The role of farmland owners in providing environmental services: CAP perspectives

Allan Buckwell[1]

Introduction

The decade and a half since the early 1990s has seen a transformation in the European debate on its Common Agricultural Policy (CAP). This transformation has been pushed by a complex mix of domestic (EU) concerns - especially agricultural surpluses, budgetary pressures, environmental concerns in the context of EU enlargement - combined with the pressures of globalisation and international trade liberalisation. It is characterised by a remarkable change from an exclusive focus on agriculture *per se*, to a much wider consideration of land management and the delivery by private landowners of public environmental services. This debate shows no sign it has run its course. Indeed since the concerns about global climate change rose high in the political agenda in 2005/06 this focuses specific attention in land management policy to the need to protect scarce agricultural land and water and to more intelligently manage carbon. This paper, written from the perspective of landowning and managing organisations, reviews the progress made in the European Union towards grappling with these issues.

The multiple outputs of land management – pervasive market failure

Land owners and managers[2] produce, or could produce, a series of nine outputs or services – which we like to characterise as the nine F-words shown in Table 1 below[3].

Table 1 The Outputs from Land Management – the nine F-words!
Food and fibre
Forest products
Farm buildings and property
Fuels: biogas, biomass, biofuels
Fun: tourism, culture, heritage, recreation solitude
Flora and fauna: i.e. habitat and species, biodiversity
Farmed landscapes
Flood protection; and water management – filtration and storage
Fixing carbon; sequestration in soils and wood

[1] Emeritus Professor of Agricultural Economics, Imperial College London and currently Chief Economist and Head of Land Use, Country land and Business Association (CLA), London, and Chairman of the Policy Group of the European Landowners Organisation (ELO).

[2] Throughout we very deliberately refer to land management, land owners and managers, and land management policy rather than farming, farmers and agricultural policy, this is because the businesses which are doing the management are multi-functional, and also because the ecology, hydrology, economics, and perhaps sociology too, of agriculture, forestry, and recreational and wildlife land management are interlocked.

[3] See CLA (2005) Pubic Goods from Private Land for a landowners' review of interactions between farming and environment.

Table two stylises three characteristics of these outputs, whether they are market or non-market goods, whether there are efforts also to offer public provision of these services, and the extent to which they are over or under-provided.

Table 2 Characteristics of the outputs

Output	Market or Non-market	Public provision	Over or Under provided?
Food & fibre	M	-	**O**
Forest products		Forestry Commission	**-**
Farm buildings		-	**-**
Fuels	M/N	Energy crops	**U**
Fun		-	**?**
Flora and fauna	N	Agri-environment schemes	**U**
Farmed landscapes			**U**
Flood protection		-	**U**
Fixing carbon		-	**U**

The market vs non-market characterisation is another way of denoting the extent of what economists call market failure. The essence of this failure is that the very nature of the services is that non-payers for them cannot be excluded from consumption (non-excludability), and when one person's enjoyment of the service does not diminish others' consumption of the same service (non-rivalness). The first few entries, Food and Fibre, Forest products, and Farm buildings or property are essentially market goods and there are no real reasons why competitive market forces will not bring about essentially the right allocation of resources to their production[4]. As we move down the list, Fuel – that is land based renewable energy and Fun embody some elements which can be, and are, well provided essentially by market processes (like rural tourism) there are also strong elements of market failures. Fundamentally the reason for the upsurge in renewable energy is a market failure, viz. that the utilisation of fossil fuels causes externalities – pollution – which is very largely responsible for Global Climate Change. The last four Fs in the tables are classic market failures. No one directly pays for biodiversity, landscape, flood

[4] Of course in this concentrated account there is not space to tease out the complexities of these statements. Two of the most significant 'complexities' creating very significant problems for agriculture deserve mention. First the structural imbalance between the highly fragmented primary production sector (farming) squeezed between the highly concentrated upstream supply industries and downstream processing and retailing sectors. Second, because this sector fundamentally deals with biology and is dependent on climate (and furthermore provides the daily food needs of the population) it is both more exposed to, and less able to deal with, the volatility that results from these features. Note also that rural properties often incorporate a great deal of heritage features around for which markets alone cannot provide adequate solutions.

protection or carbon sequestration so it is no surprise at all that they will not be optimally provided by private, profit making businesses.

How do we decide the mix of land management outputs?

Because the problems we are dealing with are not new it is not surprising that there have been many attempts over the years to find public and other mechanisms (e.g. charities and trusts) to try and find solutions to some of the market failures. Each country will have its own institutional expression of this. Paradoxically the greatest supra-national attempt to deal with these problems, the CAP, chose to focus on one of the few sectors which could, in principle, essentially, be left to the market. In the process that policy managed, over the three decades 1970s – 1990s, to produce unsaleable surpluses rather than shortages[5]. However that has now, largely, been rectified by the reforms of the last decade and a half. Domestic price support instruments (especially intervention purchases) have largely been dismantled and replaced by a new Single Payment Scheme in which payments are decoupled from production, but are conditional on cross compliance conditions including keeping land in Good Agricultural and Environmental Condition (GAEC). The forestry sector has, for reasons of its own characteristics and history, been more frequently than agriculture associated with pubic or communal ownership. The creation of public policy instruments to deal with renewable energy and with biodiversity, landscape and resource protection are more recent and are the prime subject of most of the rest of this paper.

For other sectors of public life where it is agreed that market failures exist, e.g. health, education, public security and infrastructure, the classic task of deciding who pays is played out by our political processes. All these services, as are rural eco-services too, are annually supplied and so there is a continuing public debate on the quantum of the services society desires (and of course the makeup of the mix of services because all of these sectors are complex and multi-dimensional); whether the service should be funded by public expenditure or by user charges; and whether the provision should be public or private.

What is being suggested here is that land based environmental and cultural landscape services should be seen in no different light as these more familiar public services. Because the state has been so long involved, for example, in education and provision we are not tempted to try and estimate the total quantum of education service we require, rather the debate focuses on whether the current provision has to be increased or reduced, and more especially on whether one particular sub-sector primary, secondary or tertiary is lagging. However, for rural environmental services the case still has to be made that they are a significant at all. Hence it is useful that research effort is expended to seek to quantify the possible magnitude of the market failures and the value society places on these non-market services.[6] Early results of this kind of analysis show that the value of environmental outputs from the land is already far from trivial. It is also plausible to suggest that current provision is sub-optimal[7].

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5 And as a consequence stands accused of wreaking much environmental damage – though close analysis of cause and effect of agricultural structural and technical change in the post WWII period leaves some doubt as the precise connection between this damage and the CAP.

6 See Defra (2004) for a thorough attempt at Green Accounting for the UK rural sector, and Buckwell (2005) for discussion of some policy implications of this work.

7 Conceptually, the argument is that as the providers, land managers, are not rewarded for their supply we can expect under-provision of environmental services. Empirically there is plenty of evidence to back this

Furthermore it seems reasonable to suppose that these values have a strong propensity to increase with economic growth – partly because economic development has tended to be associated with degradation and diminution of environmental assets thus their scarcity value rises, and also because as incomes rise, people become more mobile, better informed about, and more concerned about environment.

There are undoubtedly ways in which environmental services produced in conjunction with food can be sold at premium prices – thereby, at least partly, internalising the environmental value. A prime example is the development of the organic or 'bio' production systems in which customers have a mechanism for paying the higher costs of the particular environmental stewardship which characterises these production systems. The extent to which such approaches can provide the full range of eco services is not clear. This is a matter of consumer tastes and preferences however it may be observed that there are few areas of consumer behaviour where the 'premium' end of the market extends much beyond ten percent of the total.

Whether the provision of rural environmental services should be public or private is largely answered by the present ownership structure of land in Europe. In Europe a very high proportion of land is managed, many European countries have little wilderness[8]. A large part of European biodiversity and landscape is man made, i.e. semi-natural. Whether this land is publicly or privately owned and managed was one of the great questions of the twentieth century – settled by 1989 in favour of private ownership[9]. It seems unlikely that this will be reversed in the near future. Where land management is to be primarily devoted to environmental service provision, as opposed to jointly producing food and other marketed goods, the ownership may be Trusts or Charities run by Green NGOs. This form of ownership may well increase if these organisations increase their membership and thus public subscription. These organisations acquire their land usually either by gifts and wills, or by buying it from the market. It seems unlikely that Governments will wish to purchase land for the purposes of delivering environmental services. The current fashion in public service provision is more usually moving in the opposite direction. Public assets are privatised and public-private partnerships set up through which public authorities contract with the private sector to the supply public services.

The scene is well set in the EU for agri-environment

For two decades in Europe there was a not very happy or understanding debate between environmentalists and farmers. The former tended to accuse the latter of poisoning the earth and destroying environmental capital, and the latter feeling cornered between these criticisms and demands of governments that they must become more businesslike, increase productivity and rely less on government subsidy. There are signs that each side of this debate are gradually learning to understand each other – perhaps blues and greens can be seen working together! The Greens are beginning to appreciate that to achieve what they want they must engage and embrace the private sector land managers. It is also dawning on the farmers and foresters that the political power of the Greens is much greater than their own and growing, whilst

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up as environmental groups weekly point out the decline in biodiversity and the poor state of many eco-systems and natural resources, see RSPB (2006) for a recent example. Whilst these interest groups may seem pathologically conditioned to focus on bad news, there is substance to their claims.

8 See European Commission (2004) for detailed statistics on the characteristics of EU rural areas.

9 See Swinnen et al (2001) for analyses of the complex processes of unwinding the collectivisation and state ownership of rural land in the ex-communist countries.

theirs drains away, and furthermore that 'greenery' provides opportunities for new lines of business revenue.

The policy expression of these opportunities has been to devise a new contract between land managers and society is within the two-pillar structure of the CAP. The was set in place by Commissioner Fischler in his Agenda 2000 reform agreed in 1999 which created the two-Pillar CAP.

The first Pillar is essentially the residual agricultural commodity market support for unreformed sectors, principally wine, fruit & vegetables and cotton, plus the direct payments to farmers as compensation for reducing the price supports for cereals, oilseeds, proteins, beef, sheep, milk, olive oil and tobacco. A second stage of Fischler reforms was enacted in 2004 when the Single Payment System was set up, decoupling the direct payments from the need to produce any agricultural products.

The second Pillar, implemented through the Rural Development Regulation, focuses on three things. First it has a land-based sectoral component stimulating structural change, productivity improvement and better marketing of agricultural products (and, increasingly from 2007, forestry products too). Second, it has an environmental land management component which is expressly to 'compensate' land managers for environmental restrictions placed on their activities, to pay them to supply environmental services, and to deal with marginal so-called (agriculturally) disadvantaged areas. Third, there are measures that encourage land-based businesses to diversify their activities – and also to stimulate wider rural development that in turn will, it is hoped, provide employment opportunities outside agriculture and forestry.

The policy concept of the two pillars was, from the outset, a dynamic one (most overtly expressed in one of the Commission-sponsored reports which preceded the Agenda 2000 reform[10]). The vision was definitely that the initial balance between the two pillars, 95% of resources in Pillar 1, would evolve in the direction of building-up Pillar 2. The mechanism devised to allow a switch of resources was given the somewhat unfortunate name of 'modulation'[11]. This was a voluntary mechanism whereby Member States could choose to cut direct payments to their farmers and transfer the resources to their Pillar 2 Rural development and Agri-environment schemes. The Commission envisaged that perhaps up to 20% of Pillar 1 funds could be shifted in this way[12]. However for a number of reasons this mechanism proved unpopular[13]. Only the UK has made use of it, progressively increasing the modulation rate until 10% of Pillar 1 payments were 'modulated' in 2006 in England. Meanwhile, in the 2004 reform it was proposed that modulation should be compulsory for all Member States, although only rising to 5% in 2007. The rebalancing of support between the two pillars, presumably in favour of the second Pillar, will be one of the main EU debates for the rest of this decade.

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10 The so-called CARPE – Common Agricultural and Rural Policy for Europe – report, Commission (1997).

11 The name arises because direct payments in Pillar 1 were cut, but for reasons of social equity the cuts were to be smaller for small payment recipients than for larger recipients, i.e. the cuts were to be modulated by payment size.

12 Bearing in mind that Pillar 1 is 100% financed from the EU budget whilst Pillar 2 schemes are 50:50 co-financed, moving 20% of Pillar 1 funds into Pillar 2 actually mobilises roughly twice this public expenditure in Pillar 2 when the Member State match funding is added.

13 See Buckwell (2005) for a discussion of the modulation story.

Paying for the environment is in its infancy

The very debate over the balance of CAP expenditure between the two pillars illustrates the still contentious nature of these arguments over paying farmers and foresters for their environmental role. Despite the fact that leaders of farmers unions, even the notoriously defensive COPA, will now defend the financial support their members receive from taxpayers as reasonable rewards for 'looking after the countryside', when it comes to specifying the nature of the payments and the conditions for receiving them, progress is slow. The result is that numerous environmental bolt-on features have been attached to the CAP over the years, which, paradoxically, makes further change even more complex, and slow. Environmentalists could see that farmers were going to hang on to as much of their agriculturally based payments as they could and therefore pushed to attach environmental levers into as many aspects of the CAP as they could. The result is that there are a number of important environmental mechanisms in Pillar 1 – which are therefore threatened if Pillar 1 is to be significantly diminished or eliminated[14].

The two most important such mechanisms are the cross compliance conditions for receipt of the Single Farm Payment, and set-aside. The cross compliance conditions comprise an expanding set of Statutory Management Requirements (SMRs) and a set of Good Agricultural and Environmental Conditions (GAEC). The SMRs are pre-existing European Regulations and Directives for environment, animal health and welfare and some other aspects of food safety regulation. As these are pre-existing EU law they should presumably already be in place and fully operating with normal sanctions for non-respect. It is an interesting observation that such is the impotence of EU and national authorities to enforce such regulations that the idea of having them as cross compliance conditions is that they would have some additional leverage on farmers who did not respect them by reducing or withholding their Single Farm Payment[15]. The Good Agricultural and Environmental Conditions are a similar long list of elements of what are deemed to be good environmental land management practice, including many national environmental laws.

These Pillar 1 payments in return for the SMRs and GAEC are quite perplexing. Farmers sometimes see them as unreasonable double jeopardy. The conditions are already law and are therefore already subject to legal sanction so why was it necessary to introduce a second system of punishment for any slip-up? Others ask why in any case farmers should be paid to respect the law. This is most often expressed as surprise that the Polluters Pay Principle does not seem to be operating[16]. One interpretation of the conceptual muddle here is that this is a classic case of lack of acceptance or definition of property rights. Farmers claim that the land is theirs. It is their right to decide: whether and with what to crop it; how much manure to apply; the size of their fields; whether the field boundaries will be stone walls, hedges, banks, ditches, fences or nothing at all; whether dead trees will be left standing of cut down for firewood. If society would like to join in such micro-level land management decision-making then farmers feel those who express such views should offer to pay.

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14 As is overtly the Vision of the UK Government, see Defra/H M Treasury (2005).

15 Whether the inspectorate who must ensure compliance for the Single Payment are better resourced or effective than the environmental inspectorates whose job it is to enforce these laws remains to be seen.

16 The author was impressed by the analysis offered by David Pannell (2003) who queried the origins and applicability of this much-revered 'Principle' which, as this very example shows, is by no means universally applied – perhaps for good reasons.

Another approach is to make the argument in terms of transactions costs. The EU and its Member States have indeed enacted a long list of environmental regulation on these matters (and many more besides). However because of the intrinsic nature of land management - it is geographically dispersed and diffuse - and because of its sheer scale and complexity, monitoring and policing costs are, and always will be, unmanageably high. Thus however 'fair' it might seem to some that the 'Polluter' pays, if he cannot easily be identified, monitored or sanctioned then cost-effective command and control regulation may simply be impracticable[17]. In this light, if a system of payments to farmers, whatever its origins, can be harnessed to bring about a better enforcement of what are, by international standards, a comprehensive set of quite demanding environmental and animal health standards which covers a high proportion of the land area, this might contain elements of a sensibly pragmatic solution.

A similar tangled set of arguments applies to the Pillar 1 instrument of set-aside. This is a requirement introduced as part of the first real reform of the arable regime of the CAP in 1992. The MacSharry reform reduced price supports offering direct financial payments as compensation, but these payments were subject to arable farmers 'setting aside' 8% of their cereal and oilseeds area. This was straightforwardly a supply control measure to contain the volume of production, and thus reduce the financial liability for the EU in subsidising exports. Not unnaturally farmers tended to put out of cultivation those parts of their fields which were less productive. Over the years since this was introduced much of this area has returned to more bio-diverse grass field margins. Other parts have been used in conformity with the rules devised to produce non-food crops particularly energy crops. Thus an agricultural production management tool has turned out in part to be a useful way of paying farmers to deliver agri-environmental benefits.

The point of elaborating these environmentally helpful features of Pillar 1 is that if the payments and supply control measures are eliminated as part of the agenda to liberalise agriculture then these environmental benefits will disappear.

Pillar 2 contains the main environmental instruments of the CAP

Because there is much latitude for the Member States to pick and choose the measures available in the Rural Development Regulation (RDR) to make up their regional Rural Development Programmes, there is a great deal of variability from one region to another. Figure 1 (taken from Mantino (2004)) shows the pattern of use made between four categories of instruments for he period 2000 – 2006 for the EU-15[18]. It can be seen that agri-environment measures account on average for just over half the expenditures in this programme, and account for more than half in seven of the member states in the top half of the figure.

[17] There is nothing new of course in the observation that identifying the polluter to apply the Polluter Pays Principle is difficult in the case of diffuse pollution. However correctly identifying the polluter in the case of global pollutants like green house gases adds a further layer of difficulty. Unilateral action e.g. in the EU to curtain livestock production to reduce their emissions of ammonia, nitrogen oxides and methane, which simply displaced the production to other parts of the world would do nothing to reduce the pollution. It might be concluded the polluter is the consumer rather than the producer.

[18] The first three of these categories correspond to the three axes which have been defined in the more guided or strategic approach for the RDR which is to apply for the period 2007-2013.

There are seven kinds of instrument in the RDR which can be seen as seeking to encourage better environmental management of agricultural land.

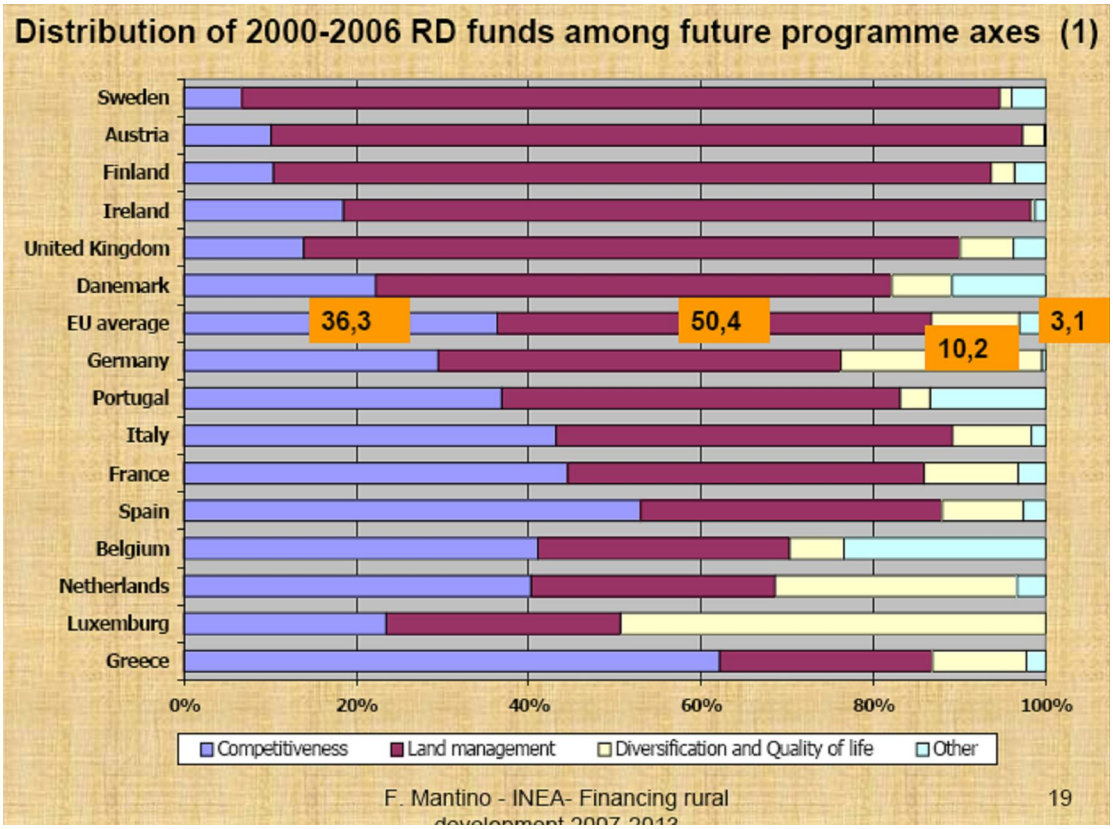
(i) Agri-environment schemes are custom-built schemes devised to adapt farming systems to deliver environmental services. There are many types of such schemes around the EU, which operate with varying degrees of success. They are mostly focussed on paying for biodiversity and landscape. Some schemes contain elements of water and soil protection, and others include the maintenance and enhancement of archaeological, historical and heritage features[19].

(ii) Less used, but also available in the RDR is the facility to pay compensation to farmers, and from 2007 foresters too, for restrictions on the way they can use their land in areas which have been designated under the so-called Natura 2000, the Birds and habitats directives.

(iii) All Member States of the EU have also designated parts of their rural territory as less favoured, or suffering from permanent natural handicap (for agricultural production). These are mostly the uplands, mountains, remoter islands, and in the case of Finland the land north of parallel 62. There is considerable discussion, as yet unresolved, about what are rational motives for paying farmers to produce in areas manifestly uncompetitive for agricultural production because they have poor soils and climate and are remote from markets. Whilst some try to make economic or social arguments for justifying such payments, there can be little doubt, there is an environmental case on biodiversity and cultural landscape grounds for paying farmers to manage these areas in traditional ways.

Figure 1

[19] See Agra/Ceas Synthesis of the Rural development Regulation mid-term evaluations, published on the DG Agri website which contains evaluation of these Agri-environment and other schemes.



(iv) New chapters were introduced into the RDR in 2004 to allow Member States to provide transitional compensatory support for farmers who have to make investments to enable them to cope with higher environmental standards. It is too soon to see how widely, for what measures, and with what success this instrument is used.

(v) There has been an upsurge in organic farming in the EU in recent years, and this is partly due to additional payments to help farmers through the conversion period whilst they are not using artificial fertiliser and the full range of crop protection chemicals and yet before they can sell their produce as organic. More controversial are ongoing organic maintenance payments to compensate for lower yields of these crops. Some argue that the market is capable of paying for this quality differential.

(vi) Farmers are constantly being encouraged to pool their efforts to sort, pack and market their produce, and for example to strive for greater market segmentation and differentiation of produce by place of origin, style of production, breed of animal, season and so on. There is thought to be great scope to embody good care for the environment in food products – selling such produce at premium prices to cover the higher production costs. The RDR contains measures to stimulate such processing and marketing developments including the setting up of producer groups.

(vii) In addition to the use of set-aside land for growing energy crops, the environmental land management measures within Pillar 2 also provide some limited supports for establishing renewable energy crops.

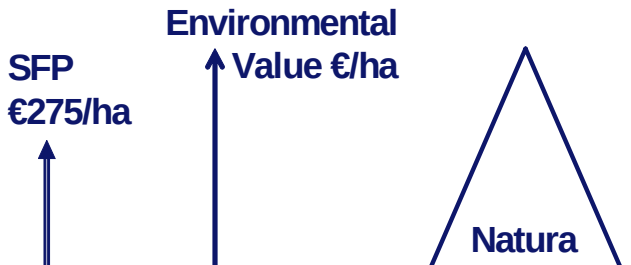
How coherent is this plethora of CAP supports for the environment?
It is easy to be critical and to complain that this mix of payments and supports is incoherent. There are very wide differences in the way the Member States have implemented the regulations. This is partly because environmental problems, and also the value placed upon the environment, differs from region to region, these in turn are because of the quite different levels of development, eg between Member States in the North and West of Europe and those in the South and East. Some defence can be offered that the variety of approaches in Pillar 1 and Pillar 2, and the different interpretations of the regulations and different ways of implementing them around the regions of Europe provide useful experimentation to see what works well and what are less effective ways of delivering the environment.

The main incoherence surrounds the relative payment rates for the environmental services supplied via the Single Payment and those seen in the Pillar 2 environment schemes. This is often depicted in the very simplistic two-dimensional form as in Figure 2 below. In the triangle shown the horizontal axis indicates the proportion of rural land area, i.e. the base of the triangle is the total area, and as we move vertically up we describe small proportions of the area. The vertical axis is supposed to represent the environmental value, or higher and higher environmental delivery by the measures shown in the diagram as we move vertically up.

The horizontal line A – A depicts the division between private property rights in land use above this line, and public property rights below it. Thus in principle we are happy to adopt a 'Producer or Provider Receives' stance for environmental values delivered above this legally-required minimum base line. Below the line land managers are not achieving the required standard and may be subject to legal sanctions.

Using the new suite of schemes introduced in 2005 in England, there are three tiers of Environmental Stewardship shown. Starting from the legal minimum – which is also the set of cross compliance conditions for receipt of the Single Farm Payment (SFP), the lowest level is called the Entry Level Stewardship (ELS) scheme. In principle all farmers, and thus most land, provided it can score enough points by providing various environmental services – mostly biodiversity and landscape but some resource protection – can enrol in this non-competitive scheme. The payment level offered is €44/hectare. Next up, delivering higher environmental value, and one assumes higher costs of delivery, is the Higher Level Stewardship scheme (HLS). This is more difficult to get into as there are fewer areas of land capable of delivering the higher environmental values, habitats & species, resource protection and also some heritage features. Correspondingly the payment rates for HLS are higher. Above this are the most treasured hotspots of designated sites of special scientific interest which are also often Natura 2000 sites. These will cover least area and may involve higher environmental standards, more costs (often but not always in forgone economic output) and higher payment rates.

Figure 2 The land stewardship triangle



The outstanding incoherence is immediately visible in this depiction. The Single Farm Payment averages about €275/hectare[20] . This level of payment rate is not unheard of for some aspects of the HLS scheme, but the SFP is paid (more or less) over the whole agricultural area, and in return for achieving the base level of environmental delivery. Plainly these payment rates are topsy-turvy. This is not surprising because the scale of SFP is a reflection of past agricultural commodity support and not environmental delivery. But as the purpose of the SFP is transformed towards payment for environmental and cultural landscape service delivery then some rearrangement of these payment rates is clearly necessary.

How are we to move forward?

It has to be acknowledged that the depiction of rural policy described here is not universally accepted across Europe – there are many, especially those representing the recipients of the current agricultural supports (i.e. the Single Payment) who would like these to continue as they are. There is certainly scope to make the argument that paying European farmers something to keep their land in *Good Agricultural and Environmental Condition* is a highly intelligent food and environmental security policy. Projections of climate change on the impacts on

[20] EU-15 figure, it is much lower than this in the new Member States.

water supplies and agricultural production world-wide in the Stern Report certainly suggest that a prudent policy is guard against loss of food, and renewable energy production capacity. Other arguments are that these payments are an important income stabilisation mechanism, and also they compensate European farmers for the higher environmental standards they are asked to adhere to compared to some of their competitors. However it has to be said that there is little analysis to show that these motives justify current payment levels.

To the extent that there is a consensus that the future shape of the CAP is to switch resources from the Pillar 1 Single Payment to the Pillar 2 environment schemes, it invites the research community to suggest how we assess the quantum of services which should be provided by EU-funded Pillar 2 environment schemes. Estimating society's demand for the total quantum of any public service will never be an exact science, but work to indicate some orders of magnitude could be helpful.

Having estimated the quantum of environmental services society desires to pay land managers to provide, the next challenge is to determine the payment rates to bring forth the right level and mix of environmental services. As illustrated above the current rates of payment were negotiated when governments and farmers were both well aware that farmers were receiving very large other direct payments. In the event that the Single Payment were much reduced or withdrawn, farmers would certainly be expected to argue that the environmental scheme payment rates would have to increase. How much is an empirical question. To date there does not seem to be any recognition that Pillar 2 payment rates may in some cases have to be renegotiated up as Pillar 1 payments are brought down.

The very principles of these payment rates are highly complex, not least because the environmental services they are paying for are multi-dimensional, interactive, dynamic and thus very complex. To date the Green Box of the WTO defines that environmental payment rates may take account of the income forgone because agriculture is restricted by such schemes, any direct costs imposed by the schemes, and a profit element. However as time passes, the rates which emerge from such calculations my simply not incentivise people to stay on the land and produce the semi-natural eco-systems and landscapes which characterise much of Europe's rural areas. The relevant opportunity cost is not the relatively unprofitable agriculture but the best possible alternative, which may well be to leave the land and find better paid employment in the cities.

It is not difficult to imagine that devising the correct payment rates for something as complex as the environment could easily outstrip the capacity of public administration to solve. Administering, and policing, such schemes over the bulk of the European territory will demand simplicity, and a rather ad hoc, learning by doing approach.

A challenge to the research community

These issues certainly provide many challenges to the research community. Green accounting has much to offer to help estimate the quantum of services societies want. Such work has to be done region by region across Europe and it poses some fascinating conceptual as well as practical measurement challenges.

Discovering the appropriate supply prices, i.e. what we have to pay to get the services delivered has also opened up a wide and active field of research amongst environmental economists. Some have advocated auction approaches, others suggest these are not always preferred especially when there is a repetitive price setting (see Latacz-Lohmann and Schilizzi (2005). Another interesting line of inquiry which could make things easier for public administration would be to examine the extent to which land managers can contract for supplying environmental services not with individual contracts with government but via cooperatives created for this purpose.

Another area for research is in estimating the demand for these services. Perhaps buyers could be encouraged to form clubs for their purchase from local land managers. It would be interesting to know n what circumstances would this work. A great deal of all of this work requires more research on valuation of environmental services. There is now a reasonably settled literature on the methods for valuing individual well-defined eco-services, however problems of aggregation are far from settled.

There are some tricky question about whether enrolment in environmental schemes can always be voluntary. Also who owns the environmental capital which has been accumulated under a publicly-paid scheme? Is it the farmers' so he is at liberty to destroy this capital if he chooses at the end of his contract? This idea offends some.

Under all this economic and public policy research is of course the basic scientific research about the impacts of different management systems on ecology and resource quality and quantity. Without sound knowledge of these natural systems and how they interact it will not prove possible to devise sustainable land management systems. Amongst many issues this requires us to better understand is the one of connectivity of eco-systems across the wider countryside. Knowledge of how wildlife currently adapts and moves, and the nature of the connecting corridors and their management is likely to grow in importance as climate change wreaks its effects.

Concluding remarks

In Europe there is a willingness to pay farmers and other land managers for providing public environmental services.

These services are highly complex. They are produced jointly with other marketed goods. There is strong interaction between the things needed to reduce the negative external impacts of farming (i.e. pollution) and the actions which are required to produce the positive external effects – the biodiversity and landscape. It is sensible to be pragmatic and to exploit these interactions to the greatest extent and not get too hung-up on unenforceable concepts like polluter pays.

The solutions to these challenges are currently being sought alongside a complex set of reforms of the CAP, external pressures form the WTO, and the enlargement of the EU. This latter consideration introduces Member States at very different economic development levels, and this makes it even harder to focus on supplying

environmental services. We can therefore be certain that these matters will not be resolved in the near future!

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