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Environmental Legislation in Europe The European Union Nitrate Directive Lessons for New Zealand

Anton D. Meister



Discussion paper in natural resource ^{and environmental} economics

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**Discussion Paper in Natural Resource and Environmental
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FOREWORD

Agriculture affects the environment and the environment affects agriculture; this is something that has been known for quite some time and many countries have implemented policies to minimise the effects of these interactions. In the post-GATT era, realisation has also dawned that trade affects the environment and that environmental legislation can affect trade. This latter realisation in particular has developed more recently and is now a major topic of debate in government, trade and academic circles.

To understand these interactions, one needs to understand the environmental impacts caused by agriculture, the types of policies that are put into place to minimise those impacts and the possible implications of those policies on production and trade.

This discussion paper reports on a case study dealing with one particular environmental problem in one particular region. The problem is nitrate pollution caused by intensive farming systems and the region is Western Europe. In the paper the nitrate problem is briefly highlighted and the legislation and policies put into place to deal with the problem are discussed for five countries. In the discussion emphasis is focused on the types of policies used and on the reasons why particular policies were chosen. The discussion also looks at the implementation of the polluter-pays principle to which all those five countries in principle adhere, and at the issues of property rights and equity.

The basis goals for the study were:

- (a) to find out if the policies (or intended policies) were going to have any major impacts on agricultural production and possibly trade, and

- (b) to see if the cases studied had lessons for New Zealand in terms of environmental policy formulation and implementation.

This research was part of a wider research project which dealt with "Agricultural Trade and the Environment" and was funded by public Good Science Foundation Contract (RAE201).

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I Introduction

This discussion paper has a long and a short title. The long title to this paper would read something like this:

'the impact of agricultural policy on land use and the consequent impact on the environment requiring environmental legislation aimed to bring about new land use changes, which...etc..

It is this cycle of change and consequences calling for more change that I want to talk about in this paper. The case study will be Western Europe but in the back of our mind should be New Zealand, a land where change is endemic and where in this age of post GATT euphoria we also witness (and will continue to witness) changes in land use.

The concerns associated with the land use changes that occurred in Western Europe are concerns about production intensive agriculture which affects the environment due to poorly assigned or non-assigned property rights. Looking at Europe, the rapid mechanisation of agricultural production after the second world war made it difficult for many persons to appreciate the impact of a more production-intensive agriculture on the environment. In more recent years however, these impacts have been capturing public attention and that of policy makers, and have developed into a growing concern about the consequences of some agricultural practices and policies that directly encouraged negative environmental impacts. These include:

- pollution of ground and surface water resources through the infiltration and run-off of certain nitrogenous and phosphate based fertilisers and pesticides;
- soil erosion and compaction;

- drainage of wetlands;
- air pollution from manure production and crop spraying;
- loss of landscape amenity and habitat diversity;
- and clearance of marginal agricultural lands.

Basically, we have here a concern that the free market is under supplying public goods, associated with land, that have become highly valued, such as amenity values, water collection values, habitat for wildlife and landscape values. These public goods are the stocks that provide external benefits to society. With changing values the demand for these goods has increased and hence the conflicts with regard to the use of land.

The new awareness and concern have led to a demand for environmental regulations, such as controls on fertilisers and pesticides, constraints on farm practices, health regulations etc. The introduction of such legislation has led on the part of the producers (and policy makers) to a concern about the potential effects of environmental policies and health regulations on production and on patterns of world agricultural trade. Producers in the European Union (EU) are also worried that, due to the introduction of stricter environmental standards, they might lose their competitiveness in world markets. Of course producers outside the EU are equally interested in changing levels of production within the EU and the impact on world trade, as well as in changes to environmental and health regulations which might be used as international trade barriers.

On the one hand then we have the concerns of citizens and consumers demanding environmental legislation and on the other producers (and for a long time the politicians) concerned about competitiveness (and about getting re-elected and not wanting to lose the rural vote).

In the EU, responsibility for legislation on environmental protection and nature conservation is divided between the Community and the

Member States, with the latter retaining substantially more powers than in the case of agricultural policy formulation (Baldock and Beaufoy, 1993). Within several Member States, nature conservation and other areas of environmental policy primarily are the responsibility of regional authorities, rather than central government. Consequently, there is a complex and varied pattern of legislation and policy in the environmental field in Europe.

1.1 Change in Attitudes towards the Environment in the EU

In 1972, the environment was included in the Treaty (the European Economic Community Treaty) by stating that it was not quantitative economic expansion *per se* that counts, but that it should go hand in hand with an improvement of life with special attention being devoted to environmental protection. From that time onwards, Action Programmes for Environmental Protection have been in operation and the general objective of the EC became the following:

“sustainable growth respecting the environment” would become the explicit task of the EC. One of the objectives of the EC would be “to promote economic and social progress that is balanced and sustainable ..” (Title 1, art. B); the “task” of the EC would become (Title 2, art. 2): “to promote...a harmonious and balanced development of economic activities, sustainable and non-inflationary growth respecting the environment....”

The legal requirement to integrate environmental protection into other European Community policy areas was established in 1987 by the Single European Act.

“Article 130 R, paragraph 2, says that “Action by the Community relating to the environment shall be based on the principles that preventive action should be taken,

that environmental damage should as a priority be rectified at source, and that the polluter should pay. Environmental protection requirements shall be a component of the Community's other policies". (European Documentation, 1990)

The need for 'environmental integration' is also a main theme of the Fifth Environmental Action Programme and is given a more comprehensive legal basis in the Maastricht Treaty. Further more, at the time of agreeing the "MacSharry" reform package in May 1992, the EC Agricultural Council declared its commitment to "make environmental protection an integral part of the Common Agricultural Policy". (Baldock and Beaufoy, 1993)

A lot of this is being achieved through the encouragement of extensive farming systems, environmental sensitive areas, less favoured areas, Directives, and other measures. An inventory of some of the policies most likely to influence agriculture and the environment is presented in table 1 in the Appendix. A breakdown of the CAP (Common Agricultural Policy) budget, to show the small proportion of the total budget allocated to agri-environmental issues, is presented in Table 2.

Of course since 1993 we have had the CAP reform which is having, indirectly, a major impact on the environment. It is early days still to make predictions about the consequences of CAP reform and the GATT agreement, especially regarding land use. Some of the scenarios regarding possible consequences predicted anywhere from 25 to 75 per cent of land being taken out of production. Most commentators feel however, that an economic squeeze on agriculture would have to be very severe in order to result in such large-scale land abandonment and that such policy would unlikely to be socially and politically acceptable. On the other hand, a more gradual reduction in price/income support may produce only limited changes in overall

production and the total area of farmland. Although an increasing number of farmers would go out of business, those continuing to farm could be expected to take over bankrupt holdings in an attempt to maintain economic viability through increased economies of scale.

Baldock and Beaufoy (1993) concluded therefore that, "so long as the maintenance of acceptable levels of farm income remains a central objective of the CAP, any significant reductions in the farmed area outside the most marginal farming regions are most likely to arise from active policy mechanisms, such as set-aside, than from a savage cut in prices". (Baldock and Beaufoy, 1993).

1.2 The Place of Agriculture in Europe

To understand the development of environmental policy in Europe one needs to understand the special place that agriculture occupies in the EU. For a long time there was little specific discussion of pollution from non-point sources in relation to the agreed to principle of the Polluter Pays. To many governments it appeared that this principle was irrelevant to agriculture and therefore agriculture was excluded from discussion on implementing the PPP (Polluter Pays Principle). However, by the mid 1980s the consensus was changing. In 1985 in a Green Paper on the Common Agricultural Policy (CAP) it was stated that agriculture, like other sectors, "...should be subject to reasonable public prescriptions and controls designed to avoid the deterioration of the environment" (Commission, 1985). The OECD report on "Agriculture and Environmental Policies: Opportunities for Integration" which appeared in 1989, stated that the "PPP should apply to all agricultural policies and programmes which are designed to prevent or control or reduce both point and non-point sources of pollution"(OECD, 1989).

Even though all this has occurred, there is today still a lingering attitude that sees agriculture as a special case. The reasons have to do with (Baldock and Bennett, 1991):

- The perception of agricultural pollution. Until recently this was not seen as important except in the case of pesticides;
- The nature of pollution. Much agricultural pollution is diffuse, from non-point sources, and some forms are difficult to trace and may be apparent only in the long term. This has several consequences:
 - the impact of some farm pollutants are relatively slow to appear. Most people and farmers are unaware of the extent of the pollution, especially where ground water is concerned. Only recently have all become better informed. Can farmers now be held responsible for past practices, undertaken in good faith and often with strong government support?
 - it may be difficult to determine who the polluter is. There may be many parties involved. Environmental policy is not well adapted to these collective groups. It may be argued that some responsibility attaches to fertiliser manufacturers, to the agricultural advisory services or to "government policy" in a wider sense.
- the distinction between potentially polluting and non-polluting agricultural activities may be hard to

determine. A practice in one field may be polluting while not in another.

- the diffuse nature of the pollution creates special problems in achieving effective and cost-efficient enforcement of PPP.

Further there are also special features of the agricultural sector:

- the scale of agricultural production - the large number of small units which may have special difficulties in adapting to changing environmental requirements and for whom economic constraints may be particular severe. There is also the fact that access to capital is often limited, reducing the scope for sizeable pollution control investment.
- the limited ability to pass on costs.
- impacts on competitiveness, especially within the EU.
- inflexibility of production factors.
- socio-political status of agriculture. Many European governments give high priority to the objective of maintaining a sizeable agricultural work force and large numbers of farms.
- strategic importance of agriculture; self-sufficiency, labour.

Some of this reasoning still remains and is reflected in the way different Member States have dealt with the environmental problems caused by agriculture.

It is not the intention of this paper to deal with the whole gamut of environmental legislation and the consequences with regard to land-use. The emphasis will be on one particular piece of environmental

legislation, the Nitrate Directive. The reason for choosing this piece of legislation is that it has taken on a role of major importance in terms of agriculture and land use in the EU and the implementation of this legislation may have some lessons for New Zealand.

A Directive is a piece of legislation passed at the Community level which is binding on all Member States. The implementation (policies) of the Directive is left up to individual member States. Other Directives with implications for the environment are, for example, the Bird Directive, the habitats Directive, the Directive on environmental Assessment and Directives on drinking water and the protection of groundwater.

The Nitrate Directive has become important because one of the EU's chief concerns today is the effect of nitrate accumulation on water quality. Nitrates from livestock manure and chemical fertilisers are leached from the soil and lead to contamination of potable water supplies in several highly populated areas of the EU and the eutrophication of EU inland and coastal waters. Because the problem is considered sufficiently serious and trans-national in character, it needed to be dealt with on an EU wide basis.

Another reason for picking on the EU Nitrate Directive is that after the Directive passed into legislation, many predictions were made as to the ultimate impact of this Directive on livestock and crop production in the EU and consequent trade impacts. There was great hope that the environmental concerns would bring the Europeans to their senses regarding subsidised agriculture, straighten out their agricultural and environmental problems and benefit the rest of the world.

In this paper I will look at the legislation that was developed in response to the Directive, look at some of the predictions made as to the consequences for EU agriculture and discuss the likelihood of these predictions coming to pass. Having then discussed the European

situation, I will briefly ask the question "Are there lessons in all of this for NZ?" In particular, in this day and age of 'economic instruments', it will be interesting to see how they have fared in the European situation and how the issues of property rights, public goods and compensation have all been dealt with.

II The EC Nitrate Directive

In December 1991 a directive concerning the protection of waters against pollution caused by nitrates from agricultural sources was announced to Member States. This directive, mostly referred to as the Nitrate Directive, is to prevent and reduce the pollution of waters by nitrate from agricultural sources. The Directive addresses the earlier EC Directive regarding the quality of drinking water by limiting nitrate levels in potable water to less than 50mg per litre.

The Directive sets the goal to be achieved and provides guidance on how and when Member States should deal with the nitrate problem. It includes regulations on how to handle manure and chemical fertilisers in vulnerable zones. This regulation should form the basis for an action programme for each Member State. The Directive stipulates the following:

1. all waters to be monitored by December 1993 and zones vulnerable to nitrate must be identified (areas where water standards are not being met). The regulations laid down in the Directive are compulsory in these zones (voluntary elsewhere). One of these regulations is the 'code of good agricultural practice' to prevent unnecessary nitrate emission, which must be prepared by the same date¹.

¹ A code of good agricultural practice should comprise of the following items, in so far as they are relevant to the areas of concern (Rude and Frederiksen, 1994, page 81):

- 1) periods when the land application of fertilizers is appropriate;
- 2) the land application of fertilizer to steeply sloping ground;
- 3) the land application of fertilizer to water-saturated, flooded, frozen or snow-covered ground;
- 4) the conditions for land application of fertilizer near water courses;
- 5) the capacity and construction of storage vessels for livestock manure, including measures to prevent water pollution by run-off and seepage into ground water and surface water of liquids containing livestock manure and effluents from stored plant materials such as silage.
- 6) procedures for the land application, including rate and uniformity of spreading, of both chemical fertilizers and livestock manure, that will maintain nutrient losses to water at an acceptable level.

Member States may also include in their code(s) of good agricultural practices the following items:

- 7) land use management, including the use of crop rotation systems and the proportion of the land area devoted to permanent crops relative to annual tillage crops;
- 8) the use of catch crops (ie. crops planted for the primary purpose of taking up surplus nitrogen);
- 9) the establishment of fertilizer plans on a farm-by-farm basis and the keeping of records on fertilizer use;
- 10) the management of irrigation systems.

2. an action programme must be formulated by no later than December 1995 and implemented by December 1999. National action programmes must include a maximum application rate of minerals from animal manure (not to exceed 170kg of N / ha including manure from grazing livestock, with a dispensation of 210 kg from 1996-1999) to be achieved by 2004. The application of manure must be consistent with good agricultural practice in relation to the use of nitrogen by the crop, the amount of nitrogen from chemical fertilisers and other sources, and the amount already in the soil.

The nitrate problem is mainly caused by intensive livestock production under confined conditions and from manure applied to crops. Nitrate leaching into groundwater can lead to contamination of drinking water resources. Ground water is a major source of drinking water in most of the EC member states. The proportion ranges between 28 per cent in the U.K and 99 percent in Denmark. The nitrate concern is to some extent a localised problem, concentrated in The Netherlands, low lying parts of Belgium and France, southern Britain, Denmark, much of Germany and northern Italy. A complicating factor is the dynamic nature of nitrate pollution: it can take up to 40 years for nitrates to travel from the soil to groundwater (Hanley, 1991).

2.1 The Predictions

While in the early days of the Nitrate Directive many policy options were talked about, no-one knew for sure what policies would eventuate. The options mentioned were: command and control policies to reduce nitrogen fertiliser application and application of animal manure; regulations regarding better management of nitrogen applications; economic instruments such as fertiliser taxes; headage taxes on livestock producers; tradeable nitrogen quotas, or lump-sum compensation of producers subject to nitrogen/headage taxes, etc. Without knowing what

policy instruments would be used, many researchers, attempting to predict the implications of the Nitrate Directive, either by simply trying to balance manure production and the 170kg N/ha constraint in the various countries or by looking at the impact of a nitrogen quota and nitrogen taxes.

The magnitude of changes in output predicted were, for example: "The Nitrate Directive implies possible reductions in EC livestock production ranging from 1 percent for sheep to 12 percent for pigs. Reductions may occur only in Belgium, Denmark, and The Netherlands, but are subject to many factors that are unknown or difficult to account for at present. Smaller reductions are likely to the extent that manure is more carefully stored, handled, and applied, or substituted for commercial fertiliser. Livestock may also be fed differently or raised in regions of other countries where problems do not exist" (Leuck, 1994: 100).

The changes in output could have significant effects upon the exports of livestock products, assuming a decline in self-sufficiency proportionate to the reductions in livestock numbers. On the basis of the figures calculated by Leuck (1994), beef exports decline by 50%, and dairy products decline between 34 and 100 percent. For pork and poultry products, the EC would actually become a net importer.

Similar conclusions were reached by Haley (1994), especially when nitrogen policies (such as a tax) were combined with the MacSharry plan. On their own Haley showed that fertiliser taxes could be effective in reducing residual nitrogen levels, with only relatively small effects on EC production and trade. Don et al (1993) using a modelling approach, showed that fertiliser taxes would only lead to marginal changes in EC production. This is what would be expected in light of high levels of support prices. Abler and Shortle (1992) predicted significant increases in world commodity prices in the medium run from restrictions on chemical use in agriculture, but stated that changes in production and consumption would not be substantial. Hartman (1992) analysed the

imposition of a nitrogen quota using the SWOPSIM (TEPSIM) model. She found that agricultural production would decrease, net exports would be discouraged, EC agriculture would lose some comparative advantage and EC production would increasingly be displaced by agricultural production in third countries.

Most of the models discussed above looked at the EU in aggregate. However, aggregate measures of residual nitrogen do not reveal problems known to exist in certain parts of the UK, France, Germany, the Netherlands, Belgium, and northern Italy. Therefore, reduction in livestock numbers in particular regions may be offset by production shifts to other regions (within countries) as a result of policy inducements or economic pressures associated with the Nitrate Directive.

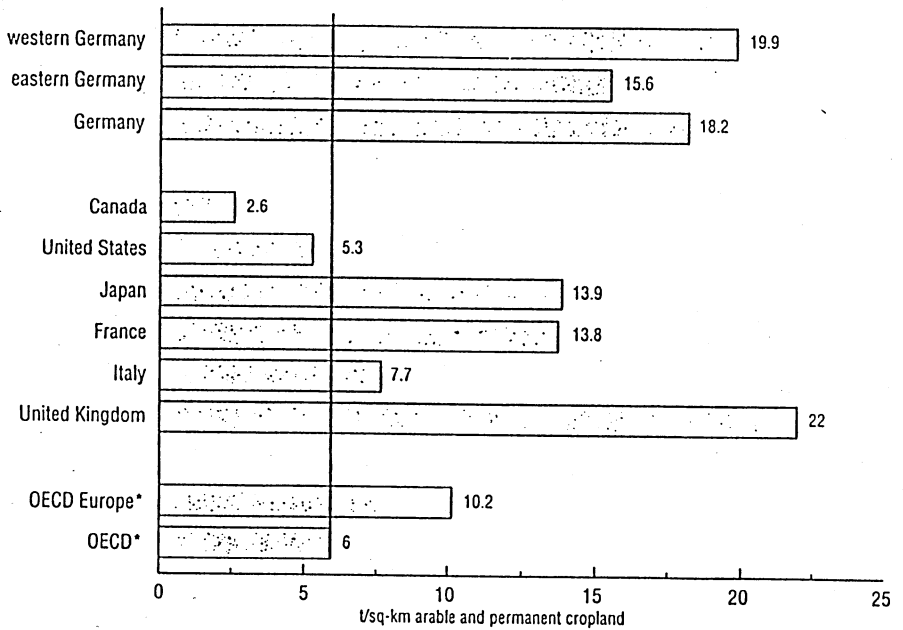
It was this concern about aggregate models versus local and regional problems, and an interest in environmental policy formulation that made me travel to various countries (Germany, Denmark, France, The UK, and the Netherlands) to see what was being achieved in terms of policy formulation, how it was done and what the possible impact might be, especially from the point of view of a third party exporter such as NZ.

2.2 The Policies

2.2.1 Germany

Germany is one of the largest users of nitrogenous fertilisers among the OECD countries (Figure 1) (OECD, 1993), and nitrogen pollution of ground water, rivers and coastal areas is an emerging problem.

Figure 1. Nitrogenous fertiliser use in OECD countries



(Source: OECD, 1993. p.77)

In Germany the Federal Government sets the legal framework which has to be fulfilled by the Länder (a province or region). Federal Acts are binding to all, Länder policies can vary.

The EC Drinking Water Directive was made a federal law in 1986 (Drinking Water Ordinance). To achieve the 50 mg/litre directive, an

act for water resource management was passed which enables regional authorities to designate protected water collection areas and impose restrictions on agricultural production in these areas. Twenty five percent of the cultivated area in Germany has been designated as a water protection area (Frohberg, et al., 1992). The Water Resource Management Act entitles farmers to compensatory payments if stricter practices, than the most profitable ones, have to be implemented. There is still much debate going on as how 'proper or profitable farming' should be defined. (Schleef and Haxsen, 1993). Some of the Länder pay these compensations out of the general budget while others levy a so called 'water penny' on water consumption and use these revenues for paying farmers. An example of such a compensation scheme is the one found in Baden-Wurtemberg. called SCHALVO (water protection and compensation programme). Under this programme the farmers will refrain from doing a series of forbidden practices (eg. grassland ploughing, and applying nitrogen fertiliser in the winter) and follow recommended practices (e.g. fertilization level 20% below the requirements by the plants, and mixed cropping). For this the farmer gets paid a lump sum of 310DM/ha (US\$240) or individual compensation for yield losses if they can prove that the lump sum does not cover their economic losses. This programme is financed from a 'water penny' levy. In other Länder compensation is negotiated between water supplying enterprises and the farmers. It is interesting to note that farmers as the polluter of water are the recipients of the compensation payments and are not charged. In this case, the property right has been assigned to farmers and the polluter-pays-principle is not followed.

In 1992 the federal government presented the first draft of the Fertiliser Application Ordinance which would define more precisely "good agricultural practice" and fulfil the requirements of the Nitrate Directive. This ordinance postulates that fertiliser application has to be guided by realistic yield expectations. This also means that the available nutrients in the soil, natural conditions like climate, soil type and the results of regional field experiments must be taken into consideration. At the

beginning of the cropping year the farmer has to ascertain the nitrogen content of the arable land. Soil tests for P, K, N, Mg and Ca have to be performed once within a crop rotation. Fertilisers have to be applied in such a way that most of the fertiliser will be taken up by the crops. Further restrictions refer to:

1. the maximum amount of animal manure which may be applied per hectare;
2. restriction on fertiliser application (timing, amount, place)
3. restrictions on spreading of animal manure (needs to be worked in, followed by plants or covered with straw);
4. compulsory preparations of fertiliser balance sheets.

All these regulations are complemented by extension and education programmes. The regulations will in the first instance apply to the protected water collection areas but it is expected that the enactment of the Fertiliser Application Ordinance will designate the whole of Germany as a zone vulnerable to nitrate leaching. Difficulties in implementing the maximum standard of 170kg of N/ha will vary from region to region.

In summary, the German nitrate policy at the national level as well as at the level of the Länder is mainly implemented through command-and-control regulations. General rules focus on the use of codes for good agricultural practice and the handling of manure. German policy also favours the assumptions that training and extension services will change farm practices towards improved nitrate management.(Rude and Frederiksen, 1994).

A pilot project in Lower Saxony analysed what would happen if a group of farmers was issued a nitrogen quota which would be lower than the officially recommended level of nitrogen use. Preliminary results from the research showed that farmers changed their cropping patterns and the crop rotation, reduced and reallocated mineral fertiliser among different

crops, reduced the level of pesticides, particularly fungicide use and changed the timing of liquid manure application. "With increasing restrictions on N use, there seemed to be a tendency to substitute external inputs with on-farm resources by paying more attention to the self-regulating forces within the farm system". The conclusion that the researchers came to is that "considerable reductions in external inputs can be undertaken without any effect on production." (Stoyke and Waibel, 1993).

Economic measures have not been used as a primary tool. The subsidies given to farmers within the Protected Water Collection Areas cannot be considered as an economic instrument because the payments mainly compensate compulsory changes in farm practice. The same applies to financial support for investments in storage facilities (Rude and Frederiksen, 1994). Although Germany has discussed the use of taxes on fertiliser, the Federal Government is not in favour and prefers training and advice and in sensitive areas the use of existing legislation as discussed above. This attitude reflects to some extent the unwillingness to impose costs on farmers who still carry political clout in Germany.

In Germany, agricultural and agro-environmental policy concepts focusing primarily on economic efficiency - and the PPP - have not found much support. Equity and income considerations as well as broader aspects of rural development and environment are in the forefront of public concern and determine the acceptability of policy measures. Property rights to ground water which belonged to those owning the land above, now, with the Water Resource Management Act, have shifted from private to public property and farmers are being compensated (Baldock and Bennett, 1991).

With regard to overall impact on production and trade, the general opinion is that there will be none. Enforcement of the Acts discussed above will not be strict, and compensation will be paid all along the way.

2.2.2 Denmark

Agriculture in Denmark is still very important for employment and foreign currency, and despite a falling acreage, production has grown. Of the total output, about two-thirds is exported: half goes to the EC countries, half to the rest of the world. Agricultural exports today represent approximately 25 percent of total exports.

The major environmental issues are the rising content of nitrate in ground and surface water and the side effects of pesticides on flora and fauna. Another area of concern is the alteration of the rural landscape caused by modern farming, for example in the form of drainage and cultivation of wetlands, infilling of ponds, and removal of hedgerows and other landscape features. Since the mid - 1980s a number of policy measures have been introduced to remedy environmental problems created by agriculture. With regard to nitrate policy, in 1987 the Aquatic Environment Action Programme was introduced. This plan aimed at halving the annual nitrogen emissions from industry, agriculture and municipal purification plants, and reducing phosphate emission by 80% annually (Rude, 1991, Rude, 1992)

In the early 1990s it became evident that several of the objectives for improving environmental conditions in agriculture were impossible to achieve with the measures employed up till then. Therefore the Government found it necessary to initiate another action plan - **Action Plan for Sustainable Development in Agriculture**. This plan was published in the spring of 1991 and concentrates mainly on nitrate pollution and the use of pesticides.

With regard to nitrogen the following measures were proposed:

- liquid manure not to be spread between 1 September and 1 March, excepting its use in September for winter rape seed and grass;

- liquid manure shall be used only on growing crops or be immediately injected into the soil;
- solid manure shall be ploughed in immediately after spreading; and
- solid manure may not be spread on fields in autumn before 20 October except for fields which will be followed by a green cover. These regulations came into force on January 1995. (Ministry of Agriculture, 1992).

Since September 1993, farmers also need to practice **mineral bookkeeping** for fertilisers. Each year farmers are to draw up manuring and fertilisation plans on the basis of norms approved by the Danish Institute of Plant and Soil Science. Farmers have to annually fill out forms detailing, on a paddock by paddock basis, the application and utilisation of fertilisers and the application of manure.

The first year (Aug 1993 - July 1994) was the planning year. During 1994 farmers had to complete their plans before September 1994 and send documentation to the Ministry of Agriculture by March 1995.

There are 55,000 farmers in Denmark, but only 33,000 have been sent forms. These 33,000 farmers were chosen on the basis of stratification and high risk areas. The Ministry is not intending to carefully read through all plans, but rather do spot checks on a series of plans. The Ministry, as yet, has not quite determined how to deal with all the plans and neither has it determined what the level of penalties are going to be for those farmers who apply a surplus of minerals.

Nitrogen taxation was considered but not implemented. The mineral book keeping was implemented as an alternative strategy. The nitrogen tax however, has been often debated in Denmark (Dubgaard, 1991). While there is a general acceptance by many of the tax, there is

an unwillingness on the part of government to apply it, in fear that the competitive position of the nation's agriculture would deteriorate.

Current environmental legislation dealing with nitrate pollution and pesticides has put into place a complex system of mineral and pesticide book keeping and reporting. According to Ministry of Agriculture officials, the impact on Agriculture will be minimal. Denmark has no problem, given its land area, to get rid of its manure. What is needed, and what the book keeping scheme hopes to achieve, is that farmers more carefully balance the use of manure and synthetic fertiliser. The Danish extension system provides computerised fertiliser application advice to all farmers.

Consumption of fertilisers and pesticides is expected to decrease, not so much due to the environmental legislation, but rather due to the changes in the Common Agricultural Policy in the EU (eg. the set-aside agreement) and the recently concluded GATT agreement (MAF, 1992). Any implications for production and trade are those that are predicted for the EU as a whole as a result of the CAP reform and GATT.

2.2.3 France

In France an important increase in the damaging effects of agriculture on the environment has been observed in areas of intensive agricultural production over the last few years. From the deterioration in quality of underground aquifers to the eutrophication of rivers, via the destruction of wild fauna and flora on agricultural land, the opinion of experts is categorical: agricultural enterprises need to be aware of environmental considerations to the same degree as do industrial enterprises.

The nitrate problem is localised and affecting mainly the Paris basin, Brittany, the Charente, the Garonne Valley and the Valence region.

The Legislative Framework

Administratively, France is divided into 22 regions and 95 départements. French nitrate policy is carried out both at the national and the département level.

At the national level there are three types of policies important to water management (Rainelli, 1993):

1. Environmental protection and town planning. This mainly deals with land use planning.
2. Water protection. The Water Act of 1992 (an update of an older Act of 1976) proposes a balanced management of total water resources. The aim is the protection of the aquatic ecosystem and wetlands, the protection of the quality of surface waters and ground waters, and a better use of water from an economic point of view. To achieve this balanced management, new watershed management schemes were set up. Water basin agencies have been set up under this Act, and this Act also enables the charging of a tax based on the size of livestock enterprises and on the spreading quality of the manure produced (OECD, 1989).
3. Classified installation and intensive rearing. Any activity coming under this Act (nearly all livestock activities over a certain size) is classified as a reporting establishment or a permission regime. While the former has to adhere to rules laid down for the département (rules on the installation of the livestock rearing facilities and on the spreading of manure), the latter has to go through an impact assessment which is to provide details on the source, nature and magnitude of any disamenities liable to result from the installation concerned. Disamenities include noise, use and discharge of water, the protection of underground waters, and waste disposal.

The policy at the département levels is illustrated by the case of Brittany. This policy is more comprehensive than in other parts of France because of the seriousness of the pollution problem in this area. The impact assessment for new activities comprises of the following components:

- effluent storage capacity (6 months supply)²;
- the surface area of land where manure is spread. The recommended minimum of one hectare of cultivated land per 40 pigs per year, or one hectare of grazing per 100 pigs per year has never been adhered to, particularly in Brittany, where slurry and manure is based on the land.
- a balance of nitrogen fertiliser used on the farm, both organic and mineral and the preparation of nitrogen balance sheets.
- a detailed description of any other livestock on the farm and distance of the farm from neighbouring dwellings.

It is intended that from 1999 all existing installations will be included and need to obtain a permission.

² If this was extended (as it will) to the whole of France this will affect 80,000 establishments. The cost of this is close to 7 billion franc and implementation will take 10 years. In the opinion of the Ministry for the Environment (Mr Depagne, pers.com) livestock farmers will not move, but will adapt. The options are fewer livestock, exportation of manure, treatment on farms or by collectively provided facilities.

Nitrate Policies in France

Historically nitrates have been recognised as a problem and in 1984 a permanent administrative body was set up to recommend and implement measures to deal with nitrate pollution and to coordinate a campaign against nitrate pollution. This committee was called the CORPEN (steering committee for the reduction of nitrate pollution in water) and has an executive body called MEN (Mission Eau-Nitrates).

The CORPEN is composed of representatives from government, industry, water agencies, and research organisations. The role of CORPEN and MEN is to promote research studies aimed at perfecting techniques for nitrate pollution control.

Till the early 1990s the national campaign against water pollution by nitrates has rested essentially on voluntary participation by, and support of, all those concerned. The pursuit of consensus has led to an avoidance of the PPP because of opposition by farmers. CORPEN and MEN set up many experiments at the regional, département and local level (paid by them) and the results were relayed to farmers (Baldock and Bennett, 1991). By the early 1990s there was still a noticeable discrepancy between the recommendations made and the farmers' actual performance.

In 1991 the French government decide to introduce a tax on nitrogen emission from manure originating from intensive livestock farms. The tax is calculated at the farm level, based on total manure production modified with regard to building facilities, livestock density and manure application practices. At the same time subsidies will be available (till 1998) for farmers to reduce their pollution (Rainelli, 1993). The system of taxes was supposed to start in 1994. However, farmers protested about the starting date and also against the whole principle of taxation. The farmers' union argued that agriculture is a special case because of the particular circumstances of the farming economy, of agricultural pollution and of agricultural policy. The

latest news is that the government still has to decide on a new starting date for the tax!

The EC nitrate directive and its implementation in France

France argued very much against the Nitrate Directive at the EC level and wanted to avoid having any mandatory measures imposed on them at all. They claimed that production systems and farmers in France are too numerous and too diverse to be controlled by a single regulatory system.

Three administrative circulars have been produced by the French authorities to implement the nitrate directive in France. They define the vulnerable areas at the regional level (completed December 1994). A task force was set up in each département to improve coordination and information. This task force includes on the one hand the directorates of agriculture, environment, and health and on the other elected representatives from water users, farmers and nature conservation associations.

The zoning is based on the average level of nitrate concentration during the past year. Waters (aquifers or rivers) for which the level of NO_3 is over 50 mg are classified as polluted. In the waters where nitrate concentration reaches 40 mg per litre and where time-series data do not exist the pollution is considered as apt to occur in the very near future.

The definition of the vulnerable zones is achieved by combining watershed boundaries and administrative boundaries. Large areas will be defined, probably at the level of the department. It seems for example, that the whole of Brittany will be a vulnerable zone.

Codes of good agricultural practice have been publicised at the national level, but still need to be worked out further at the département level. The work of CORPEN will continue

The impact of the Nitrate Directive on agriculture will vary across France. This will be due to differences among départements on nitrate policies, agricultural structure and natural conditions. While in some areas intensive livestock production will have to make adjustments, in others no adjustments will be necessary. New improvements in animal diet by improving the amino-acid balance in feed, could also lead to a drastic reduction in the nitrogen content of animal wastes (Bonnieux et al., 1994).

The French situation is one of command and control. Much emphasis is placed on voluntary action, consensus, and the activities of extension services and research and development work as important ways of influencing farming practices (Rude and Frederiksen, 1994). Economic instruments have played no role, and in the only case where one was to be introduced, implementation has been delayed.

Agriculture is still very important in France and for that reason the government has been reluctant to confront farmers. Rude and Frederiksen conclude, "When environmental problems became a public and national issue, the representatives of agriculture denied any connection between agricultural practice and water pollution. They argued that no clear relationship existed between the intensification of production and pollution. Now this attitude has changed, and farmers accept that some problem exist, but claim that their economic situation does not allow for environmental regulations which could negatively affect farm income" (page 53). The French government so far seems to have accepted this argument.

2.2.4 The UK

In a few parts of Britain, nitrate levels in drinking water are close to or above the European community limit of 50 mg/l, partly due to nitrate leaching from farm land.

Only few regulations directly address nitrate problems. The main policy programme enacted by the U.K Government so far has been the Nitrate Sensitive Areas Pilot scheme started in 1990, which aimed to tackle the problem of unacceptable levels of nitrate leaching from farmland into water sources. In addition to the NSA scheme, 9 other areas were made subject to an advisory campaign. The scheme found that the following measures were particularly effective in reducing nitrate leaching:

- controls on the amount and timing of livestock manure and fertiliser;
 - the conversion of arable land to low-intensity grassland, and
 - the use of green cover crops to avoid bare land in the autumn.
- etc.

The scheme is voluntary and farmers are compensated. A report on the findings of the pilot scheme showed that, apart from land voluntarily converted to low-intensity grassland, changes can be made within existing farming systems which will make a significant contribution to reducing nitrate leaching. In particular, the more efficient use of inorganic fertilisers following the provision of detailed fertiliser recommendations to farmers and more careful allowance of nitrogen supplied by livestock manures. In addition, cover crops established promptly after harvest played a valuable part in mopping up surplus nitrogen and minimising leaching in the vulnerable autumn period.

A new Nitrate Sensitive Areas Scheme was started in 1994 under the Agri-environmental legislation of the EU. The area is intended to cover 35,000 hectares. On top of this another 24,000 hectare will be subject to an extension campaign through the Advisory Area scheme. Like the Pilot Scheme, the new Scheme will be voluntary and based on

compensation payments for constraints beyond "good agricultural practices", such as:

- applying manure in excess of 250kg of total N / ha;
- to apply within 50 meters of a water source.

There are several categories with different levels of compensation.

So far the Sensitive Areas Scheme (covering 1 percent of agricultural land in the UK) is the only guideline for the identification of vulnerable zones in accordance with the EC Nitrate Directive.

Harvey had the following to say about this scheme, "The definition of the sensitive areas and the voluntary nature of the incentives to adopt more friendly practices are both causes of some concern in this approach. Over and above these concerns, however, there are two substantial problems. First, if the prices received for farm products are artificially high, as they are under the present CAP, then the payments necessary to persuade farmers not to adopt intensive farm practices will also have to be set artificially high. Thus, the taxpayer (and consumer) pays twice- once for unsaleable surpluses and second for the prevention or limitation of adverse side-effects production. The second major problems is one of the 'moral hazard' - the possibility of farmers accepting payment for not doing things which they had no intention of doing in any event. On the one hand it is possible to accept this possibility as an unavoidable cost of obtaining the appropriate response. On the other, this possibility should prompt additional analysis to develop alternatives measures which are less prone to the problem" (Harvey, 1991).

2.2.5 The Netherlands

In the Netherlands, concerns regarding nitrate pollution focus on ground water and eutrophication of surface water; ammonia

evaporation is also considered to be a serious environmental problem, however.

The environmental goals are:

- total nutrient emissions to surface waters from all sources was to be reduced by 50% in 1995 relative to 1985 (this has not been achieved);
- the standards for ground and surface waters and drinking water set by the Netherlands and EC are to be realised;
- A balanced application of manures and fertilisers which should not exceed crop demand ('equilibrium fertilisation') for N and P is to be realised by the year 2000. In addition, there is to be no structural accumulation of P in the soil and the acceptable N losses are not to exceed the above-mentioned water quality standards.

To achieve this the Dutch have put in place a National Environmental Policy Plan. This has three phases, the third going from 1995-2000. The first two phases were very much constrained by the power of the Dutch farmers union, but this was broken by the late 1980 when it appeared that not sufficient progress was made³.

³ In early 1990 a book was published "Manure and Power" which documented the role of farmer organisations in policy making up to that time. Since the early 1990's the balance has swung away from the farmer. The seriousness of the manure problem, the pollution, and the changing values have to some extent brought this change about. The minister of agriculture was quoted to say that even though he understood that many jobs would be lost in agriculture due to the environmental regulations, healthy farm enterprises would not go broke because of environmental regulations alone and that the government was determined to achieve its goals by the year 2000 (De Telegraaf, 14 December 1993).

Phases 1 and 2 put into place the following:

1. Manure quotas (or manure production rights), given to each farmer according to livestock numbers and agricultural area in 1986 (these quotas became tradeable in 1994). This stopped the establishment of new farms.
2. Manure balance sheets - to identify manure surpluses.
3. Levy on manure surplus.
4. Establishment of a national Manure Bank (distribution, processing).
5. Utilisation standards - max standards for application of P from manure.
6. Restrictions on spreading of manure.

Over the period 1991-1994 the manure utilisation standards were tightened. However, as tightening did result in greater surpluses, the rate of decrease was tailored to enable the development of solutions for either surplus reductions or environmentally acceptable ways for disposal. An example is the reduction of mineral excretion through a reduced mineral intake via feed, eg. by adding enzymes which would assist the animal to digest the phosphate better, and through manure distribution and processing.

The third phase started this year and is aimed at further reductions in manure and fertiliser applications to realise a balanced application of fertiliser and manure as regards both P and N by the year 2000. This means that the amount of minerals applied will match crop demand, thus preventing structural accumulation of P in the soil. To achieve this the plan puts into place:

1. Loss standards - acceptable surplus of P and N that the environment can cope with (this will be reduced yearly).
2. New N fertiliser application standards.
3. Reductions in manure quotas.

4. A Mineral Accounting System and a prohibition levy. Under a mineral accounting system farmers keep a record of the exact amount of minerals they use and of the quantity of minerals that leaves the farm in animals, crops sales, milk, fodder or manure. Each year farmers send in a provisional assessment based on their minerals accounting, which is comparable to an income tax assessment. A surplus indicates a loss to ground and surface water, air and soil. However, not all losses are harmful to the environment and this is why the mineral surplus is compared to the surplus that is acceptable from the environmental viewpoint. This level will be set by governmental organisations, taking account of environmental goals and specific circumstances. Non-acceptable losses are settled by means of a levy. The levy will force farmers to lower their mineral surplus, eventually to the level of the environmental goals. Separate levels will be set for P and N. (see Figure 2)
5. Standards on ammonia emissions. A requirement for new intensive animal housing systems. As a newspaper headline stated "The cow will in the near future disappear from the landscape." (De Telegraaf, 11 December 1993).

Figure 2. Advantages of minerals accounting compared to a system of obligations and prohibitions

- The system is effective. There is a direct relationship between minerals surpluses on the farm and losses to the environment.
 - The system can be used throughout the sectors, for both nitrogen and phosphorus, and for inputs from both organic sources (manure, feed) and inorganic sources (fertilisers). The environmental quality goals for N and P can be tackled with one instrument.
 - The system applies the 'polluter pays' principle.
 - Within limits set by the environment, farmers are free to choose how to meet the conditions. Within these limits the system promotes an economically efficient agriculture.
 - The information needed for minerals accounting can be used by farmers as management information. That this is useful was proven by the use of the minerals accounting system for extension purposes.
 - Minerals accounting is expected to meet with farmer approval for the former three reasons.
 - Links with tax accounting and other farmers' and companies' administrations of purchase and sales. (MANMF, 1993)
-

While the main emphasis of Dutch policy is placed on technical solutions intended to reduce the manure surplus, economic incentives have been introduced to a certain extent to improve regional distribution of manure, to decrease manure production, and to encourage investments in buildings and storage facilities. All these incentives must be seen as being complementary to the main command and control regulatory framework.

Overall, compliance with the EC Nitrate Directive will result in major changes in the Dutch Agricultural Sector. It is expected that livestock numbers will decline drastically. Predictions are that dairy cow numbers will continue to decline (this mainly due to the McSharry Plan and GATT). Pig and poultry numbers will also decline to be able to meet the goals of the environmental plan and because a loss in competitiveness.

2.3 Overall impact

From NZ's point of view, the hope was always there that environmental problems in the EU, caused by intensive livestock farming and cropping and encouraged by a highly subsidised regime, would bring some rationality to farming in the EU. That rationality is a reduction in output and hence surpluses with consequent trade impacts for NZ. Some of the predictions from models quoted earlier in this paper gave some hope that this may be achieved.

The conclusions that can be drawn from a study of environmental policies, especially dealing with one of the more pressing environmental problems, is that the Nitrate Directive will have little direct impact on agricultural production and output (except in the Netherlands). But, while the Nitrate Directive on its own will do little, in combination with the CAP reforms started in 1993 and the GATT agreement it may contribute to the changes in output and environmental quality brought about by those programmes.

The reasons for the minimal impact of environmental legislation are:

1. the lingering attitude that agriculture is a special case and deserves special treatment, hence the lack of enforcement and control of environmental legislation and the less than rigid adherence to the PPP principle. Of importance to many countries is also the need to preserve rural communities; to protect the jobs in the primary product related industries; and a reluctance to weaken the competitiveness of farmers in the EU.
2. scientific uncertainties and practical problems associated with non-point source pollution such as: difficulties in monitoring and control; difficulties in exactly pinpointing which practices on which fields are responsible for particular changes in nitrate concentrations in deeper aquifers; social and political considerations connected partly to the large number of small units in agriculture, which may militate against transferring substantial additional costs to the sector; the practical constraints on radically modifying land-based forms of agricultural production in the short term.
3. the local nature of the particular problem discussed.
4. the great amount of scope to deal with the problem, through extension and education; changes to feed composition (15% reduction in nutrients); waste processing.

III Lessons for New Zealand

In all of this, are there any lessons for NZ? Or, is the situation as described so different from what is happening in NZ that few lessons can be drawn from the European experience? The conclusion that I reached was that there are some lessons and that New Zealand, although very different in terms of its agriculture (not highly subsidised intensive agriculture), should take note of the particular pollution problem discussed and the policy tools used. I will discuss these lessons under three heading, lessons with regard to the problem, the policies and the stakeholders.

3.1 Lessons with regard to the problem

Quoting Morgan Williams: "In capitalising on post GATT dairy opportunities, are we confident that our increased use of N and feed supplements is not taking us down the same path as the Netherlands' Agriculture? Do we have the monitoring systems in place to establish what the nutrient losses are from increasingly intensive dairy systems?" (Williams, 1995: 3)

In the Evening Standard of 28/4/95 we read, "High nitrate levels "health threat to babies". Or from another source, "Farmers in Taranaki need to take particular care not to over-use nitrogenous fertilisers because of the possible effects this can have on long-term productivity, environmental qualities and also public health, says a report to the Taranaki Regional Council.A particular concern in Taranaki is that over-use of nitrogenous fertilisers, such as urea, can lead to high levels of nitrates in groundwater and effects on the water quality of streams (Water and Wastes in NZ, November, 1994, p.41).

For a clean and green country, sentences like "lowland river reaches in agriculturally developed catchments are in poor conditions.Their poor condition also reflects agriculturally derived diffuse and point

source waste inputs in isolation or in addition to urban and industrial waste inputs. Either dissolved inorganic nitrogen and/or dissolved reactive phosphorus concentrations are often excessive.Many lowland reaches may often be unsuitable for contact recreation. (MAF, 1993, p. vii).

All this is not to scaremonger. But as I often tell my students, NZ is clean and green by default not by design. We cannot take good environmental quality for granted. We have to work at it to maintain what we have and we can't be complacent. Even though we may be willing to accept some decrease in environmental quality due to more intensive agriculture (which I doubt) we also need to consider what the implications are for trade. Will a decrease in environmental quality be seen by our trading partners as an environmental subsidy?

What has been said for nitrates (or fertiliser) also holds for pesticides. "There is little doubt that pesticide use is going to be more restricted in the future, certainly in Denmark, Sweden and the Netherlands. It might well influence policies in other areas such as the rest of the EU and North America. If so, those should have consequences for imports into those countries. (Wynen, 1993)

Hewison writes "of major concern, .., are the gaps between perception and reality. New Zealand has a high relative energy use per capita compared with other countries. It also uses considerable quantities of fertiliser and pesticides in agricultural production. New Zealanders generate large amounts of waste compared with many countries and are among the highest users of cars per capita in the world" (Hewison, 1995: p.5). Therefore, even though in the eyes of the world we seem to be, irrespective of what was said above, much cleaner than many of our competitors, the gap between perception and reality appears to be more easily sustained because of our relative isolation from major overseas markets. The question remains - just how 'clean and green' does New Zealand need to be to maintain the perception?

Hewison goes on to say that a clear perception is emerging that some of NZ's more important export industries must move away from their present unsustainable practices and focus more on the long term. For instance, some agricultural production is still based on practices that cause severe environmental degradation. Soil erosion and the control of pests are serious problems. Contamination of waterways and aquifers, due to excessive use of fertilisers and pesticides, and recent links between residues of these chemicals and breast cancer must also be of concern. The booming tourism industry is another example. Here efforts must be made to enhance protection of the conservation estate. Our seafood sector also relies heavily on a 'clean green image'. Finally, much of NZ's economy is dependent on cheap energy and fossil fuels, that contribute to carbon dioxide emissions and leave the country vulnerable to international price fluctuations (Hewison, 1995).

In conclusion, the European problem is not really so foreign to us. It is all too easy to get excited by the post GATT euphoria and convert more land to dairying, extend the production season by using nitrogenous fertilisers and irrigation water, and ignore some of the tell-tale signs on the environment that more intensive agriculture can produce. We need to learn from some of the European experiences to avoid repeating their mistakes. A recent Dutch visitor to NZ was quoted to say "it is only a matter of time before New Zealand will have to introduce stricter regulations, particularly in areas of more intense farming like the Waikato" (Evening Standard, March 29, 1995, p.15).

3.2 Lessons with regard to policies

To maintain and improve what we have got, we need to consciously manage the environment. In New Zealand we have put into place an institutional structure of Regional Authorities working under the Resource Management Act legislation. Much has been made of the opportunity, offered in the Resource Management Act, to use economic instruments for environmental management. The European experience

with the Nitrate Directive has some lessons for New Zealand regarding the management of non-point source pollution. In the first place to manage, one needs to monitor and one needs to have to have the scientific knowledge regarding the pathways of say nutrients in soils and waterways. Are our Regional Councils equipped to deal with a prospective nitrate problem. Evidence suggests that, for various reasons, monitoring has not been done hence the surprises in some areas that there is a nitrate problem. This was confirmed in some recent articles in the Planning Quarterly, one with the title "water purity due to good luck, not management" (Beanland and Brown, 1994, Beanland, et al, 1994). The Europeans knew they had a problem but it has taken them a long time before they dealt with it seriously. The costs of cleaning up contaminated groundwater are often prohibitive and other sources of water usually have to be obtained. As a Canterbury Regional Council Report points out, the emphasis needs to be on prevention rather than on attempts to "cure" groundwater contamination. - are the Regional Councils equipped to deal with a prospective nitrate problem? (Canterbury Regional Council, 1995).

Secondly in the cases where control and management is necessary, do we have the right policies?

The European experience shows how difficult water quality management is with non-point source pollutants. Scheierling (1995), quoting Libby and Boggess (1990), gives three reasons for the difficulties associated with water quality management:

1. the optimal solution [to water quality] is dependent upon a particular set of property rights. A problem in this regard is that historically, property rights in water quality have not been clearly defined;
2. the causes and effects of water pollution are generally separated temporally and spatially. This renders a static framework inadequate for addressing the marginal costs

and benefits and greatly complicates the possibilities of matching "buyers and sellers" in order to carry out the necessary transactions;

3. many water quality-based goods are public or "nonexclusive" goods. Because it is impossible to collect payments for the provision of nonexclusive goods, they cannot be offered in private markets;
4. the overall lack of information about water quality damages and the costs of water quality improvement introduces tremendous uncertainty. This uncertainty limits the willingness of private individuals to participate in "market transactions" and introduces a safety-first perspective as the public strives to achieve an acceptable level of reliability. Thus, as uncertainty increases there is a tendency to focus on prevention rather than treatment and to employ more reliable control mechanism. (Scheierlerling, 1995: p. 2).

The complexity of the demand for and supply of improved water quality suggests that a strict application of the Polluter-Pays-Principle in such situations raises practical and political difficulties. The practical difficulties lie in the clear identification of property rights; the uncertainty about nitrate flows in the subsurface region and the temporal and spatial dimension involved. The political difficulties lie in a rapid transfer of pollution abatement costs to the agricultural sector which could have severe repercussion for the economic viability of agriculture in certain area and for rural communities.

The European case study shows that although many countries had considered the use of environmental policies using economic instruments (Holland, Denmark, Germany) few have actually persevered with those policies. In the Dutch case especially, the transferable manure permits are to be replaced by a strict regulatory regime. In most

of the other countries, second-best solutions have been developed, involving regulations and perhaps subsidies, to be able to effectively control agricultural pollution. Economic instruments, where they are used are complementary to an overall command and control policy regime, which seem to be the case in most countries where economic instruments have been used (Meister and Sharp, 1993). The European experience shows how a variety of instruments is used to deal with the nitrate problem, including, besides the regulatory and economic policy tools, education, and advisory and voluntary approaches. The key has been to determine an institutional framework that provides the incentives necessary to achieve the desired level of damage mitigation in an economically efficient manner, resulting in the desired distribution of benefits and costs (Scheierling, 1995). Much of this has been a trial and error approach.

Thirdly, good policies are based on good data and good scientific knowledge. Currently in New Zealand much time is spent on biophysical or environmental bottom lines. Is the scientific knowledge there to support that work? As a member of South Island High Country Review team, we searched around for scientific information on land sustainability. The working party had to conclude that "science has not provided (and is currently not in a position to provide) the necessary knowledge and opportunities for sustainable management." (South Island High Country Review Working Party, 1994:55). The Europeans had to scramble to come up to scratch regarding scientific knowledge to deal with the problem at hand. The lesson for New Zealand is simply to be prepared. Recent changes in the Public Good Science Fund, creating an environmental output category, may have helped.

3.3 Lessons with regard to stakeholders

The European example has shown that to achieve sustainable resource use requires more than simply using environmental legislation and/or

economic instruments. There is a need to look for new tools and different approaches. Sustainable use of our resources means that we need to work together with all those who are affected by the way resources are used, ie. the stakeholders. On the one hand it is now generally understood that "farmers are only one party in decisions about multiple land use. Increasingly, the farm is no longer viewed - particularly in the developed countries - as a private property which can be exploited for private commercial gain. A farmer is seen as the custodian of what are rapidly becoming scarce goods: green space, clean water, fresh air, biodiversity and natural beauty" (Williams, 1995:21). This view immediately raises questions about property rights and compensation. Under many laws in the EU, so long as farmers abide by "good agricultural practices" - and this does not preclude use of nitrate fertiliser or spreading of animal wastes - then any nitrate emissions from agricultural land are exempt from state control in most circumstances. In cases where the State or the Region wants to achieve higher levels of environmental quality, compensation is often paid. The whole issue of property rights is a complicated one and of great concern to land holders or to quote Graham Robertson, "recent governments have diluted private property rights by such measures as prohibiting for aesthetic reasons, the harvesting of forests, or forcing landowners to set aside reserves along rivers and streams. ...Federated farmers has strenuously opposed these insidious restrictions on the rights of owners of freehold property. We believe the issue to be of such importance that we need to remind all New Zealanders of the inviolate nature of the freehold title." (Robertson, 1993).

The European situation shows how in some countries there is a firm commitment to compensate farmers for restrictions going beyond good agricultural practices while in others, for example in the Netherlands, farmers carry most of the cost of agricultural pollution abatement. The underlying philosophy in the former countries is that farmers are seen as stewards of the land whose entrepreneurial use of their resources is, for self-interest, tied to their proper maintenance. Because damages usually

are assumed to be largely on-site, persuasion and education are viewed as the most reasonable methods of countering agricultural pollution. This bias in favour of voluntary approaches and compensation is often reinforced by a system of property rights that suggests that farmers have the right to use resources as they wish. The political power of farmers in those countries is also often a strong deterrent to effective water pollution control (Scheierling, 1995). In the latter countries, an opposing view is taken which sees most of the damage of farming activities to lie off the farm, and which places a much greater right with the wider society to a pollution free environment. A conflict in philosophies not too dissimilar to current arguments about pollution and pest control responsibilities in New Zealand.

Property rights can be changed as has been shown in the European situation, and the notion that property rights are inviolate is something that is not accepted by many. The fact that some do hold this view shows that to bring about change will require more consultation. While farmers in some cases are the cause of the pollution problem, they are at the same time also the solution. This points to working together with farmers and communities. The Dutch Environmental Policy Plans states this very clearly:

“In the past the Dutch government shaped its policies through rules and regulations. Awareness is rising, however, that policies are supported and implemented only if target groups are convinced of their importance. Therefore objectives and targets and implementing measures are increasingly determined after consultations with the public and with target groups” (MANMF, 1993: p. 7)

The landcare group idea, started in Australia and now also present in NZ is a step in the right direction. Other examples are the Round Table groups in Canada (Williams, 1995). The Rabbit and Land Management Programme has shown how much can be learned from involving farmers

in some basic environmental monitoring of farm properties, in many ways the mineral book keeping, now introduced in most of the Western European countries, is doing the same.

The Resource Management Act has opened up a way for decentralised decision making and is leaving it up to regions to determine what sustainability is to mean for their region. To bring this about requires consensus building between industry, government and community interests that can lead to agreed actions by a diverse range of stakeholders.

The European case shows that this has been happening in some of the countries discussed. Initially there was enormous opposition to more regulations and costs. But slowly through extension (something we used to have long time ago), education and discussion, the command and control regulations have now been accepted. In some cases positive benefits have flown from them, not only for the wider community but also for the farmers in terms of more efficient management of their own resources.

IV Conclusions

It is easy to say that the European situation is so different from ours that there is little we can learn from it. In this paper I hope to have shown that that may not be completely true. Sure, European agriculture is highly subsidised and takes place in densely populated countries. But as I have shown, the problems are not completely dissimilar to the ones currently (or potentially) experienced in New Zealand.

While there may not be much comfort to New Zealand in terms of massive reductions in agricultural outputs due to environmental legislation in the European Union, this because it simply is not happening, there are lessons to be learned from the legislation and the way problems have been handled. The few lessons I have drawn from the European case study are:

1. don't take a 'clean and green' NZ for granted. If we don't watch out we soon will be facing similar problems as those discussed for Europe.
2. to deal with non-point source pollution is difficult. Not only because of distributional problems (ie. who pays and who benefits) but also because of practical problems. The way the problems have been dealt with in Europe can teach us something about the role of command and control rules, the place of economic instruments and the issue of property rights.
3. successful management of the environment requires scientific information and extensive monitoring. The Europeans had to catch up quickly to get the required data and information needed for management. It appears that in NZ we also have some catching up to do.

4. successful environmental management (or sustainable management of our resources) requires new approaches in terms of science and in terms of working with the multiple stakeholders, or “sustainability requires new kinds of lateral thinking, if we are to overcome the vertically-organised bureaucratic systems, the reductionism of science, and the compartmentalisation of information” (Williams, 1995, 27).

All this appear to be a long way removed from the topic area of this paper, the problem of nitrate in Europe. Let's hope that in NZ we have the institutions, the policies, the people, the knowledge and the ability to laterally think, to keep the nitrate problem and other environmental problems caused by agriculture, a 'long way removed'. Only in that way will we stay (or should I say become) 'clean and green'.

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Table 1. EU Policy Measures Relevant to the Environment⁴

A. Agricultural policies

- agricultural trade policy
- CAP market support measures
- CAP direct payments
- Less Favoured Area payments
- agricultural structural policies
- agri-environmental measures
 - ESA - type schemes
 - extensification
 - organic/biological farming conversion schemes
 - environmental set-aside
 - management of abandoned land
 - incentives for reducing inputs
 - multiple objective ecopoint schemes
 - habitat restoration/recreation schemes
- forestry measures
- incentives for alternative crops, biomass production, farm diversification etc.
- agricultural tenure legislation and rules
- agricultural research and development
- advice, training and education

⁴ Source: (Baldock and Beaufoy, 1993, page 94-95). This table presents a inventory of some of the policies most likely to influence the environment in the EC. Several of these policies involve decisions at the Community level such as the Structural Funds and EC policies on the the environment. The EC Structural Funds are to promote economic and social development in those regions of the Community which are lagging behind.

B. Regional policies

EC Structural Funds

- Objective 1
- Objective 5a
- Objective 5b
- Community initiatives

EC Cohesion Fund

Member States' regional policies

C. Environmental policies

EC habitats Directive

EC birds Directive

LIFE

Member States' nature conservation policies

Member States' environmental policies, including pollution control, physical planning, etc.

controls and taxes on agricultural inputs, including fertilisers, pesticides, etc.

controls and taxes on agricultural outputs, including livestock wastes

controls on agricultural practice, including the storage and handling of livestock waste, drainage, and irrigation, straw burning, ammonia emissions, tree felling, etc.

D. Other policies

economic and employment policies affecting agricultural markets, on and off-farm employment, interest rates etc.

fiscal policies including income tax, VAT, property taxes, inheritance taxes etc.

policies on farm animal health and welfare, food hygiene, etc.

policies on land ownership and control including the management of common land, village land, church land, state forests etc.

policies determining local socio-economic conditions, including health, education, housing, training, water, electricity, transport etc.

Table 2 Summary of main relevant CAP mechanisms and approximate budgets⁵

Policy	Objectives	Budget	Mechanisms
Overall CAP budget	Article 39 of the Treaty	'Agricultural guideline' rising from 35 billion ECU to 38 billion 1993/1999	Expenditures via Guarantee and Guidance Sections plus systems of import tariffs
Market support	Stable and 'reasonable' prices, assured supplies, fair living standards for farmers	Approximately 95 per cent of above, including most direct payments	Intervention storage, export subsidies, consumers subsidies, direct payments, etc.
Direct payments	Compensation for reduced prices (arable), production incentives (livestock) etc.	Approximately 15 billion ECU per annum (1994)	Headage payments for sheep and cattle, per hectare payments for cereals, oilseeds, protein crops
Accompanying measures	Afforestation, early retirement and agri.environment measures	FEOGA cost average 800 million ECU per annum over five years, agri-environment 400 million ECU per annum	Investment in annual payment for afforestation, retirement incentives, incentives for extensification, countryside management, long term set-aside, etc.
Structural policies, funded by Guidance Section of CAP budget	Support for structural change, LFAs, capital investment, young farmers, processing of farm products etc.	Currently approximately 2.8 billion ECU per annum (including share of set-aside)	Investment aids for farm efficiency, young farmers, agricultural marketing and processing, and LFA payments
Less Favoured Areas	Support for continuation of agriculture in disadvantaged regions	FEOGA share approximately 460 million ECU per annum in 199	Compensatory allowances, mainly livestock headage payments

⁵ Source: (Baldock and Beaufoy, 1993, page 99). The main purpose of this table is to show that the budget devoted to the 'accompanying measures' and to support for farmers in Less Favoured Areas is relatively small in comparison to the rest of the budget. Most of these figures are however pre 1993 and since then with the CAP reform and GATT, things have changed.

