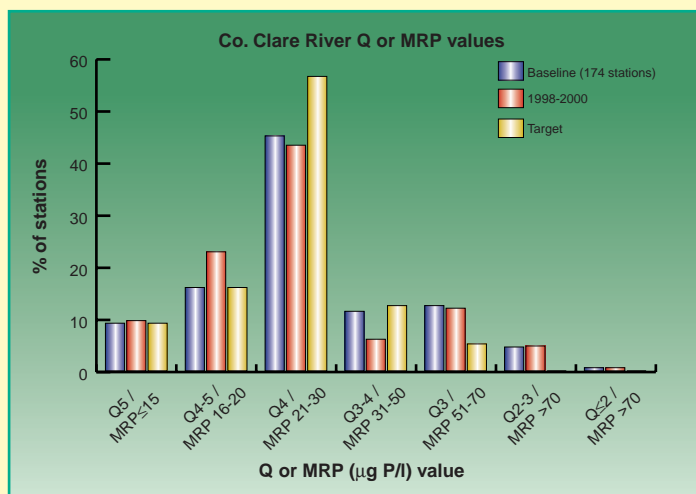
Clare County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Clare has improved in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 71 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 76 per cent of stations are now of satisfactory quality, while 74 per cent are satisfactory based on Q values only. A total of 71 per cent of stations were satisfactory in the baseline biological survey.
- The number of stations recording either a Q5 value or an $\text{MRP} \leq 15 \mu\text{g P/l}$ in 1998-2000 is the same as the number of Q5 stations in the baseline survey. However, the number of Q5 stations has fallen.
- Six of the eleven lakes monitored in the baseline survey were of unsatisfactory quality (Loughs Ballybeg, Ballycullinan, Derg, Dromore, Gortglass and Lickeen). Current monitoring indicates Lough Derg has improved in quality to mesotrophic status and complies with the Regulations. However, this apparent improvement may be largely due to infestation of the lake with the zebra mussel.

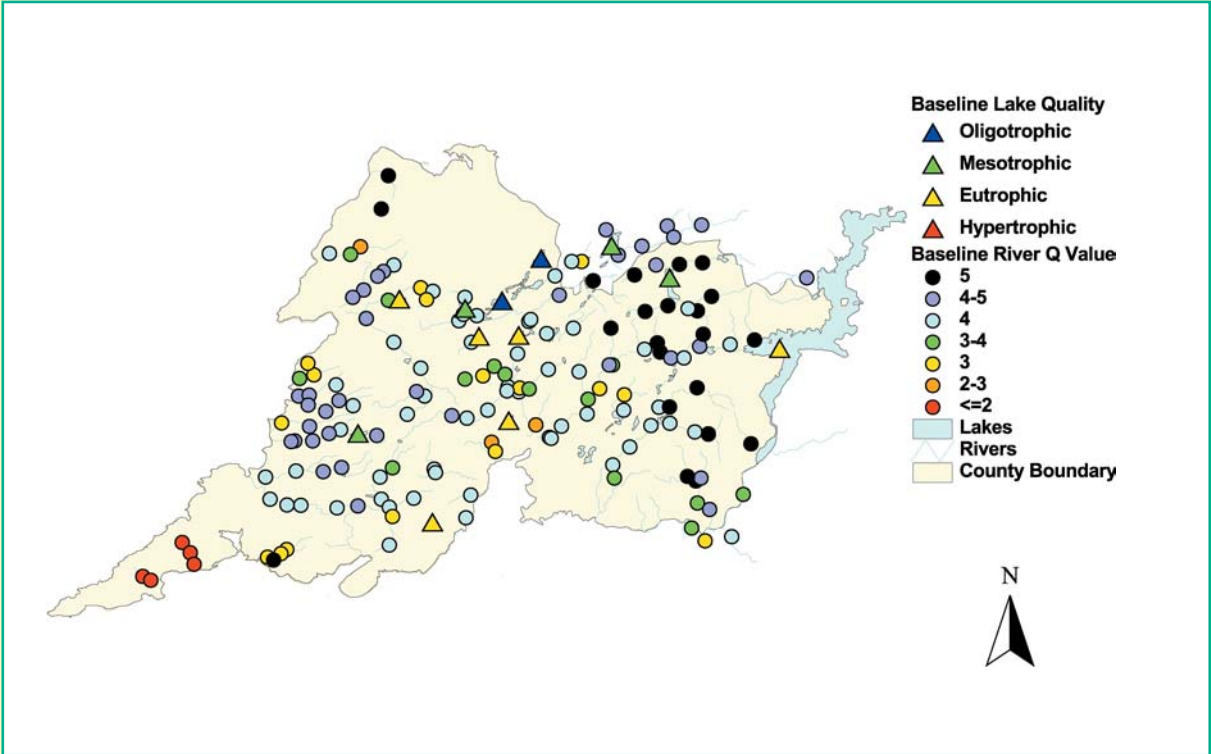
PROGRESS IN MEASURES BEING IMPLEMENTED

- Groundwater protection scheme for County near completion.
- Source protection plans were prepared for Ennis, Ballyvaughan and Whitegate water supply source areas and are to be implemented shortly.
- Waste management plan adopted by Limerick and Kerry County Councils and Limerick Corporation.
- Doorra landfill to close in 2001 and central waste facility planned for Inagh 2001-2002.
- Co-ordination of planning and water quality.
- Catchment studies undertaken for Lickeen Lough, Lake Cullaunhyheeda (Nth), Ballybeg / Killone Lakes, Victoria Stream and Lough Derg.
- Catchment studies have comprised extensive farm surveys (over 200), risk classification and issue of Section 12 Notices and Advisory letters where necessary. More farm surveys proposed.
- Promotion of Best Farm Management Practice and REPS.
- In year ending July 2000, three new licences issued under Section 4 of the Water Pollution Act, twenty-nine Section 12 Notices and three Section 23 Notices were issued and legal proceedings taken in three cases of isolated pollution.
- Liaison with Coillte on aerial fertilisation.
- Ongoing monitoring of thirty WWTPs, thirteen rivers and twenty-six groundwater sites by Co. Council and 80-100 lakes by Trinity College Dublin.
- GIS being used for catchment management.
- Environmental Awareness Officer appointed May 2000.
- Environmental Technicians participate in REPS courses.
- Public awareness / education included in Lough Derg/Ree study.

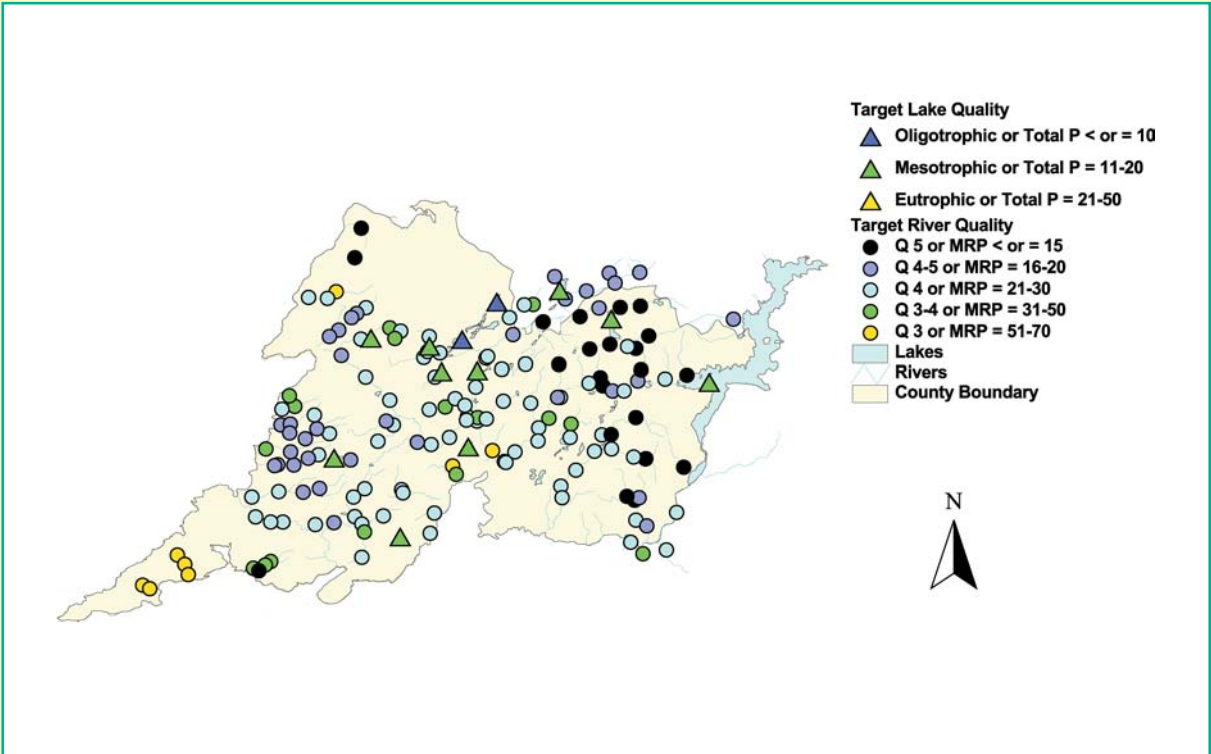


ADDITIONAL MEASURES PROPOSED

- Proposed Shannon River Basin Management Project and Western River Basin Management Project to incorporate 96 per cent and 4 per cent of county respectively.
- Establish multi-sectoral catchment management groups.
- Support more designations under EU Freshwater Fish Directive.
- Require Nutrient Management Plans for high risk farms.
- Control discharges from septic tanks and small treatment plants through planning.
- Prepare Source Protection Plan for Ballybeg and Killone Lakes.
- New sewerage schemes to be provided for Feakle, Kilkishen, Quilty/ Mullagh, Doolin, Broadford, Carrigaholt, Labasheeda, Corraclare, Crusheen, Limerick environs.
- Sewerage schemes will be upgraded at Ennis/Clarecastle, Scarriff/Tuamgraney, Lisdoonvarna, Shannon, Corofin, Ballyvaughan, Kilfenora and Tulla.
- New WWTPs for Feakle, Carrigaholt, Cusheen and Kilkee.
- Phosphorus removal to be provided at Feakle, Kilkishen, Broadford, Carrigaholt, Corraclare, Tulla, Ennis/Clarecastle, Scarriff /Tuamgraney, Lisdoonvarna, and Corofin WWTPs.
- Constructed wetlands proposed for Cooraclare, Labasheeda and Carrigaholt.
- Assess discharge effects of Carrigaholt and Kilrush.
- Council seeking additional finance/staff from Government.



Map 5 Baseline River and Lake Quality in County Clare



Map 6 Target River and Lake Quality in County Clare

Cork Corporation

SUMMARY OF WATER QUALITY STATUS

- The EPA has no river biological monitoring stations in the functional area of Cork Corporation.
- One lake, known as The Lough, was monitored in the baseline survey and recorded to be of mesotrophic status – a status that must be maintained under the Regulations.

PROGRESS IN MEASURES BEING IMPLEMENTED

- Measures yet to be implemented.

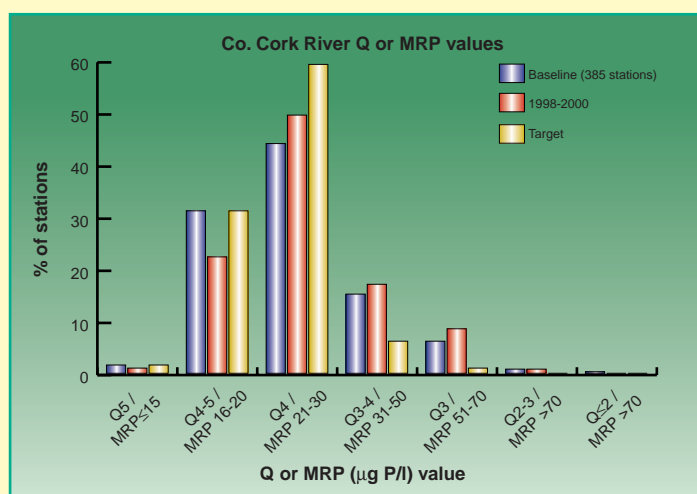
ADDITIONAL MEASURES PROPOSED

- The Agency did not receive a Measures Report from Cork Corporation, however an Implementation Report was received in March 2001.
- Cork Corporation submitted a letter to the Agency in February 2000 stating that only a very small stretch of water of the River Lee is freshwater within the functional area of the Corporation, the rest being estuarine. The Corporation abstracts water from this location to treat and supply to the majority of the citizens in the city. The Corporation is concerned with protecting the quality of the water at this location and has viewed the deterioration in the symptoms of eutrophication since the 1980s with alarm. The Corporation states that the cause of these symptoms is the nutrient enrichment of Iniscarra Lake, which is in the functional area of Cork County Council. The Corporation has expressed its concern to the County Council on a number of occasions in the past.
- The Corporation also states that the estuarine stretch of the River Lee is enriched due to the sewage discharges from the city. Some of the smaller streams and rivers also suffer from cross connections, sewer overflows in the city and imported nutrients from farm activities in the county. The Corporation states that the municipal treatment plant will improve the water quality in the Lee estuary enormously, but that improvements to the quality of the streams in the county area would also be desirable.
- Measures proposed in the Implementation Report for maintenance of water quality in Cork Lough include:
 - Maintenance and upgrading of exit drain.
 - Possible tracing of underground sources and hydraulic contributions to the Lough.
 - Monthly monitoring of Lough.
 - Consultation with public representatives, community groups, wildlife groups, fishery interests, South Western Regional Fishery Board and other interested parties.
 - Stabilisation or reduction in bird life numbers may be required.

Cork County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Cork has declined in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 63 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 73 per cent of stations are now of satisfactory quality, while 73 per cent are satisfactory based on Q values only. A total of 77 per cent of stations were satisfactory in the baseline biological survey.
- The number of high quality Q5 and Q4-5 stations has fallen significantly.
- Three of the four lakes monitored in the baseline survey were of unsatisfactory quality (Abisdealy, Ballinlough and Iniscarra).



PROGRESS IN MEASURES BEING IMPLEMENTED

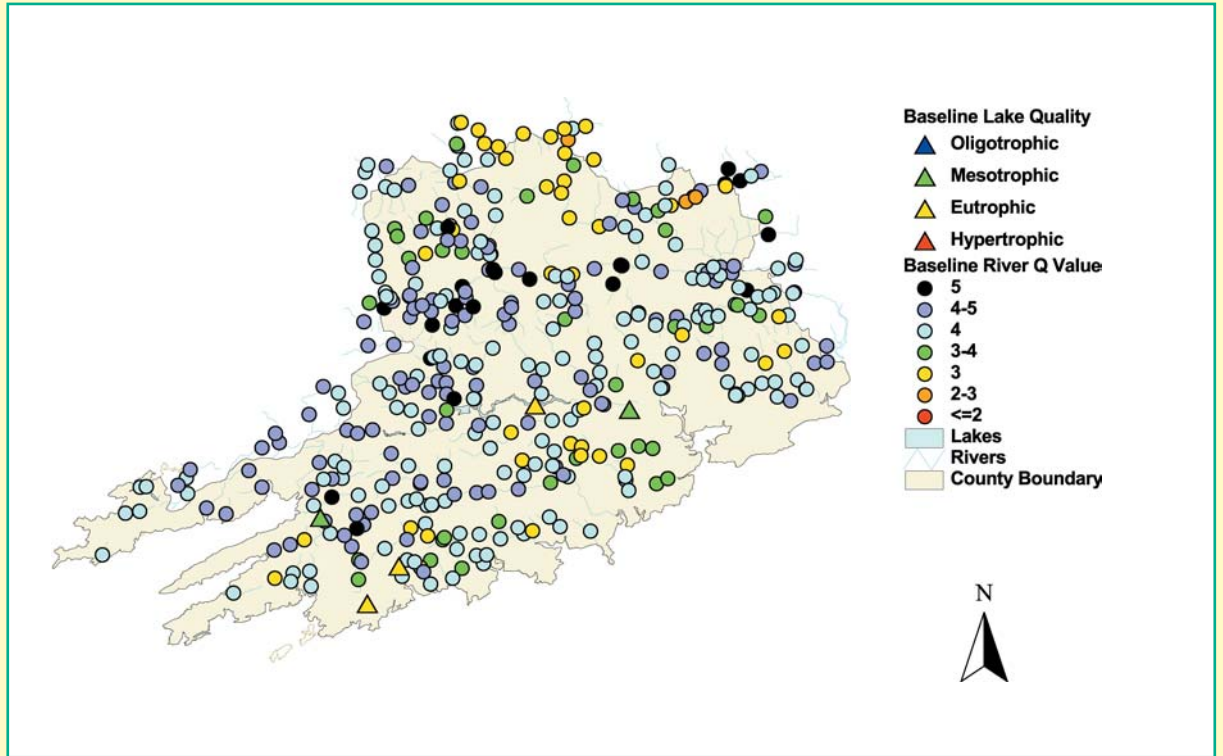
- Byelaw Co-ordinator, Nutrient Management Specialist and Phosphorus Regulations Manager all retained.
- Additional agricultural and environmental staff appointed, more expected.
- Priority Farm Survey programme developed.
- 1049 farms visited in 2000, 343 warning letters sent, forty-nine Section 12s issued, four Section 23s issued, several farm plans and Nutrient Management Plans requested and agreed, several prosecutions in progress.
- Agricultural Byelaws came into force on 1 October, 1999, regulating agricultural practices in River Lee, Funshion and Gradoge catchments.
- Major bye-law publicity campaign in operation (including 6000 information packs).
- Joint work with Teagasc on benefits of NMP.
- Public Awareness Campaigns on environment ongoing.
- Study of Options for the Treatment / Management of Pig Slurry conducted – policy on Pig Slurry Production now under consideration.
- Survey of Pig Production units in South Cork initiated.
- Southern/Western Farm Working Group ongoing, in co-operation with Fisheries Authorities and Farm Development Authorities.
- Industrial Wastewater, Municipal Wastewater and Water Resources working groups established.
- Ongoing liaison with Kerry Co. Co., EPA, GSI, Teagasc, re proposed Shannon Catchment Management Body ongoing.
- Workshop held between council and Fisheries Board to standardise approach to farm surveys.
- Cork County Council Waste Management Plan for Cork County published May 1999.
- River, lake and groundwater monitoring reviewed and augmented.
- Phosphorus monitoring initiated at large WWTPs.

PROGRESS IN MEASURES BEING IMPLEMENTED

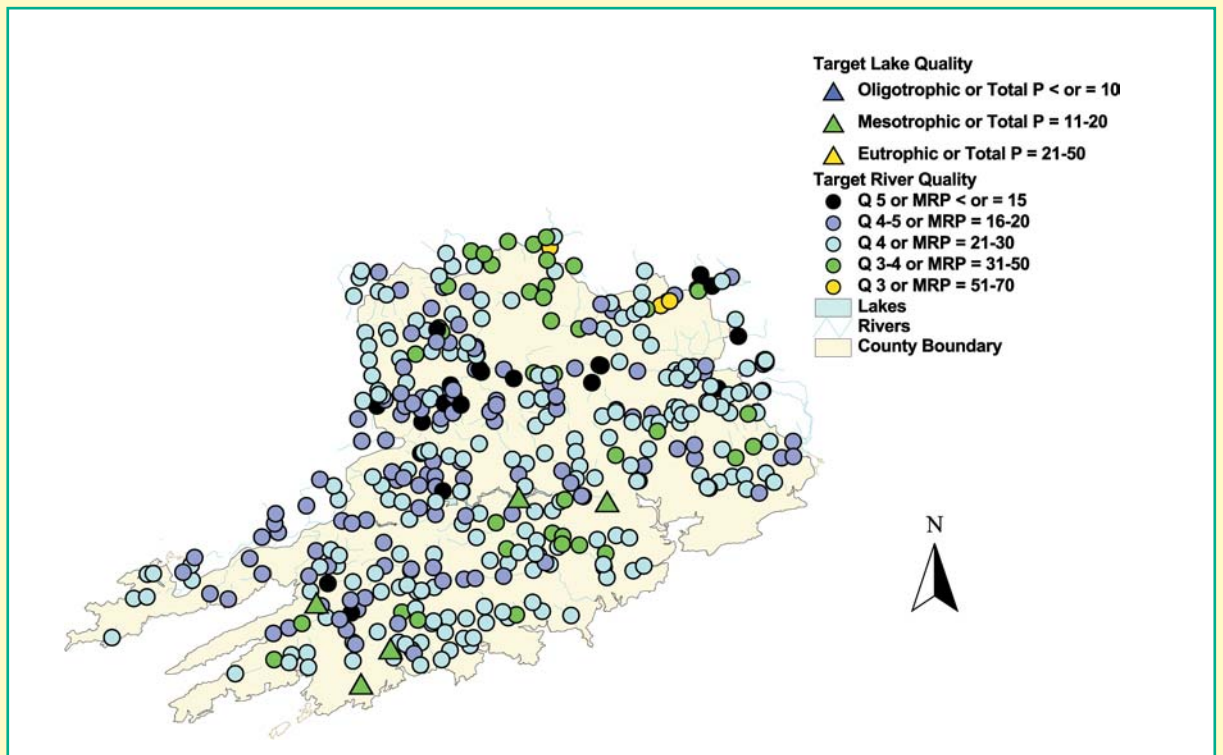
- County list of 170 IPC and non-IPC industries compiled, discharge points identified and priority list drawn up for investigation /review or discussion with EPA as appropriate.
- All new non-IPC industrial licences to submit effluent management plan.
- Regular monitoring of non-IPC industries and some prosecutions in progress.
- County list of 150 WWTPs compiled, discharge points identified and priority list drawn up for investigation/review of operations.
- A reassessment of water supply and sewerage needs for Cork County and Borough is currently being carried out by Sanitary Services.
- Foul and surface drainage systems being surveyed and upgraded in certain areas.

ADDITIONAL MEASURES PROPOSED

- Agricultural bye-law compliance surveys.
- Continue active programme of farm surveys.
- GSI to produce an Aquifer Protection Plan for the South Cork region and source protection zones for six sites in North Cork.
- More liaison with forestry bodies required.
- North, South and Western Sanitary Services Working Groups to be further developed.
- Re-establish Northern Farm Working Group.
- Project proposed on sludge management practices and spreadlands of industry / WWTPs.
- Environmental Education Officer proposed.
- GIS facility under consideration.
- Purchase additional monitoring equipment.
- More integrated environmental approach in future Cork County Development Plans.
- Upgrading/ construct WWTPs.
- Time extension for achieving targets.



Map 7 Baseline River and Lake Quality in County Cork

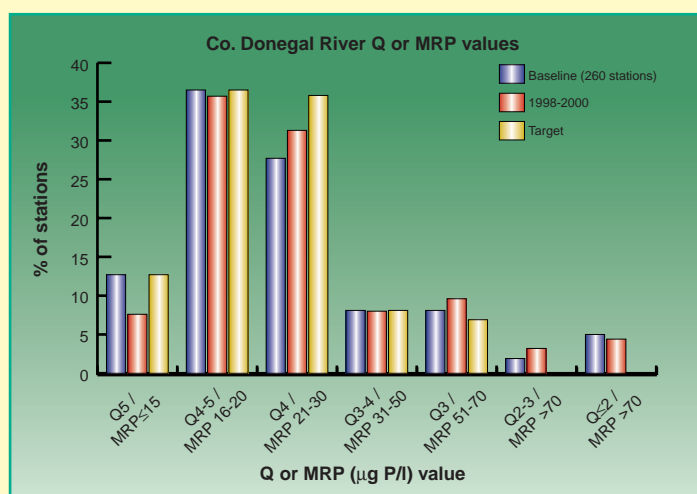


Map 8 Target River and Lake Quality in County Cork

Donegal County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Donegal has declined in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 59 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 75 per cent of stations are now of satisfactory quality, while 75 per cent are satisfactory based on Q values only. A total of 77 per cent of stations were satisfactory in the baseline biological survey.
- The number of high quality Q5 stations has fallen markedly.
- There is still a relatively high proportion of stations with badly polluted waters.
- All of the six lakes monitored in the baseline survey were of satisfactory quality. Current monitoring indicates that these lakes have maintained their satisfactory quality.



PROGRESS IN MEASURES BEING IMPLEMENTED

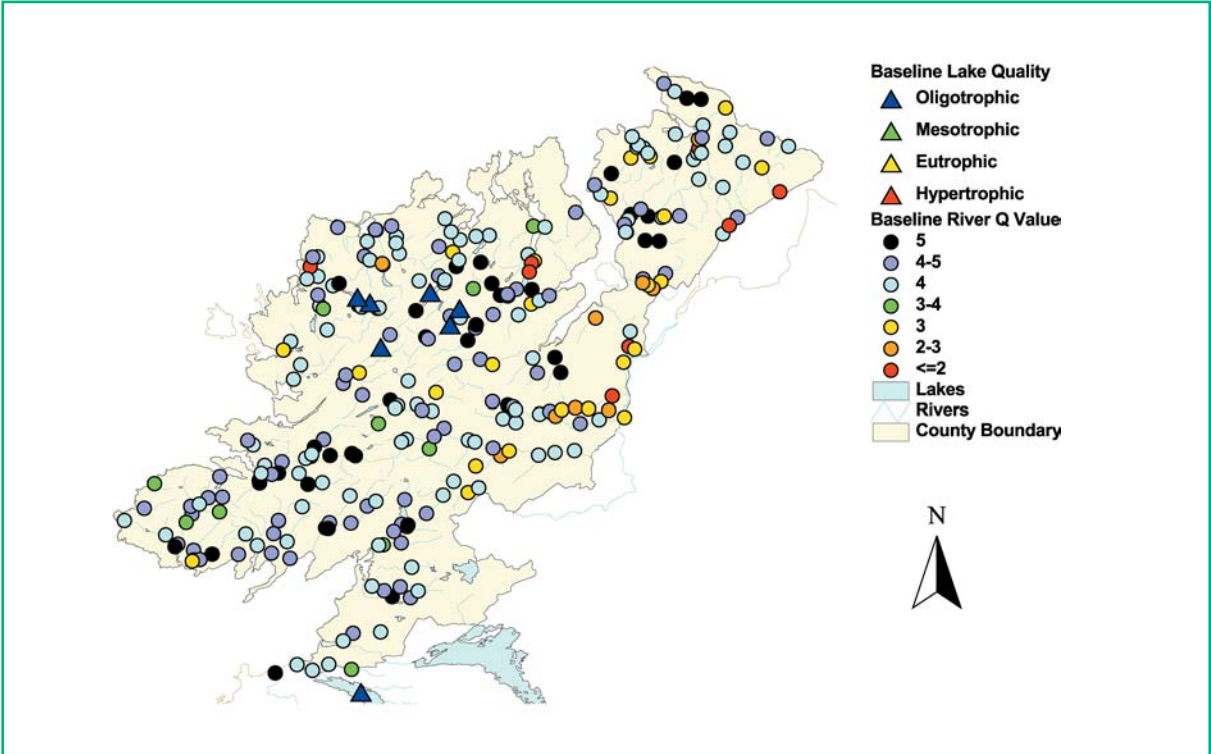
- Standing Committee on Pollution ongoing – discusses all environmental issues including farm management and aquaculture.
- Meeting with major aquaculture developer held to improve discharge to Tullaghobegly River from this source.
- Monitoring and licensing of industrial discharges under Water Pollution Act ongoing. Stricter conditions being applied.
- Industrial pollution of Aigh River stopped.
- Improvement in discharge from Killybegs Fish Processing plant and other processors following installation of effluent treatment and clean technology.
- Sludge Management Plan drafted and awaiting final adoption by Elected Members.
- Sludge Management Plan involved high level of co-operation with agricultural sector.
- Number of agricultural pollution incidents dealt with.
- Teagasc advice always sought in control of agricultural pollution problems.
- Continuous programme of farm surveying in operation.
- Draft Waste Management Plan under consideration by Elected Members.
- Two EPA waste licences obtained for Churchtown and Muckish landfills - leachate treatment being installed at both landfills and Churchtown landfill to close.
- Clean-up of local dumping in Glenna River.
- Monitoring effects of aerial fertilisation of forestry at a number of sites.
- Substantial funds available for development of WWTPs – number of projects ongoing.
- Ballybofey/Stranorlar WWTP operational.

PROGRESS IN MEASURES BEING IMPLEMENTED

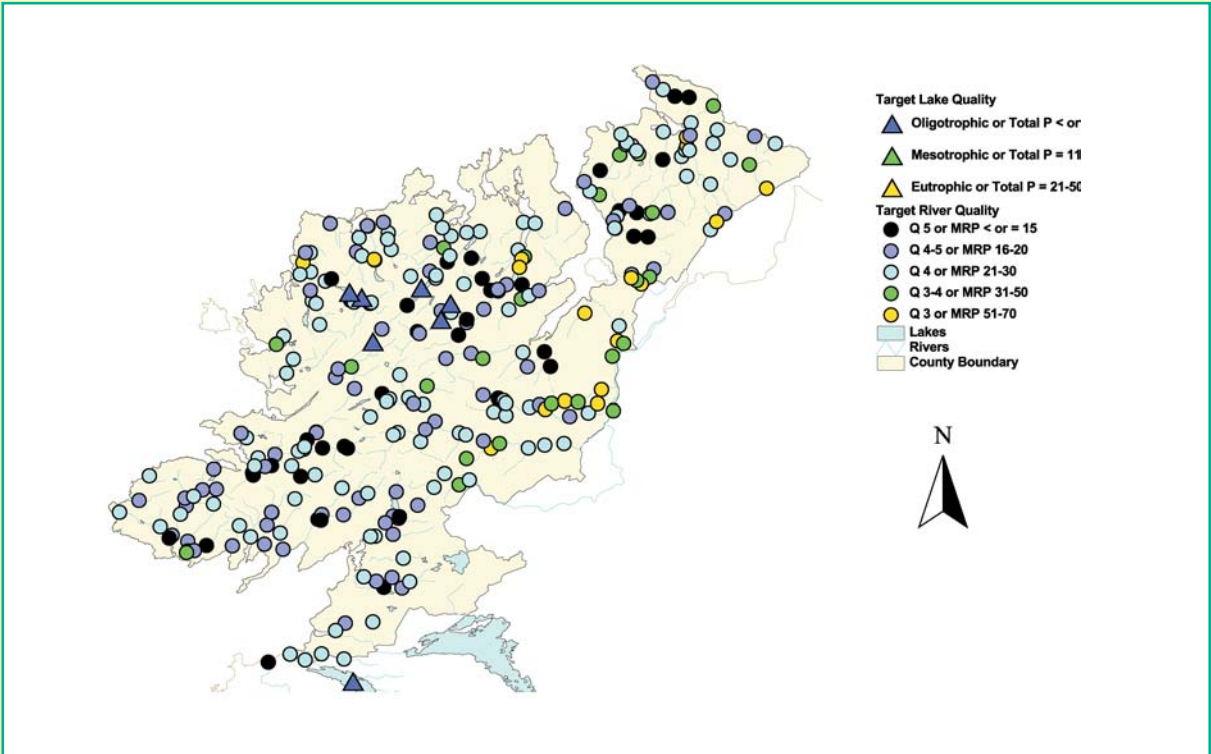
- Investigations were carried out to determine reasons for poor water quality of a number of water bodies. However, causes were indeterminate in several cases.
- Additional lake and river monitoring initiated – to be maintained and enhanced.
- Survey of Lough Swilly undertaken.
- Environmental Awareness Officer implements educational programme for all Primary schools and many Secondary schools.

ADDITIONAL MEASURES PROPOSED

- Upgrade/construct WWTPs including Moville, Ballyshannon, Rossnowlagh, Letterkenny and Carndonagh, which are to go to construction before 2002. Draft list of schemes in Measures Report.
- Pollution from several additional WWTPs noted, including those at Carrigans, Ballintra, Kilmacrennan, Milford and Dungloe.
- Control of agricultural problems through nutrient management planning or REPS.
- Foyle Catchment Management Plan to be reviewed and finalised.
- Swilly Catchment Management Plan to be implemented.
- Donegal Bay Catchment management plan to be prepared by 2002.
- Development of new laboratory facility.
- Plan to develop co-operative approach with EPA regarding chlorophyll measurement using new University College Dublin equipment.



Map 9 Baseline River and Lake Quality in County Donegal

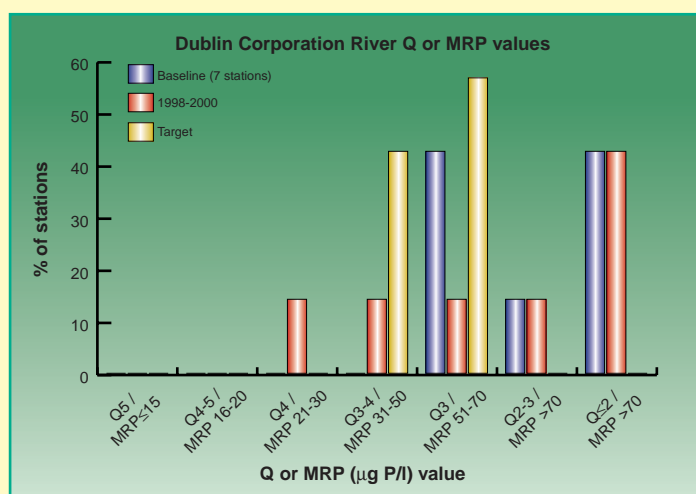


Map 10 Target River and Lake Quality in County Donegal

Dublin Corporation

SUMMARY OF WATER QUALITY STATUS

- A total of 43 per cent (3) of stations monitored in 1998-2000 comply with the standards set in the Regulations.
- Based on river Q and MRP values, 14 per cent (or 1) of the stations monitored were of satisfactory quality in the 1998-2000 survey, while none of the stations were satisfactory based on Q values only. None of the stations monitored were of satisfactory quality in the baseline biological survey.
- Significant phosphate reductions have been recorded at most stations.
- There is still a relatively high proportion of stations with seriously polluted waters.



PROGRESS IN MEASURES BEING IMPLEMENTED

- Twenty-nine new discharges to sewers and seventeen reviews screened for phosphates; two new discharges to water screened.
- Licence applicants encouraged to use phosphate free detergents where possible.
- Construction of North Fringe foul sewer commenced.
- Liaison with neighbouring Local Authorities to reduce incoming phosphate in rivers ongoing.
- Regular contact between the four Dublin local authorities and Central Laboratory on implementation of phosphate monitoring programmes.
- Work on diversion of the Clonee foul sewage (Meath) and Saggart Treatment Works (South Dublin) will contribute to improvements in river quality in the Dublin Corporation area.
- Summary report and recommendations prepared on Tolka Water Quality Management Plan with Fingal and Meath Co. Councils; measures report sent to all stakeholders.
- Additional phosphate monitoring of sites carried out to meet sampling requirements of Regulations.
- Survey to locate misconnection of foul wastewaters to surface water systems carried out in Santry and Tolka catchments.
- 2,079 houses inspected with 7.5 per cent misconnection rate in Santry (80 per cent now diverted to foul sewer) and 4.2 per cent misconnection rate in Tolka (60 per cent now diverted to foul sewer).
- Groundwater GIS for city centre gravel aquifer commenced.

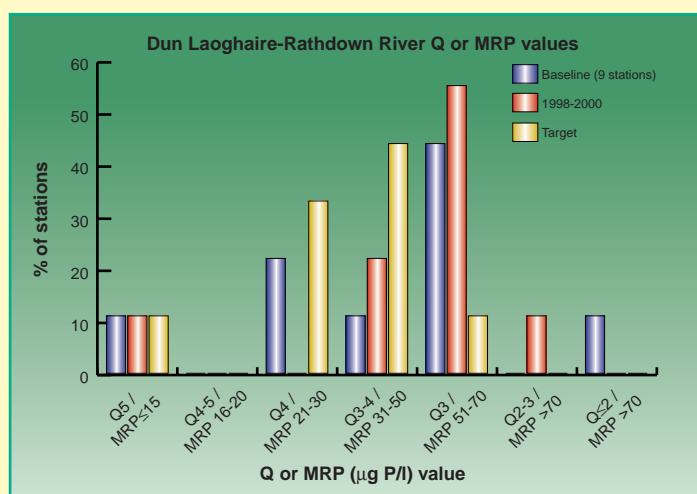
ADDITIONAL MEASURES PROPOSED

- Upgrade foul sewerage systems in Rathmines and Pembroke.
- Set up River/Groundwater GIS .
- Phosphate control to be implemented in new licences and under reviews for trade effluent discharges to sewers and waters.
- Preparation of Water Quality Management Plans for the Rivers Camac, Dodder and Santry and update of Tolka Plan deferred as Eastern River Basin Management Project proposed by DELG under the Water Framework Directive.
- Survey to locate misconnection of foul wastewaters to surface water systems planned for Camac and Dodder catchments.
- Divert all misconnections to the foul system.
- Set up hydrometric database and increase monitoring. Flow meters and OTT dataloggers to be installed at three locations.
- Establish phosphorus inputs / phosphorus loadings for each catchment.
- Conduct surveys of algal/weed growth.
- Construct wetland in the River Tolka catchment.
- Additional Q-value surveys requested.
- Set up a Phosphate Measures Group including all stakeholders.
- Recruit staff to help implement Regulations.
- Extension sought under Article 3(9) as compliance with target phosphate concentrations largely outside direct control of Dublin Corporation and is dependent on major engineering works being carried out by neighbouring local authorities.

Dun Laoghaire -Rathdown County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Dun Laoghaire-Rathdown has declined in the 1998-2000 survey, as compared to the baseline results.
- A total of 11 per cent (1) of stations monitored in 1998-2000 comply with the standards set in the Regulations.
- Based on river Q and MRP values, 11 per cent of stations are now of satisfactory quality, while 11 per cent are satisfactory based on Q values only. A total of 33 per cent of stations were satisfactory in the baseline biological survey.
- There has been a decline in water quality at the two previously satisfactory stations, but an improvement has been recorded at the seriously polluted station.



PROGRESS IN MEASURES BEING IMPLEMENTED

- The Agency has not received an Implementation Report from Dun Laoghaire-Rathdown County Council.

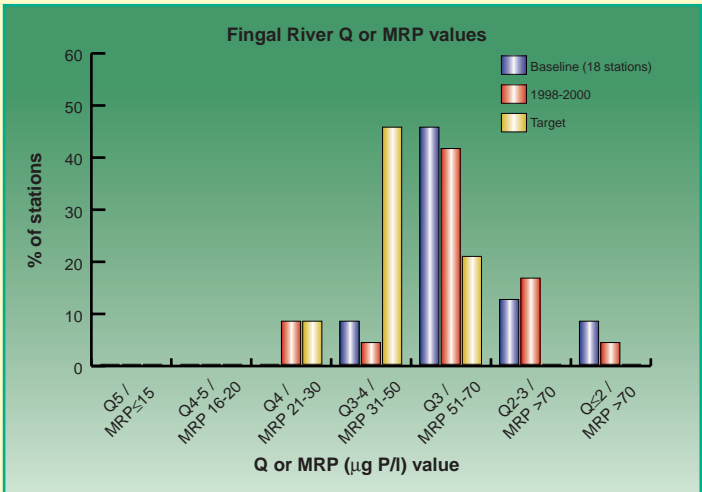
ADDITIONAL MEASURES PROPOSED

- Prepare water quality management plans for individual catchments and the county as a whole. Carry out liaison with other counties as appropriate.
- Prepare aquifer protection plan for Glencullen Stream catchment and determine if other plans are needed elsewhere.
- Assess need for nutrient management planning.
- Incorporate above plans in County Development Plan.
- Review discharge licences.
- Survey drainage systems to rectify misconnections.
- Stakeholders contacted to discuss actions to reduce discharges.
- Commence MRP sampling at EPA monitoring stations and consider increasing number of sampling points.
- Prepare a survey regime to monitor changes in riverbank habitats.
- Prepare a GIS database for the storage and review of information.
- Various public education and advisory measures.
- Investigate further funding measures for surveys and investigations into water pollution.
- Investigate if local businesses, tourist agencies, recreational bodies etc. will contribute funding for catchment management.
- Investigate leachate emissions from landfill.
- Assess distribution of and effectiveness of septic tanks.
- Identify possible hazards from existing activities.

Fingal County Council

SUMMARY OF WATER QUALITY STATUS

- A total of 22 per cent (4) of stations monitored in 1998-2000 comply with the standards set in the Regulations.
- Based on river Q and MRP values, 11 per cent of stations are now of satisfactory quality, while 11 per cent are satisfactory based on Q values only. None of the stations monitored in the baseline biological survey were of satisfactory quality .
- There has been a decline in Q-values at five stations, however significant phosphate reductions have been recorded at most stations.
- There is still a relatively high proportion of stations with moderately or seriously polluted waters.



PROGRESS IN MEASURES BEING IMPLEMENTED

- Investigation of causes of poor water quality in the Delvin, Ward and Mayne Rivers.
- Liaison with Teagasc ongoing with regard to farming practices in Fingal.
- Currently formulating list of companies / organisations to provide information on farming activities in Fingal.
- Enhanced monitoring programme introduced in March 2000 for monthly phosphate concentrations.
- Assessment of hydrometric stations currently under way.
- Pollution Section currently reviewing discharge licences (to waters and sewers) to introduce phosphate limits as a condition on licences.
- Measures outside of Fingal which should contribute to better water quality in Fingal include a sewerage scheme currently under construction at Ashbourne, Co. Meath.

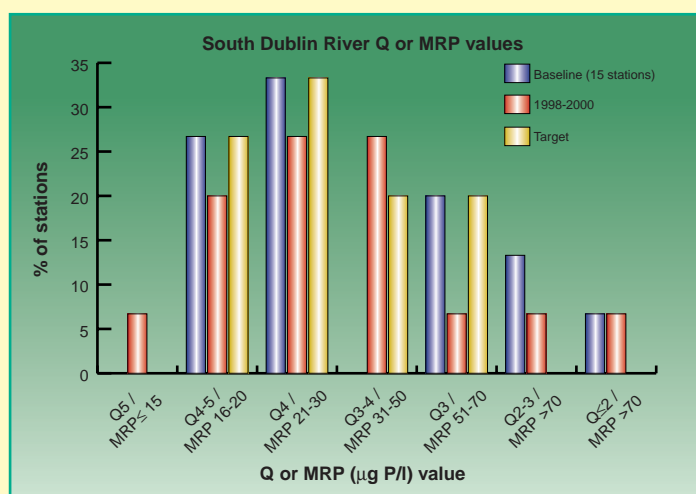
ADDITIONAL MEASURES PROPOSED

- Carry out farm surveys to assess need for Nutrient Management Planning and implement as required. Pilot Farm Survey to be conducted in 2001.
- Develop GIS with other local authorities and the Local Government Computer Services Board for the purpose of the Farm Survey.
- Review phosphate inputs from WWTP discharges, assess phosphate assimilation and upgrade treatment plants where necessary.
- Survey onsite treatment systems including septic tanks. Systems that give rise to eutrophication will be located, mapped and monitored. Where necessary enforcement action will be taken.
- A survey of storm water sewer misconnections and overflows will be undertaken in urban area and any required upgrading proposed.
- Regarding the River Liffey, Fingal County Council will co-operate with the implementation of the measures arising from the preparation of the Water Quality Monitoring and Management Scheme under the Three Rivers Project.
- Fingal will co-operate with Dublin Corporation to implement the measures detailed in their Phosphorous Measures report to improve the water quality of the Santry River.
- Swords WWTP to be upgraded and nutrient removal installed.
- Balgriffin WWTP to be decommissioned when North Fringe/Northern Interceptor Sewer Project completed in early 2002.

South Dublin County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in South Dublin has generally declined in the 1998-2000 survey, as compared to the baseline results.
- A total of 67 per cent (10 out of 15) stations monitored in 1998-2000 comply with the standards set in the Regulations. However, half of these stations met the standard through the MRP levels alone. When Q values alone are considered five stations have declined in quality since the 1995-1997 period and only one station has improved in quality.
- Based on river Q and MRP values, 53 per cent of stations are now of satisfactory quality, while 40 per cent are satisfactory based on Q values only. A total of 60 per cent of stations were satisfactory in the baseline biological survey.
- One station on the River Dodder improved in quality from Q4 to Q5.

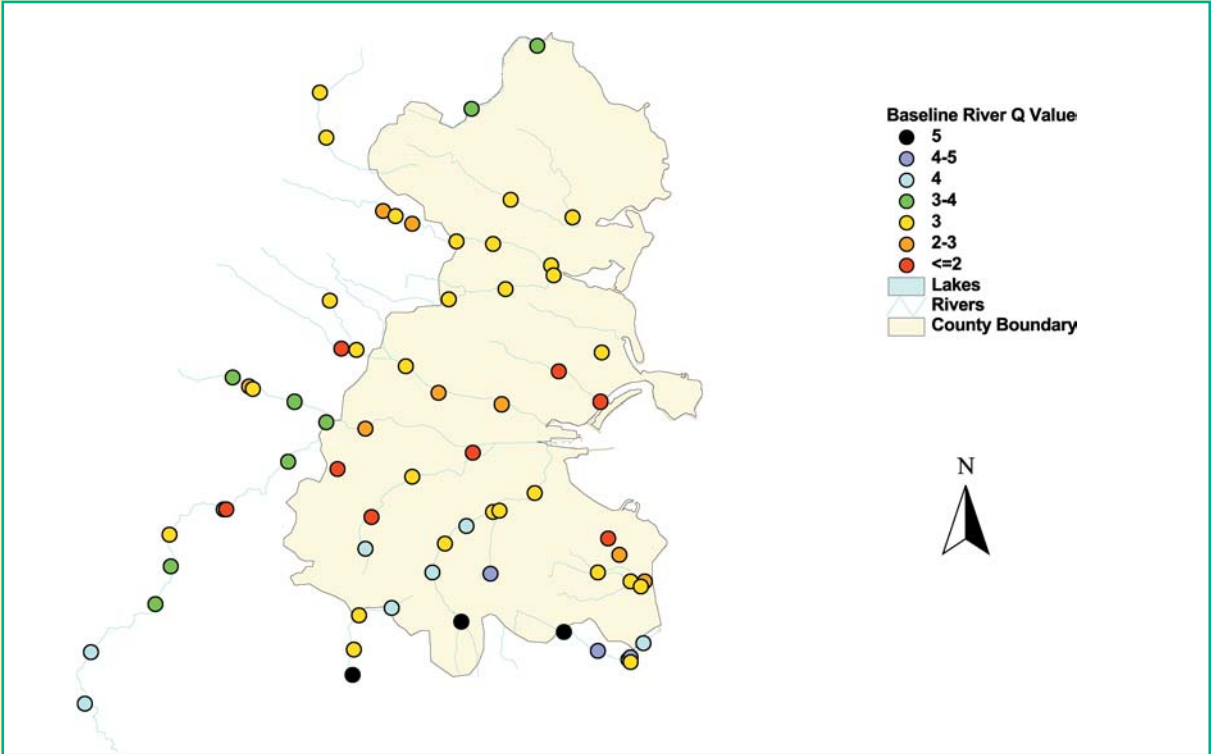


ADDITIONAL MEASURES PROPOSED

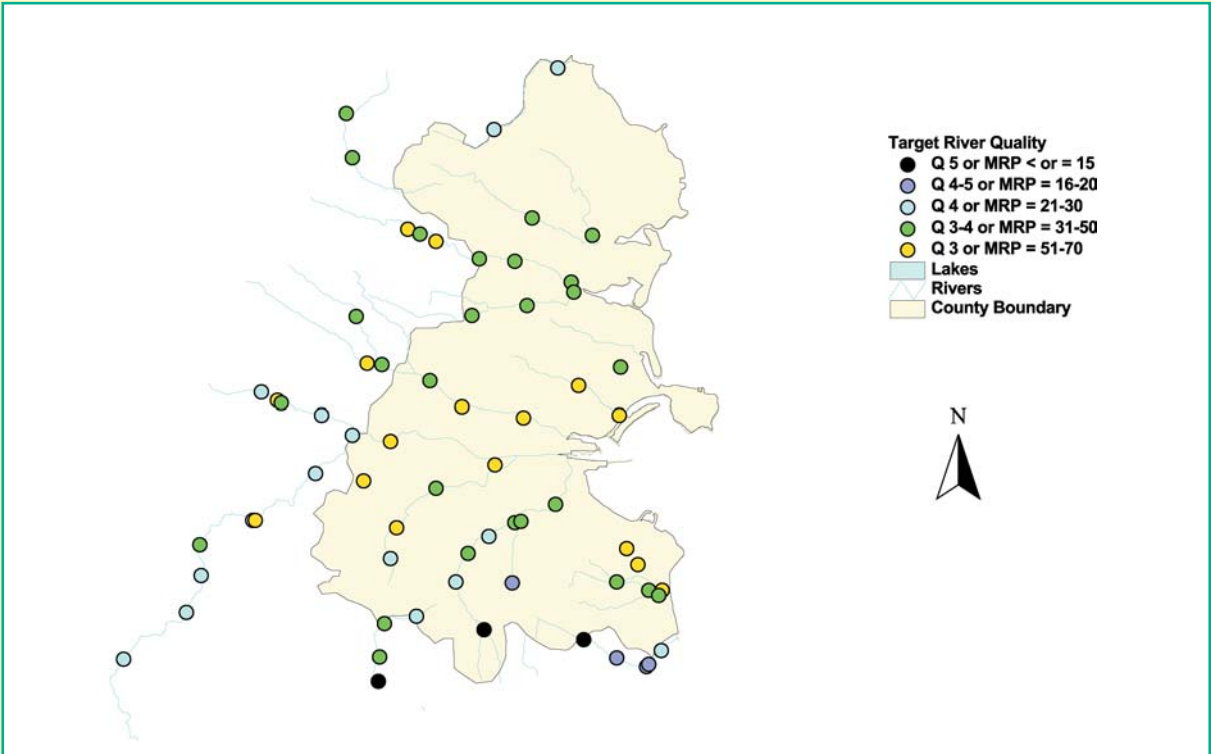
- Review all Section 4 licences by 2007.
- Use powers under Water Pollution Acts to protect water quality.
- Determine level of MRP in rivers entering the functional area from neighbouring local authorities.
- Carry out groundwater monitoring, farm surveys and require nutrient management plans where necessary.
- Possible introduction of bye-laws to control agricultural activity.
- Carry out public education campaign and consultation with concerned groups.

PROGRESS IN MEASURES BEING IMPLEMENTED

- Existing river MRP monitoring programme augmented; additional monitoring stations proposed.
- Work on new drainage scheme for the Newcastle, Saggart and Rathcoole areas has commenced. This will remove Saggart and Newcastle WWTPs and pipe all foul sewage from these areas to a main trunk sewer in Clondalkin, which will be treated in Ringsend WWTP.
- Inspector has been appointed to carry out a misconnections survey, which commenced in 2001, concentrating on urban areas initially.
- As part of misconnections survey, the public are being informed of importance of separation of foul and surface waters.
- Measures report sent to all Dublin local authorities; liaison will be extended to other local authorities in Liffey catchment also.
- At present the Three Rivers Project is developing a monitoring and management system for the River Liffey.



Map 11 Baseline River Quality in County Dublin



Map 12 Target River Quality in County Dublin

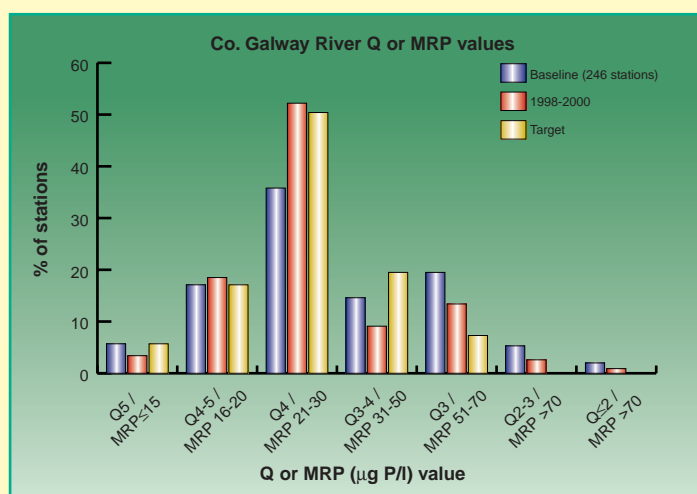
Galway County Council & Galway Corporation

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Galway has generally improved in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 69 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 74 per cent of stations are now of satisfactory quality, while 71 per cent are satisfactory based on Q values only. A total of 59 per cent of stations were satisfactory in the baseline biological survey.
- However, the number of high quality Q5 stations has fallen markedly.
- All but one (Lough Derg) of the forty-three lakes monitored in the baseline survey were of satisfactory quality. Current monitoring indicates that Lough Derg is now of (satisfactory) mesotrophic status. However, this apparent improvement may be due to infestation of the lake with the zebra mussel. Current monitoring indicates that Lough Mask remains of (satisfactory) mesotrophic status.

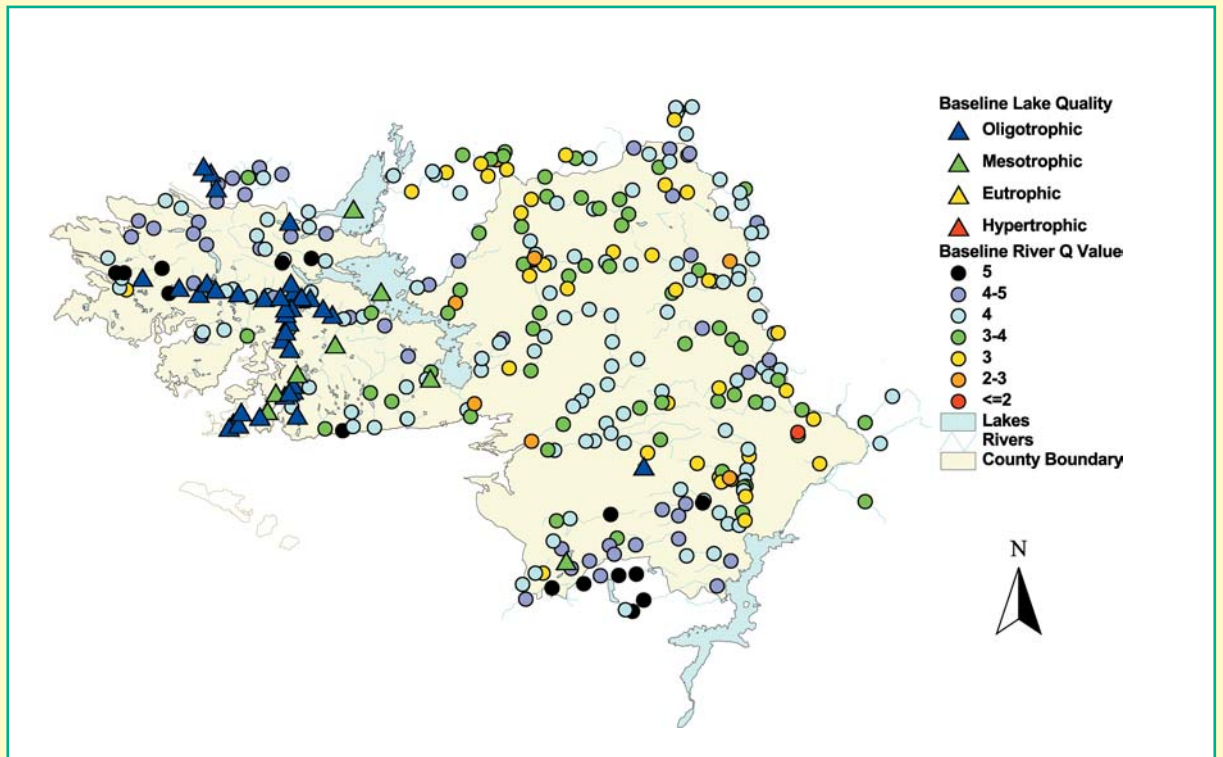
PROGRESS IN MEASURES BEING IMPLEMENTED

- Galway Corporation has stated in a letter to the Agency that the Water Pollution Control function in Galway City is discharged by Galway County Council pursuant to an agreement between the Council and the Corporation.
- Lake monitoring programme expanded to include eighty additional lakes.
- New Portumna wastewater collection and treatment system completed and in operation.
- Oranmore sewage collection system completed.
- Terryland river investigations of industrial estates have resulted in Corporation yard storm sewer being connected to foul sewer.
- Carrowmoneash stream investigations have resulted in major remediation works of contaminated industrial site at Oranmore.
- Forty-eight farm surveys took place in Suck catchment in 2000.
- Review of effluent discharge licences 70 per cent complete (eighty reviewed) - phosphate limits on discharges reduced and monitoring in place.
- Three Section 12 Notices issued.
- Laboratory facilities improved as lachate system purchased which measures Total Phosphorus.
- Pilot Environmental Information Management System set up, with register of pollution complaints and follow up actions taken.
- Council staff participate in seminars relating to REPS and water quality.

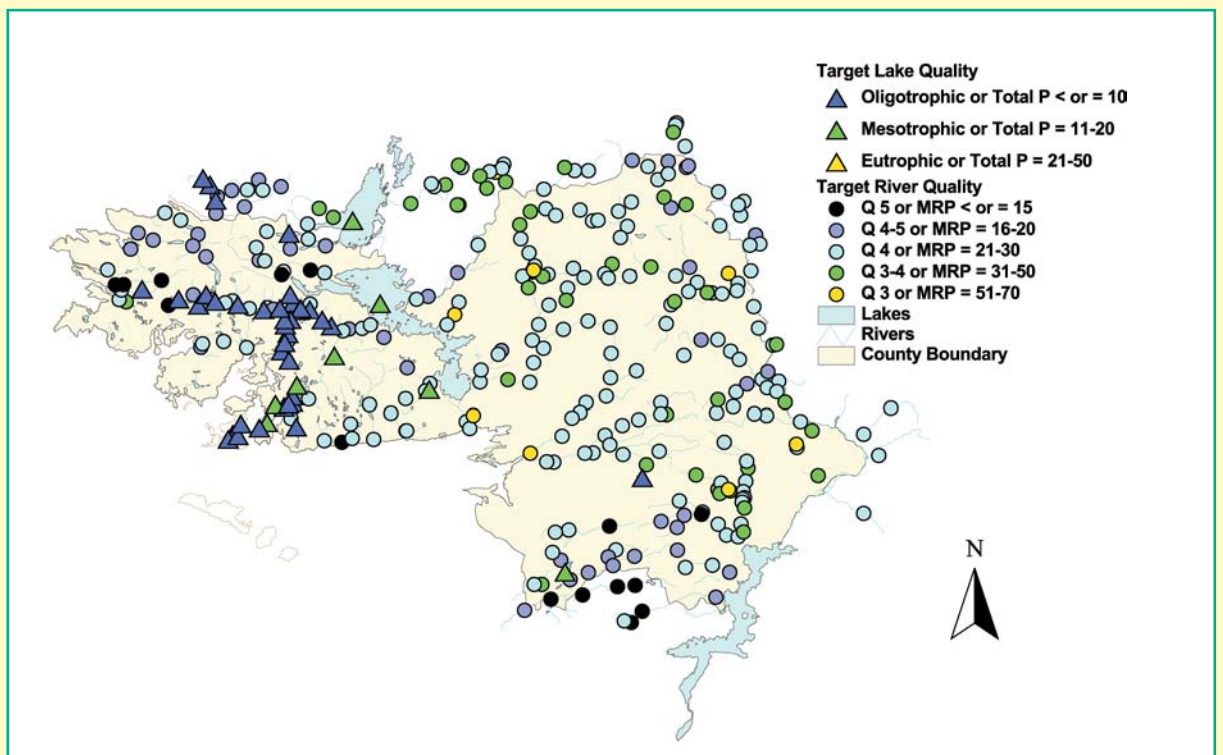


ADDITIONAL MEASURES PROPOSED

- Construct/upgrade WWTPs to comply with the EU Urban Waste Water Treatment Directive and provide phosphorus reduction facilities where necessary.
- WWTPs to be upgraded / constructed include Loughrea, Moycullen and Ballinasloe (2001), Athenry, Kilkerrin, Dunmore, Galway City and Oranmore (2002) Oughterard, Clonbur, Leenane and Tully (2003), Clifden (2004) and Letterfrack, Clarinbridge, Kinvara, An Spidéal, Casla, An Cheathrú Rua and Roundstone (2006).
- Closer integration of Council Planning and Environment functions.
- Closer liaison with EPA on IPC licensed facilities.
- Introduce bye-laws 2002, start consultation 2001.
- Serve notices under the Water Pollution Acts requiring nutrient management planning.
- Farm surveys proposed for Woodford/Coos, Kilcrow/Cappagh, Shannon Corridor and Shannon Estuary North catchments.
- Promote uptake of REPS and good farming practices.
- Carry out septic tank surveys and strengthen control of discharges through Planning.
- Western and Shannon River Basin Management Projects proposed to commence in 2001. Separate catchment management plans, groundwater protection plan and comprehensive monitoring programme to be prepared as a result of these projects. GIS to be used. Stakeholder groups and public education campaigns to be established under RBM projects (Corrib Catchment Task Force not reconstituted).
- Waste minimisation to be promoted and Ballinasloe landfill to be upgraded with leachate collection system.
- Establish protocols for a co-ordinated approach to pollution mitigation and follow-up with Fisheries Boards, Teagasc and other bodies.
- Enforcement of the Water Pollution Acts.
- New monitoring stations proposed.



Map 13 Baseline River and Lake Quality in County Galway



Map 14 Target River and Lake Quality in County Galway

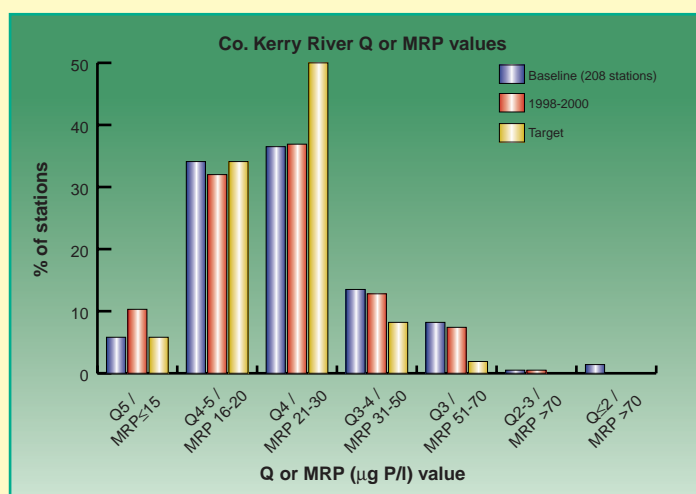
Kerry County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Kerry is similar in the 1998-2000 survey, as compared to the baseline.
- Of stations monitored in 1998-2000, 73 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 79 per cent of stations are now of satisfactory quality, while 77 per cent are satisfactory based on Q values only. A total of 76 per cent of stations were satisfactory in the baseline biological survey.
- In addition, all of the seriously polluted stations have improved in quality.
- However, there has been a decline in the number of high quality Q5 and Q4-5 stations (when MRP is not considered).
- Four of the five lakes monitored in the baseline survey were classified as being of satisfactory quality and current monitoring indicates these lakes have maintained their quality. Lough Leane was classified as being of eutrophic status and requires improvement. Current monitoring indicates that this lake is now of mesotrophic or satisfactory status.

PROGRESS IN MEASURES BEING IMPLEMENTED

- Water Pollution Act enforcement through issue of Section 12 and 23 Notices.
- Ongoing Section 4 and 16 licence review.
- Closer integration of planning and environment functions.
- Monitoring and upgrading of WWTPs ongoing.
- Increase in number of reed-beds planned for.
- Farm surveys and pollution investigations ongoing, more planned
- Closer liaison with EPA, Fisheries, farming organisations, elected members, public etc.
- Formation of Environmental Strategic Policy Committee.
- River / lake / groundwater monitoring expanded, more planned.
- Environment Awareness Officer appointed.
- Continue and expand Multi-Sectoral and Public awareness campaigns.
- Dedicated GIS development team.
- Meters installed at water abstraction points.

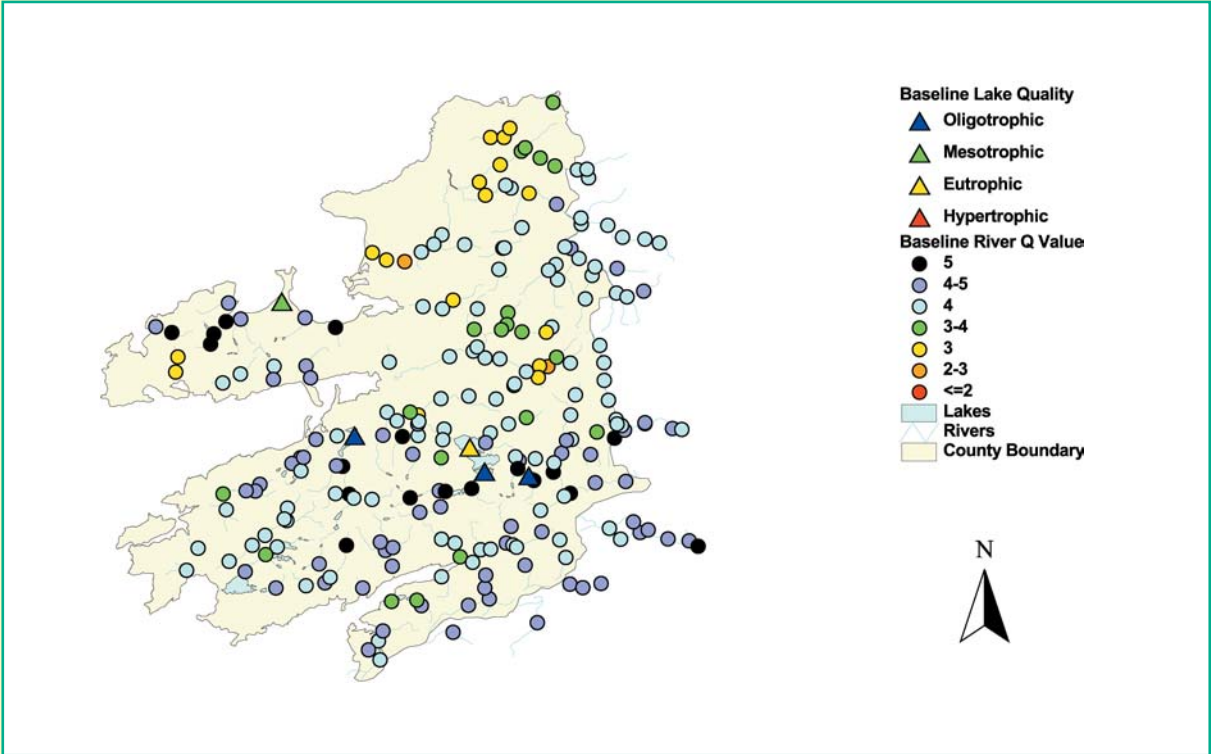


PROGRESS IN MEASURES BEING IMPLEMENTED

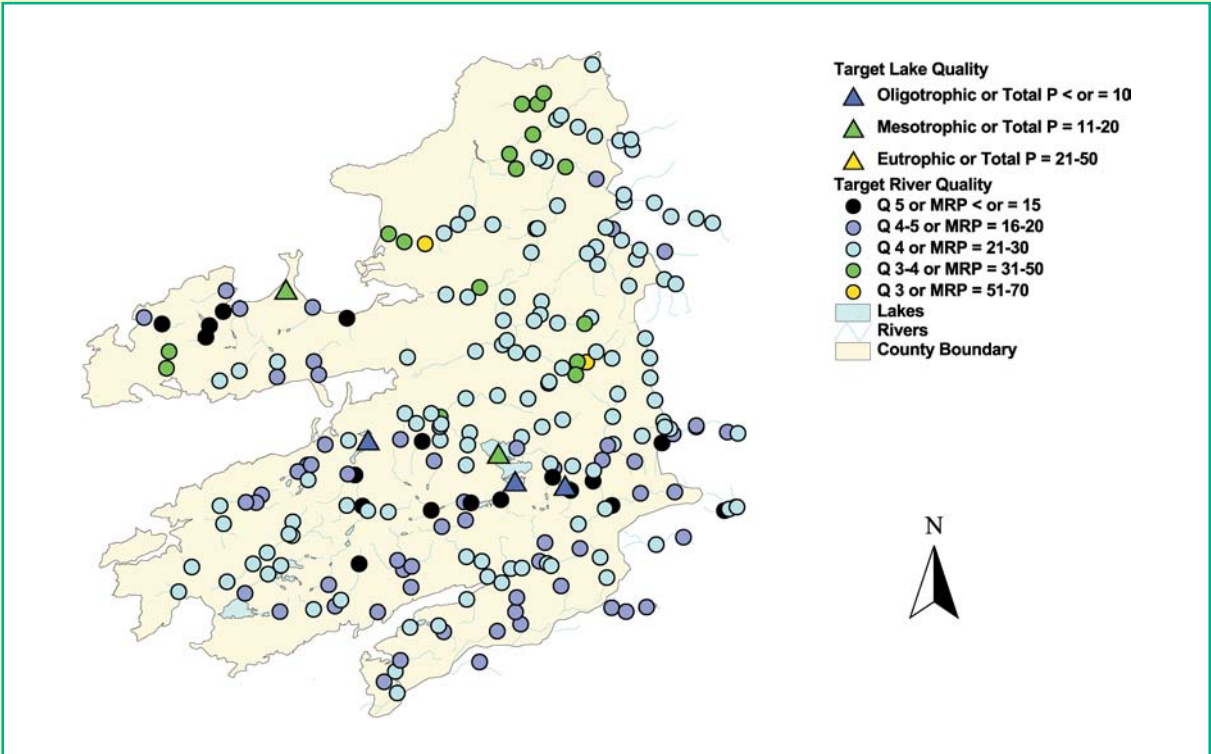
- Progress specific to Lough Leane catchment includes:
 - Establishment of Steering Group and Multi-Sectoral Working Group.
 - Catchment monitoring programmes developed to determine sectoral loading.
 - Two reports published.
 - Ongoing study on Killarney sewerage system and WWTP.
 - Closure of Killarney landfill and replacement with licensed Waste Transfer station.
 - Nutrient management pilot programme in sub-catchment area.
 - Farm survey in Quagmire catchment.
 - GIS developed.
 - Establishment of catchment P-budgets.
 - Catchment soil phosphorus status determined.

ADDITIONAL MEASURES PROPOSED

- Establishment of Shannon and South Kerry / Cork River Basin Management projects.
- Introduction of bye-laws to control agricultural activities.
- Assess possibility of requiring Nutrient Management Planning.
- Implement Sludge Management Strategy.
- Appoint additional staff.
- Kerry County Council currently developing Lough Leane Catchment Management and Monitoring System (in period July 1998-2001).
- Additional measures proposed under System include:
 - Laboratory upgrading and accreditation.
 - Possible register of approved septic tank contractors.
 - New sewerage schemes planned for Barraduff and Kilcummin.
 - Use of phosphate free detergents being assessed.
 - Further phosphorus removal at Killarney WWTP.
 - Implement positive aspects of Lough Leane Catchment project county-wide.



Map 15 Baseline River and Lake Quality in County Kerry

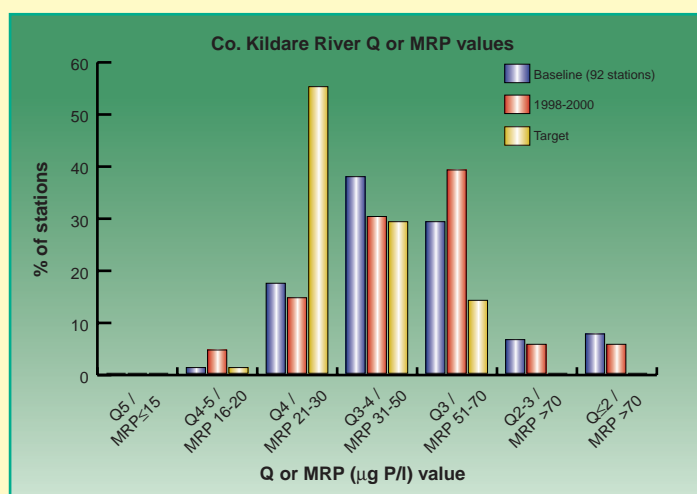


Map 16 Target River and Lake Quality in County Kerry

Kildare County Council

SUMMARY OF WATER QUALITY STATUS

- There has been mixed river water quality results at monitoring stations in Co. Kildare in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 31 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 19 per cent of stations are now of satisfactory quality, while 19 per cent are satisfactory based on Q values only. A total of 18 per cent of stations were satisfactory in the baseline biological survey.
- In addition, the number of high quality Q4-5 stations has risen significantly.
- However there has also been a significant increase in the number of poor quality Q3 stations.



PROGRESS IN MEASURES BEING IMPLEMENTED

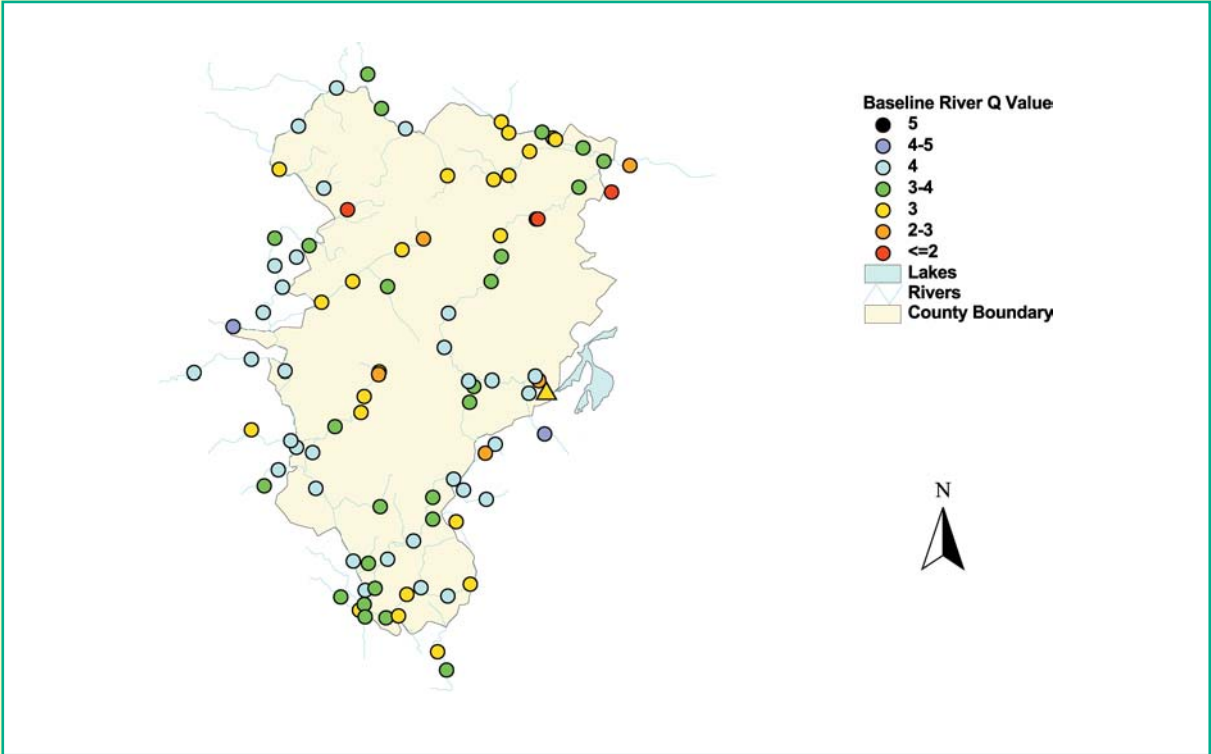
- Three Rivers Project ongoing in Boyne and Liffey catchments.
- New Section 4 and Section 16 licence applications being processed, and existing Section 4 and Section 16 licences being reviewed, in light of Regulations.
- Licences are being enforced with regular monitoring and site inspection, prosecutions will be taken where necessary.
- Water Pollution Act enforcement ongoing.
- Phosphorus removal has been installed at Osberstown, Leixlip and Nurney WWTPs.
- Agricultural special study area set up in Clonshanbo catchment by Three Rivers Project.
- Agricultural mini-catchment study set up in Boyne catchment at Wilkenstown, Co. Meath.
- Consultative structures set up under Three Rivers Project with quarterly meetings of all relevant stakeholders.
- Three Rivers Project also involved with local anglers association in investigation of poor water quality in Ryewater catchment.
- GIS system being developed for Boyne and Liffey as part of Three Rivers Project.
- Council MRP monitoring of river stations has been integrated with EPA and improved to satisfy the requirements of the Regulations.
- Sampling by the Council at twenty-three stations in the River Barrow catchment commenced in February 2000. Ten additional stations proposed by November 2000. The Three Rivers Project carry out monitoring of Boyne and Liffey catchments.
- Fourteen new hydrometric stations installed in Liffey catchment and an additional hydrometric station installed in the Barrow catchment. Additional hydrometric stations proposed.

PROGRESS IN MEASURES BEING IMPLEMENTED

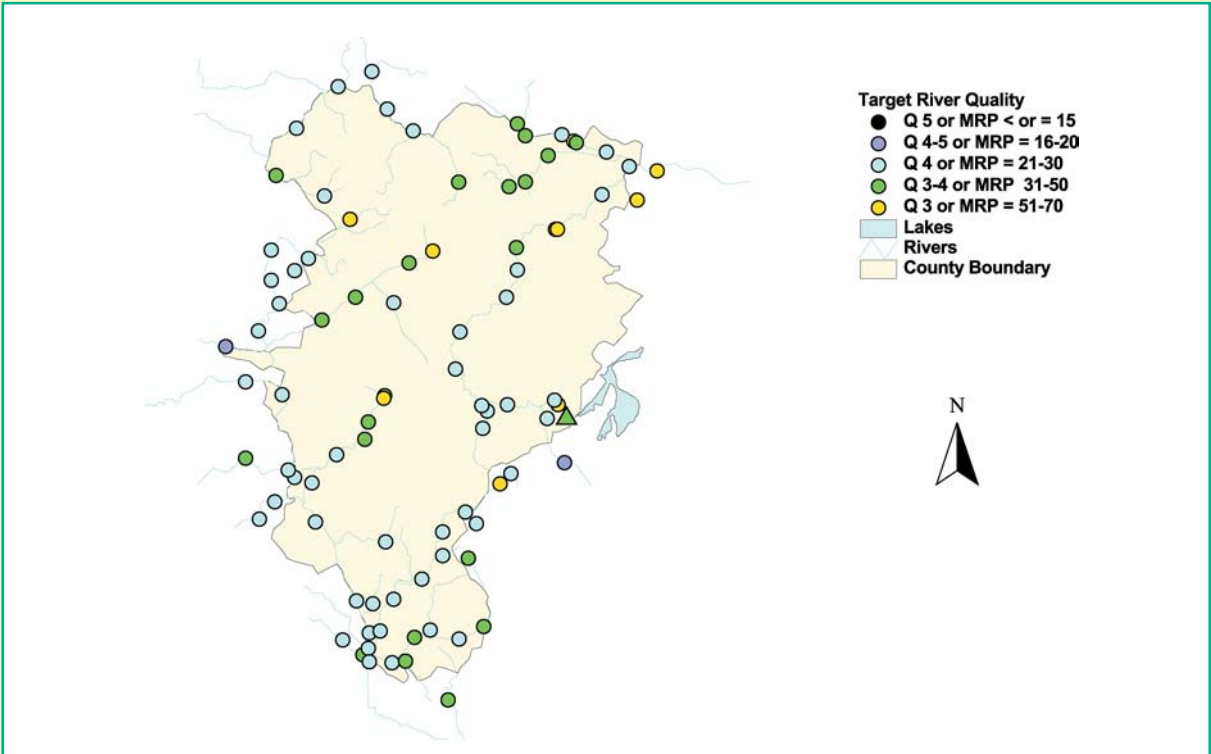
- Three Rivers Project undertaking programme of consultation and awareness; large amount of publicity gained for 'Preliminary Report'; website established since May 2000.
- 'Happy Fish' campaign run for schools.
- Council Environmental Newsletter published every three months.
- Barrow Steering Group produce bi-annual newsletter 'Barrow News'.
- Council contributing £7500/yr for three years for limnological sampling in Rye River system.
- Council and Three Rivers Project promoting REPS, Control of Farm Pollution Scheme and Best Farm Management Practices where appropriate.

ADDITIONAL MEASURES PROPOSED

- Upgrade wastewater treatment plants and increase monitoring.
- Carry out farm surveys in River Barrow catchment and establish database.
- Require nutrient management planning where necessary.
- Introduce agricultural bye-laws where necessary.
- Prepare GIS for the Barrow Catchment.
- EPA recommendations on Single House Treatment Systems to be adopted in Planning process.
- South East and Eastern River Basin Management Projects proposed.
- New laboratory facility at Osberstown WWTP will be used for future sample analyses.
- Seek funding from Government.



Map 17 Baseline River Quality in County Kildare



Map 18 Target River Quality in County Kildare

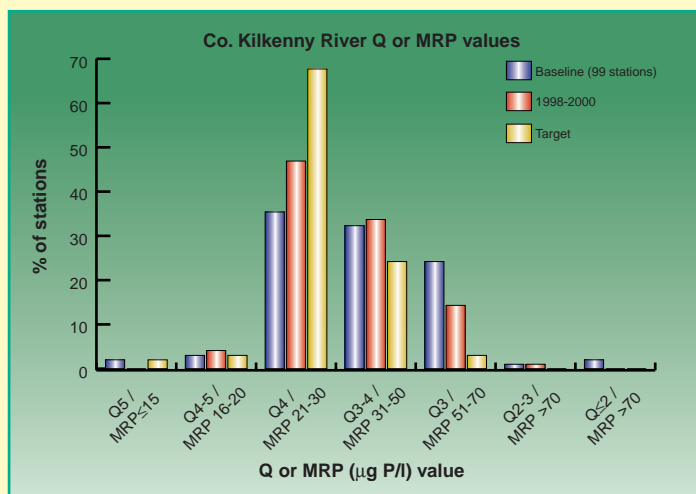
Kilkenny County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Kilkenny has generally improved in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 58 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 51 per cent of stations are now of satisfactory quality, while 52 per cent are satisfactory based on Q values only. A total of 40 per cent of stations were satisfactory in the baseline biological survey.
- In addition, the number of seriously polluted sites has fallen.
- However, the number of high quality Q5 stations has fallen also, with no sites of Q5 status now recorded in the county.

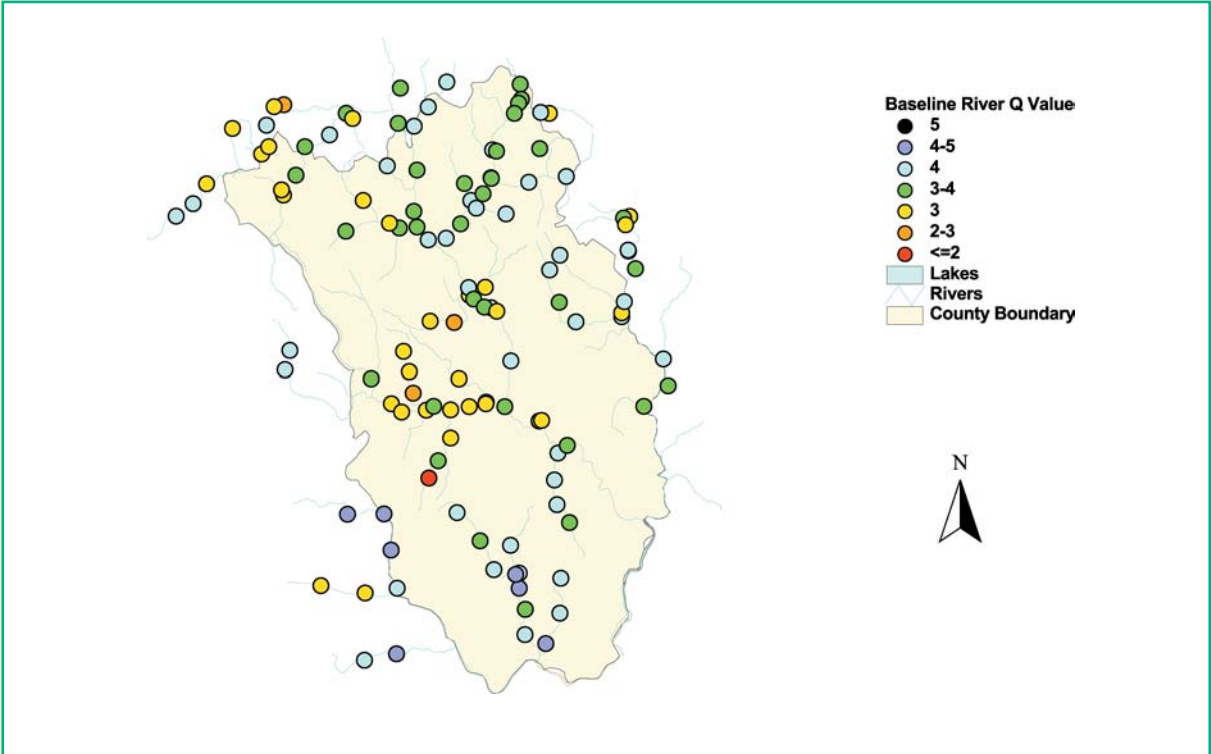
PROGRESS IN MEASURES BEING IMPLEMENTED

- Three Rivers Project in Suir catchment ongoing. Preliminary Report published.
- Sewerage Schemes under development or completed are the Bregagh Valley Sewer and the Kells, Stoneyford and Castlecomer Sewage Treatment Works.
- Farm surveys for pollution control ongoing.
- One meeting of local representative forum (including the County Council, Southern Regional Fisheries Board, Teagasc, IFA/ICMSA and Coillte) held in February 2000.
- A number of school visits undertaken with brief talks on water quality.
- Phosphate monitoring increased to cover thirty-eight additional stations and comply with sampling regime in Regulations.

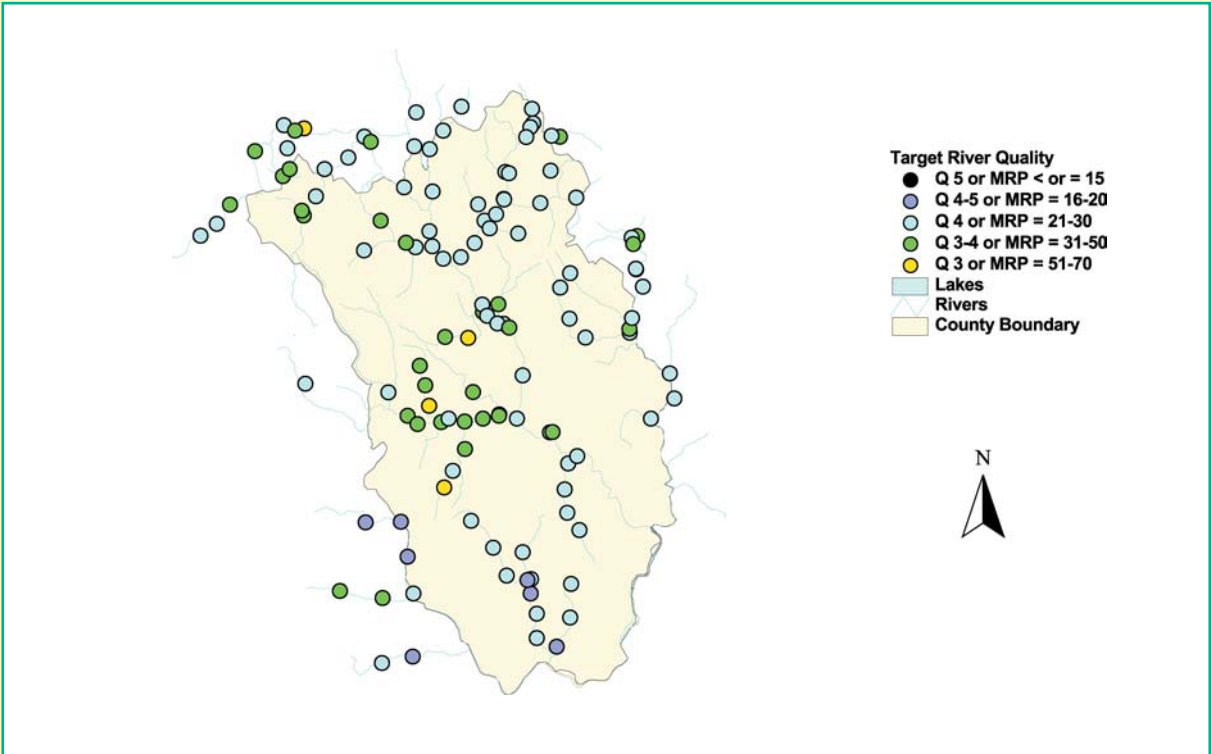


ADDITIONAL MEASURES PROPOSED

- Upgrade sewerage networks and wastewater treatment plants including phosphorus removal from a number of facilities. Major Sewerage schemes planned for include Kilkenny City & Environs, Waterford Environs, Kilmacow, Thomastown (by 2001), Graiguenamanagh (by 2001) and Urlingford.
- Examination and possible review of all Section 4 and Section 16 licenses.
- The Council will utilise its powers under the Water Pollution Act to conserve, protect and improve water quality.
- A survey of effluent generating industries will be undertaken and, where relevant, licensing of existing activities will be carried out.
- Groundwater Protection Scheme to be completed by 2001.
- South-East River Basin Management Project proposed.
- Sludge Management Plan for county in progress.
- Elected Council members to be briefed on implementation report.
- Liaison between Council and EPA in respect of licensable activities.
- Closer co-ordination of river monitoring regime with EPA.
- Environmental Education Officer to be appointed in 2001.



Map 19 Baseline River Quality in County Kilkenny



Map 20 Target River Quality in County Kilkenny

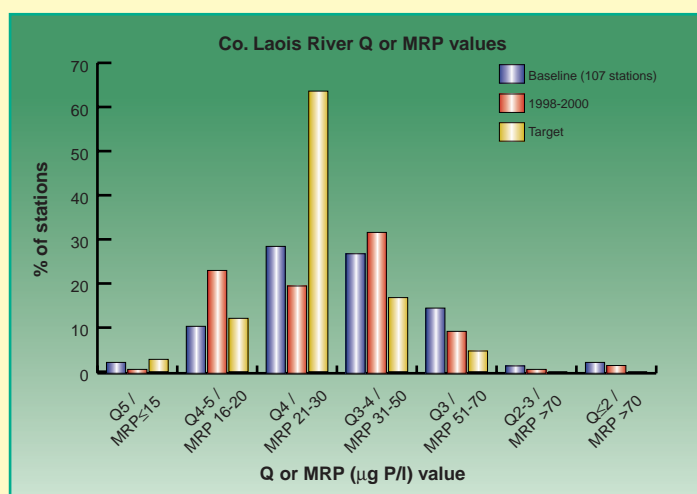
Laois County Council

SUMMARY OF WATER QUALITY STATUS

- The trend in river water quality at monitoring stations in Co. Laois from the 1998-2000 survey is equivocal.
- Of stations monitored in 1998-2000, 56 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 50 per cent of stations are now of satisfactory quality, while 45 per cent are satisfactory based on Q values only. A total of 48 per cent of stations were satisfactory in the baseline biological survey.
- There has been a decline in the number of high quality Q5 stations.
- However, there has also been a decline in the number of moderately and seriously polluted stations; and an increase in the number of Q4-5 stations.

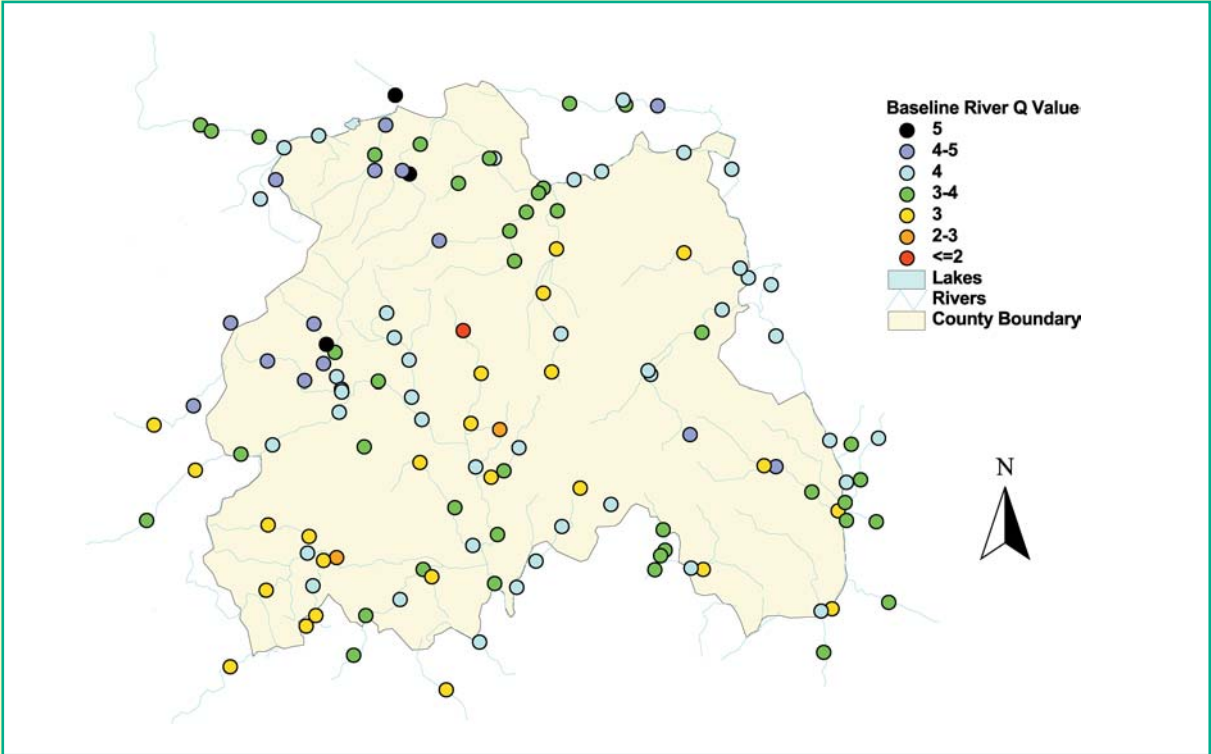
PROGRESS IN MEASURES BEING IMPLEMENTED

- First meeting of Implementation Committee involving all stakeholders held in January 2001.
- Three sub-committees formed – Local Authority, Industry and Agriculture – which are preparing draft sectoral Implementation Reports for second Committee meeting in April 2001.

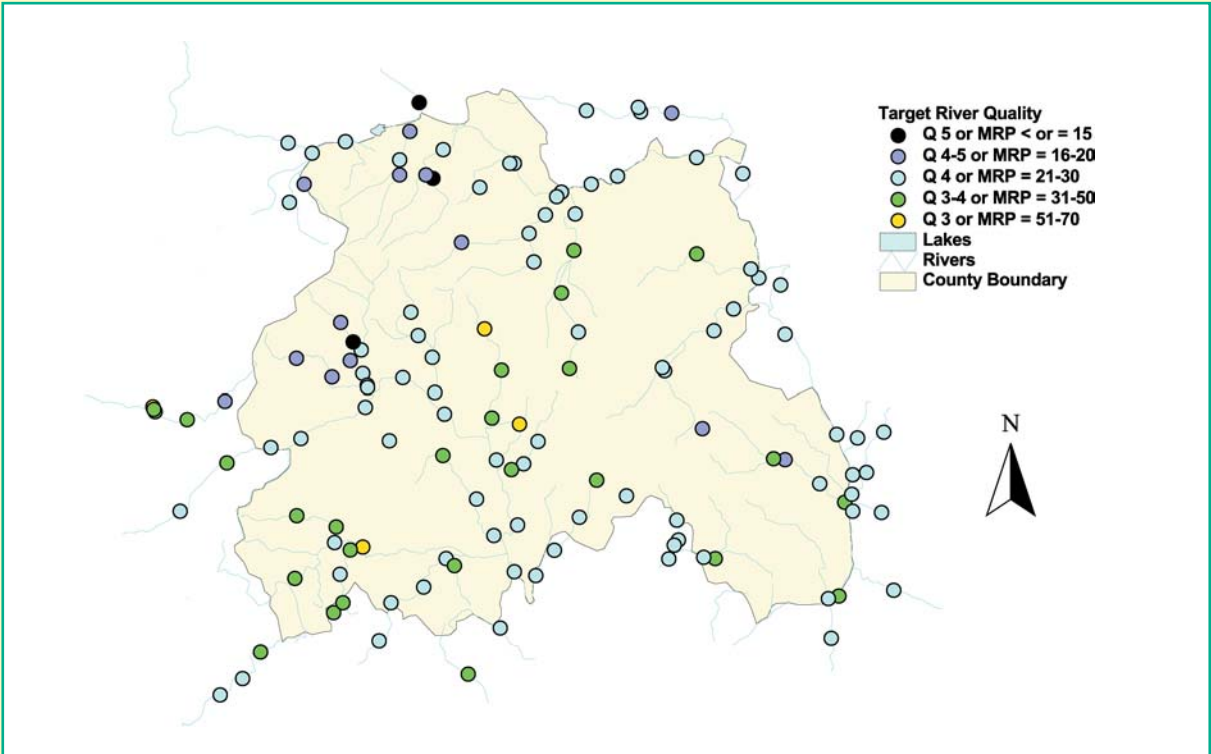


ADDITIONAL MEASURES PROPOSED

- Co-operative approach with all stakeholders.
- Establishment of multi-sectoral Implementation Committee.
- Enforcement of Water Pollution Act.
- Farm surveys.
- Educational programmes to raise awareness in target sectors by 2001, particularly in 'hot-spot areas'.
- Review and enforcement of Section 4 discharge licences by 2001.
- Liaison with EPA on IPC licences.
- Investigate possible sources of elevated phosphate levels in groundwater and adopt action plans.
- Review groundwater monitoring and implement pending Aquifer Protection Plan.
- Co-operate with other local authorities on catchment management.
- Recruit additional staff.
- Integrate EPA and local authority monitoring.
- Consider the introduction of Nutrient Management Planning.
- Review of phosphorus inputs from wastewater treatment plants by 2001.
- Upgrade wastewater treatment plants including phosphorus reduction measures to meet BATNEEC guidelines.
- Investigate impact of urban run-off from Portlaoise.
- Review public and private forestry holdings in county by 2001.



Map 21 Baseline River Quality in County Laois



Map 22 Target River Quality in County Laois

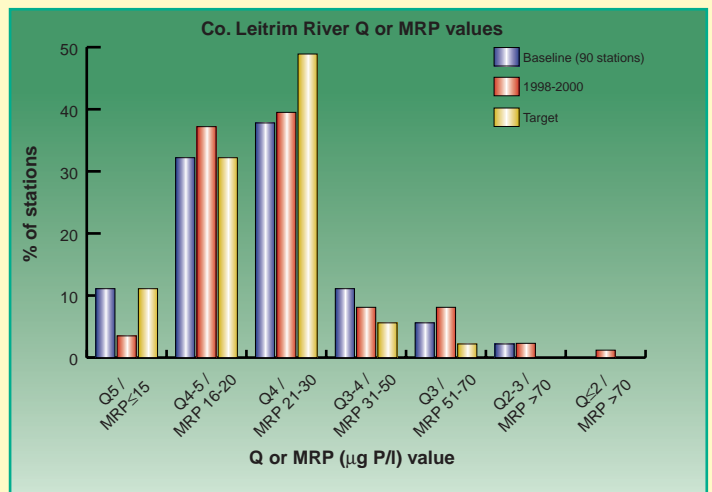
Leitrim County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Leitrim is generally similar in the 1998-2000 survey, as compared to the baseline results, though there has been a marked decline in high quality stations.
- Of stations monitored in 1998-2000, 64 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 80 per cent of stations are now of satisfactory quality, while 80 per cent are satisfactory based on Q values only. A total of 81 per cent of stations were satisfactory in the baseline biological survey.
- The number of moderately and seriously polluted stations has risen.
- The number of high quality Q5 stations has fallen very significantly, with only one station of Q5 status now recorded in the county.
- All but one (Acres Lough) of the five lakes monitored in the baseline survey were of satisfactory quality. Current monitoring indicates that Acres Lough is still of eutrophic or unsatisfactory status, whilst Lough Allen and Lough Garadice remain of satisfactory quality.

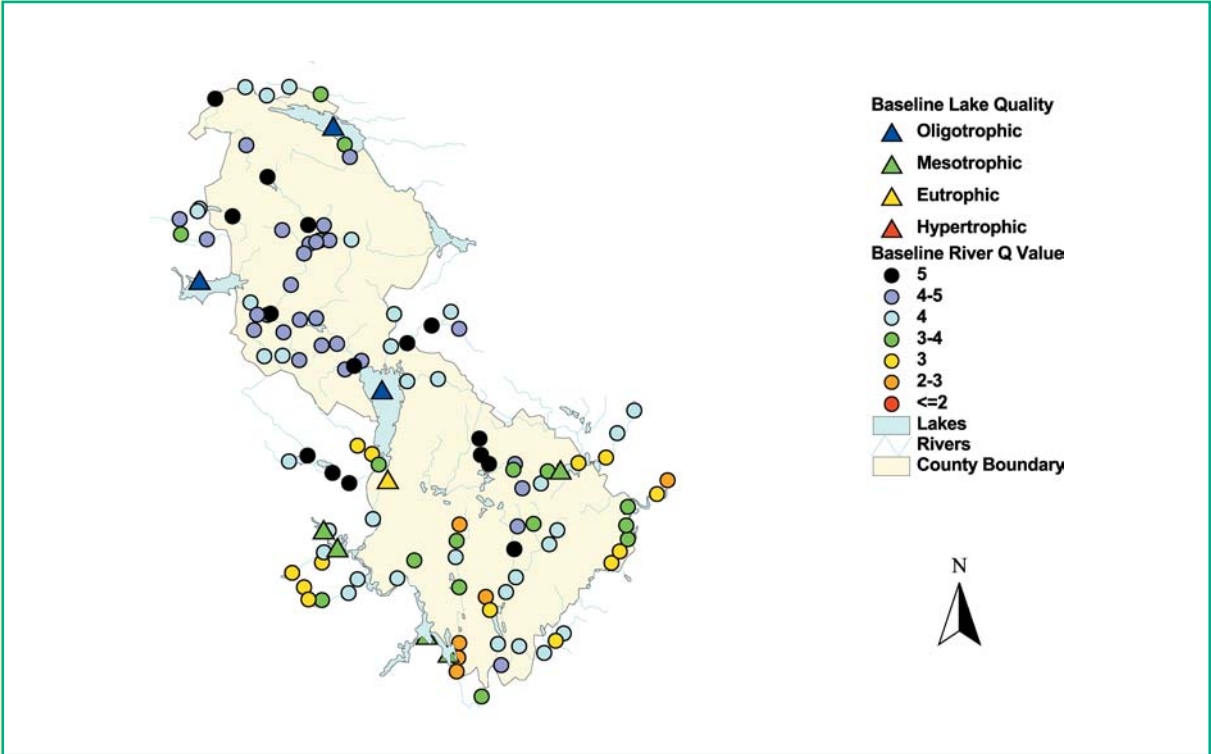
PROGRESS IN MEASURES BEING IMPLEMENTED

- Four discharge licences currently being processed.
- Presentations have been given to schools and other local organisations, article in local newspaper.
- Initial trials have been completed on setting up a method for laboratory analysis of phosphorus.
- Information being gathered for catchment management plans.

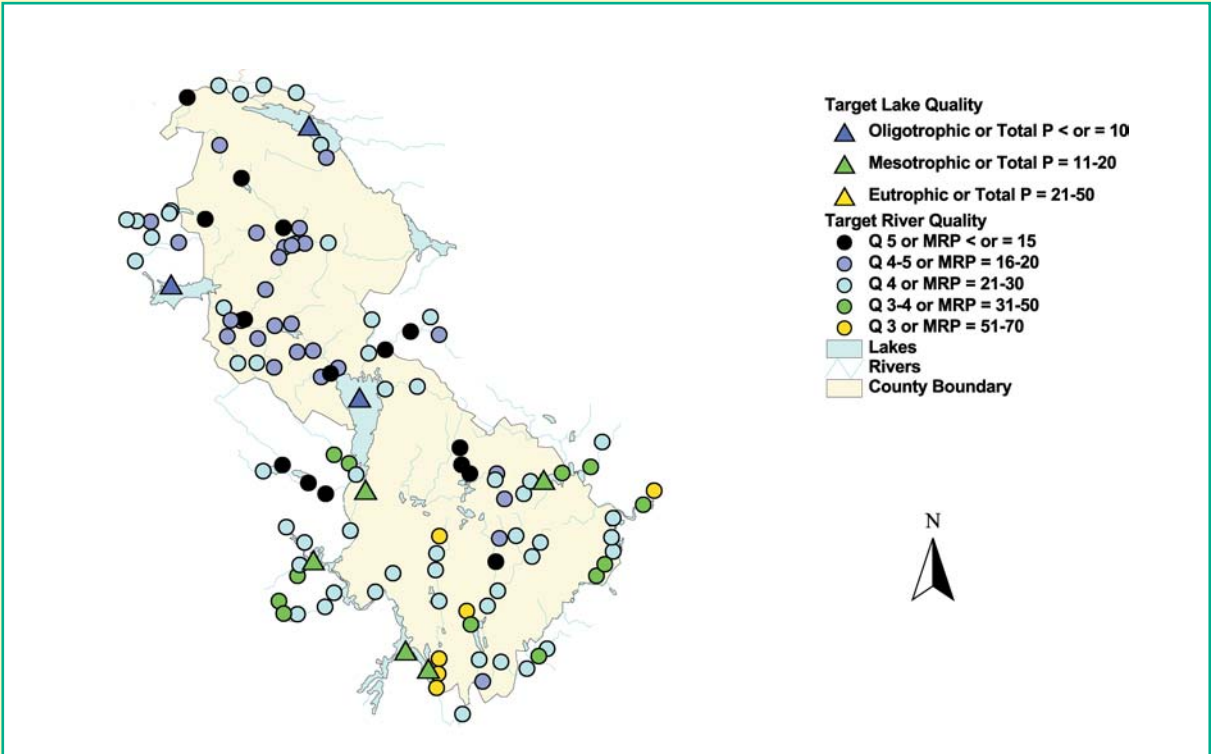


ADDITIONAL MEASURES PROPOSED

- Upgrade WWTPs at Carrick on Shannon (by 2001) and install WWTPs at Roosky and Jamestown (by 2002).
- Carry out survey of septic tanks in the county (by 2007).
- Carry out farm surveys (by 2007).
- Review discharge licences (by 2004).
- Prepare water quality management plans for each catchment over the next two years.
- Initiate new monitoring programme and integrate with EPA.
- Prepare a Groundwater Protection Plan for the county.
- Continue involvement in Lough Derg / Ree and Lough Melvin catchment management groups.
- Assess need for agricultural bye-laws and nutrient management planning.
- Enforce Water Pollution Act as required.
- Establish public education programme.
- Promote REPS / Control of Farm Pollution Scheme.
- Targeted use of fines.



Map 23 Baseline River and Lake Quality in County Leitrim



Map 24 Target River and Lake Quality in County Leitrim

Limerick Corporation**SUMMARY OF WATER QUALITY STATUS**

- There are no EPA monitored river stations or lakes within the functional area of Limerick Corporation.

PROGRESS IN MEASURES BEING IMPLEMENTED

- The Agency has not received an Implementation Report from Limerick Corporation.

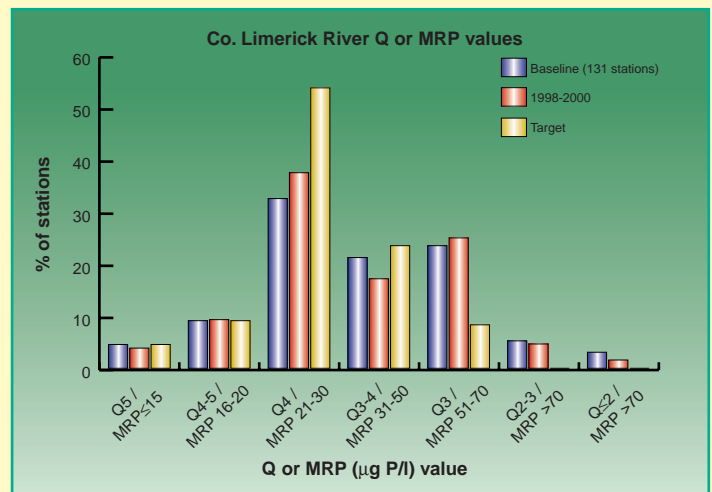
ADDITIONAL MEASURES PROPOSED

- The Agency has not received a Measures Report from Limerick Corporation.
- However, Limerick Corporation has stated in a letter that:
 - Limerick Corporation has no rivers or streams within its jurisdiction except for the River Shannon itself.
 - As the River Shannon is tidal for most of its reach in the city and is monitored under the Lower Shannon Catchment project, Limerick Corporation has made no analyses for the Regulations.
 - With the construction of the new main drainage scheme and the withdrawal of phosphates from detergents by the manufacturers the level of phosphorus discharged will reduce sharply within the next few years.

Limerick County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Limerick has generally improved in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 54 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 51 per cent of stations are now of satisfactory quality, while 50 per cent are satisfactory based on Q values only. A total of 47 per cent of stations were satisfactory in the baseline biological survey.
- However, the number of moderately polluted Q3 sites has risen.

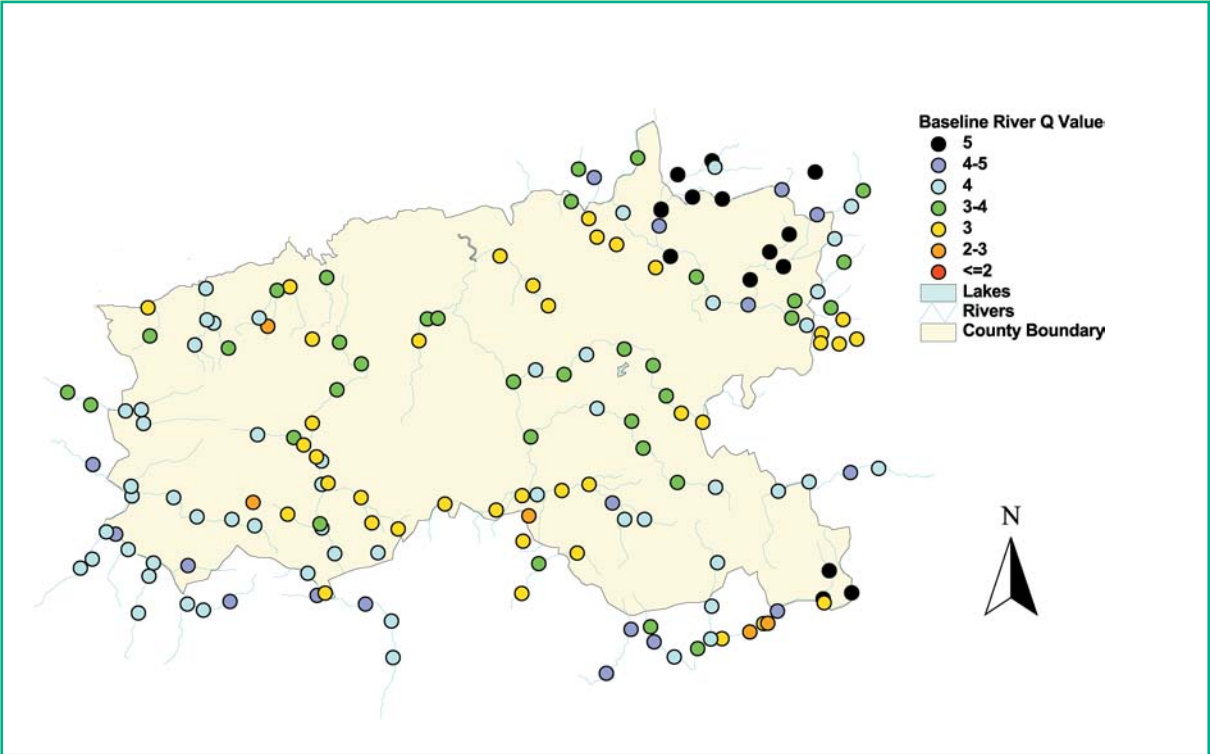


PROGRESS IN MEASURES BEING IMPLEMENTED

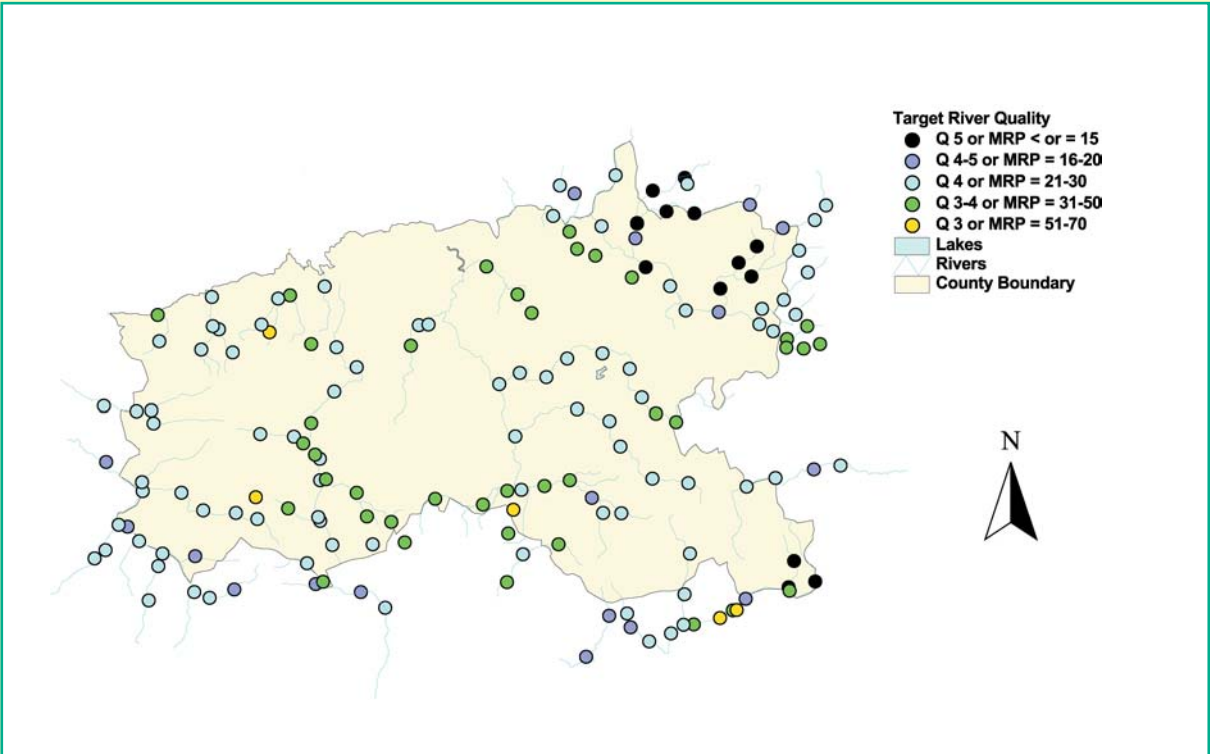
- £100,000 allocated to Phosphorus Regulations in 2001, which will be used to establish a team dedicated to implementation of Regulations.
- Monitoring programme enhanced including expansion of network of MRP monitoring stations from fifty-three to sixty-nine in 2000 (biological monitoring under consideration).
- Monitoring of Lough Gur and Bleach Lough introduced. Monitoring of WWTPs ongoing.
- Real time monitor installed on the Deel, a second monitor to be installed on the Feale in 2001.
- GIS system under development.
- Comprehensive audit programme of Section 4 and 16 licences commenced in 2000, any breaches being acted on.
- Several licence reviews have been initiated, one Section 16 licence revoked.
- New discharge licence applications assessed in light of Regulations.
- Use of phosphate free detergents specified in licence conditions where appropriate.
- Nutrient Management Planning imposed on some intensive agricultural activities.
- Potential problem farms have been inspected and Water Pollution Act enforced where necessary e.g., in Deel catchment.
- Council involved in catchment management projects for Mulkear and Mague rivers, which are managed by Shannon Regional Fisheries Board.
- Success achieved in stopping point source discharges from farms in Balliana and Gloscha subcatchments of River Mague.
- Strong emphasis on farmer education and co-operation in Mague catchment.
- Council involved in web-based AQUANET project with Co. Limerick Vocational Educational College to raise awareness of water quality issues.

ADDITIONAL MEASURES PROPOSED

- Shannon River Basin Management Project proposed under Water Framework Directive.
- Implementation of the Three Rivers Project, which covers the River Aherlow – to be subsumed eventually into proposed South Eastern River Basin Management System.
- Comprehensive farm survey programme.
- Carry out more comprehensive licensing of trade effluent discharges with enforcement of Water Pollution Act where necessary.
- Thirty-one WWTP schemes prioritised in Assessment of Needs Report 2000-2006, and forty-one included for 2006-2020 – all upgraded plants which discharge to freshwater will include phosphorus removal.
- Identify septic tank clusters and assess pollution potential.
- Monitoring of storm water overflows to be introduced in 2001.
- Liaise with forestry sector to reduce siltation and phosphorus application.
- Appoint Agricultural Scientist to oversee implementation of Nutrient Management Planning, encourage REPS uptake and carry out liaison with farming groups.
- Annual auditing of measures.
- Agricultural bye-laws to be introduced in 2001.
- Article 3(9) extension of six years sought for unsatisfactory rivers in county.



Map 25 Baseline River Quality in County Limerick



Map 26 Target River Quality in County Limerick

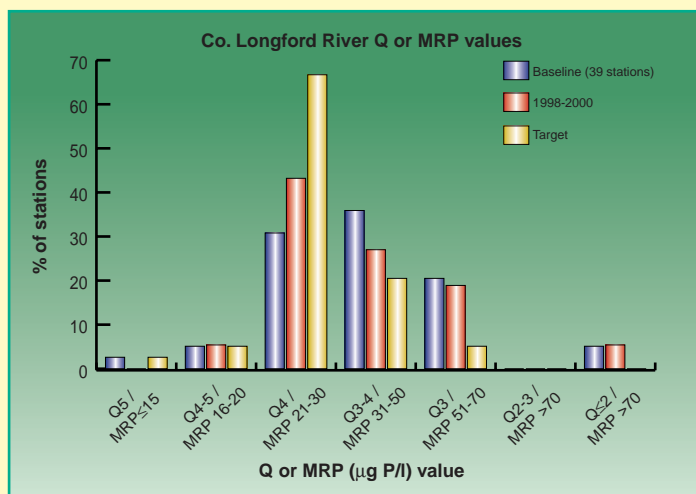
Longford County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Longford has generally improved in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 49 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 49 per cent of stations are now of satisfactory quality, while 49 per cent are satisfactory based on Q values only. A total of 38 per cent of stations were satisfactory in the baseline biological survey.
- However, there are still a number of seriously polluted sites.
- In addition, the only Q5 station in the county has declined in quality, thus there are currently no monitored stations of Q5 status in the county.
- Four of the six lakes monitored in the baseline survey were classified as being of satisfactory quality. Lough Ree and Lough Gowna were classified as being of eutrophic status and require improvement. Current monitoring indicates that Lough Ree is of mesotrophic (or satisfactory) status, thus meeting the target of the Regulations. However, this apparent improvement may be largely due to infestation of the lake with the zebra mussel. Current monitoring indicates that Loughs Boderg and Bofin have maintained their satisfactory quality.

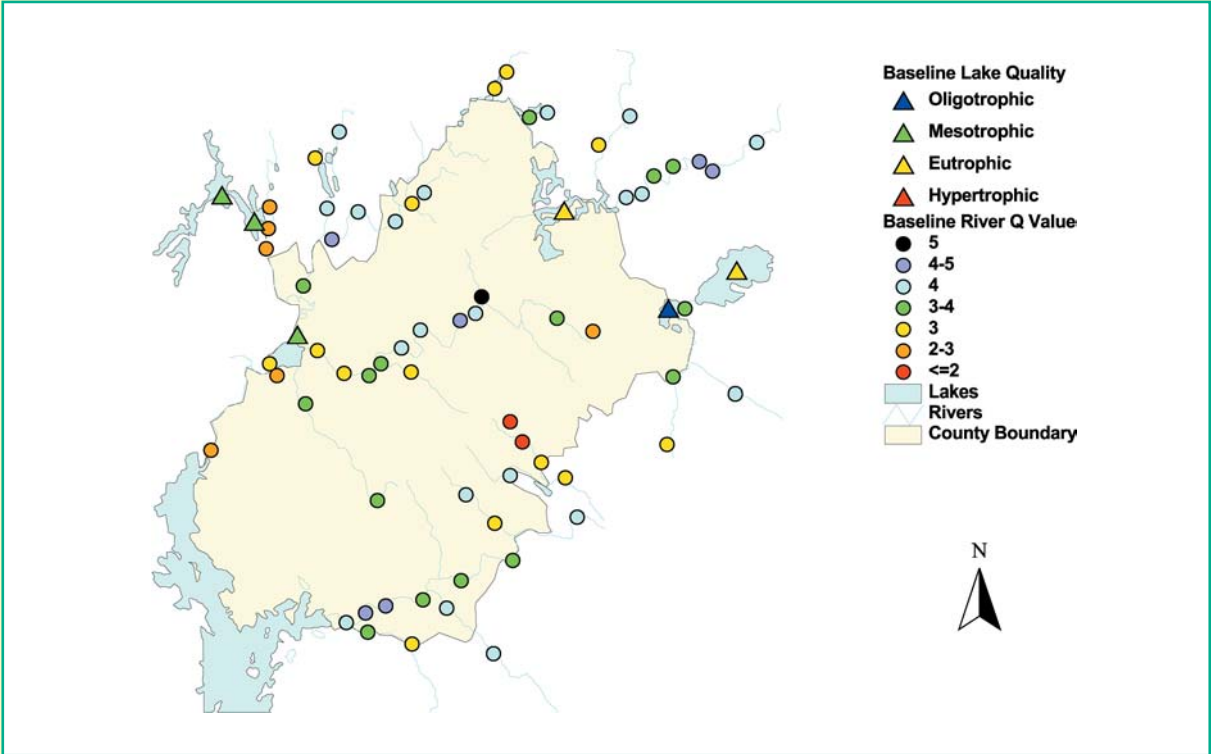
PROGRESS IN MEASURES BEING IMPLEMENTED

- The Agency has not received an Implementation Report from Longford County Council.
- However, Longford County Council states in a letter sent to the Agency that proposals on bye-laws, to deal with the problem of eutrophication of inland waters, went forward for approval to the Council in February 2001.

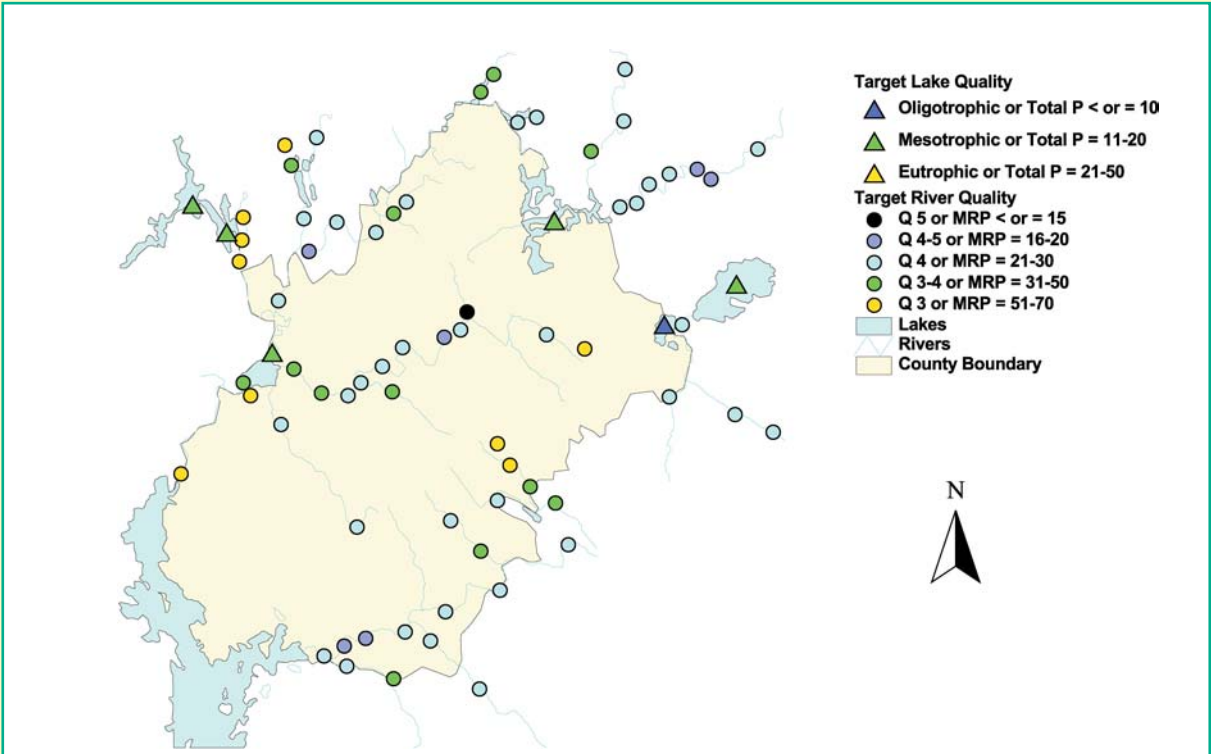


ADDITIONAL MEASURES PROPOSED

- The Agency has not received a Measures Report from Longford County Council.
- Longford County Council states in a letter sent to the Agency that almost all of County Longford is included in the Lough Derg and Lough Ree Catchment Monitoring and Management Scheme.
- The Council has approved implementation of the measures proposed by the Monitoring scheme and is seeking to do this in conjunction with the other relevant local authorities.
- Longford County Council stated that it does not have the resources to carry out a measures report for the small area not covered by the Lough Derg/Ree Scheme. This area is in North Longford and is included in the River Erne Catchment. The Council states that contact is being made with the River Erne Catchment Scheme, which has dealt with the situation around Lough Gowna.
- Copies of the Lough Derg / Ree Management Proposals and the River Erne Catchment Proposals were submitted to the Agency.



Map 27 Baseline River and Lake Quality in County Longford

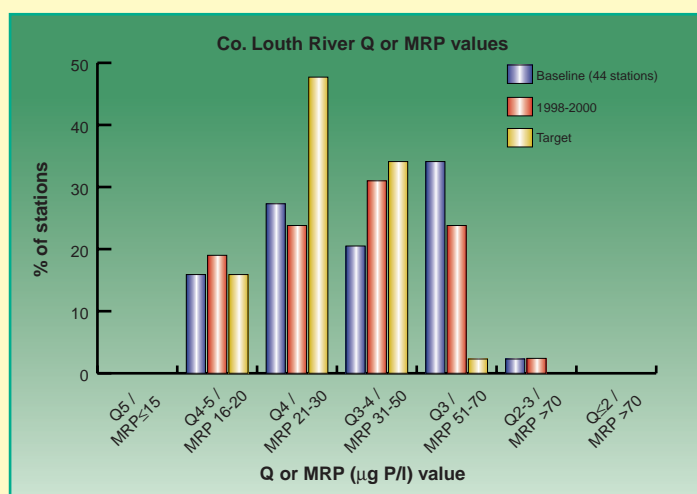


Map 28 Target River and Lake Quality in County Longford

Louth County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Louth is similar in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 55 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 43 per cent of stations are now of satisfactory quality, while 44 per cent are satisfactory based on Q values only. A total of 43 per cent of stations were satisfactory in the baseline biological survey.
- The number of moderately polluted stations has fallen markedly.

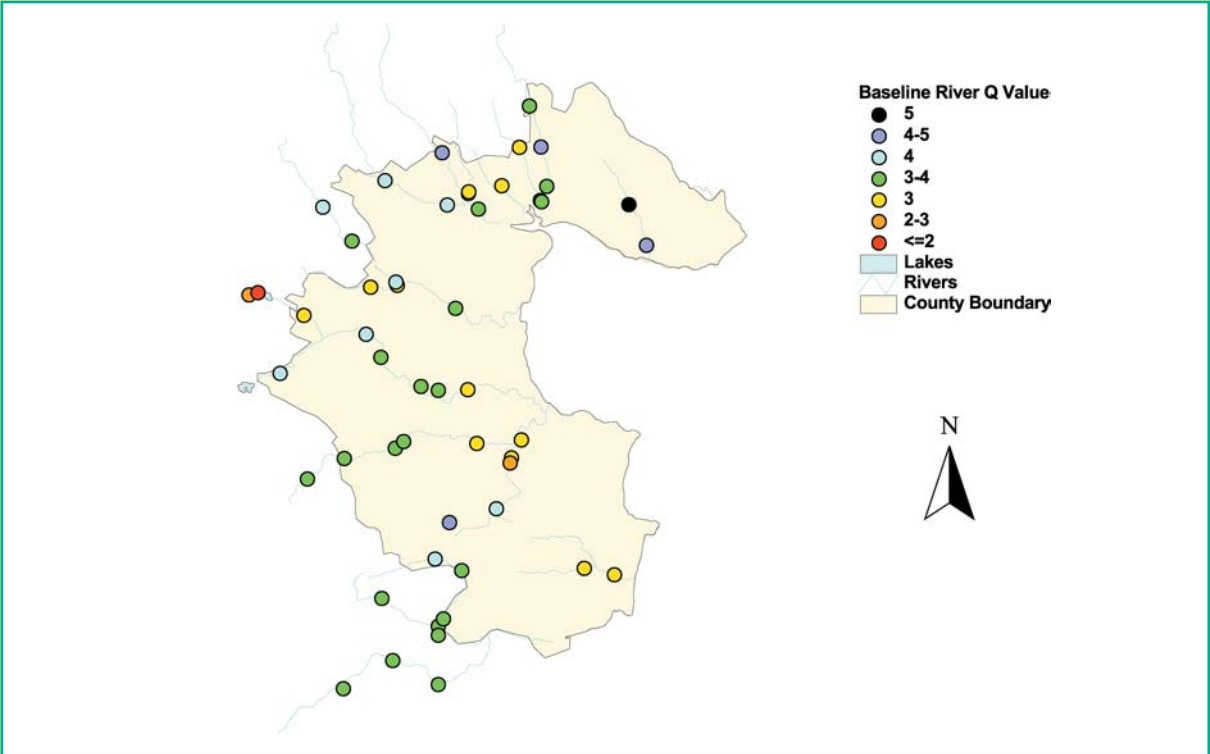


PROGRESS IN MEASURES BEING IMPLEMENTED

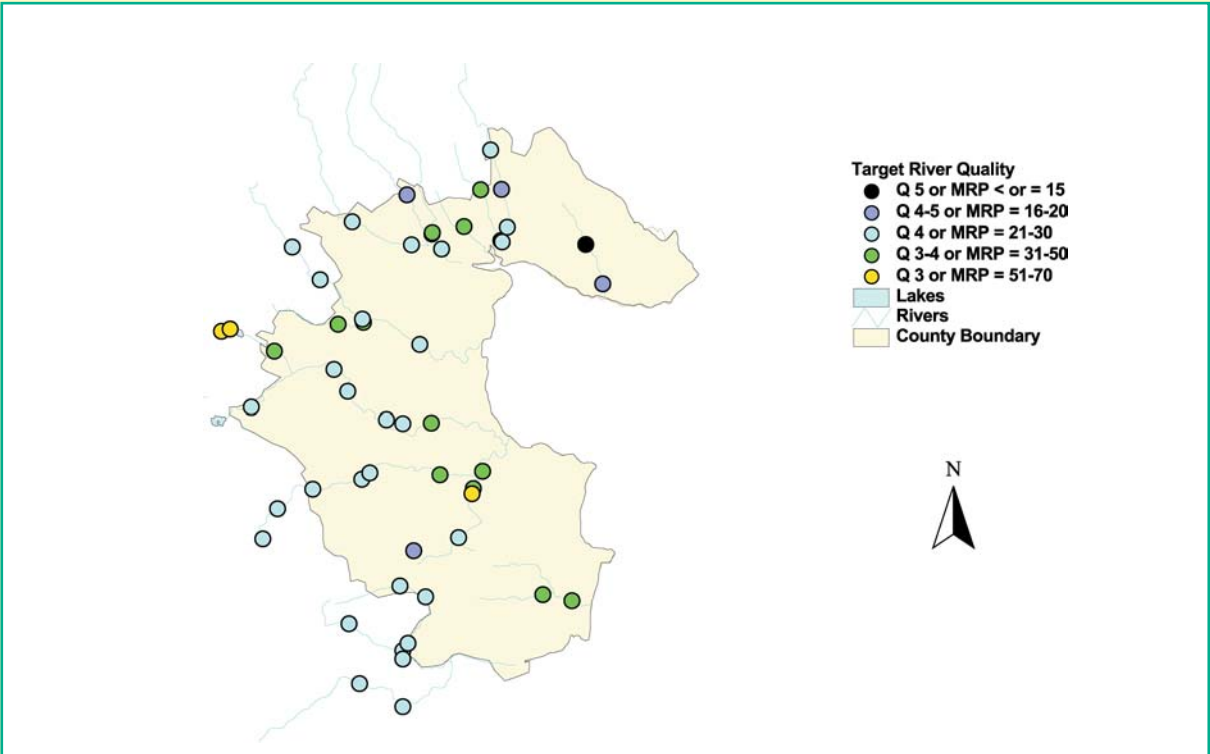
- The Agency has not received an Implementation Report from Louth County Council.

ADDITIONAL MEASURES PROPOSED

- The strategies and recommendations in the Three Rivers project relating to agriculture, urban and industrial discharges will be the initial focus of new measures adopted by Louth County Council.
- Increase phosphorus and flow monitoring of river catchments by 2000.
- Prepare priority programme for further catchment surveys by 2002.
- Upgrade sewage treatment facilities at Dunleer, Carlingford, Clogherhead, Knockbridge, Tallanstown and Annagassan in 2000.
- Examine requirements for enhancing effluent treatment plant performance and seek funding for same by 2002.
- Review discharge licences by 2000 and impose phosphorus limits on new licences.
- Assess all new developments seeking planning permission to ensure sustainable method of disposal /recycling of waste by 2000.
- Establish liaison structures with neighbouring local authorities by 2000.
- Complete package for educational and awareness programme and commence delivery of same (by 2002).
- Develop proposal for county wide Agricultural Education Programme by 2000.
- Carry out farm surveys on a catchment basis – surveys already conducted in Fane catchment.
- Establish database of phosphorus loading from point source discharges by 2002.
- Establish GIS to integrate information by 2002.
- Prepare groundwater protection plans by 2007.



Map 29 Baseline River Quality in County Louth



Map 30 Target River Quality in County Louth

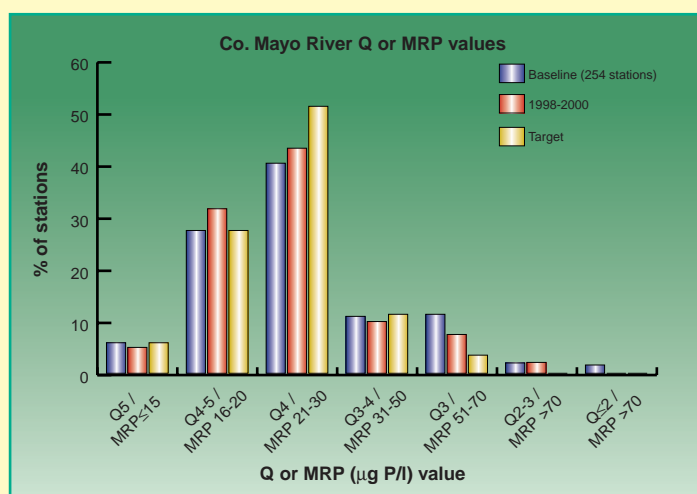
Mayo County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Mayo has generally improved in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 73 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 80 per cent of stations are now of satisfactory quality, while 78 per cent are satisfactory based on Q values only. A total of 74 per cent of stations were satisfactory in the baseline biological survey.
- In addition, all the seriously polluted sites have improved in quality.
- However, the number of Q5 stations has fallen.
- All of the eleven lakes monitored in the baseline survey were classified as being of satisfactory quality. Current monitoring of Loughs Mask, Carra, Carrowmore, Conn and Cullin indicates that these lakes have maintained their satisfactory quality. However, current monitoring indicates that Knappaghbeg Lake has declined in quality from mesotrophic to eutrophic and requires improvement.

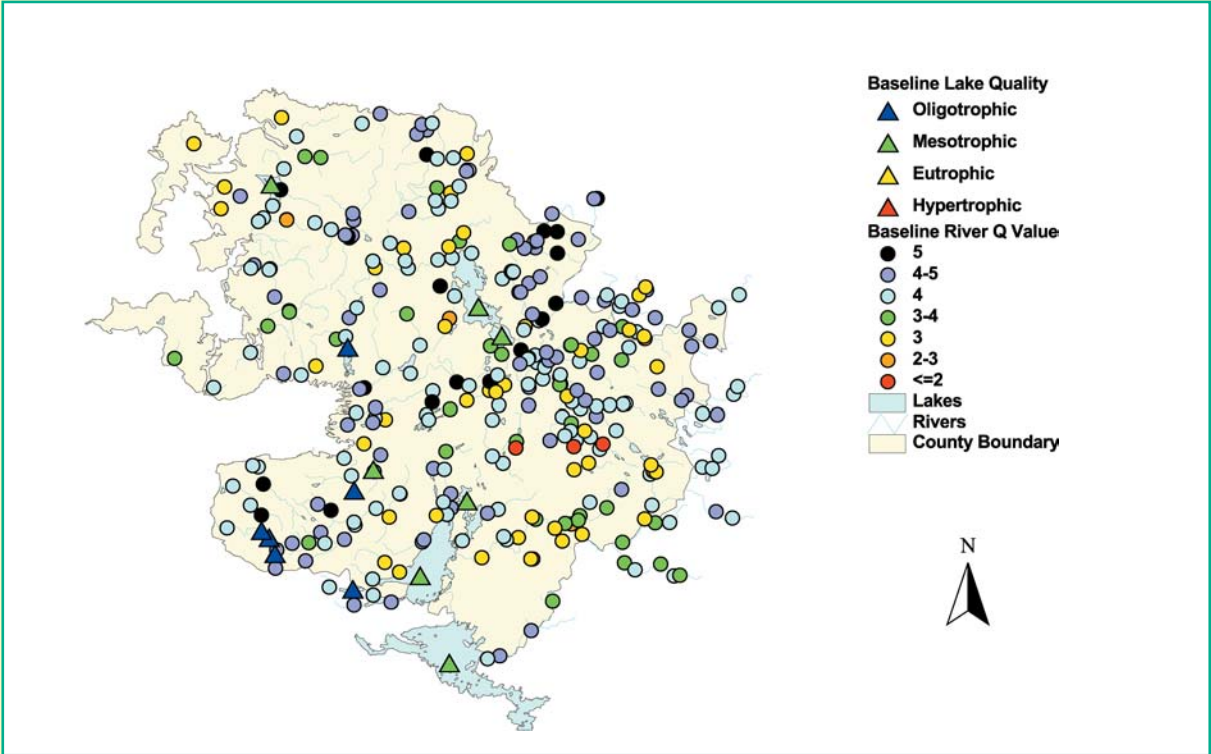
PROGRESS IN MEASURES BEING IMPLEMENTED

- Bye-laws have been drafted which encourage the adoption of nutrient management planning and control artificial fertiliser purchase and sales.
- The bye-laws may also introduce control on aerial fertilisation of forestry.
- Phosphorus removal installed at Ballyhaunis and Castlebar WWTPs.
- Catchment Monitoring, Management and Co-operative measures have been ongoing in Lough Conn and Lough Carra / Mask catchments.

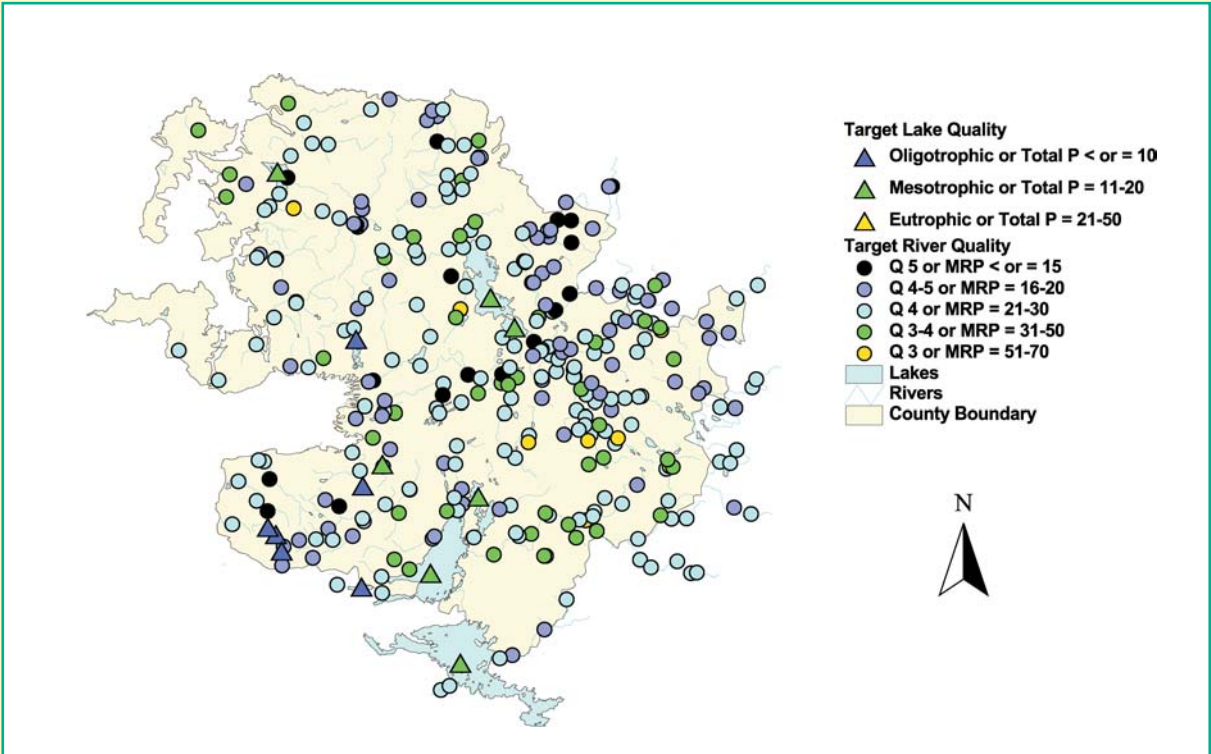


ADDITIONAL MEASURES PROPOSED

- Western River Basin Management Project proposed under WFD.
- Environmental Education Officer to be appointed to inform members of the public of findings and recommendations.
- Conduct more farm surveys and additional monitoring when resources become available.
- Upgrading of WWTPs is ongoing – phosphorus removal facilities to be installed at Crossmolina and Claremorris WWTPs. Other treatment works will be assessed and modified if required.
- Consultants have been assigned to develop a Sludge Management Plan for the County.



Map 31 Baseline River and Lake Quality in County Mayo

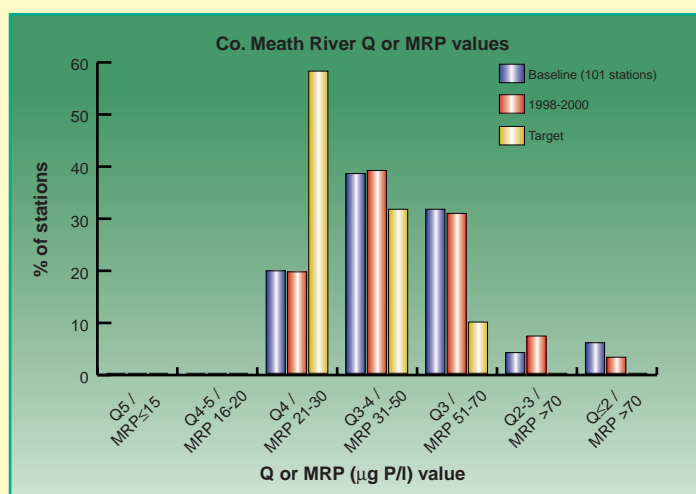


Map 32 Target River and Lake Quality in County Mayo

Meath County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Meath is generally similar in the 1998-2000 survey, compared to that recorded in the baseline survey.
- Of stations monitored in 1998-2000, 36 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 20 per cent of stations are now of satisfactory quality, while 20 per cent are satisfactory based on Q values only. A total of 20 per cent of stations were satisfactory in the baseline biological survey.
- The number of seriously polluted stations has declined.
- Lough Sheelin was classified in the baseline survey as being of eutrophic status. Current monitoring indicates that Lough Sheelin remains of unsatisfactory quality and thus requires improvement.



PROGRESS IN MEASURES BEING IMPLEMENTED

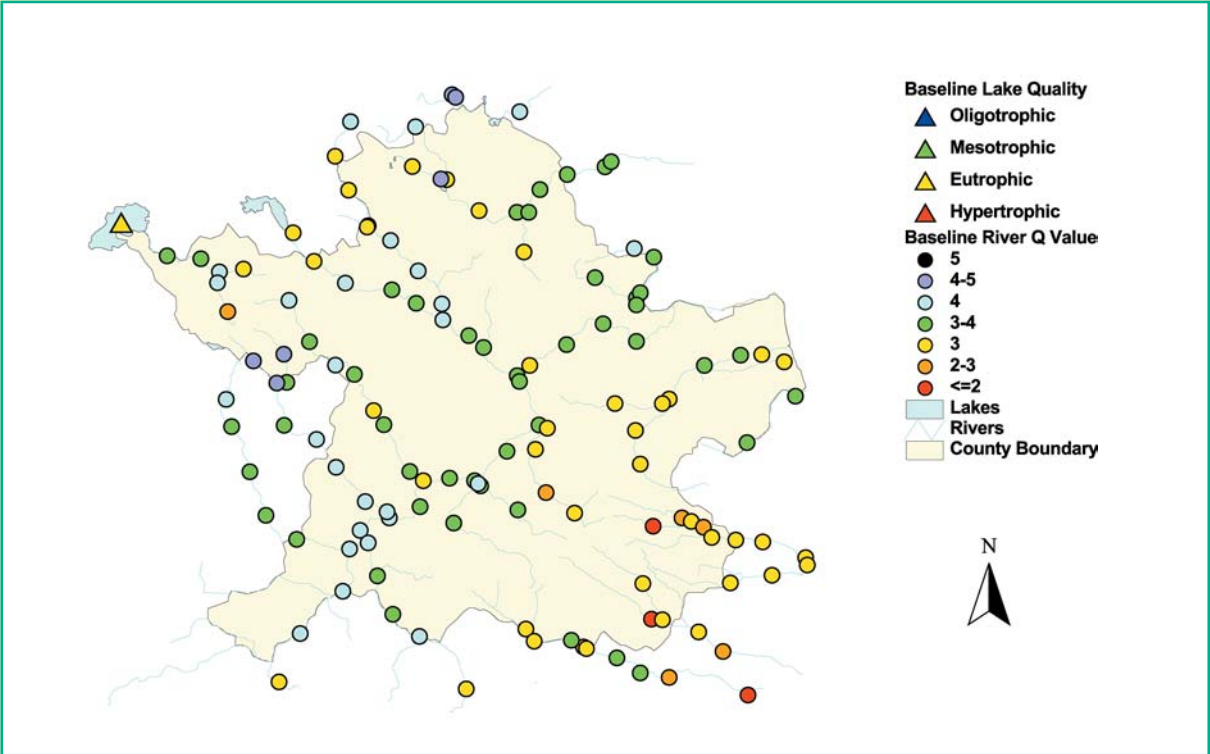
- The Agency has not received an Implementation Report from Meath County Council.

ADDITIONAL MEASURES PROPOSED

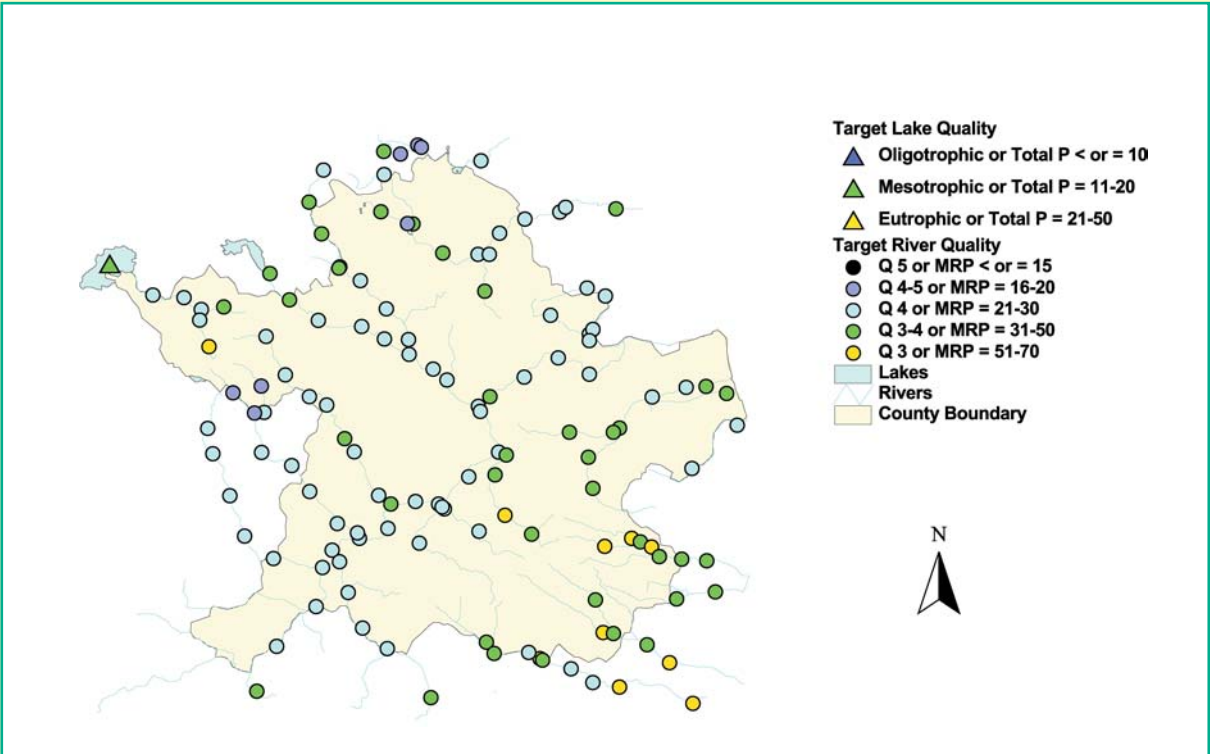
- Part of the functional area of Meath is currently the subject of two separate EU-funded, catchment monitoring and management studies: 1) The Lough Derg and Lough Ree Catchment Monitoring and Management system includes the River Inny sub-catchment and 2) The Three Rivers Project includes the Boyne and Liffey catchments.
- Meath County Council states that it will co-operate fully with these management systems and will implement measures proposed by these projects and in the River Tolka Water Quality Management Plan.
- County-wide public consultation forum to be established with all sectoral interests.
- Encourage better management practices in forestry and peat extraction sectors.
- Expand role of environmental education officer to include water quality and to promote use of phosphorus-free detergents.
- Survey septic tanks, promote better technologies and enforce Water Pollution Act where necessary.

ADDITIONAL MEASURES PROPOSED

- Meath County Council to carry out liaison with Teagasc and other farming groups.
- Promote Best Farm Management practices in co-operation with Teagasc.
- Promote participation in REPS.
- Carry out farm surveys in hot spot areas and enforce Water Pollution Act where necessary.
- Promote and implement the use of nutrient management planning for individual farms where hot spots are identified.
- A groundwater protection scheme was prepared for Meath County Council in 1998.
- Upgrade and construct wastewater treatment plants, provide phosphorus removal at certain plants. Phosphorus removal installed at Trim WWTP and to be installed at Navan WWTP.
- Increase monitoring of surface water quality and of WWTPs.
- Integrate EPA and local authority monitoring.
- Establish a steering committee to implement catchment management plans where applicable.
- Survey housing estates for misconnections of foul sewers to surface water drains.
- Maintenance and regular updating of GIS based data management system.
- Review discharge licences in light of Regulations and target unlicensed discharges.
- Review licensed landspreading.
- Review water abstractions.



Map 33 Baseline River and Lake Quality in County Meath



Map 34 Target River and Lake Quality in County Meath

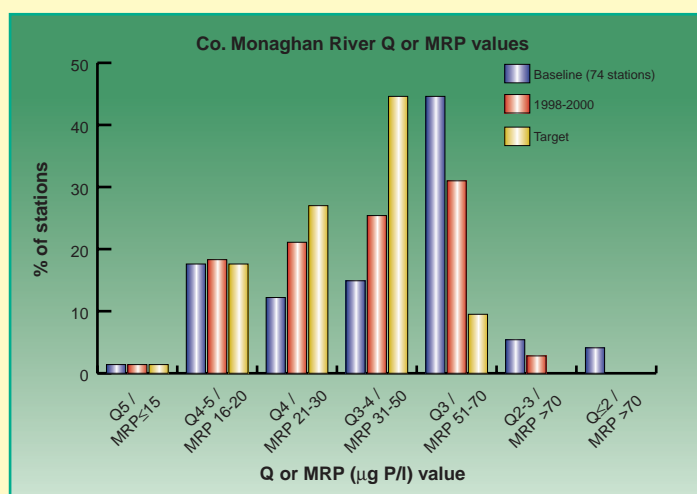
Monaghan County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Monaghan has generally improved in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 55 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 41 per cent of stations are now of satisfactory quality, while 33 per cent are satisfactory based on Q values only. A total of 31 per cent of stations were satisfactory in the baseline biological survey.
- In addition, all the seriously polluted sites have improved in quality.
- However, when biology alone is considered the number of high quality Q5 and Q4-5 stations has fallen such that there are currently no monitored stations of Q5 status left in the county.
- Three of the four lakes monitored in the baseline survey were classified as being of unsatisfactory quality and require improvement. Lough Egish and White Lake were classified as hypertrophic and Lough Annamakerrig was classified as being of eutrophic status.

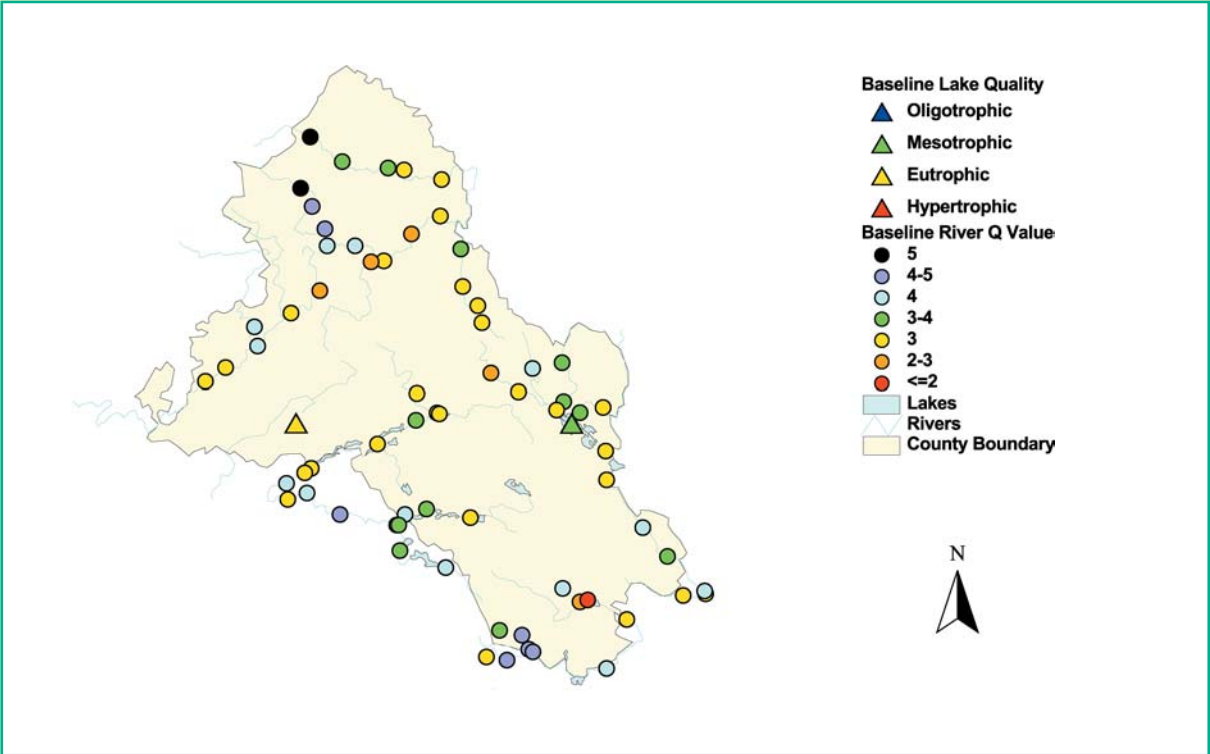
PROGRESS IN MEASURES BEING IMPLEMENTED

- Recent commissioning / upgrading of WWTPs in Monaghan, Carrickmacross, Tyholland, Threemilehouse, Drum, Emyvale, Scotstown, Ballinode and Coolreagh Cottages. WWTPs planned for Glaslough, Tydavnet and Magheracloone.
- Consultant appointed to carry out GIS mapping project and to make recommendations on water quality monitoring and management.
- Phosphorus monitoring stations increased from sixty-three to eighty-three and frequency of sampling increased. Integration of hydrometric and phosphorus monitoring attempted, further work in this area proposed.
- Forty-eight lakes sampled in 2000.
- Assessment of all new developments to ensure sustainable method of disposal / recycling wastes ongoing.
- Alternatives to landspreading under study.
- Geological Survey of Ireland is preparing Groundwater Protection Plan, which is due by 2001.
- Review of discharge licences ongoing.
- Enforcement of Water Pollution Act ongoing.
- Some preliminary work done on education and awareness through notices in local press.

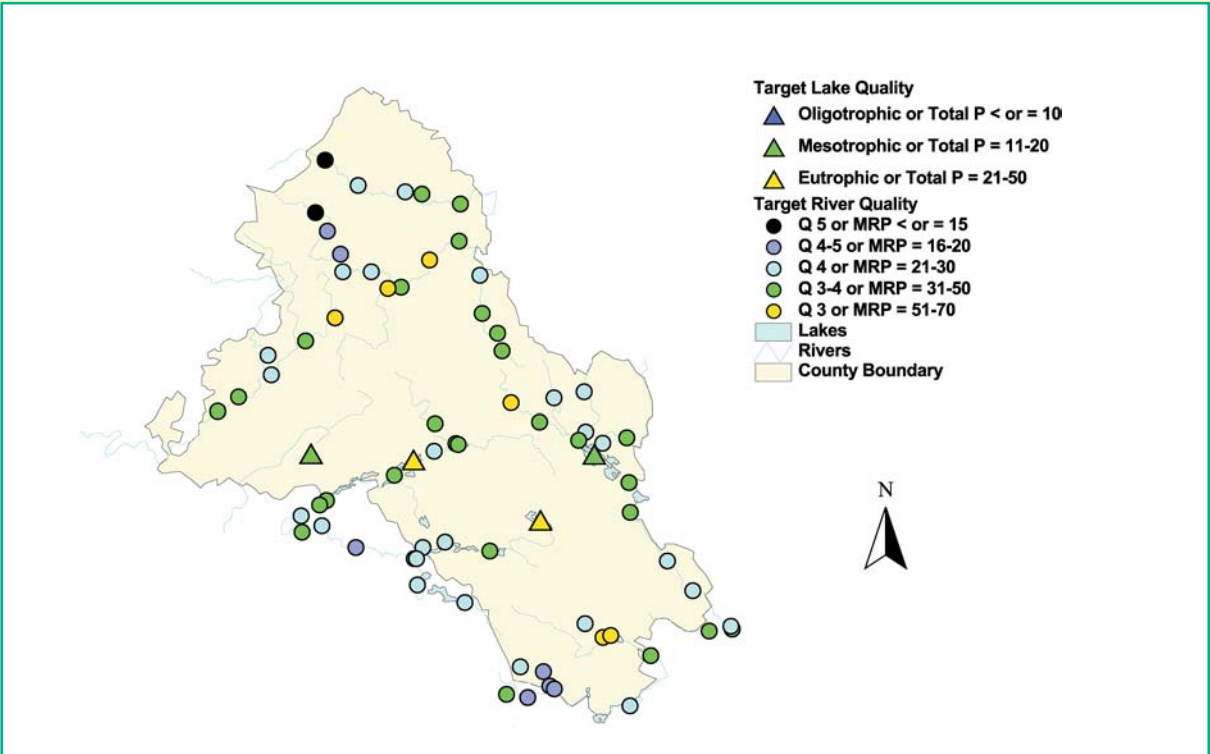


ADDITIONAL MEASURES PROPOSED

- Intensive survey work proposed for Bunnoe River catchment using it as a pilot catchment, including examination of agricultural nutrient loss mechanisms.
- Agricultural Education and Awareness Programme.
- Carry out soil surveys and run-off risk assessment of lands where feasible.
- Establish databases on soil phosphorus levels and phosphorus load from point source discharges of both urban and industrial waste waters.
- Possible upgrade of Ballybay and Clones WWTPs proposed.
- Establish Steering Committee to review progress on implementation of Regulations.
- Establish Working Group to inspect agricultural and other enterprises.
- Specialist in area of diffuse agricultural pollution to be appointed.
- The Council will seek funding and partnerships with other local authorities to develop and implement water quality management plans.
- An extension under Article 3(9) of the regulations is proposed for the entire county for the maximum allowed period of six years.



Map 35 Baseline River and Lake Quality in County Monaghan

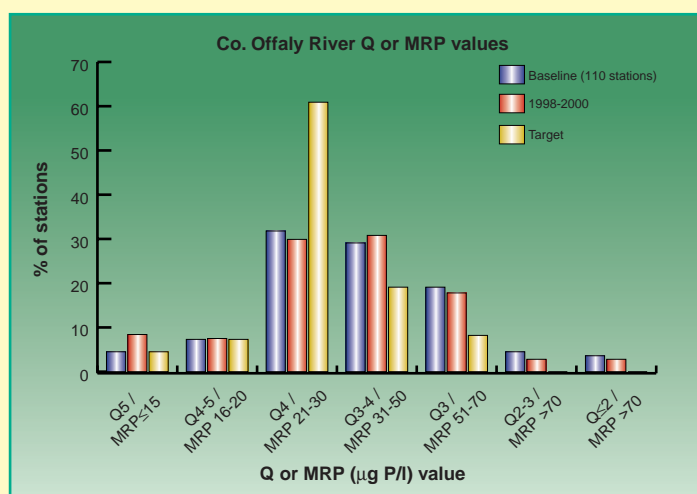


Map 36 Target River and Lake Quality in County Monaghan

Offaly County Council

SUMMARY OF WATER QUALITY STATUS

- Water quality results at monitoring stations in Co. Offaly in the 1998-2000 survey, are similar to those recorded in the baseline survey.
- Of stations monitored in 1998-2000, 55 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 46 per cent of stations are now of satisfactory quality, while 44 per cent are satisfactory based on Q values only. A total of 44 per cent of stations were satisfactory in the baseline biological survey.
- Some of the moderately and seriously polluted sites have improved in quality.
- The number of stations recording either a Q5 value or an $\text{MRP} \leq 15 \mu\text{g P/l}$ in 1998-2000 is greater than the number of Q5 stations in the baseline biological survey. However, further analysis comparing stations sampled biologically in both survey periods reveals a decline in the number of Q5 stations from four to two.

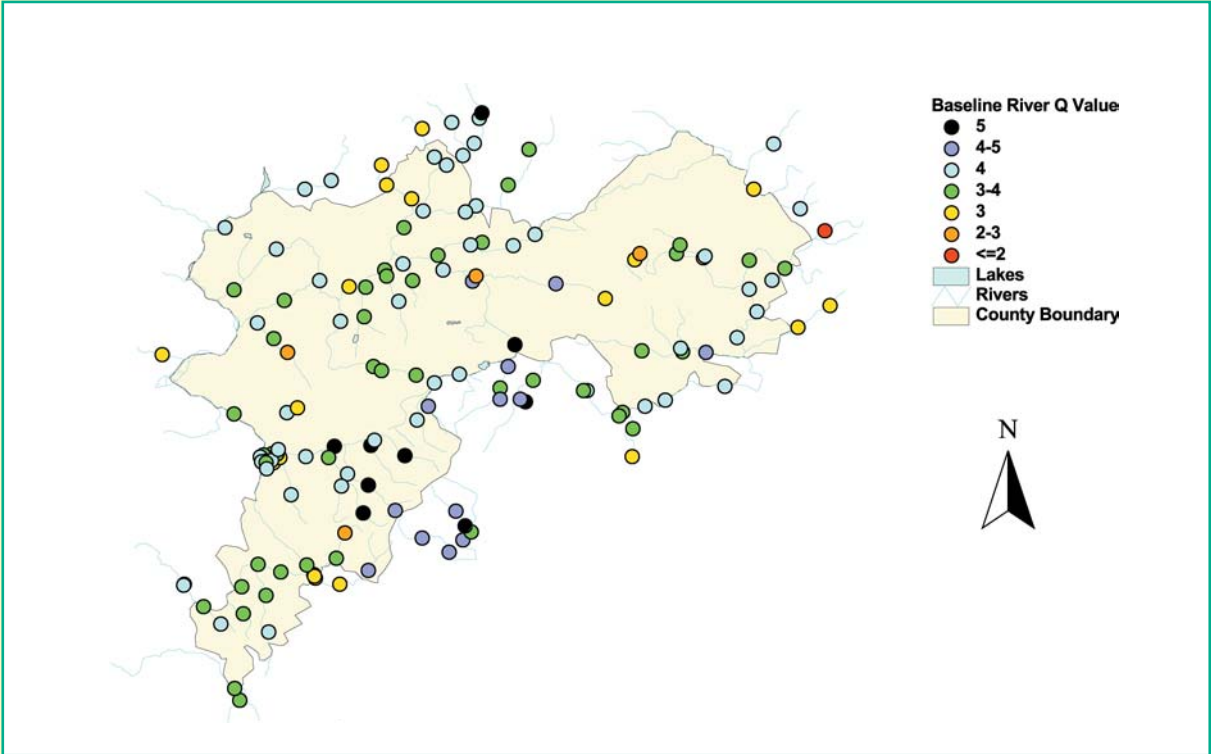


ADDITIONAL MEASURES PROPOSED

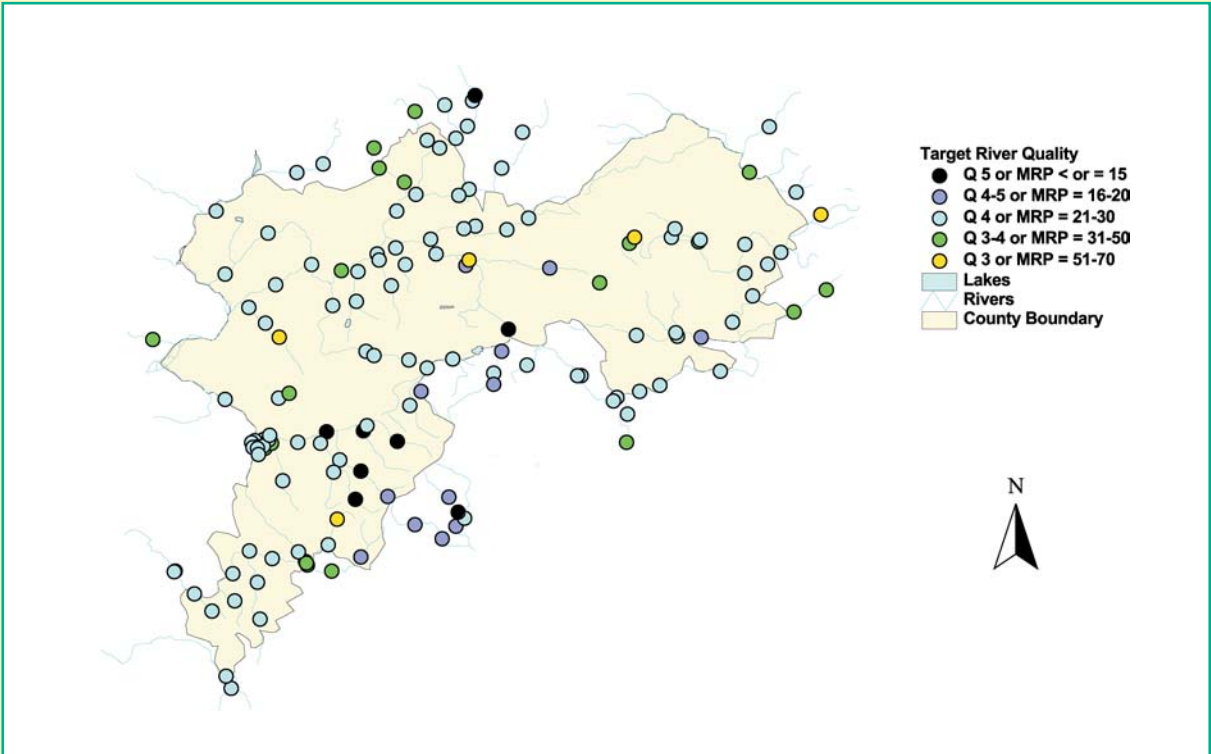
- County Offaly includes part of the Shannon and South Eastern River Basin Management Project proposed under Water Framework Directive.
- WWTPs to be upgraded / constructed include those at Kinnitty, Moneygall, Dangan, Clara, Ballycumber, Ferbane, Clonaslee, Bracknagh, Clonbulloge, Clonygown, Walsh Island, Mucklagh and Rahan. Upgrading proposed for surface water overflows and stormwater treatment at Tullamore.
- Draft agricultural bye-laws prepared for Shannon catchment.
- Improved collaboration with neighbouring local authorities.
- Nutrient management planning required in many areas.
- Improve river water quality monitoring.
- Address problems arising from peat producing industry – consultations begun, licensing may be required.
- Monitor forestry development and control aerial fertilization.

PROGRESS IN MEASURES BEING IMPLEMENTED

- Offaly County Council takes an active part in Lough Derg / Ree Catchment Monitoring and Management System.
- Member of Barrow Catchment Management Group.
- Member of Operational Management Group of Three Rivers Project which includes the Boyne.
- Crinkle WWTP decommissioned - cessation in discharges has improved water quality in Rock River.
- Improved operation of phosphorus removal facilities at Birr and Tullamore WWTPs.
- Four Section 16 licences reviewed, more reviews planned.
- Significant industrial discharge to Birr WWTP identified and discharge licence applied for.
- All Section 4 licences given preliminary review and five are being revised.
- Review of fish farm licence on Golden Grove Stream underway.
- Ten Section 12 Notices served on identified polluters.
- Recruitment of temporary staff to carry out farm surveys underway.
- Promotion of REPS and Control of Farm Pollution Scheme ongoing.



Map 37 Baseline River Quality in County Offaly



Map 38 Target River Quality in County Offaly

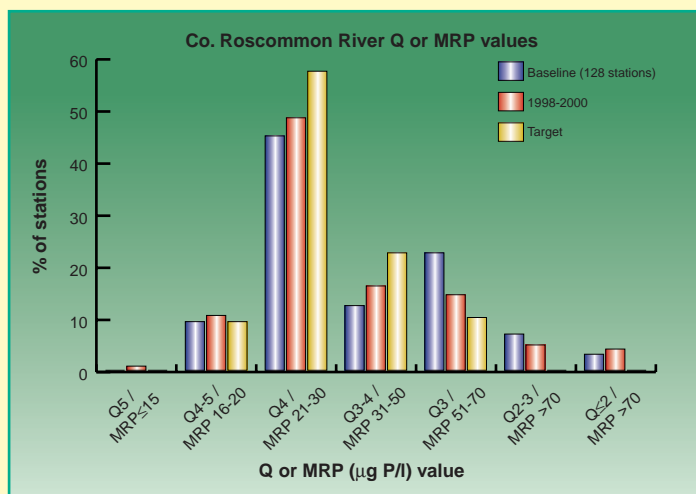
Roscommon County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Roscommon has generally improved in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 63 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 60 per cent of stations are now of satisfactory quality, while 60 per cent are satisfactory based on Q values only. A total of 55 per cent of stations were satisfactory in the baseline biological survey.
- In addition, there has been a slight increase in the number of high quality Q5 and Q4-5 stations.
- However, the number of seriously polluted stations has also risen.
- Nine of the ten lakes monitored in the baseline survey were classified as being of satisfactory quality. Lough Ree was classified as being of eutrophic status. Current monitoring indicates that Lough Ree is now of mesotrophic status and thus meets the target of the Regulations. However, this apparent improvement may be largely due to infestation of the lake with the zebra mussel. Current monitoring indicates that Loughs Allen, Boderg, Bofin, Drumharlow, Key and Oakport have maintained their satisfactory quality.

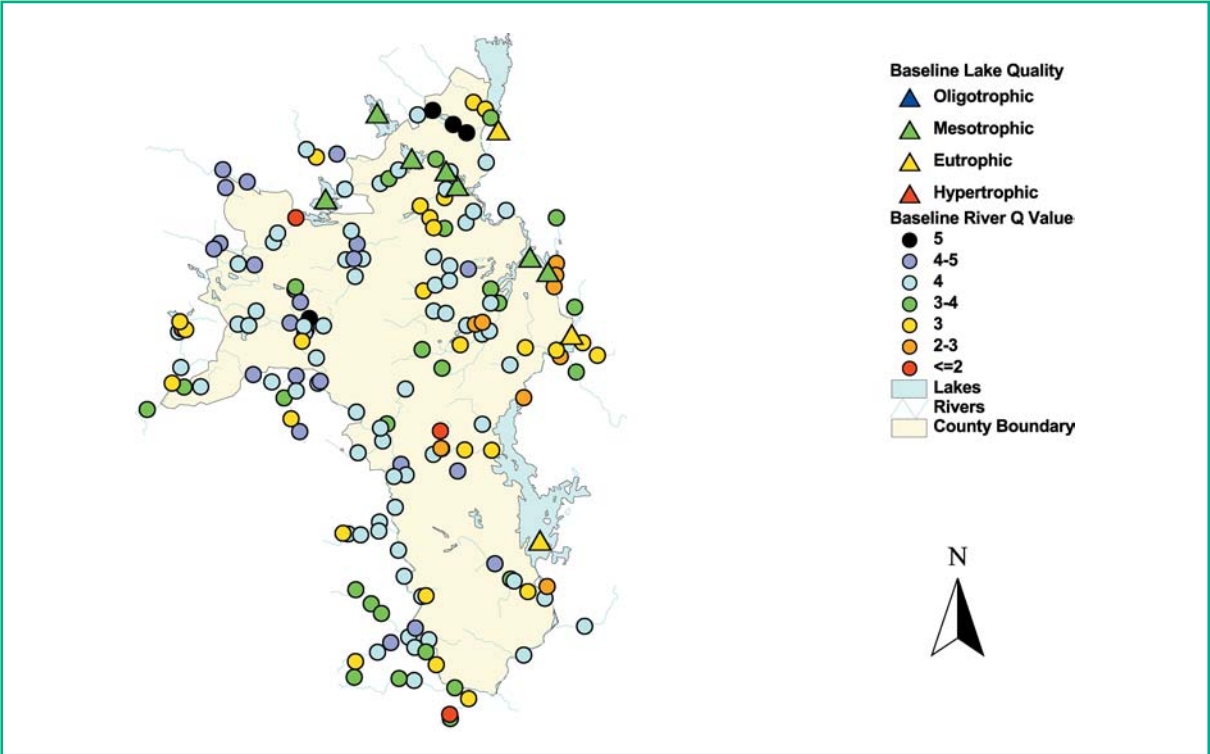
PROGRESS IN MEASURES BEING IMPLEMENTED

- Roscommon County Council submitted an Implementation Report for the Cloonfad River catchment only.
- A primary Sewage Treatment Works and reedbed system for Cloonfad village was completed in 1999. The number of connections increased from twenty-one to forty-one in previous year with work continuing.
- Planning system used to control discharges from septic tanks and other small scale sewage treatment systems.
- Development applications referred between Planning and Environment Section for inclusion of appropriate environmental conditions where permission approved.
- The frequency of monitoring at both stations in Cloonfad catchment has been increased to a minimum of fifteen samples in twenty-four months to satisfy the monitoring requirements of the Regulations.

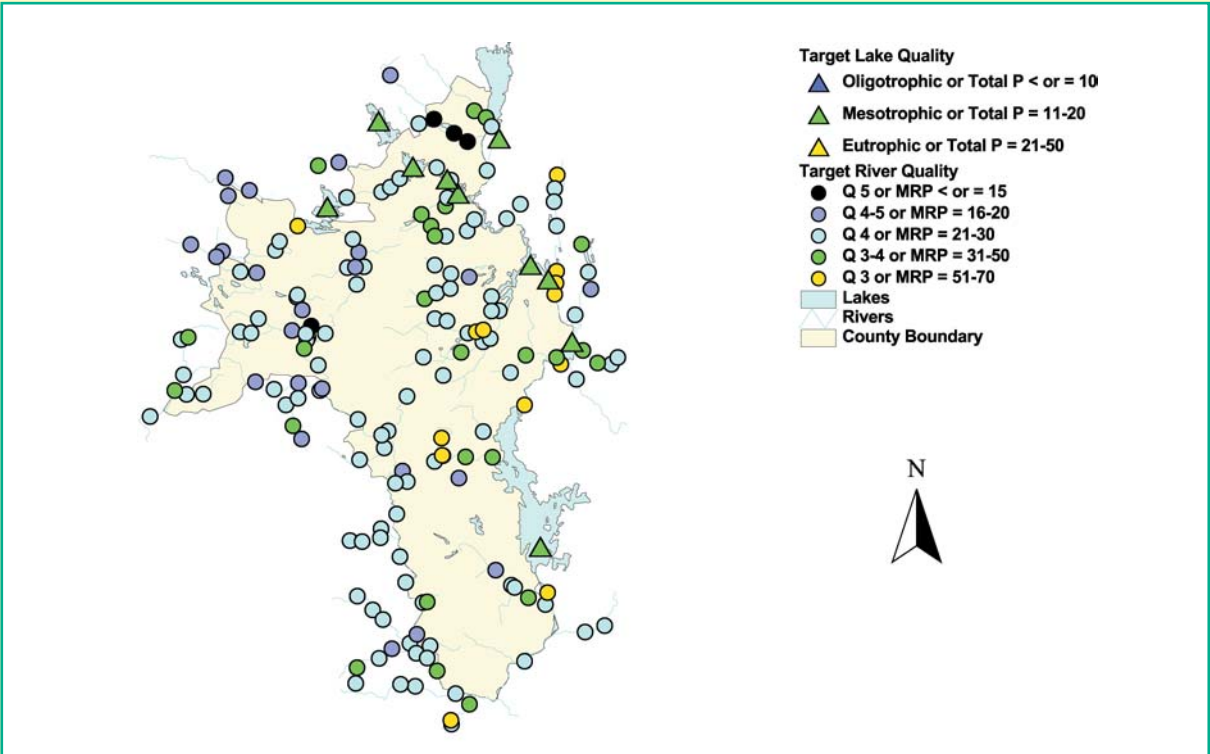


ADDITIONAL MEASURES PROPOSED

- Roscommon County Council submitted a Measures Report for the Cloonfad River catchment only. In addition, the Council submitted the Lough Derg and Lough Ree Management Proposals to cover the rest of the county.
- In the Cloonfad catchment closer liaison with forestry interests proposed.
- Environmental Education Officer to be appointed to increase public awareness of water quality issues.
- Council currently takes part in REPS seminars, however education measures will be introduced in Cloonfad catchment which are open to all farmers.



Map 39 Baseline River and Lake Quality in County Roscommon



Map 40 Target River and Lake Quality in County Roscommon

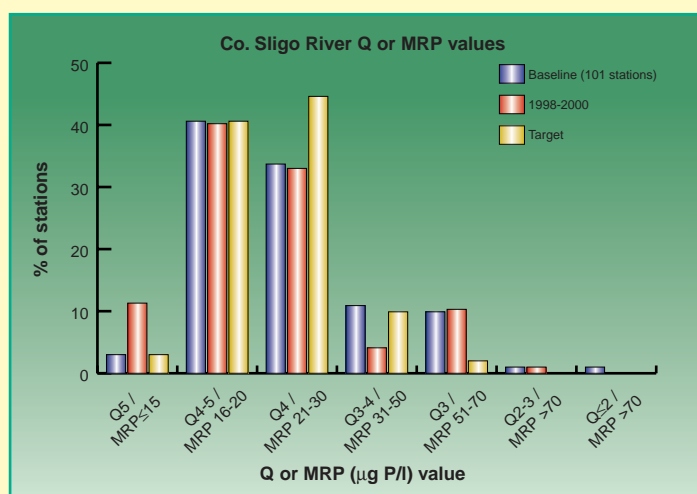
Sligo County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Sligo has improved in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 78 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 85 per cent of stations are now of satisfactory quality, while 82 per cent are satisfactory based on Q values only. A total of 77 per cent of stations were satisfactory in the baseline biological survey.
- In addition, there has been an increase in the number of high quality Q5 and Q4-5 stations.
- The seriously polluted station has improved in quality.
- All of the five lakes monitored in the baseline survey were classified as being of satisfactory quality.

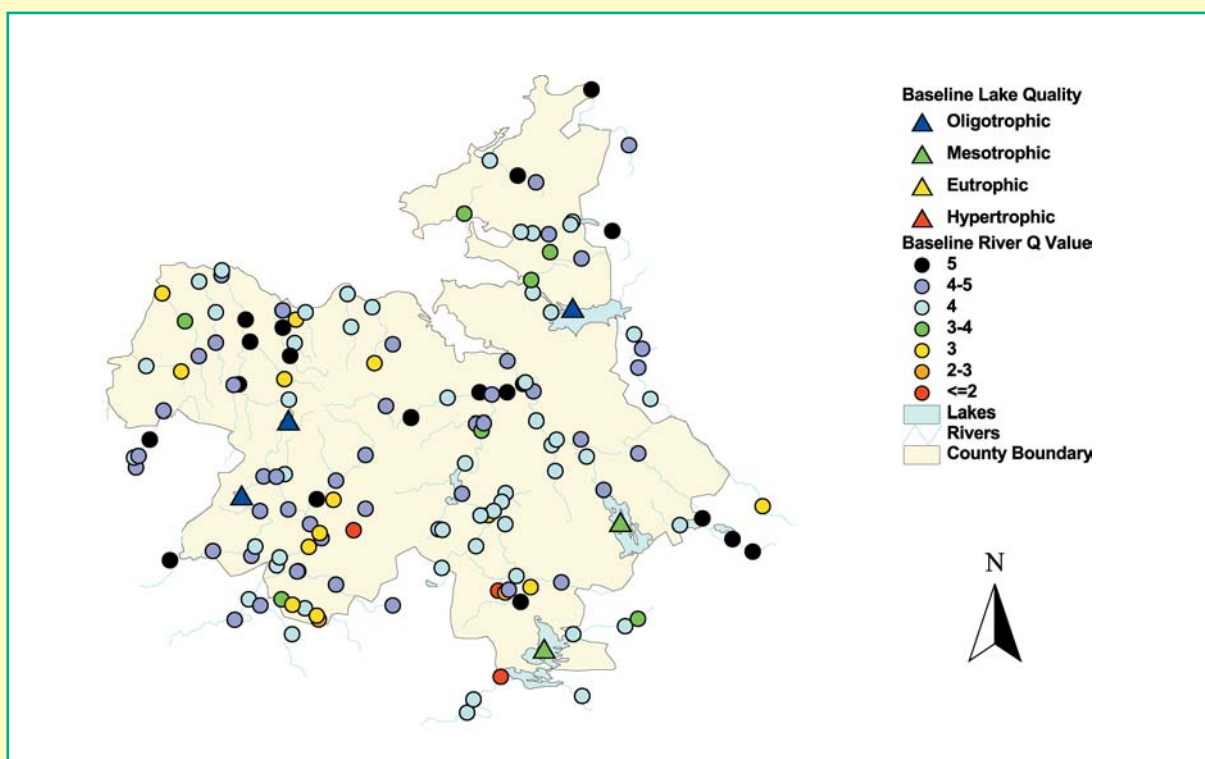
PROGRESS IN MEASURES BEING IMPLEMENTED

- The EPA received an Implementation Report for all of County Sligo except for Lough Gill. A separate Implementation Report for the Lough Gill catchment has not been received by the Agency. The Management Plan for the Lough Gill Catchment (1998) was received by the Agency, but the current status of measures proposed within this plan is unclear.
- Enforcement of Water Pollution and Waste Management Acts ongoing.
- Waste Management Plan for Connaught region adopted by Council.
- Funding obtained for Sludge Management Plan.
- Three additional staff recruited in 2000.
- Communication Officer appointed and Environmental Brochure to be launched shortly.
- New laboratory equipment purchased for nutrient analysis; improved quality control / assurance to be addressed in 2001.
- Phosphorus removal provided at Geevagh and Curry WWTPs and construction of Monasteraden Plant (with phosphorus removal) to commence 2001.
- Detailed river surveys commenced on Bellawaddy River, Tobercurry stream and at suspected pollution source on River Moy – more surveys planned on other rivers.

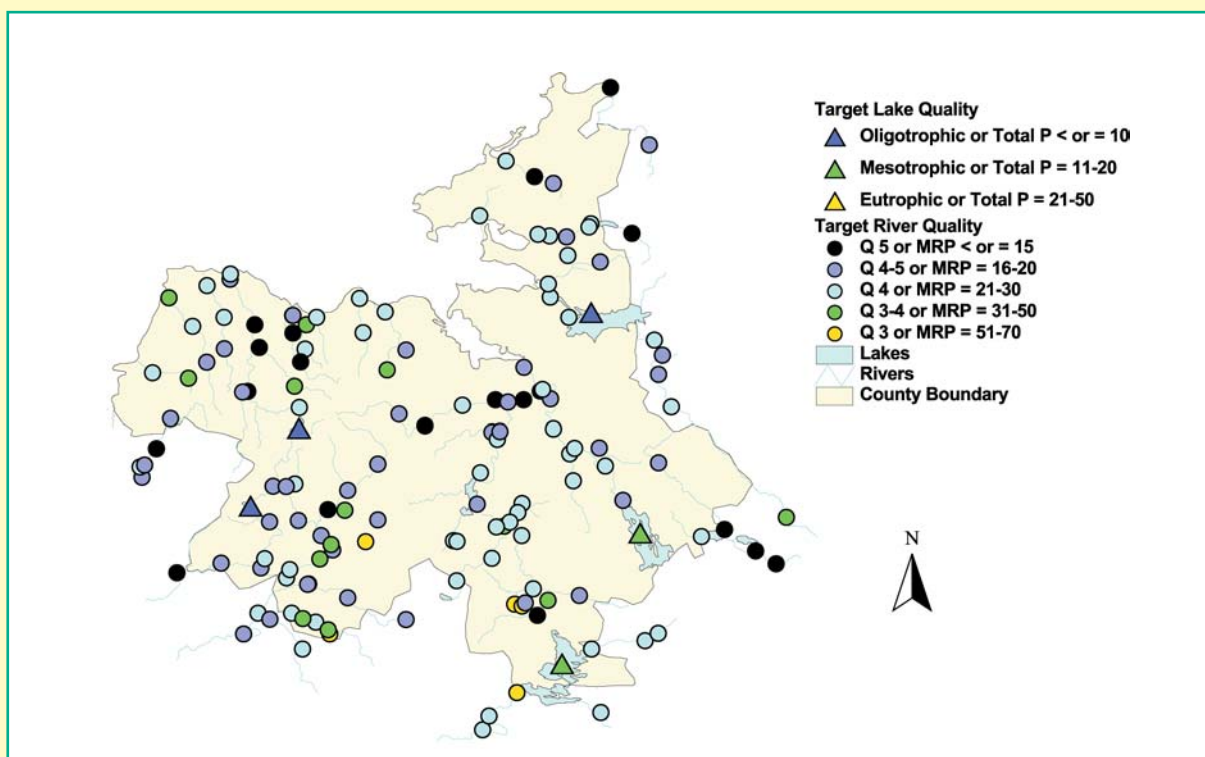


ADDITIONAL MEASURES PROPOSED

- Review water quality monitoring programme and integrate with EPA; set up monitoring committee in 2001.
- Secure Central Government finance for: capital works programmes; recruitment of four additional staff; preparation of Groundwater Protection Plan; expansion of GIS; increased monitoring; farm surveys and ancillary costs.
- Assessment of Needs Report 2000 identifies upgrading / provision of eighteen sewage treatment plants (eleven of which discharge to inland waters).
- Establish multi-sectoral catchment management committees in the Owenmore and Moy Catchments.
- Recruit Environmental Services Co-ordinator and establish an environmental education programme, particularly in relation to good agricultural practices.
- Utilise Lough Gill Management Plan website to obtain publicity for water quality issues.
- Expand Lough Gill GIS to whole county.
- Review discharge licences (to commence 2001).
- Carry out farm surveys and risk assessment in almost all catchments, particularly the Owenmore and Moy catchments, help assess need for nutrient management planning (to commence 2001).
- In-depth study of nutrient run-off from two farms proposed, details to be finalised 2001.
- Nutrient management planning to be required on farms which receive pig slurry.
- Assess need for bye-laws to control agricultural and forestry activities.
- Carry out septic tank survey (around Lough Arrow).



Map 41 Baseline River and Lake Quality in County Sligo



Map 42 Target River and Lake Quality in County Sligo

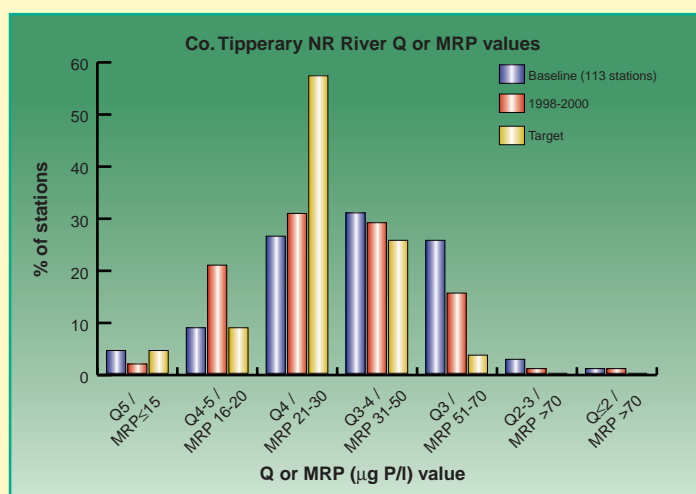
Tipperary NR County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Tipperary NR has generally improved in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 61 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 54 per cent of stations are now of satisfactory quality, while 51 per cent are satisfactory based on Q values only. A total of 40 per cent of stations were satisfactory in the baseline biological survey.
- There has been a marked increase in the number of Q4-5 stations but a decrease in the number of high quality Q5 stations.
- There has been a decrease in the number of moderately polluted stations.
- Lough Derg was the only lake monitored in the county in the baseline survey and was classified as being eutrophic. Current monitoring indicates that Lough Derg is now of (satisfactory) mesotrophic status and therefore meets the target of the Regulations. However, this apparent improvement may be largely due to infestation of the lake with the zebra mussel.

PROGRESS IN MEASURES BEING IMPLEMENTED

- Templemore, Thurles, Borrisoleigh and Nenagh WWTPs approved for upgrading; Roscrea WWTP upgraded and being commissioned; construction due to commence on stage two of Nenagh Sewer Scheme.
- Phosphorus removal installed in Nenagh, Roscrea and Ballina WWTPs, though required removal efficiencies not yet attained at Nenagh and Roscrea – special study underway on percolation filters.
- Consultants appointed for Sludge Management Plan.
- Environmental Technician recruited in 2000 to carry out farm surveys, 361 farmyards visited, more farm surveys planned – Water Pollution Act to be enforced as a result of surveys.
- Environmental graduate appointed to review and update Section 4 and 16 discharge licences.
- Agricultural bye-laws, introduced on 1 January 2001, include mandatory nutrient management planning and slurry storage capacities for specified areas.
- Envisage, a Computerized Information System, which comprises a series of databases linked to a GIS, has been installed – use includes management of water quality and farm survey data.
- Environmental Awareness Officer appointed in 2000.
- Environmental newsletter published in 2000 and distributed to all households and businesses – will be published every three months.
- Local environmental project sponsored by Council for Nenagh River, in partnership with An Taisce and local anglers.
- REPS promotion ongoing.



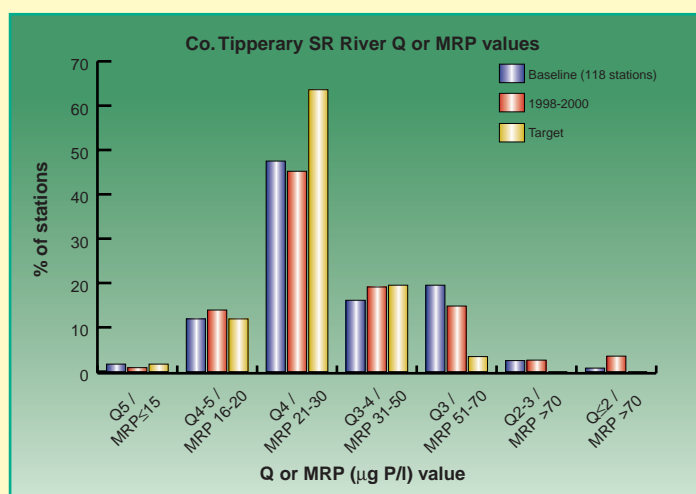
ADDITIONAL MEASURES PROPOSED

- Council is involved in committees on Lough Derg / Ree Catchment Monitoring and Management System, on Three Rivers Project (for the Suir), on proposed Shannon River Basin Management Project (under Water Framework Directive) and on the Mulkear Catchment Management Group. Council co-operates with Nore Catchment Management Group.
- Groundwater Protection Plan being developed in partnership with the Geological Survey of Ireland, report due 2001.
- Funding sought for upgrading of smaller WWTPs which do not qualify for EU Cohesion funds.
- Improved flow and chemical monitoring of WWTPs.
- Publicity campaigns on water quality issues.
- School environmental education programme.
- Impact of forestry to be investigated.

Tipperary SR County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Tipperary SR has declined slightly in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 52 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 60 per cent of stations are now of satisfactory quality, while 60 per cent are satisfactory based on Q values only. A total of 61 per cent of stations were satisfactory in the baseline biological survey.
- In addition, there has been an increase in the number of seriously polluted stations.



PROGRESS IN MEASURES BEING IMPLEMENTED

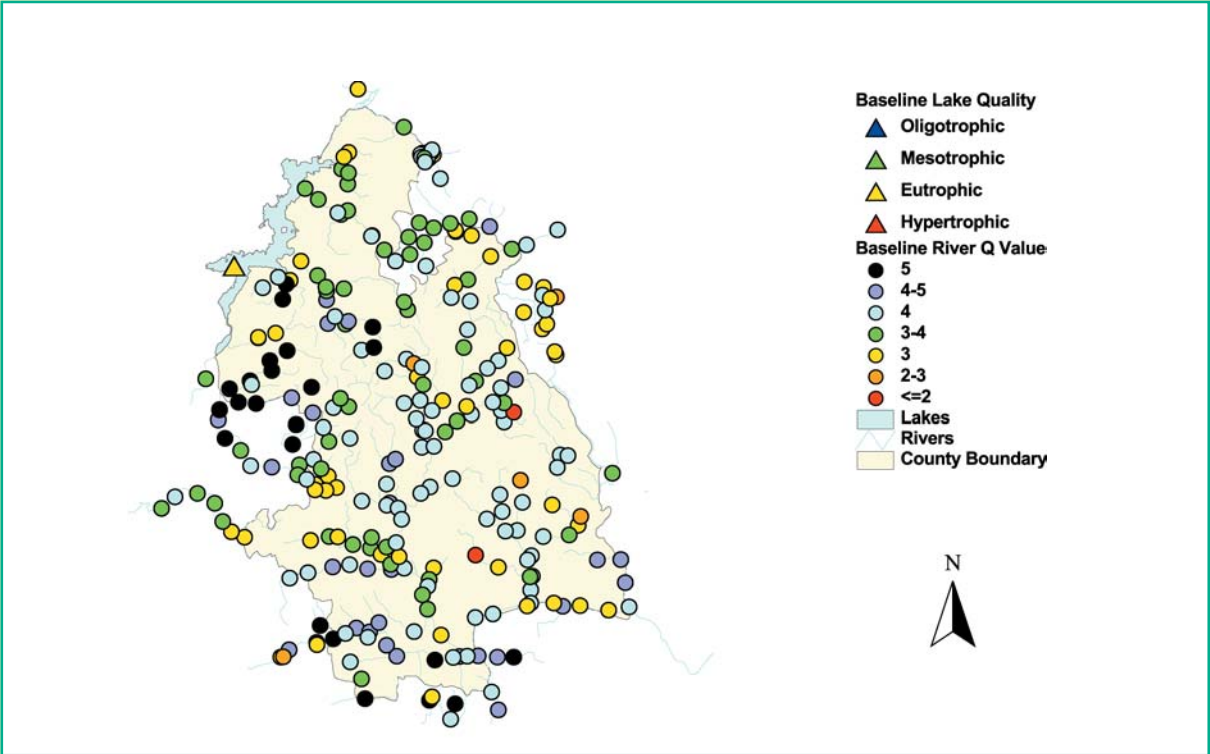
- Local authority has in place and is implementing on an ongoing basis its Groundwater Protection Plan; Sludge Management Plan and Waste Management Plan.
- Measures being implemented under Sludge Management Plan include stringent controls on management of pig slurries.
- Intern recruited to initiate application of Envisage GIS and Mapinfo software for management of data relevant to water quality.
- Three Environmental Technicians currently being recruited, to be deployed in farm surveys, GIS application and laboratory analysis.
- 139 farm inspections carried out.
- Council Environmental Management System at initial stage of development.
- Increase in number of discharge licences issued from twenty-four to fifty-four and a further seventy-two unlicensed discharges are under assessment.
- Section 4 and Section 16 discharge licences currently under review, two licences reviewed.
- Tipperary Co-operative Creamery now connected to main drainage system.
- Tipperary WWTP currently being upgraded, with phosphorus removal to be installed by 2002, Killenaule WWTP fitted with new clarifier.
- Enforcement of Water Pollution Act ongoing, ten Section 12 notices issued – mostly requiring nutrient Management Planning, prosecution taken against major polluter.
- Good co-operation obtained from Coillte and Fisheries Board in deciding areas where aerial fertilisation may or may not take place.
- £43,000 provided by Council for hydrometric stations.

PROGRESS IN MEASURES BEING IMPLEMENTED

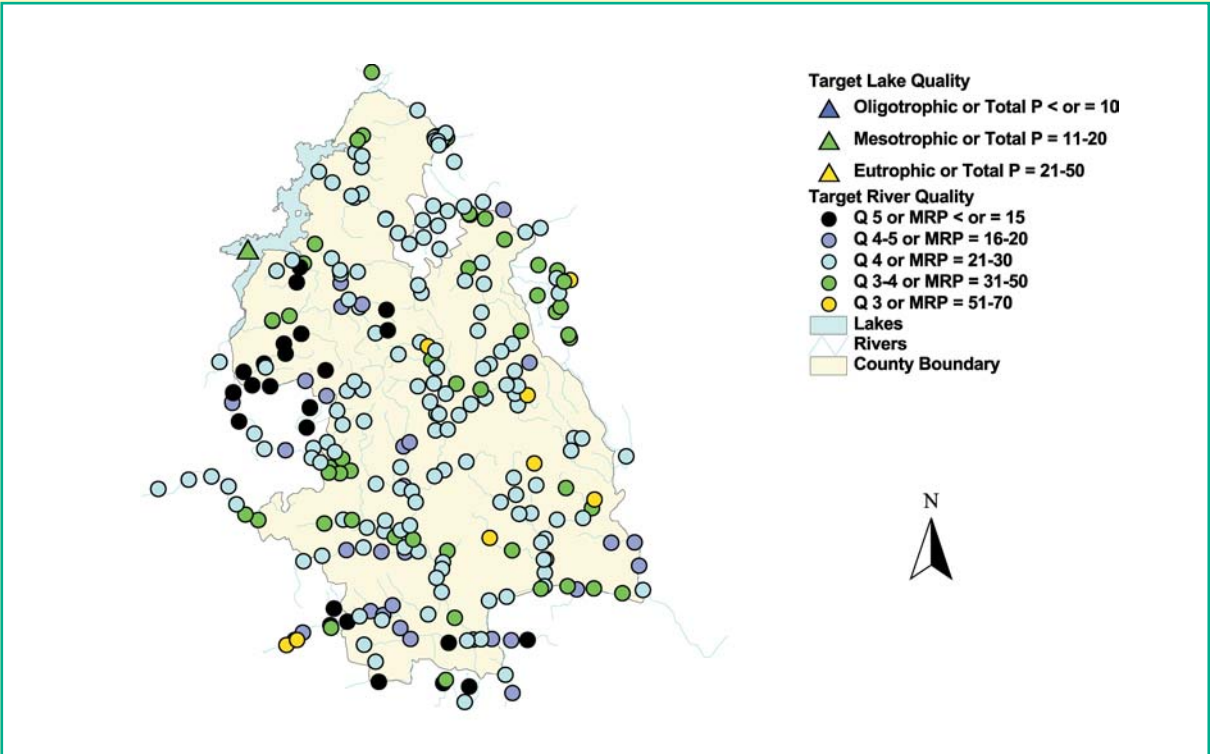
- Three Rivers Project, Council and EPA monitoring data under review – improved integration of monitoring being examined.
- Monitoring of discharge licences ongoing.
- Three Rivers Project have chosen River Ara as pilot subcatchment to assess diffuse nutrient loss.
- Presentations given to schools on environmental issues.
- Much publicity obtained through Three Rivers Project.
- REPS promotion ongoing.

ADDITIONAL MEASURES PROPOSED

- Three Rivers Project for River Suir will form basis for Council implementation of Regulations throughout entire county.
- Upgrade five WWTPs to include nutrient removal.
- Improve monitoring of point discharges and of receiving waters.
- Improve enforcement of licensed discharges.
- Farm surveys, with a target of 300 per year.
- Establish Steering Group of all major stakeholders.
- Establish soil phosphorus levels.
- Recruitment of Public Awareness Officer in 2001.
- Review monitoring data and assess need for bye-laws and Nutrient Management Planning.



Map 43 Baseline River and Lake Quality in County Tipperary



Map 44 Target River and Lake Quality in County Tipperary

Waterford Corporation

SUMMARY OF WATER QUALITY STATUS

- There are no EPA monitored river stations or lakes within the functional area of Waterford Corporation which currently come under the Regulations.
- However, Water Corporation provide data from stations on the St John's River and the River Suir.

PROGRESS IN MEASURES BEING IMPLEMENTED

- Nine outfalls determined as major sources of pollution to St John's River.
- Four discharge licences reviewed and phosphorus inputs reduced.
- Substantial completion of Interceptor Sewer No. 1 in 2000 has reduced sewage pollution of lower tidal reaches of River Suir and, to a lesser extent, St John's River.
- Cleaning of St John's river and banks of illegally dumped material and excessive growth ongoing.

ADDITIONAL MEASURES PROPOSED

- Development of catchment management programmes.
- Review all Section 4 licences and enforce Water Pollution Act.
- Clean river and banks of illegally dumped material and excessive growth.
- Form alliance with general business and residential sectors with regard to eliminating unauthorised connections and dumping to surface drains.
- Form alliance with Teagasc and local farmers with regard to agricultural pollution.
- Designate areas where nutrient management planning required.
- Educate all parties bounding the river / stream about negative effects of dumping.
- Develop schools education programme.
- Carry out groundwater sampling and identify any sources of pollution.
- Waterford Corporation is awaiting a decision on the proposed Waste Water Treatment Plant at Gorteens.
- Establish phosphorus loads from proposed WWTP.
- Installation of nutrient removal facility at the proposed WWTP.
- Apply for waste licence for Kilbarry landfill.
- Close present landfill, develop leachate management plan for landfill, establish phosphorus loads from landfill, select alternative landfill site.

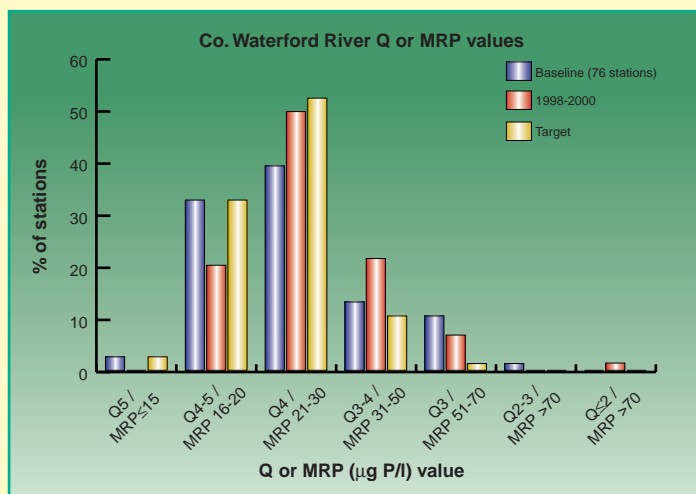
Waterford County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Waterford has declined in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 54 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 70 per cent of stations are now of satisfactory quality, while 70 per cent are satisfactory based on Q values only. A total of 75 per cent of stations were satisfactory in the baseline biological survey.
- In addition, there has been a marked decrease in the number of high quality Q5 and Q4-5 stations, such that there are currently no stations monitored of Q5 quality in the county.
- One station in the county, on the Dunhill River, was recorded as seriously polluted.

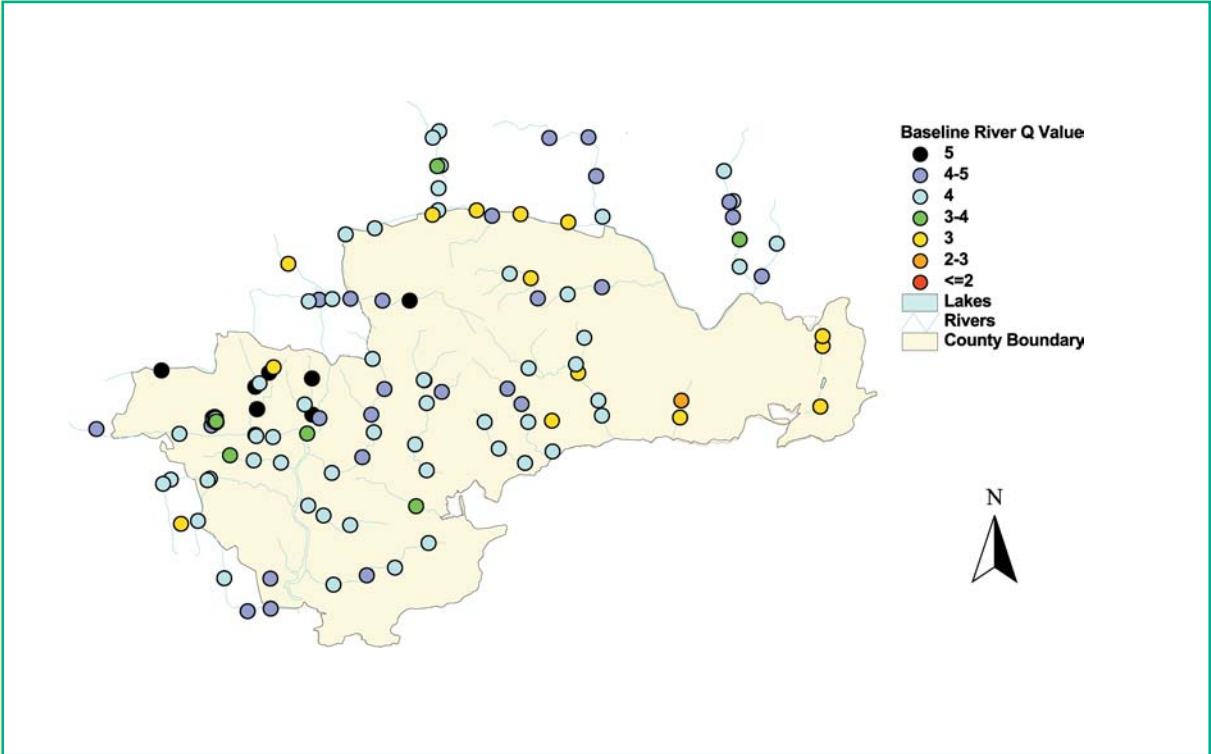
PROGRESS IN MEASURES BEING IMPLEMENTED

- The Agency has not received an Implementation Report from Waterford County Council.

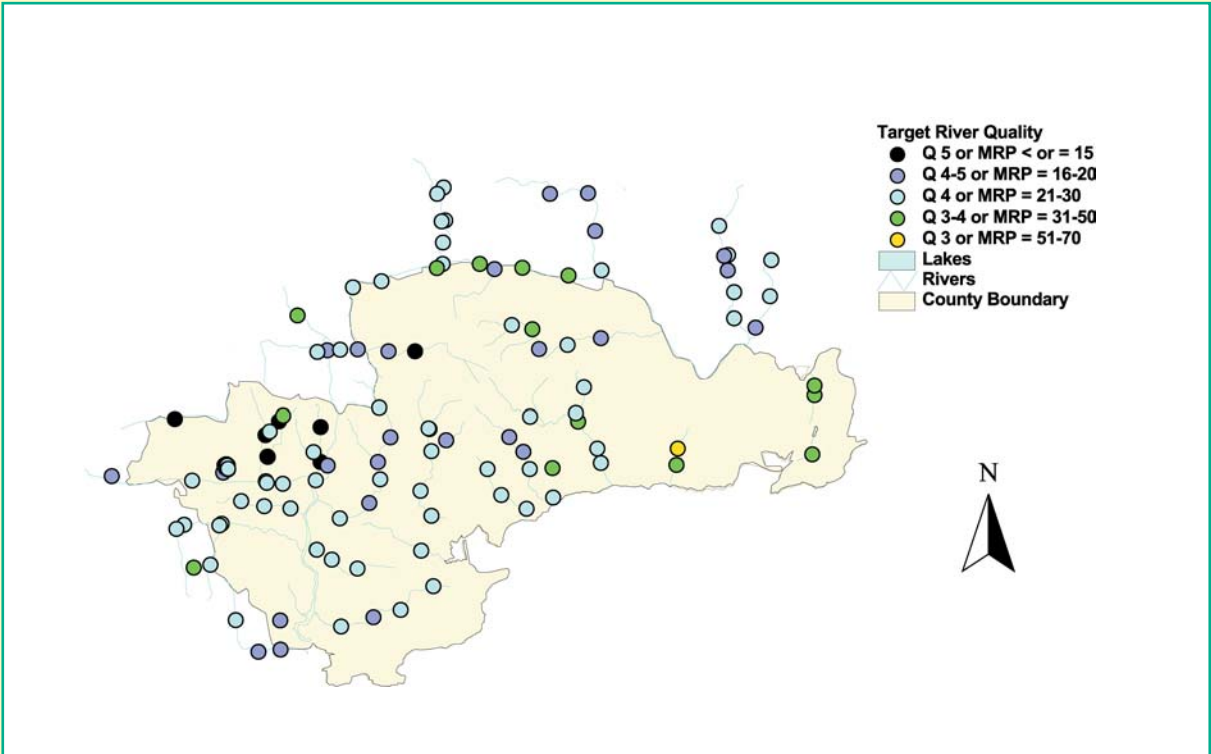


ADDITIONAL MEASURES PROPOSED

- Three Rivers Project ongoing for River Suir catchment.
- Development of specific catchment / subcatchment monitoring programmes.
- Liaison with EPA on monitoring programme.
- Review Section 4 and Section 16 licences in light of Regulations.
- Carry out farm surveys in target areas and enforce Water Pollution Act where appropriate.
- Liaison with farmers, Teagasc etc. to reduce phosphorus loadings in land spreading.
- Determine phosphorus loadings from wastewater treatment plants and reduce where necessary.
- Investigate and reduce blue-green algal occurrence.
- Use straw treatment to suppress algal bloom in Knockaderry Reservoir.
- Assessment of Needs Study for Sewerage Schemes included in report – this includes provision / upgrading of fourteen major schemes (in excess of £250,000 each), and five smaller schemes by 2006. Work proposed for 2006-2020 also outlined.
- Central sludge treatment plant proposed for Dungarvan.
- Implement Groundwater Protection Plan which was produced by Geological Survey of Ireland in 1998.



Map 45 Baseline River Quality in County Waterford



Map 46 Target River Quality in County Waterford

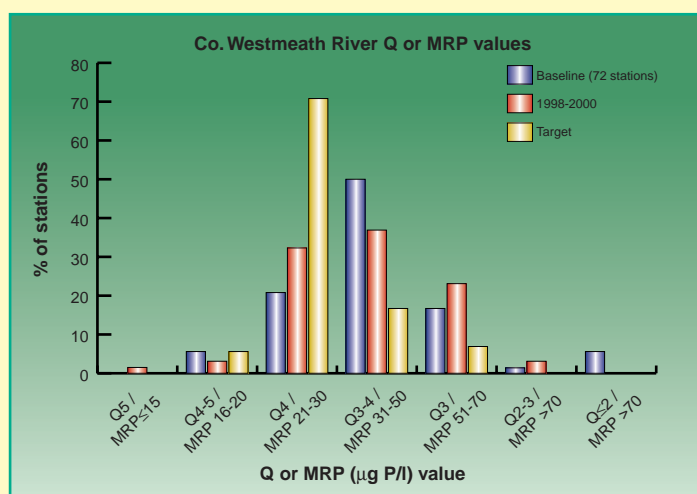
Westmeath County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Westmeath has generally improved in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 46 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 37 per cent of stations are now of satisfactory quality, while 35 per cent are satisfactory based on Q values only. A total of 26 per cent of stations were satisfactory in the baseline biological survey.
- In addition, all of the seriously polluted stations have improved in quality.
- However, there has been a marked decline in the number of high quality Q4-5 stations also.
- Seven of the nine lakes monitored in the baseline survey were classified as being of satisfactory quality. Two lakes, Lough Ree and Lough Sheelin were classified as being of eutrophic status. Current monitoring indicates that Lough Sheelin remains of eutrophic status and thus requires improvement. Current monitoring indicates that Lough Ree is now of mesotrophic status and thus meets the target of the Regulations. However, this apparent improvement may be largely due to infestation of the lake with the zebra mussel. Current monitoring indicates that Loughs Ballykeeran, Coosan, Derravaragh, Ennell, Killinure, Lene and Owel have maintained their satisfactory quality.

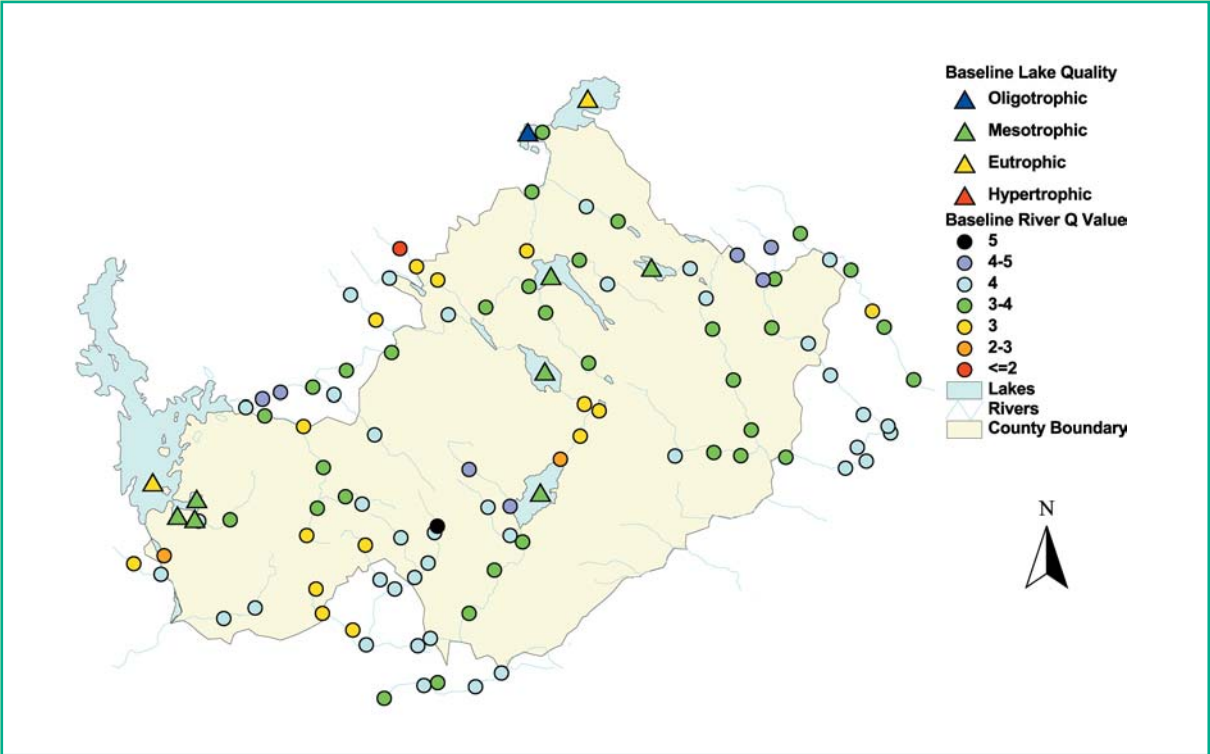
PROGRESS IN MEASURES BEING IMPLEMENTED

- Public awareness of water quality issues raised through leaflet drop to each household on eutrophication in 1999 – further public awareness work proposed.
- Agricultural bye-laws introduced on 1 March 2001 which include requirements for slurry storage and spreading, nutrient management planning and burial of fallen animals.
- Farm surveys commenced in high risk areas.
- All seven Section 4 discharge licences and twenty-four Section 16 licences are under review; a further eighteen discharges are under investigation with a view to licensing if applicable. Compliance being enforced also.
- REPS actively promoted.

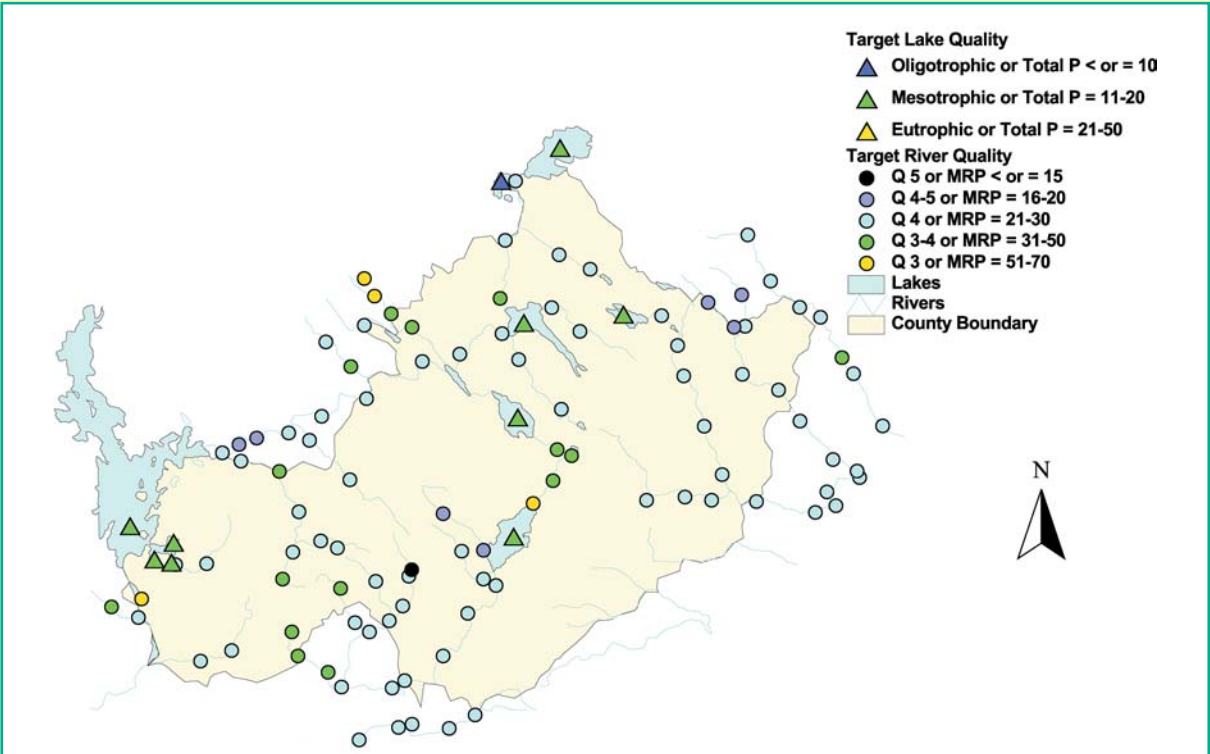


ADDITIONAL MEASURES PROPOSED

- Council involved in Lough Ree / Derg Catchment Monitoring and Management System (Shannon) and Three Rivers Project (Boyne).
- Funding sought to ensure that wastewater treatment plants comply with the requirements of the EU Urban WasteWater Treatment Directive and provide phosphorus reduction facilities at WWTPs that contribute to eutrophication.
- Funding secured to commence work on storm overflows and phosphorus removal at Mullingar WWTP (to be completed 2003).
- Install phosphorus reduction at Castlepollard wastewater treatment works before 2005.
- Phosphorus reduction will be installed at Rochfortbridge, Killucan, Kinnegad, Clonmellon, and Delvin wastewater treatment works before 2005. Work to commence on Kinnegad plant in 2000.



Map 47 Baseline River and Lake Quality in County Westmeath



Map 48 Target River and Lake Quality in County Westmeath

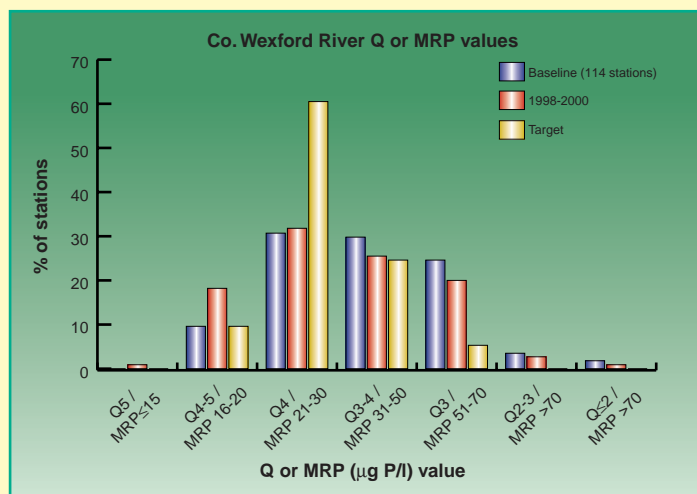
Wexford County Council

SUMMARY OF WATER QUALITY STATUS

- River water quality at monitoring stations in Co. Wexford has improved in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 55 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 51 per cent of stations are now of satisfactory quality, while 49 per cent are satisfactory based on Q values only. A total of 40 per cent of stations were satisfactory in the baseline biological survey.
- In addition, there has been an increase in the number of high quality Q5 and Q4-5 stations.
- The number of seriously and moderately polluted stations has fallen.

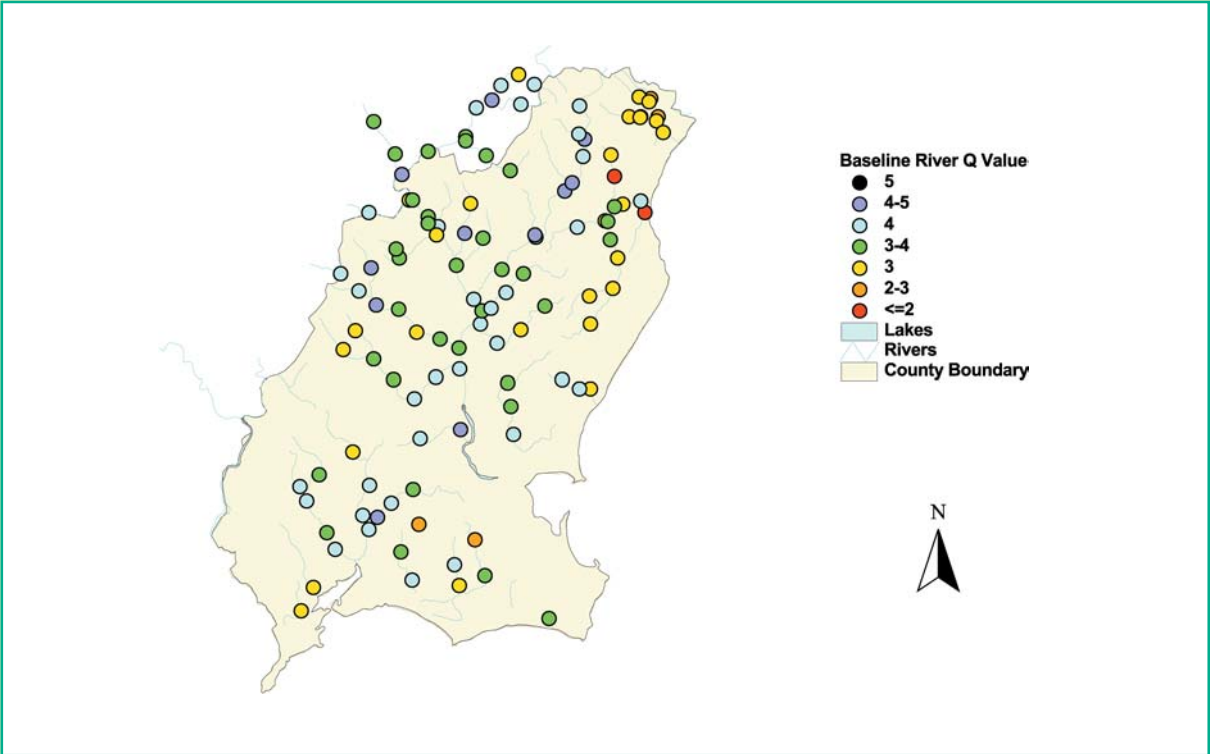
PROGRESS IN MEASURES BEING IMPLEMENTED

- All existing licences to discharge trade effluent to waters have been reviewed. Phosphorus discharge limits and monitoring included in licence conditions.
- Phosphorus emissions from WWTPs being monitored.
- All existing licences to discharge domestic effluent to water from caravan parks have been reviewed. Phosphorus discharge limits and monitoring included in licence conditions.
- All planning applications are checked to ensure suitable effluent treatment measures are taken and must apply for discharge licence where necessary.
- GIS being developed to show discharges from WWTPs, caravan parks, farms and industry and related to water quality.
- Identification of point and non-point sources of pollution ongoing.
- Promotion of REPS and Control of Farm Pollution Scheme ongoing.

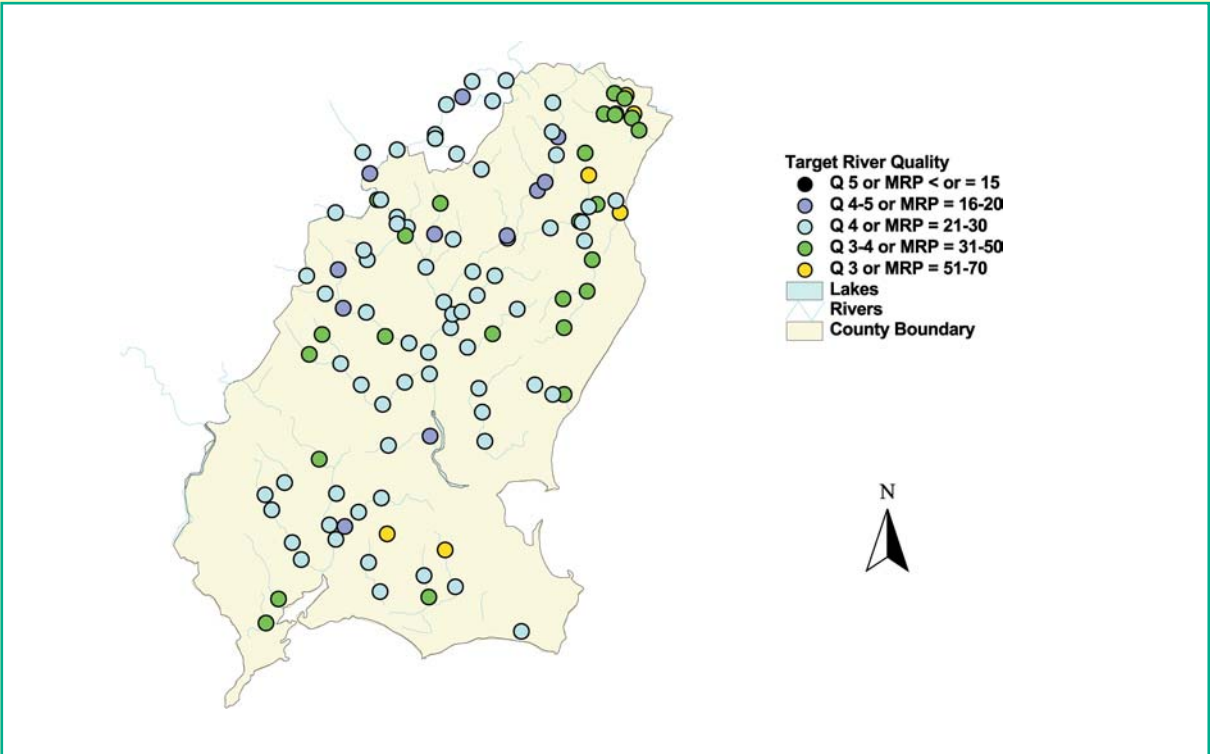


ADDITIONAL MEASURES PROPOSED

- Upgrade sewage treatment plants and put in place phosphorus removal where required.
- Install secondary treatment plant at Courtown / River Chapel. Upgrade Gorey WWTP.
- Full survey of industrial and caravan park discharges planned for 2001 – those with trade effluent discharge will be required to apply for licence.
- Enforce Water Pollution Act.
- Carry out farm survey to identify high-risk areas.
- Investigate occurrence of excess phosphorus in soils and discourage excessive use of fertiliser.
- Introduce nutrient management planning.
- Implement groundwater protection plan.
- Implement measures in County Development Plan to protect aquifers from pollution and to improve the quality of the drinking water supply.
- Develop / increase monitoring of rivers and point sources.



Map 49 Baseline River Quality in County Wexford



Map 50 Target River Quality in County Wexford

Wicklow County Council

SUMMARY OF WATER QUALITY STATUS

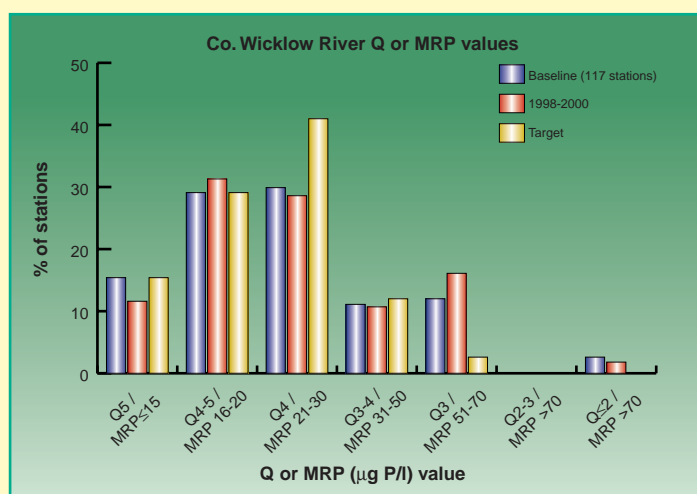
- River water quality at monitoring stations in Co. Wicklow has generally declined in the 1998-2000 survey, as compared to the baseline results.
- Of stations monitored in 1998-2000, 57 per cent comply with the standards set in the Regulations.
- Based on river Q and MRP values, 71 per cent of stations are now of satisfactory quality, while 71 per cent are satisfactory based on Q values only. A total of 74 per cent of stations were satisfactory in the baseline biological survey.
- In addition, there has been a decrease in the number of high quality Q5 stations and an increase in the number of moderately polluted stations.
- Four of the six lakes monitored in the baseline survey were classified as being of satisfactory quality. Golden Falls Lake and Bray (Lower) Lake were classified as being of eutrophic status and require improvement.

PROGRESS IN MEASURES BEING IMPLEMENTED

- Phosphorus and flow monitoring of wastewater treatment plants ongoing – phosphorus loads to be determined.
- Priority list of WWTPs to be upgraded being drawn up.
- Funding (£405K) secured from DELG for small water and sewerage schemes.
- One Section 4 licence reviewed, two under review.

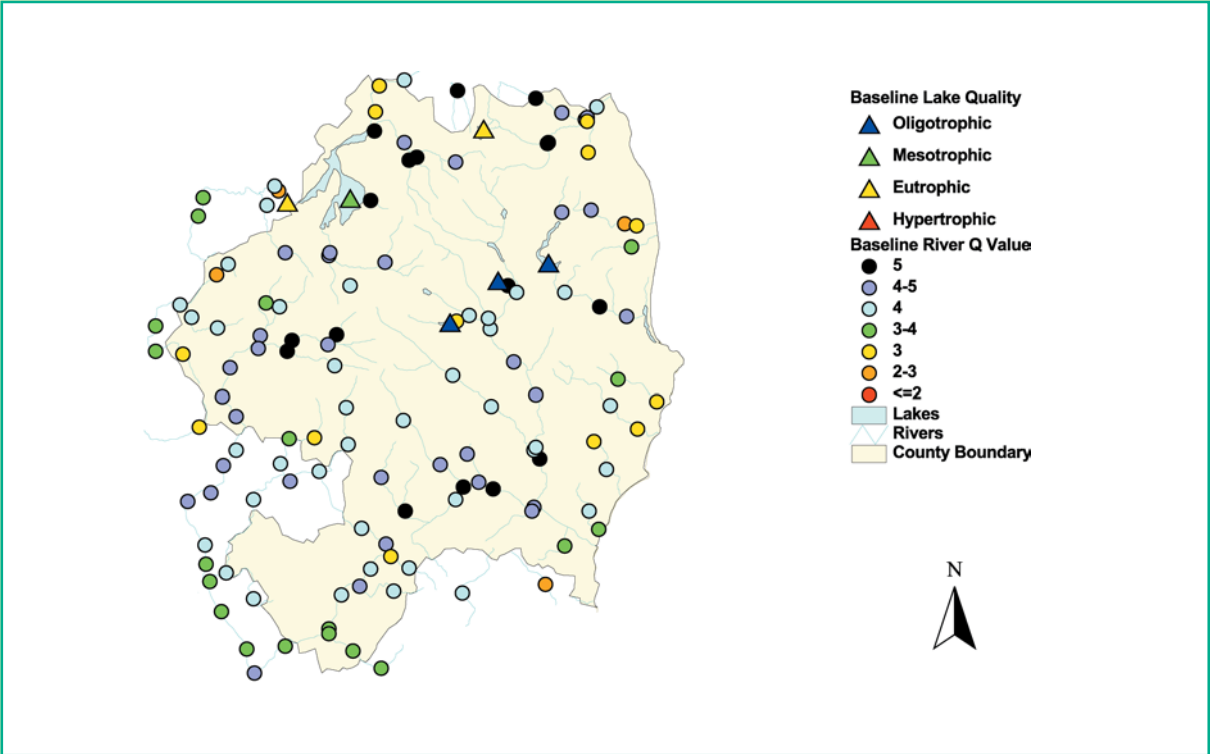
ADDITIONAL MEASURES PROPOSED

- Wicklow County Council has adopted Water Quality Management Plans for the Slaney, Liffey and Barrow rivers and is a party to the Three Rivers Project (Liffey).
- Wicklow County Council has drawn up a draft Groundwater Protection Scheme for the county in conjunction with the Geological Survey of Ireland.
- Review Section 4 and 16 discharge licences.
- Enforcement of Water Pollution Act.
- Review licensed landspreading.
- Liaison with EPA on IPC licences.
- Review all water abstractions.

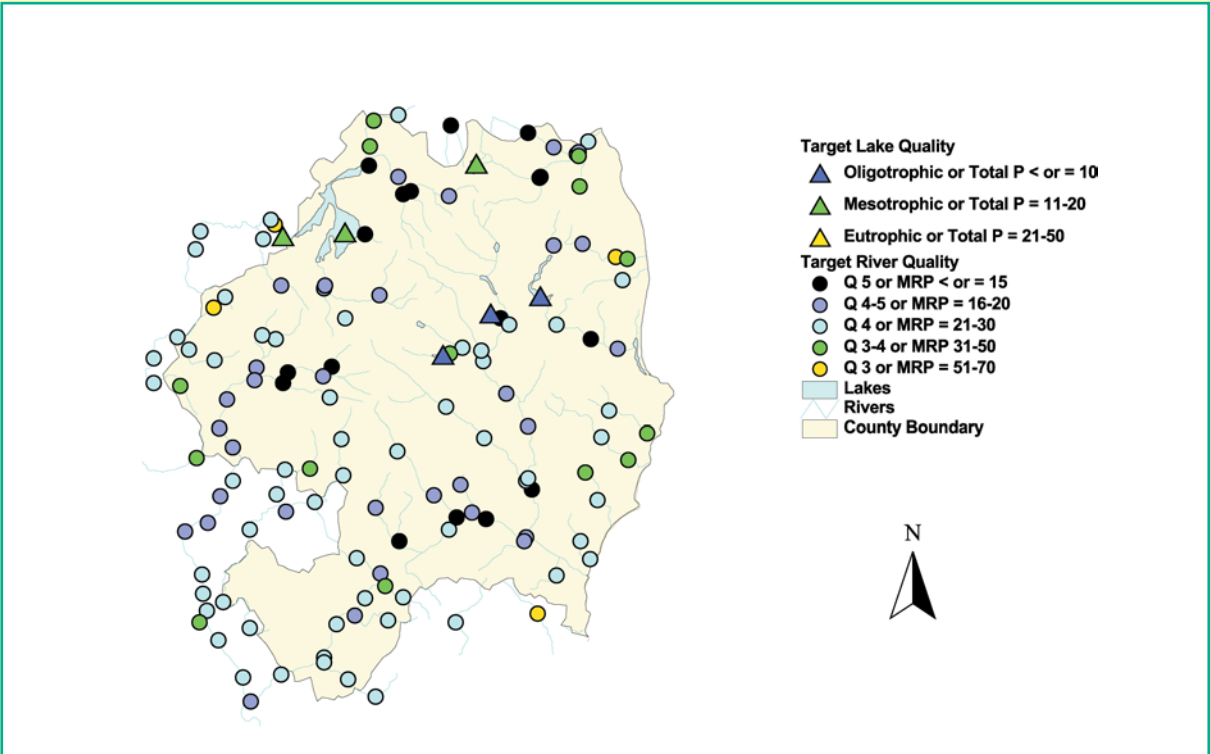


ADDITIONAL MEASURES PROPOSED

- Encourage the application of Best Farm Management Practices including appropriate storage of farm wastes and nutrient management planning.
- Encourage forestry service to review and upgrade their guidelines relating to protection of aquatic environment.
- Carry out farm surveys.
- Catchment surveys to reduce phosphorus inputs from point sources by 2005.
- Improve the design, operation and maintenance of septic tanks.
- Encourage the screening of storm overflows and the use of storage impoundments.
- Upgrade WWTPs and small water and sewerage schemes.
- Liaison with farming organisations, Teagasc, Coillte, forestry companies and Fisheries Boards.
- Review river monitoring programme.
- Establish catchment phosphorus budgets by 2005.
- Public education and advisory measures by 2005.
- Water quality report to be published annually and information to be included in Council's environmental education programme.
- Promote REPS.
- Provide technical advice and assistance.
- Have regard to findings and recommendations of Three Rivers Project.
- Develop GIS by 2003.



Map 51 Baseline River and Lake Quality in County Wicklow



Map 52 Target River and Lake Quality in County Wicklow