Water Quality Regulations – The Key Role of Nutrient Management

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The most recent water quality report from the Environmental Protection Agency (EPA) for the period 1995-1997 shows a continuation of the decline in surface water quality. The length of unpolluted (Class A) river channel is down from 84% of that surveyed in 1971 to 51% in the latest review period. Nutrient losses from agriculture (mainly Phosphorus) are universally recognised as significant contributors to this problem.

In spite of major investment programmes and awareness campaigns in the agricultural, industrial and municipal sectors the problem has continued to deteriorate. It is not surprising that the latest battery of water quality legislation both from Government And the EU are more determined and more focused on reversing the trend than any previous measures.

The agricultural contribution has been estimated at about 45% by the EPA. This varies between 25% and 75% depending on the intensity of the farming practised. This problem arises mainly from phosphorus (P) in farmyard seepage and P-rich run-off from farm land. The latter may arise following the landspreading of manures and fertilisers particularly when these operations are carried out under unsuitable soil and weather conditions, and where soil P levels are excessively high. Other major P sources include industry and town sewage. Though nitrogen (N) losses also play a part in surface water deterioration the effect on nitrate levels in drinking water is the major concern.

Water Quality Regulations

Water quality standards for P in rivers and lakes which were given statutory effect in 1998 (S.I.258 of 1998) will have significant implications for many farmers. The P regulations required an immediate halt to falling water quality standards and specify significant improvements by the end of 2007. The practical effect of the new regulations was to oblige local authorities to take whatever measures they considered necessary to ensure that P concentrations in surface waters meet the prescribed limits.

The extent of the water quality problem can be gleaned from the fact that all local authorities have over 20% of their river monitoring sites polluted while 15 have more than 50% polluted. EPA monitoring indicates that 40% of river and 19% of lake monitoring sites are unsatisfactory in the context of the P Regulations and require improvement. The extent to which some of our major rivers exceeded the new standards for phosphorus in the 1995-97 EPA study is presented in Table 1.

Table 1. Non-compliance with Phosphorus Standards in Major Rivers (1995-1997)

Catchment	No.Sampling Stations	% Stations Exceeding P Standards
Boyne	117	93
Slaney	71	37
Barrow	66	74
Nore	121	73
Suir	174	60
Blackwater	41	54
Lee	17	35
Bandon	21	29
Maigue/Deel	38	100
Lower Shannon	147	35
Upper Shannon	205	36
Erne	51	82

Source:Lucey,J.,EPA

The P Regulations mark the beginning of a more proactive approach to water quality protection which will specifically target sensitive areas with a history of poor water quality. As a first step each local authority was required by statute to prepare an action plan by July 1999 setting out measures to achieve the new quality standards. The sanctions available to local authorities have also been strengthened to include bye-laws and mandatory nutrient management planning (NMP). These compliment the powers available under Section 12 of the Water Pollution Act (1977-1990).

The EPA published a Measures Report containing a summary of the county action plans earlier this year. There are short term proposals to introduce bye-laws in 18 local authority areas. These could be in place in 7-8 counties by mid 2001. At least 18 local authorities have indicated their intention to introduce mandatory nutrient management planning (NMP) mostly in the short term (by 2002). A reporting mechanism designed to assess implementation progress requires the submission of Implementation Reports to the TPA every 2 years to 2008. The first Implementation Reports was due by 31 July 2000 and a summary is due to be published by the EPA by 30 April 2001.

The main measures focused on agriculture in the first Measures Report are outlined in Table 2, together with the number of local authorities proposing to implement each type of measure.

Table 2.Enforcement/Promotional Measures Planned by Local Authorities

Measure Type	Number of Local Authorities
Bye-laws	15
Farm Surveys	23
Mandatory Nutrient Management Planning (NMP)	18
Issue-Enforcement of Section 12 Notices	18
Issue/Enforcement of Section 3 Notices	14
Implement Catchment Management Plans	10
Forestry Controls (Mainly Fertiliser Application)	12

The measures considered to have the greatest implications for farming (ie bye-laws and mandatory nutrient management planning (NMP) are further analysed on a county basis in Table 3. The stated time scale for implementation of these measures is also given.

Table 3 Time scale for Implementation of Major Agri-related Enforcement Measures by County

Measure mid	Ongoing	Immediate (2000)	Short Term (2002)	Med. Term (2004)	Long Term (2007)	Timescale Not Stated
Bye-laws	Cork Cavan	Tipp.NR Longford Offaly Westmeath Mayo	Carlow Tipp SR	Galway Kerry		Kildare Kilkenny Leitrim Limerick Sligo Waterford Dublin S.
Mandatory NMP	Monaghan Wexford	Clare Tipp SR	Cork Fingal Galway Kerry Kildare Meath	Sligo	Limerick	Kilkenny Leitrim Mayo Offaly Tipp NR Waterford

Source: EPA Measures Report (updated)

Though the Measures and time scales in Table 3 are not cast in stone they do give the best indication yet of the intentions of the local authorities and the enforcement measures farmers can expect in the short to medium term.

Section 27 Bye-laws

Section 27 of the Water Pollution Act provides for the introduction of bye-laws to regulate farming practices. So far, two local authority (Cork and Cavan County Councils) have introduced bye-laws in specific sensitive catchments. Other local authorities including Tipperary NR, Offaly, Westmeath and Mayo have developed draft bye-laws. There are considerable differences between counties in the measures proposed reflecting the variation in soils, climate and farming conditions as well as the range of environmental issues being addressed. Some involve significant restrictions in agricultural practices whereas others are solely concerned with storage and management of animal manures. Some restrictions such as those on organic N and soil P levels may inhibit traditional movement of slurry from pig farms to intensive grass farms. There are general requirements to record the quantities of organic and chemical fertilisers used.

The introduction of bye-laws where necessary) should ideally be targeted at specific problems in specific geographical areas. One local authority has proposed a blanket ban on the purchase of fertilisers containing P for all farmers in its functional area excepting the production of a local authority permit. It proposes to issue permits only on the basis of soil P test advice. Such a blanket approach is considered neither necessary nor workable.

The bye-laws differ significantly from the Mandatory NMP provision discussed below in that failure to implement them is an offence subject to prosecution and are perceived to have more "teeth" than the NMP provision. The latter appears to place more emphasis on the mandatory nature of the planning exercise than on subsequent implementation. In practice the local authorities appear to be implementing NMP under the bye-laws which carry stronger enforcement provisions.

Mandatory Nutrient Management Planning (NMP)

Section 21A of the Water Pollution Act empowers local authorities to compet farmers to prepare nutrient management plans (NMPs) where these are considered necessary to prevent or alleviate water pollution.

NMP is recognised as a key tool in curtailing nutrient (P and N) losses from agriculture. It involves a planned approach to the control and safe use of nutrients from all sources on the farm. Crop nutrient application levels are brought into line with crop requirements so that losses to the environment are minimised. Detailed guidelines on the preparation of nutrient management plans have been issued to local authorities by the Department of the

Environment and Local Government. These guidelines point to agriculture as a significant player in the pollution stakes and highlight three broad areas to be addressed as follows:-

•Management practices and manure storage facilities in the farmyard.
- Management of land application of organic and inorganic fertilisers.
- Excessive use of chemical P and N.

The guidelines issued to local authorities advocate NMP in sensitive river and lake catchments and provide criteria for identifying "hot spots" where resources are to be focused.

Where a farmer receives a notice to prepare a nutrient management plan an existing plan prepared for REPS, for example, will suffice. The formal notice from the local authority to prepare a plan must provide for a period of at least 5 months for submission of the plan. Preparation of the plan is the responsibility of the farmer. Failure to comply with the notice may result in prosecution. While the guidelines provide for the landowner/farmer, where he is "*competent to do so*", to prepare the plan it is pointed out that the production of plans to the standard required to meet local authority approval will *generally "involve the engagement of a qualified agricultural adviser*". It is of little consolation to farmers to be allowed to prepare the plan when in practice he is unlikely to be able to do so.

Where a farmer receives a notice to prepare a nutrient management plan an existing plan prepared for REPS, for example, will suffice. Though failure to implement the nutrient management plan is not an offence per se, pollution arising from non-implementation may be prosecuted under the general provisions of the Water Pollution Act. There is a mandatory requirement to keep records.

Section 12 Notice

Additional powers are available under other sections of the Water Pollution Act, notably the Section 12 Notice traditionally used to deal with inadequacies identified in the provision of adequately sized, properly constructed and leak proof storage facilities for slurries and effluents. Such notices generally specify a time scale for remedial works to be carried out under threat of prosecution.

Integrated Pollution Control Licensing

Integrated Pollution Control (IPC) licensing of environmentally complex activities is one of the primary functions of the EPA. Intensive agricultural enterprises (IAEs) involving pig and poultry production above a minimum threshold size are subject to such licensing. Licensing of new (IAEs) came into operation in September 1996, while the phased licensing of established

activities commenced in March 1998. A detailed NMP is always required. Enterprises with IPC licenses are exempt from the bye-law provisions.

Planning Regulations

Local Authorities have enforcement powers available to them under the Planning and Development Acts so as to ensure that conditions associated with exempted development status are observed in the interests of protecting the environment. Increasingly Planning Authorities require the submission of a NMP for significant farmyard developments.

Catchment Management

This Government strategy goes back to a Department of the Environment and Local Government (DELG) publication *Managing Ireland's Rivers and Lakes – a Catchment Based Strategy against Eutrophication published* in May *1997*. The primary objective was to address the ongoing enrichment of surface waters on a catchment basis. The strategy was given statutory support by the Water Quality for Phosphorus Regulations, 1998.

In order to promote the catchment based approach to reducing P inputs to rivers and lakes from all sources a number of catchment based projects were funded from the EU Cohesion fund. These included the Lough Derg & Lough Ree catchment management project which covers the Shannon catchment (excluding the estuary), the Three Rivers Project for the Boyne, Liffey and Suir and Lough Leane project in Killarney.

The Lough Derg and Lough Ree Project was particularly important, covering valuable drinking water supplies and recreational and tourism activities. This flagship project with an initial budget of IR£2.3 million has had a life span of almost four years. Based on more than 8,500 river samples collected throughout the catchment the project has identified river stretches experiencing the effects of pollution. The principal causes were catalogued in each instance so that individual local authorities could take remedial action.

Agricultural investigations were undertaken by Teagasc on behalf of the L. Derg and L. Ree Project in three selected mini-catchments, representative of the typical range of farming activities and physical conditions within the catchment. Agriculture was the sole industry in each 'mini-catchment' and there are no significant municipal or industrial discharges.

The mini-catchment studies identified the key issues to be addressed in order to achieve the desired water quality improvements. These are:

- adequate containment and management of manures generated during the winter housing period;
- improved farmyard management, particularly waste minimisation through storm water control;
- management of slurry spreading operations;

• elimination of unnecessary P inputs to lands with excessive soil fertility.

Farmers in the 'mini-catchments' were provided with comprehensive nutrient management plans and intensive advisory support including farm visits and group meetings over the project period. A reduction in soil P levels and an improvement in water quality was recorded in the Clarianna agricultural mini-catchment after the 3 years of intensive advice (Phelan, P J., pers. Communication).

Information meetings involving the project team, Teagasc and the farm organisations were also conducted in each county in the wider catchment. The results of the 'mini-catchment' studies will provide a blueprint for widerspread application of the catchment-based approach.

Management measures were proposed to the individual local authorities including the making of bye-laws to regulate farming activities. These have been proposed for implementation in problem areas within the catchment. Using a Georgraphical Information System (GIS), maps of the areas likely to present the highest risk were prepared. These have been divided into extensive agricultural risk areas and localised risk areas. The making of bye-laws is proposed for the former and a system of farm surveys and follow-up action for the latter. The proposed measures are summarised below:

L Derg & L Ree Project Management Proposals for Agriculture

Measure Application	*Requirements*
Bye-laws	
* Storage and Management of Waste	– 20 weeks (variable) manure storage (3 year compliance period) – Soiled/storm water control – Specified landspreading times
* Areas with high Soil P	– Mandatory nutrient management planning
* Pigs and Poultry – over certain unit size thresholds an Integrated Pollution control (IPC) Licence	– Mandatory nutrient management planning for pig/poultry farmer or
* Farms receiving manure from Pig/poultry farms	– Mandatory compliance with nutrient management plan
Farm Surveys	
* Specified localised risk areas	– Farm surveys with appropriate follow up

REPS

* REPS farmers exempted	– Active promotion of REPS throughout the catchment

It could be said that the catchment strategy embodies the 'carrot and stick' approach combining intensive planning and advice with enforcement. Another essential element is financial assistance for farmyard renovation works involving pollution control investment. This is expected to be addressed in a more comprehensive fashion under the new Waste Management scheme.

River Basin Districts

Following the success of the L.Derg & L. Ree Project in moving the catchment based approach to water quality significantly forward action is currently under way to establish a nationwide system through six/seven river basin districts (RBDs) with significant EU and exchequer funding. This is a major initiative which will significantly improve the chances of reversing the decline in water quality as required in the Water Quality for Phosphorus Regulations. This major initiative will form part of Ireland's response to the EU Water Framework Directive and will address the protection and and improvement of aquatic ecology, valuable habitats, drinking water resources and bathing waters.

Investigations underway as part of the pilot catchment projects (L. Derg & L. Ree, Three Rivers and Lough Leane) to develop and evaluate measures aimed at reducing agricultural pollution will probably be extended to the new RBD management systems. This will provide wider national characterisation of farming and land-use practices which give rise to pollution, especially nutrient losses to waters. Monitoring the effectiveness of proposed action programmes for Nitrate Vulnerable Zoned (NVZs), where these are designated will be an important objective.

The development and maintenance of good working relationships between stakeholders will be an important part of the success or otherwise of the River Basin District system. A high priority will be placed on inter agency and cross-sectoral co-operation.

EU Water Framework Directive

The new EU directive on water quality has been in preparation since 1997. It envisages a 16 year time frame for implementation which will require at least 'good status' for all waters. Surface water status is 'good' when both its ecological status and its chemical status are at least 'good' as defined in the Directive. Groundwater status is either good or poor depending on compliance with quantitive and chemical criteria. While the Directive is primarily concerned with the quality of aquatic systems and their waters, quantity has major environmental significance for groundwater. As there is only

a certain amount of recharge each year over-abstraction can affect that required to support connected ecosystems, whether rivers, lakes or wetlands.

The Directive heralds an era of tougher water quality regulations which will have to be taken on board at national level. It demands a more comprehensive and integrated approach to water management and will have significant implications for resources given its scope an ambitious targets. The Directive supports the concept of river basin management plans (RBMPs). However, the approach required in the new RBMPs will be substantially wider in scope than earlier projects.

The requirements of a number of other directive such as the Fresh Water Fish Directive, Surface Water for Abstraction Directive, Ground Water Directive and Dangerous Substances Directive will eventually be subsumed into the Water Framework Directive. These will eventually be repealed. The Directive is a very complex, which is not surprising given that it is expected to govern all aspects of the aquatic environment including surface, estuarine, coastal and groundwaters.

Nitrate Vulnerable Zones (NVZs)

Nitrate is one of the common contaminants identified in groundwater world-wide. It is highly mobile and easily leached from the rooting zone. Nitrates in groundwater have posed less problems to date in Ireland than in most other countries with intensive agriculture. However, draft EPA reports on nitrate (1997) have shown that a significant number of public supply sources in eastern, south-eastern and southern counties have mean nitrate N levels greater than the EU guide level (25 mg/l). Agricultural sources, whether yard or field losses, are considered to make a significant contribution to nitrate levels in these areas.

The EU Nitrates Directive agreed by the Council of Ministers in December 1991 establishes a maximum admissible nitrate concentration of 50 mg/l In drinking water. Consumption of nitrogenous fertilisers has been increasing fairly steadily, from 275,000 tonne in 1980 to just over 444,000 tonne in 1999. The EPA has pointed to evidence that the efficiency of the utilisation of nitrogen in fertiliser is decreasing as the quantity used increases.

The directive places an obligation on national governments to declare Nitrate Vulnerable Zones (NVZs) in sensitive areas. NVZ designation may impose severe restrictions on farming practices including stocking rate reductions. Moreover, in keeping with the 'polluter pays principal' there is no provision for compensation for respecting the Nitrates Directive. The voluntary 'Code of Good Agricultural Practice to Protect Waters from Pollution by Nitrates' published by Government in July 1996 will become mandatory in all designated zones. Identification of the vulnerable areas is currently under way. Up to 13 groundwaters in counties Carlow, Cork, Kerry, Louth and Waterford

have been identified as being polluted or susceptible to pollution by nitrates. The catchments which contribute to these waters are now being identified and formal designation of these areas as NVZs is expected in early 2001. Action programmes for the NVZs involving public consultation are expected to be developed by the end of 2001. The designation of further NVZs are anticipated arising from EU pressure.

Cross Compliance

Environmental cross compliance is an EU imposed requirement which we signed up to in the Amsterdam Treaty. It requires the integration of environment with other policies. This is a response to community demands that farming must act responsibly, preventing pollution, avoiding severe erosion and protecting valued natural and cultural heritage. This is expected without compensation. Agri-environmental payments, on the other hand, will only apply to environmental measures over and above 'good farming practice'.

The EU Commission has recently introduced regulations which require farmers to apply 'usual good farming practice' in order to quality for aid under CAP or under the Structural Funds. Good farming practice involves a range of measures which mirror those required by REPS but at a lower compliance level. The measures include a requirement to follow Teagasc fertiliser recommendations; protection of water, proper use handling and storage of chemicals and compliance with animal welfare and hygiene standards. Where applicable, wildlife habitats and features of historical or archaeological interest must be protected.

The Department is developing a detailed specification for good farming practice in conjunction with the Department of the Environment. Arrangements will be put in place to monitor compliance with good farming practice by applicants for certain direct payments such as headage and on-farm investment schemes including the Farm Waste Management scheme. It is expected to apply to all direct payments in the foreseeable future. It is understood there will be official inspections to ensure compliance with good farming practice. Simplified records of fertiliser usage purchases will be required. Good farming Practice is expected to encourage greater participation in the new Waste Management scheme and REPS. However, response at farm level is likely to depend on the level of policing at farm level.

REPS Contribution to Water Quality

Evidence of water quality improvement has emerged in at least one catchment with a high uptake of REPS. The Kilcrow river in Co. Galway was classified as eutrophic over much of its length when surveyed by the EPA in 1996. The problems were believed to emanate from agricultural sources. There has been a high uptake of REPS (<40%) in the catchment in recent years. The

1999 EPA biological survey shows a significant improvement in water quality.

As the numbers of REPS farms increase towards the new target of 70,000 more definite evidence of the impact of REPS on water quality will be expected. While REPS is likely to have a limited effect on the intensive farming areas where water quality is most under pressure, it is anticipated that the regulatory framework outlined earlier will encourage compliance in this sector. So far local authorities have exempted REPS farmers (reluctantly in some cases) from bye-law and mandatory NMP provisions on the basis of the perceived effectiveness of REPS to deliver improvements in water quality. It is in the interest of farmers that REPS lives up to expectations. This comes down to the conscientious delivery of Measure 1 in all its aspects on each REPS farm.

As a group REPS participants appear to be complying with Measure 1. Preliminary analysis of data from the 2000 National Farm Survey shows that REPS farms used 20 kg and 4 kg less chemical nitrogen and chemical phosphorus, respectively, per hectare in 1999 than the non-REPS farms of similar intensity. REPS farmers also benefited financially from the nutrient management plan spending 6% less per hectare on fertilisers than in 1994.

Relative to 1994 there were very significant increases in new building investment (38%) and building maintenance (71%) on REPS farms compared with no change and a 6% increase respectively for non-REPS farms of similar intensity. This suggests that REPS farmers have upgraded their buildings and pollution control facilities as required by REPS. In contrast stocking rate and N use increased by 16% and 13% respectively on intensive non-REPS farms while investment in farm buildings declined by 17%. This suggests that intensive farmers largely representative of the dairying sector are becoming more intensive while spending significantly less on farmyard facilities.

Environmental Awareness

In recent years there has been a decisive move to strengthen enforcement of the polluter pays principal. The enforcement agencies are telling us that the voluntary approach alone, involving awareness building and education, primarily promoted by the advisory service and the farm organisations is not delivering the goods. While promotional campaigns over the past decade have not always achieved their objectives, few would argue that the consciousness and the attitude of the farming population to water pollution has not altered radically. Notable changes were affected in the attitude to silage pollution in the late 1980s when annual agriculture-related fish kills were six times current levels. Another example of the effectiveness of the voluntary approach was the reduction in the use of P fertilisers arising from the successful Teagasc P reduction campaign in 1996. Though controversial at the time it marked a very significant decline in P usage down from 62,000 tonne to 50,000 tonne by 1999. The reduction in fertiliser P use reflects the substantial numbers of

farmers who are prepared to follow sensible nutrient advice.

The 'up-skilling' of agricultural graduates in relation to the environment has been instrumental in successfully imparting environmental knowledge to farmers. More than 100 agricultural graduates in Teagasc and the private sector have received professional qualifications in environmental management and conservation over the past 6 years. Environmental expertise also assists effective engagement with the enforcement agencies. It is important to convince them that laws and regulations can be more successfully enforced when there is public consensus and acquiescence. Awareness and information programmes for farmers at county level involving the enforcement agencies, advisory services and farm organisations are essential if declining water quality is to be reversed.

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