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ENVIRONMENTAL INDICATORS FOR A REFORMED CAP: MONITORING AND EVALUATING POLICIES IN AGRICULTURE

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Research Report

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Andrew Moxey[1]
Martin Whitby[2]
Philip Lowe[2]

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[1] Department of Agricultural Economics and Food Marketing, University of Newcastle University
[2] Centre for Rural Ecomomy, University of Newcastle

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1. INTRODUCTION

1.1 Historical Context

British agriculture has been a heavily supported sector since the Second World War, first through domestic support and since the 1970s under the Common Agricultural Policy (CAP). The common themes of these policies have been to expand output by easing the (private) costs of adopting new productivity-oriented technologies, through a mixture of grants and input subsides; and to ensure adequate income levels in farming, through high product prices maintained by intervention buying and import barriers. Since the mid 1980s, however, policy emphasis has shifted somewhat in response to three factors (Buckwell, 1990; Whitby, 1994, 1996; Winter and Gaskell, 1997).

First, the budgetary costs of maintaining open-ended CAP support became unacceptably high. This led, for example, to the imposition of milk quotas and grain co-responsibility levies during the 1980s. Second, the consequences of the subsidised export of Europe's growing farm surpluses ensured that agricultural trade became a subject of intense scrutiny during the Uruguay Round of the General Agreement of Tariffs and Trade (GATT). This, together with continuing budgetary pressures, led to a general (but phased) lowering of price support and protection measures under the 'MacSharry' reforms of the CAP initiated in 1992. Third, the environmental impacts of agriculture gained in importance as a political issue. This led to the introduction of agri-environmental measures under the CAP, starting with Article 19 of the Structures Regulation 797/85 (which established Environmentally Sensitive Areas) and broadening out to the Agri-Environment Regulation 2078/92, one of three 'Accompanying Measures' to the MacSharry reforms.

1.2 Environmental Management

Despite these shifts in policy emphasis, the environmental impacts of productivist agriculture are still accumulating. Whereas farming practices and estate management over preceding centuries are credited with creating 'valued' habitats and landscapes, agricultural intensification in the post-war period is widely held responsible for the steep decline in the area of semi-natural habitats, the populations of associated farmland wildlife species and the diversity of landscape structures (NCC, 1990). That is, either through destructive action or simply the absence of positive management, contemporary practices are degrading and depleting the stock of agri-environmental natural capital[3] accumulated by previous generations. For example, the 35 years following the Second World War witnessed the loss of 95% of lowland herb-rich grasslands, 50% of ancient woodlands and 33% of all upland grasslands, heaths and mires (NCC, 1984; Barr *et al.*, 1993).

Typically, pockets of natural capital remain only as fragmented features at the margin of modern agriculture, often where biophysical constraints preclude intensive practices, for example in waterlogged lowland sites or remote and exposed upland areas. Contemporary maintenance of the fragmented natural capital base is attempted primarily through specific schemes for environmental land management. Participation of land managers in such schemes is typically voluntary and time-limited, resulting in scarce funds being used to 'buy' what may only be temporary alleviation of environmental degradation or damage at that site (Moxey *et al*, 1995). This reflects the pre-eminence of agricultural interests over environmental interests, and the success of the former in keeping

[3] Used here as an umbrella term encompassing notions of biodiversity, landscape structure and pattern, and cultural heritage [Atkinson, 1994, 1995; Whitby and Adger, 1996, 1997].

control of property rights in the countryside (Cox et *al*, 1990). Such schemes include Sites of Special Scientific Interest (SSSIs), Environmentally Sensitive Areas and, more recently, Countryside Stewardship.

As Tilzey (1997) notes, this approach revolves around the notion that natural capital can be conserved or enhanced on a site-by-site basis, without reference to the broader spatial (environmental) or sectoral (socio-economic) context. It does nothing to address natural capital conservation in the remaining countryside beyond protected sites/areas. Thus, conservation efforts are typically remedial in nature, treating specific and discrete symptoms of an intensive agricultural system without attempting, or indeed having the scope, to address the underlying causes. However, sites cannot be conserved in isolation; they are adversely affected by the condition of surrounding land whose treatment is driven by socio-economic forces that extend well beyond the local level (Turner and Gardner, 1991; Naiman, 1992). Environmental connectivity in landscapes requires that management for conservation be conducted over a range of spatial scales, not just at the individual site level. Likewise, awareness of the complexity of socio-economic forces driving land use and the inter-linkages and substitution possibilities between different commodity regimes and markets, reveals the need to address generic causes of land use change (O'Callaghan, 1996; Dabbert *et al*, 1998).

Accommodating these broad scale considerations would represent a radical shift away from the current 'environmental managerialist' position to a more holistic, whole countryside approach (see, for example, Naiman, 1992; Midmore *et al*, 1996). That is, rather than treating symptoms, efforts to conserve and enhance the agri-environmental natural capital base would be directed towards tackling the causes of environmentally damaging or degrading

practices. The analogy here with health policies is evident: prevention may well be more attractive and desirable than having to fund expensive cures.

1.3 The Present Situation Regarding the Greening of the CAP

An assessment of the MacSharry reforms indicates that they have not incorporated conservation objectives into the strategic direction of the CAP. The following are the key conclusions from a review of the implementation of those reforms in the UK.

The implementation of the 1992 CAP reforms was phased in over a 3-4 year period and coincided with other major events, which greatly affected the economic climate for agriculture. These have swamped the impact of the reforms whose consequences are more difficult to discern. The reforms are also operating in a somewhat altered agricultural situation from that prevailing when they were formulated and are having to address problems not then envisaged.

One of the major events that has greatly affected British agriculture since the introduction of the MacSharry reforms was Britain's withdrawal from the Exchange Rate Mechanism (ERM). That event, coupled with a tightening of world grain supplies, confounded the expectation of reduced profitability in the cereal sector following the reforms. The implementation of the reforms over the first three years coincided with high world grain prices which boosted farmers' incomes significantly. In addition, British farmers were shielded from the effects of cuts in cereal support prices by successive devaluations of the green pound. For UK cereal producers, the years following 1992 turned out in fact to be highly profitable ones (Asby and Sturgess, 1997). Of course, they

may not be able to count on such favourable conditions in the future (indeed, aggregate incomes have declined by 45% between 1996 and 1997, mainly due to lower commodity prices (MAFF, 1998), but in the meantime there has been a significant boost to intensification and specialisation.

Another major event with more profound and longer term consequences is the BSE crisis. The reforms in the beef regime were intended to bring the supply and demand for beef back into equilibrium. The drop in demand following the crisis has frustrated that objective. At the same time the efforts to reduce cattle numbers have been greatly overtaken by the slaughtering programmes introduced in reaction to the BSE crisis. The result is a large reduction in the UK beef sector with serious consequences for the agricultural economy and the rural environment.

1.3.1 The Agri-Environment Regulation as a Minor Component of the CAP

Agri-environment expenditure, particularly when narrowed down to the sub-category of actual payments to farmers, remains very low in comparison with the overall size of the UK's agricultural economy and in comparison with total CAP expenditure in the UK. In 1995-96, for example, agri-environment payments to farmers in the UK as a whole amounted to nearly £55 million, or 1.9% of total CAP expenditure in the UK of about £2.91 billion (MAFF, 1998). Although agri-environment expenditure has expanded progressively over the past ten years, and is set to expand further in the next three years, there will be little prospect of a sizeable shift towards environmentally-friendly farming practices until there is a more widespread balance between agri-environmental incentives and the production incentives in the traditional CAP regimes. As it

is, commodity supports effectively inhibit the take-up of agri-environment measures.

The bulk of expenditure under the agri-environment regulation is on ESAs, followed by Countryside Stewardship (accounting respectively for 59% and 20% of UK expenditure in 1996-97). This means that the UK implementation of the Regulation has been very particular. In essence, Britain is still largely implementing on an expanded scale a policy devised under Article 19 of 797/85. The lack of a general extensification scheme (such as the French 'prime à l'herbe'), the restricted interpretation of some measures such as that for organic farming (which is used to support organic conversion but not production) and the limited take-up of some schemes (such as the ones for countryside access and moorland conservation) all have the effect of constraining the growth of agri-environment policy in the UK. Arguably this reflects a UK preoccupation, in the development of agri-environment policy, to solve discrete and specific environmental problems through proscribed and targeted measures rather than address the generic causes of agriculture's pressures on the environment or see agri-environment policy as playing a more strategic role in reorienting the CAP.

There are certain perverse consequences. The most important is that any beneficial effects of the agri-environment regulation are likely to be swamped by the environmental impact of the rest of the CAP. There is a risk also that the intricacies of implementing the Regulation will distract attention from the bigger picture. Thus considerable resources have been devoted to monitoring and evaluating agri-environmental measures, but little to the environment impact of the CAP commodity regimes.

1.3.2 Deintensification in the Beef and Sheep Sectors

The impact of the reforms coupled with BSE is leading to a deintensification of livestock production. However, the environmental consequences are mixed and uncertain. Reduced grazing pressures are not necessarily leading to the revitalisation of degraded moor and grassland. Likewise, semi-natural habitats, including species rich pastures, need active management, and the withdrawal of livestock may lead to unwanted environmental changes. In parts of the UK, livestock numbers are falling below desirable levels from a land management/conservation point of view. The interaction between the different commodity regimes may actually be exacerbating matters, for example, by encouraging farmers to specialise in sheep or beef to maximise their returns from the different schemes on offer. Stocking rate rules have been introduced to help correlate the separate livestock regimes geographically. However, the rules are not designed to achieve environmental benefits but to constrain support costs and the available evidence suggests that the extensification mechanisms are not working.

1.3.3 Farm Investment and Environmental Pressures

Arable area payments and other commodity supports are making a vastly greater financial injection into farm businesses than are agri-environment measures. By encouraging additional investment in mechanisation, amalgamation and specialisation, they may be stimulating yet more environmental damage. Previously, the general downward trend in farm incomes since the mid-1970s had not only encouraged farmers to look for alternative income sources but had diminished the rate of investment in agriculture. In fact depreciation exceeded gross fixed capital formation over

several years. After 1993, though, the position was reversed slightly, as Table 1 shows.

Table 1 Impact of CAP reform on Income and Investment in UK Agriculture

£ million

	1993	**1994**	**1995**	**1996**	**1997** (provisional)
Net Farm Income	3,384	3,407	4,276	4,101	2,276
Depreciation	1,680	1,730	1,838	1939	1,968
Gross Capital Formati	1,652	1,893	1,980	2,048	n.a.

Source: MAFF, 1998

1.4 Policy Opportunities and Research Needs

The current policy arena offers both opportunities for, and threats to, achieving a significant shift in the focus and scale of agri-environmental management policy. The forthcoming World Trade Organisation (WTO) negotiations are expected to achieve further lowering of agricultural price supports. On the one hand, this could benefit the farmed environment through reductions in production intensity and through scope for replacing production incentives with measures to enhance environmental attributes. On the other, as Potter (1996) argues, lower agricultural support may lead to structural changes, such as land abandonment or farm amalgamation, which could actually jeopardise the remaining stock of natural capital. Moreover, WTO rules may not necessarily endorse environmental supports (Sinner *et al*, 1993; Tikof *et al*, 1997). First, the jointness in production between agricultural products and many desired environmental attributes means that it may be impossible to decouple environmental supports from food production without it being perceived as trade-distorting. Second, demonstrating that desired environmental outcomes are being, or could be, delivered by the measures in

place is a non-trivial task that may be necessary but not sufficient to win WTO approval, given that WTO has yet to announce its rules.

Knowledge and understanding of agricultural land use change and its environmental consequences remain imperfect, as does knowledge and understanding of the effect of environmental policies on agriculture and the wider rural economy. Whilst significant advances have been made in recent years, not least by the attempts to combine the insights offered by different disciplines, empirical and conceptual gaps still remain. Thus, for example, environmental scientists attempt to reconcile sparse data with possibly ill-conditioned, or at least poorly identified, systems (Jakeman *et al*, 1993); agricultural economists are still grappling with how to derive, from data on aggregate land use change, the spatial pattern of change (Wilson and Birkin, 1987; Verdiesan and Moxey, 1994); and other social scientists seek to clarify the complex relationships between farmers' attitudes, technological choices and farming practices (Lowe *et al*, 1990). Such gaps feature in an ongoing research agenda, yet needs to be acknowledged in the design and promotion of policies aimed at achieving an environmentally and economically sustainable agriculture.

The dilemma facing policy makers is that they possess sufficient information to reveal a problem, but insufficient information to apply policy solutions with any certainty (Reichelderfer, 1991; Constanza *et al*, 1992). The use of environmental indicators is one response to this problem that has been adopted by various parties. The remainder of this report reviews the theoretical and empirical nature of indicators. The discussion is structured around the emergence of indicators as a contemporary policy tool and their potential application to a set of agri-environmental policies in the UK.

2. THE DEMAND FOR INDICATORS

2.1 Pressure for Measuring Public Sector Performance

Indicators in general - and not just environmental indicators - have increasingly become a tool of regulation. This development reflects a number of broader shifts in society and governance which need to be understood if the contemporary role of indicators is to be appreciated. Perhaps the most fundamental of these shifts are pressures to measure and assess the performance of public authorities and, related to this, growing attention to certain problems whose very intractability raises doubts about the effectiveness of public policy and present forms of intervention.

Thus, on the one hand, changing attitudes have led to public services being increasingly judged alongside commercial services and therefore being required to be responsive to public demands and considerations of cost-effectiveness. This is part of a shift from a welfare state to a consumer-oriented society. Not only does this represent a change in the nature of the public demands to which government must respond (towards more complex, more exacting and more particularistic demands) but also a change in the role of government, from the monopoly provider of public services to that of guardian of the public interest in a mixed and pluralistic economy dominated by service provision.

These developments also stem, on the other hand, from the perceived failure of past public policies and state structures to tackle fundamental problems. In some cases the response has been the privatisation of previously public services; and in others, the establishment of public agencies at arm's length

from government. The requirement for government then to monitor and evaluate service providers necessitates the setting of targets and performance measures. The consequent fragmentation of authority, the plurality of providers and the complexity of public demands also require clear objectives and measures of performance for whole systems or policy domains, against which to judge the contributions of individual agencies or programmes. Forms of performance evaluation that were subject only to internal reference, essentially through measures of policy inputs or outputs, have to be externally referenced in relation to actual outcomes (i.e. the objective societal consequences of policy interventions). In terms of conventional appraisal methodology, where marginal changes are considered in terms of their marginal contribution to costs and benefits, this is part of a shift in emphasis towards concern for the effectiveness of public policy.

Part of the complexity of contemporary public demands concerns problems and issues that cross-cut traditional policy sectors organised on a functional basis - issues such as competitiveness, equal opportunities, the health of the nation and, of course, the environment. Such generic issues cannot be addressed solely within established sectors. Indeed, the functional divisions within and between sectors may actually exacerbate them. Appropriate solutions necessitate co-ordinated action across sectors and organisations. That requires explicit strategies, and again calls for performance measures that transcend particular policies and programmes. This is not simply a technical exercise but involves opening up previously closed sectoral policy communities to wider scrutiny and influence.

It is widely recognised, for example, that governments alone cannot solve the more pervasive environmental problems. Concerted action across society is

called for, including industry, voluntary organisations, communities and households. Notions such as the green consumer and the ethical business use individual citizens and firms as policy actors. 'Command and control' forms of regulation give way to means of empowering and informing responsible organisations and citizens to monitor themselves and others. As a result, the density of environmental information in circulation has increased enormously in recent years. This has been true in both specialist and general public domains. In some fields, such as environmental auditing, eco-labelling, or environmental impact assessment of development proposals, the roles of this information are multiple, ranging from better planning and decision-making, to more environmentally responsible decisions by consumers and investors. This information, duly sieved by gatekeepers, has thus acquired a new normative, as well as regulatory, function. It is also claimed that information is playing a critical role in the emergence of a different type of civil society - one characterised by what Giddens (1991) terms reflexivity i.e. a growing consciousness on the part of groups and individuals in society of the determinants and consequences of their actions (Lowe, 1990). These issues are more fully developed in Sections 4 and 5.

2.2 International Pressures

Pressures for performance monitoring are not confined within national boundaries. Transnational regulation has grown considerably as part of the globalisation process. This involves states establishing common rules and frameworks for action. Such transnational regulation requires explicit objectives coupled with monitoring procedures to allow the performance of states to be objectively judged and mutually scrutinised. The establishment of a liberalised international trading regime has been a key driving force, and

concern that domestic environmental policies might distort trade has been a major factor in the growth of international environmental law. The need to address transnational and global environmental problems has also stimulated concerted action between states. The expanding array of international agreements in the environmental field has called for transnationally comparable data to help states compare their performance and assess the compliance of others: hence the prominence of various international agencies in indicator work.

Contemporary efforts to define and derive environmental indicators stem from debates about sustainability, initiated and progressed by many individuals and agencies but popularised by the 1987 World Commission on Environment and Development (the 'Brundtland Report'; WCED, 1987) and the 1992 UN Conference on Environment and Development (the 'Rio Earth Summit, Agenda 21'; UN, 1993). These events have spawned many initiatives to research and implement sustainable indicators (Pearce *et al*, 1993). High profile examples include: OECD's work programme on 'next-generation' environmental economics and indicators (OECD, 1991, 1997); the UN Environment Programme (UNEP, 1997; http://unep.unep.no/); and the UN Commission on Sustainable Development (UN, 1996).

For Britain, the most significant arena for the internationalisation of policy and law has been the European Union. It is estimated that 80% of our environmental legislation has its origins in Brussels and Strasbourg (Gummer, 1994). There have undoubtedly been significant changes in the procedures and principles of environmental policy as a result of European integration. European directives have required that absolute legal standards be put in place for a range of environmental parameters. This has involved a shift from

flexibility to formality in formulating and implementing the objectives of environmental policy. A common European framework, coupled with legal standards to be met over proscribed timetables has greatly reduced the scope for discretion in implementation and has helped create a more transparent system that is much more open to public and judicial scrutiny. This has necessitated making explicit the principles upon which environmental protection is based and the criteria upon which its achievements may be judged. The specific needs for standardised data for policy making and compliance monitoring on an EU-wide basis has thrown up a separate organisation, the European Environment Agency, dedicated to this purpose (Lowe and Ward, 1998). Within the EU's Fifth Environmental Action Plan, Eurostat and the European Environment Agency are jointly running the Environmental Pressure Indices Project (http://europa.eu.int/en/comm/eurostat/; EEA, 1995; Stanners and Bourdeau, 1995).

2.3 The Role of Indicators

To clarify the role of environmental indicators it is necessary to consider the way in which public decisions about the environment are taken. All of the developments mentioned above are eroding traditional sources of authority and diffusing power. Policy and regulatory systems in place today rely less on in-house expertise and closed consultation with affected interests, and are more oriented towards transparency of performance against explicit and formalised standards. The formalisation of the role of environmental information, through monitoring and reporting procedures, has exposed regulation to public scrutiny and has opened up previously closed policy communities thus bringing that information forcibly to bear on the policy process. In essence, indicators are one way in which certain central policy actors are seeking to cope with these

contemporary trends and developments. Indicators must be seen therefore as a means not as an end, and their utility should be judged in relation to the ends that they serve. Largely, those ends are to do with the exercise of inter-organisational control within complex systems of governance, where traditional hierarchical and monolithic forms of authority (such as state sovereignty or closed policy communities) have been eroded. In such situations, in which power is more diffuse and less hierarchical, a variety of actors may be seeking to assert control over others or to retain their own autonomy. Indicators cannot therefore be a neutral tool. The choice of indicators and the way they are deployed only make sense in terms of wider organisational and regulatory strategies.

Within organisations, indicators are a means of coping with a surfeit of information. The capacity to absorb information by those charged with making public decisions is finite. To the extent that they can delegate to lower level staff the tasks of selecting, digesting and preparing information, to make it readily comprehensible without losing critical content, they will do so. This is never entirely a technical process unaffected by organisational or political imperatives or even the private goals of those involved. Indeed, those who use the indicators must have confidence in them and they must command a wider legitimacy (MacNaughton *et al*, 1997). This raises three major issues.

First, transparency. To be accepted by decision-makers and be persuasive to the informed public, the reasoning behind the choice of an indicator and the process by which it is derived from available data both need to be transparent. This places the onus upon designers of indicators not only to be competent scientifically, but also to be able to argue or present indicators to a (possibly) non-technical audience. This poses difficulties where the underlying science is

complex. It also poses difficulties where the degree of processing of raw data is significant, a point discussed further in Section 3.2.

Second, relevance and ownership. To be used as an indicator, a piece of information has to be relevant to an organisational decision-maker. Moreover, the organisation has to perceive some self-capability to monitor the indicator and/or influence the value of the indicator through (positive) action. If an offered indicator does not appear relevant, or is perceived to be beyond the organisation's sphere of influence, it is unlikely to be accepted. This is a potential problem in agri-environmental systems where there are myriad decision-makers operating at different levels, from farmers at ground level to policy makers at regional, national and international level. It is unlikely even if the phenomenon addressed is common, that one indicator will be accepted by all these agents. This suggests that different indicators may be required for different organisational decision-makers.

Third, there is the issue of the public legitimacy of indicators (see Chapters 8 and 40 of Agenda 21 (UN, 1993)). If they are to command wider acceptance, they must seem relevant and impartial beyond their immediate users. This poses problems since, ultimately, all indicators are used normatively in that they are selected to fulfil organisational and policy purposes. The question is whether value judgements or organisational perspectives are built into the indicators (i.e. internalised), or retained externally as in the political setting of standards, targets and so forth.

These issues point to the need for dialogue between the designers of indicators, users of indicators, and other stakeholders. Designers need some appreciation of the decision (e.g. policy) making process and the managerial opportunities

and constraints, including the fact that elevation of information to the status of an indicator will possibly induce behavioural responses from people i.e. reactivity (Fitz-Gibbon, 1990). Decision-makers need some appreciation of the theoretical and empirical basis for the choice and design of indicators.

3. THE NATURE AND CHOICE OF INDICATORS

3.1 Definitions of Indicators

Different agencies and different authors each supply their own working definitions of indicators. Hence, Gallopín (1997) reports that indicators are referred to variously as: variables; parameters; measures; statistical measures; proxy measures; values; meters or measuring instruments; fractions; indices; a piece of information; empirical models of reality; signs. The common theme running through this list is that indicators are a vehicle for summarising, or otherwise simplifying, and communicating information about something that is of importance to decision-makers[4]. Their use has arisen as mediating tools in inter-organisational (including inter-governmental) regulation.

In this, indicators are not a new concept, but rather a vogue term for the formalised information used in tracking the performance of a system (Fitz-Gibbon, 1990; LGMB, 1993). An indicator relates to some quality, characteristic, or property (hereafter all referred to as attributes) of a system, ideally a central, rather than superficial or isolated attribute. The presumption is that, to be useful, different values or states of an indicator must meaningfully represent different states or movements of system conditions such that the indicator can be used for monitoring and/or control purposes.

Indicators may be quantitative (metric) or qualitative (nominal or descriptive), although the former is emphasised in much of the literature. To date, much of the emphasis in agri-environmental systems has been upon quantitative,

[4] This poses an interesting question as to whether indicators are only distinguishable from other forms of information by their relevance to, and acceptance by, decision-makers. i.e.

biophysical indicators. Thus, for example, attention has focused upon the abundance of individual plant and animal species, or the usage of agro-chemicals, or the area of certain land covers. This raises data and methodological issues, but also some more fundamental conceptual issues.

3.2 Data and Methodological Issues

A full range of agri-environmental data is not collected routinely. Consequently, the data required to construct biophysical indicators are often unavailable: the poor quality, inaccessibility and irrelevance of existing datasets are more pervasive constraints to reliable indicator modelling than is commonly thought (Bonnen, 1989; Magnuson, 1990; UN, 1996). This problem is exacerbated in the UK by fragmented ownership of relevant data. That is, for example, datasets on soils, climate, topography, fertiliser usage, spatial land cover patterns, and species distributions are owned by a number of separate bodies such that collating extant data into a usable database for environmental indicator construction incurs high (and often repetitive) transaction costs. Undertakings such as the Countryside Survey and the National Environmental Database represent belated attempts to rectify this problem.

Decision-making problems exist at a variety of levels. Given data constraints, this leads to the use of aggregation schemes to provide different indicators for different spatial, sectoral or temporal resolutions. Such schemes are, however, prone to methodological errors which can generate misleading results. For example, the ecological fallacy, the fallacies of composition and isolation, and the modifiable unit area problem (Robinson, 1950; Openshaw, 1984; Taylor

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information is elevated to the status of an indicator by its users.

and Howitt, 1993; Steel and Holt, 1996). Similarly, where decision-making problems involve more than one variable, for example the extent and quality of a habitat, weighting schemes are often employed to combine variables into a single indicator. This is useful in that it reduces the volume of information that decision-makers have to contend with. It is, however, also prone to methodological errors and, perhaps more importantly, can obscure important trends in the underlying data. Aggregation and weighting issues thus represent a dilemma for indicator design: how to preserve the fine resolution detail required for guiding local level actions whilst avoiding information overload at the broader, global level. The challenge is to simplify in order to clarify and to do so in a way that avoids losing any critical factors for analysis, or compromising the transparency of the chosen indicators.

3.3 Conceptual Issues

Although quantitative environmental indicators have their uses, they also have their limitations, especially for policy analysis which is their main justification. One of the key limitations is that such indicators express only what is quantifiable. Some environmental characteristics are inherently more amenable than others to quantification. Concentrations of pollutants, for example, can be measured with a reasonable degree of precision, while other characteristics, such as aesthetic beauty or tranquillity or the quality of land management, are recognised to defy objective measurement despite their importance (CPRE, 1995). Rather than difficult issues that should be set to one side, these matters are at the nub of the environmental critique of forms of economic development whose preoccupation with quantitative expressions of growth overrides considerations of the quality of life.

Yet the emphasis on measurable outcomes leads to a pernicious form of issue redefinition and displacement that marginalises such matters. For example, biodiversity indicators are proposed as surrogates for landscape quality even though the latter is not reducible to the former (there are many pleasing landscapes that are ecologically unexceptional and many visually unappealing mudflats that team with wildlife). Reliance on quantitative indicators may thus lead to misrepresentation of the issues and the distortion of priorities. The risk is that action will be concentrated where it will particularly influence the available indicators - a problem common to performance measures of any type. Alternatively, governments may be tempted to set objectives that are measurable but not particularly meaningful - for example, pesticide reduction programmes expressed in terms of the overall mass of active ingredients rather than the environmental risks they pose.

Information is most often sought to explain why important conditions are changing over time or to interpret the effect of particular governmental or societal actions on the environment. Unfortunately, another shortcoming of indicators is that causation cannot necessarily be inferred from a correlation between the behaviour of particular indicators - that would necessitate detailed investigation. Indicators reveal trends, they do not explain them.

Another difficulty lies in developing indicators specifically for sustainable development. This necessitates going beyond simple measures of environmental protection or degradation to indicators that explicitly link impacts with socio-economic activity. However, such linkages are rarely straightforward and great caution or insight is required in interpreting them. The shift in emphasis towards sustainable development should highlight processes and institutional structures rather than specific environmental

outcomes: the task being to establish sustainable systems rather than to achieve some environmental end-state.

A final shortcoming of quantitative indicators relates to the problem of time. The significance of most environmental indicators is what they reveal in the medium to long-term, typically over several years, if not decades, and they are usually tracked on an annual basis or longer. Short-term fluctuations - say in wildlife populations or nutrient balances - may not be significant and may simply be due to variable weather conditions, for example. The effects of government policies and other societal interventions on the environment usually also have a long time lag. The consequence is that *current* trends are unlikely to be a reliable indication of the performance of *current* policies. Indicators may therefore be a guide to problems that need to be addressed but are of little help in assessing the policy response. The claim that indicators "can help to measure the extent to which policies aimed at sustainable development objectives are being achieved" (DoE, 1996, p.2) is therefore, something of a hollow one.

Underlying these specific shortcomings is a flawed analogy with economic statistics. The notion that the use of environmental indicators should mirror the role of economic indicators in the transactions of government implies that the issue is essentially one of management, of minor adjustments to the pace or direction of development - just as signs of an upward trend in inflation or unemployment might call for a slight tightening of monetary policy or a slackening of fiscal policy. But it is naive to imply that the only reason policies and practices in the past were unsustainable was because of lack of refined information concerning the consequences. More typically, it was because these past policies and practices were conceptually flawed in ignoring the

environment as a factor in their models of action and intervention. The shift to a sustainable trajectory must therefore involve the redesign of policies, institutions and structures. To do this purposively calls for causal knowledge, not just trend knowledge of processes. And that necessarily entails disaggregated, sector-specific conceptual models, not the sort of aggregated societal thinking that lies behind the OECD's indicator framework (with its echoes of macroeconomic models and its search for 'core' indicators).

3.4 Indicator Strategies

The apparent emphasis upon quantitative, biophysical indicators reflects a 'top-down, managerialist' or 'technocratic' approach to agri-environmental systems. This is epitomised by the OECD's Pressure-State-Response (PSR) framework and the closely related Driving-Force-State-Response (DSR) model, both of which are derived from an earlier 'stress-response' model used in a more limited ecological context (Friends and Rapport, 1979). These assume linear causality within a rigid system, neglecting the possibility for structural elements of the system to change.

Yet agri-environmental systems are complex, heterogeneous entities which encompass both biophysical and socio-economic elements. The macro and managerialist perspective imposed by the technocratic approach obscures the social and political forces at work. Thus, on the one hand, in conceiving the relation between agriculture and the rural environment in terms of technical adjustments to an economic sector (rather than the reorientation of a social and occupational community), the OECD-type indicator framework perpetuates a policy outlook which, by abstracting farming from its social and environmental context, is part of the fundamental problem. On the other hand, in seeking to

construct an objective, politically neutral indicator framework, the OECD approach deliberately obfuscates the political conflicts involved, in the outcome of which national governments and powerful sectional groups have strong vested interests. The consequence is a failure to acknowledge that effective integration of agricultural and environmental objectives must imply changed social relationships and institutional structures.

In portraying the policy process as one of rational decision-making, the technocratic approach presents indicators as standardised and universalistic norms, that are scientifically defined and allow for the evaluation and adjustment of policy interventions. For example "The work carried out by the OECD focuses on sets of indicators to be used for the integration of environmental and economic decision-making, at national and international level. These indicators can also be valuable in communicating with the public" (OECD, 1991, p 8).

An alternative, 'popular/radical' approach starts from the assumption that the integration of environmental objectives into any sector must involve changed social relationships and institutional structures. Indicators therefore are seen as means of raising the profile of problems or issues. Emphasis is placed on evidence or incidents that are open to popular judgement which allow for problem definition to be prised away from the grasp of closed policy communities and expert judgement. Within this approach, sustainability indicators are seen not as a complement but as a challenge to established economic indicators, opening up a critical debate about the conventional objectives and measurement of societal progress. In the UK, the Local Government Management Board, since 1993, has had a programme to develop sustainability indicators that will promote public communication and

participation along these lines. Rather than focusing on biophysical indicators, an alternative is to focus upon the outlook and behaviour of socio-economic agents by using attitudinal and institutional indicators.

3.5 Attitudinal and Institutional Indicators

In general, the regulatory framework will channel the course of agricultural development in so far as it modifies present agricultural practices and induces technical change on the farm. This relationship between regulation, technical change and farm adjustment may be conceived as one of 'structural learning'. Structural learning (see Argyris and Schon, 1978) focuses on changes to the cognitive or normative propositions held by individual or collective actors. From this perspective, the process of moving towards a more sustainable agriculture will be marked as much by changes in the interpretative frames of agricultural actors (i.e. developments in their understanding) and related institutional developments (that reflect the new connections and relationships being forged) as it will be by the achievement of more commonly discussed and measurable outcomes, such as reduction in pollution and increases in biodiversity. Yet the focus on environmental outcomes, which is reinforced by the preoccupation with quantitative indicators, may lead to a disregard of the lessons being learnt from regulatory policy by target groups and the need for wider institutional reforms. It is unclear, for example, whether current regulations are helping to catalyse structural learning in the direction of a more sustainable agriculture or acting to fortify incompatible behaviours and attitudes. While it is possible to gather evidence to make judgements on precisely these matters, it is also the case that the full environmental consequences of the recent measures taken to counter the adverse effects of contemporary agriculture will not become clear for several years to come.

Attitudinal and institutional indicators thus allow us to judge in the mean time whether policy is set in an appropriate direction.

In this sense, appropriate attitudinal and institutional developments may be seen as a *means* (i.e. part of the process) of achieving desired environmental outcomes. But such developments may also be seen as desired *ends* in themselves. Indeed it may be argued that the ultimate outcome is to establish sustainable systems with a capacity, at the individual and institutional levels, for self-monitoring. Any specification of environmental outcomes in contrast, must be recognised as necessarily provisional and subject to revision as a result of improved scientific understanding, debate over social priorities and the changing state of the environment.

4. EVALUATING OUTPUT AND OUTCOME INDICATORS IN USE

4.1 Introduction

Three phases in the development of policies, the processes, their output and their final outcomes, may usefully be recognised. This chapter introduces the crucial distinction between policy outputs and policy outcomes as a possible basis for indicators. It establishes the distinction first in principle and then moves on to illustrate its significance. Output and outcome indicators are firstly illustrated and assessed with reference to the DoE (1996) Indicators for Sustainable Development for the UK and then by reference to two agri-environmental programmes policies - Environmentally Sensitive Areas and Countryside Stewardship. We then turn to the question of policy process and show at the end of Section 4 what it may offer as an alternative basis for constructing indicators.

The objectives of agri-environmental policies are to produce desired policy outcomes, often specified in detail for particular sites or types of ecosystem. These outcomes may consist of natural capital which requires a long time to produce. However, the exigencies of the policy scene are such that policies have to be 'justified' even as they are introduced and certainly well before there has been any significant pay-off from them. In these circumstances policy-makers understandably fall back on justifying their activities in terms of policy outputs i.e. measures of the extent to which the policy is being applied or taken up. For example the number of, and area covered by, management agreements under agri-environmental contracts is a measure of the support for a policy

from participants. They are indicators of the 'roll-out' of a policy but do not necessarily say anything about the outcomes of the intervention.

There is at present a substantial fashion for using indicators to reflect the outcome of environmental policies of all kinds but the discussion of the previous sections has shown the weakness of such procedures. In essence the generation of indicators requires reduction of complex multi-dimensional and often dynamic processes to the time path of one or two particular chosen variables. Whilst the attractions of this cannot be denied, its shortcomings are formidable and would call for extreme caution in the use of such measures. Nevertheless, it is accepted that output and outcome measures will be used as environmental indicators.

In the remainder of this section we therefore raise the focus of the argument to consider the ultimate goals of agri-environmental policy and then return to consider how its progress towards these goals is monitored. Thus we consider in this section the indications from outcomes versus those from outputs, before turning to Section 5 in which we offer a radical alternative type of indicator, based on process.

4.2 Outcomes vs. Outputs

The need for agri-environmental indicators arises, at least partially, because the desired state of the environment sought by policy makers may not be directly observable. That is, the desired, real, physical outcomes of agri-environmental policies may lie in the future (e.g. long-term habitat regeneration) or may simply be difficult to measure, at least without extensive monitoring activities (e.g. abundance of a species). Consequently, some proxy measure is required

to indicate progress towards the desired outcome. One possibility is to use more readily observable outputs. That is, rather than attempting to measure outcomes directly, an observable impact of a policy is taken as an indicator. This approach is already reflected in some of the items proposed by the Department of the Environment's 'Indicators of Sustainable Development for the United Kingdom' (DoE, 1996). For example, section 's: Land cover and landscape' encompasses the following:

s1	Rural land cover
s2	Designated and protected areas
s3	Damage to designated and protected areas
s4	Agricultural productivity
s5	Nitrogen usage
s6	Pesticide usage
s7	Length of landscape linear features
s8	Environmentally managed land

Broadly, indicators s1, s2, and s8 are outputs. That is, the area of rural land types, designated areas and environmentally managed land are all relatively easily observed variables that respond to policy signals and can be used to comment (albeit crudely) upon the suitability of land for delivering environmental outcomes, especially when considered in conjunction with s3, s4, s5 and s6 which provide information on the manner in which the area is managed. Indicator s7 demonstrates that outputs and outcomes may coincide. That is, increasing the length of landscape linear features may be a desirable outcome in its own right, perhaps for aesthetic landscape reasons, but it may also be taken as an output indicator of habitat stock.

The inferential leap that is required to link output indicators to desired outcomes leads some commentators to focus exclusively upon outcomes. For example, the 'Biodiversity Challenge' (e.g. Wynne *et al*, 1995) suggests that the focus should be upon what needs to be achieved in terms of particular species and particular habitats. This leads to contemplation of a lengthy list of example species and habitats, together with quantified target objectives couched in terms of the number or distribution of a species or the extent and quality of a habitat. The sheer volume of individual items involved, however, points to widespread monitoring efforts that may prove too demanding. As a compromise, it is possible to consider the use of key outcomes as indicators of wider and/or more detailed outcomes. Thus, for example, the DoE also suggest a range of outcome indicators in section 'r: Wildlife and habitats':

r1	Native species at risk
r2	Breeding birds
r3	Plant diversity in semi-improved grassland
r4	Area of chalk grassland
r5	Plant diversity in hedgerows
r6	Habitat fragmentation
r7	Lakes and Ponds
r8	Plant diversity in stream sides
r9	Mammal populations
r10	Dragonfly distributions
r11	Butterfly distributions

Here, most of the suggested indicators are outcomes in their own right, but are used to indicate underlying environmental states.

4.3 Environmental Indicators in Agri-Environment Schemes

4.3.1 ESAs: Outputs and Outcomes

ESA schemes have been the subject of much official scrutiny, having just emerged from examinations by the Agriculture Committee (1997), the National Audit Office (1997) and the Public Accounts Committee (1998). Several criticisms have been made and the Government response to the Agriculture Committee (Minister of Agriculture, 1997) was generally positive.

The type of crude output indicator used to reflect early 'progress' in the establishment of ESAs is presented in Table 2. Such data pervades the literature on ESAs where it is often left to 'speak for itself', implying that it is a useful indicator.

Table 2 Environmentally Sensitive Areas: Annual and Total Area and Number of Agreements: England

	1992-3	**1993-4**	**1994-5**	**1995-6**	**Total**
England					
Area under Agreement	129,358	137,100	79,933	63,571	409,062
Number of Agreements	3,265	1,249	1,627	1,322	7,463

Source: Agriculture Committee, 1997

In addition to external scrutiny, MAFF has conducted its own monitoring programme and this has produced a series of monitoring studies of individual ESAs which have been published. Each ESA is monitored on a five yearly cycle and the first ESAs have therefore now had two rounds of monitoring. The Pennine Dales two monitoring reports (MAFF 1992, 1996) will be taken as an example of the type of information made available through these studies.

The first monitoring report (MAFF, 1992) on the Pennine Dales ESA (PDESA) relates to surveys that gathered information over the period 1987 to 1990. It records brief details of the management prescription and notes that the number of agreements operative had reached 290, covering 73% of the eligible area by 1990. The monitoring surveys were divided into four separate sub-programmes covering landscape elements, biological features, historic features and landscape quality. Each of these receives separate treatment in the report.

The landscape elements were surveyed using an aerial survey and the material was analysed in terms of land cover change and linear and point features from 1987 to 1990, comparing agreement land and non-agreement land. Not surprisingly the changes recorded in this short period are rather small. For example, the report describes linear feature change as in Table 3.

Table 3 Linear Feature Change 1987 - 1990, PDESA.

Linear Feature Class	Net Change in Length (%) 1987 - 1990	
	Agreement Land	***Non-agreement Land***
Continuous Walls	+1.0	+0.1
Discontinuous Walls	-1.4	+0.5
Continuous Hedges	-3.6	-10.0
Discontinuous Hedges	+1.9	-0.2
Continuous Walls with Hedges	-4.8	-2.7
Discontinuous Walls with Hedges	-2.4	-0.5

Source: MAFF, 1991

Clearly such material would be difficult to turn into an indicator of any kind especially if it had to reflect the changes in such a complex area as the 16,000 hectares of upland valley bottom of the PDESA. In fact this form of analysis loses a great deal of information from the original data by analysing down to the level of single net changes for the whole group of farms in a substantial but discontinuous area. The full data would have revealed substantial differences between farms with many recording much larger changes, in either direction, in the variables reported.

Some of that variability may be retained by using the 'matrix of change' form of presentation, as this report did for the land use change in the ESA. That presentation is much richer, recording movements into and out of each category of land type cover in the ESA - this variability is a vital feature of assessing environmental change. Clearly it is difficult to produce any comparable measure of change from the result that 64.2 hectares moved between categories in an ESA of the 16,000 hectares of the ESA. The matrix format is potentially interesting in that it presents much more information than the simple tabulation

of row and column totals, but only a minute amount of change was found over this rather short period in the whole ESA.

The second monitoring report on the PDESA (MAFF, 1996) covers 1987 - 1995. However, in the middle of that period the ESA was trebled in size thus leaving those conducting the survey with the dilemma as to whether they should try to analyse change separately in the old and the new ESA areas, thus making full use of the opportunity to examine some changes resulting from the policy over nearly a decade, or to examine all changes within the ESA together and ignore the fact that some of the results relate to a short period and some to a longer one. In fact they chose the latter position, thus losing any chance of measuring change over a single period for all parts of the ESA.

The objectives of the ESA are listed in Figure 1.

Figure 1 Objectives of the Pennine Dales ESA

- To maintain and enhance the wildlife conservation value of hay meadows;
- To maintain the wildlife conservation value of pasture land;
- To maintain the wildlife conservation value of rough grazing without detriment to the landscape;
- To maintain and enhance landscape quality through management of characteristic landscape elements;
- To maintain and enhance archaeological and historic features.

In an appendix the PDESA report also lists a series of objectives and performance indicators covering uptake targets (for example 80% of pasture is under Tier I agreement), targets relating only to agreement land (for example 10% of non-stock-proofed walls are renovated under conservation plans) and environmental impact indicators (for example, vegetation that is characteristic of hay meadows increases on land under Tier 2 agreement). In all 19 indicators are listed.

In contrast with the previous PDESA report it does not present a matrix of land use cover change but it does record the change in total area of 'key land cover classes' between designation and 1995 although this is clearly difficult to interpret in the light of the change in the designated area. The presentation records the total area in each class and the net change in the size of that class over the (varying) period. It records that whilst 74 hectares were lost from key classes, 75 hectares were gained. This information is of little use unless the positive or negative significance of each change is recorded with it. The fact that the changes detected are so small suggests that the major increase in the ESA has dwarfed the appearance of possible changes within each land use cover type.

4.3.2 Countryside Stewardship: Schemes

Although a much newer policy than ESAs, Stewardship has nevertheless secured a substantial number of farmer contracts and, partly because of its flexibility and its capacity to target particular features, it is seen as a highly successful policy. It has also been the subject of a number of appraisals (summarised in Tucker and Rebane, 1997). The objectives of Stewardship have been subject to adjustment as the policy has developed and are summarised in Figure 2.

Figure 2 Final Objectives of Countryside Stewardship

- sustain the beauty and diversity of the landscape;
- improve and extend wildlife habitats;
- conserve archaeological sites and historic features;
- improve opportunities for enjoying the countryside;
- restore neglected land or landscape features;
- create new wildlife habitats and landscapes.

Source: Rebane and Tucker, 1997

Figure 3 Basic Countryside Stewardship Constraints

- management of grazing to avoid damage by overgrazing or poaching;
- no disturbance of land by ploughing or other cultivation unless specified in the agreement;
- no application of organic or inorganic fertilisers, lime or slag;
- any essential rolling or chain-harrowing should avoid disturbance to birds;
- limitation of herbicide and pesticides to the use of weed wiper or spot treatment for the control of spear thistle, creeping or field thistle, curled dock, broad-leaved dock, ragwort and, with prior agreement, nettles;
- no modification or installation of new drainage systems unless specified in the agreement;
- no supplementary feeding unless agreed in advance;
- protection of other areas and features of conservation value on the holding including: hedgerows and traditional walls; trees, copses and woodlands; historic and archaeological features; geological features and wetlands, ponds, osiers and withies;
- fulfilment of all legal obligations to ensure all public rights of way are unobstructed;
- maintenance of any existing informal public access on or to agreement land.

Source: Rebane and Tucker, 1997

The basic constraints which Stewardship applies through most of its contracts are summarised in Figure 3. This complex of requirements provides a basis for assessing performance on stewardship areas. It is augmented with further detailed requirements for individual landscape types and the contracts with farmers contain specifically negotiated details of the individualised farm management package of elements agreed.

4.3.3 Countryside Stewardship: Outputs and Outcomes

Rebane and Tucker also review amounts of land attracted into each landscape type relative to national stocks of each type. The shares of national stock attracted range from 10% to 25%. An overall assessment of scheme output is based on how many of the four possible types of benefit were produced by individual agreements. The four types were landscape, wildlife, history and access benefits and the result for a sample of 117 sites is summarised in Table 4.

Table 4 Distribution of CS Schemes by Benefit Categories

Number of Types of Benefit	Number of sites	% of sites
4	21	18.0
3	47	40.0
2	35	30.0
1	3	2.6
0	11	9.4
All sites	117	100.0

Source: derived from Rebane and Tucker, 1997, Table 6.1.

Environmental benefits were assessed on the basis of two elements, first, the direction of change and second, the environmental and historical value of the site. These two elements were combined into criteria summarised in Figure 4.

Figure 4 Combined Criteria for Assessing Site Stewardship Performance

♦ sites that showed positive changes in environmental value at the time of the repeat visit.
♦ sites....judged likely to show positive changes in the future, though these were not detected at the time of the repeat visit, due to the short interval between visits and the long term nature of anticipated benefits.
♦ sites that were of high environmental value, where this value had been maintained under CS (....) or where there had been a decline in value wholly unrelated to the scheme(....).
♦ sites of low or moderate value for history / archaeology where there was no opportunity for CS to improve its value.

Source: Rebane and Tucker, 1997

The report acknowledges the evident need for judgement in applying these criteria. It also finds that the substantial majority of sites met scheme landscape and wildlife objectives (74% and 78%, respectively). Similar results were found for archaeological and historic sites.

The study also assesses the extent to which site visitors had noticed change resulting from the agreements. Considering twelve specific improvements, an impressive 80% to 94% of visitors had not noticed the change. Of the changes that were noticed most were thought to have increased the attractions of the site, the exception to that being tree felling, which usually provoked a negative initial response.

The monitoring results were also set against a 'control' group of 21 sites on which a similar assessment had been made. It was concluded that a much higher proportion of Stewardship sites had achieved improvements than control sites, demonstrating additionality of the benefits achieved.

4.4 Agri-environment Indicator Options

The above discussion of the conditions and requirements of these two forms of management agreement are summarised in Figure 5. In much of the literature on evaluation of agri-environmental policies, the starting point for evaluation is the number of agreements made and the area they cover. They are used, in the absence of alternatives, to indicate the scale of policy, but they rarely tell us more. Expenditure data are also often quoted, but they are as potentially misleading as agreement numbers and areas in that they may simply indicate the generosity of payment levels. Such data provide no indication of policy success in any long-term sense and merely reflect the need to clutch at whatever straws of information can be found. With the caveats above, we may then examine the possible indicators of success for these policies.

Countryside Stewardship is the newest of the two policy instruments considered here and, having been recently taken under MAFF management it is perhaps in a more dynamic stage of development. Stewardship differs from ESAs in that it does not require designation of specific areas - merely the specification of eligible types of landscape. This allows some flexibility in its application and gives some scope for negotiated flexibility in the way it is used. It thus provides the obvious agri-environmental policy instrument for 'filling in' the areas between the more formally designated areas.

Interestingly, its flexibility may mitigate against the use of indicators for monitoring the performance of Stewardship. Insofar as flexibility is used to extend the instrument's application, it becomes more difficult to specify which indicators are to be used for monitoring its effectiveness.

Figure 5 Managerial Structure: ESAs and Countryside Stewardship

Instrument ⇒ Characteristic ⇓	**ESA**	**Countryside Stewardship**
Duration of Designation	Perpetual.	No designation: eligible landscapes defined.
Objectives	To encourage farmers to conserve areas of countryside where the landscape, wildlife or historic interest is of national importance. ESA objectives separately specified.	Landscape, wildlife, archaeological conservation. Improve enjoyment, restore and re-create landscapes and habitats.
Requirements for agreement	Undertaking to comply with guidelines. No compulsion to make contracts.	Individually negotiated elements from a pre-defined menu. No compulsion to make contracts.
Opportunities	May offer compliance with elements of management package.	Choice of items for inclusion.
Negotiation	Mostly predetermined: details only.	Package of items agreed, each farm.
Monitoring Site level Farm level	 Informal. Was one year in 5, now one in 20.	Each year under Countryside Commission. Now less frequent under MAFF.
Sanctions	Policy is to reclaim payments made. EU Regulation offers stronger possibilities	Under MAFF, agreements may be terminated and payments reclaimed.
End of Agreement	No requirement to renegotiate : owner may do as he pleases.	No requirement to renegotiate: owner may do as he pleases, except MAFF now requires farmers who have restored walling to maintain it for a further ten years.

Source: Agriculture Committee, 1997.

For ESAs, output indicators would have to be in terms of uptake of agreements, participation in different Tiers of management and so on. Because there is no legal requirement for any form of participation, 'success' can only be measured in terms of pre-set standard levels of compliance. Even that has to be based on the assumption that uptake is not influenced by variously-generous rates of compensation. Such an assumption would be difficult to justify in the light of the NAO (1997) claim that levels of compensation are over-generous for many farmers but do not sufficiently compensate others for the prescriptions they must follow. Proceeding on that basis, nevertheless, it would be possible to design indicators. For example, objective 3 on the Somerset Levels and Moors ESA demands the maintenance and enhancement of landscape quality through management of characteristic landscape elements, as shown in Figure 6.

Figure 6 Targets for Attainment of Objective 3, Somerset Levels and Moors ESA

- there is no reduction in the total length of rhynes;
- there is no loss of pollarded willows;
- per cent of agreements have a conservation plan;
- per cent of conservation plans include provision for introducing an appropriate management cycle for non-pollarded willows;
- per cent of conservation plans include provision for the re-instatement of abandoned rhynes.

Source: MAFF, 1997

Clearly progress towards such objectives can be measured in quantitative terms and it would be possible to 'score' the extent of achievement of each of them in terms of the list. But how would such measures then be combined? It is unlikely that each of these elements is equally important so weights would be needed to aggregate this material. Similar treatment would be needed for the other three objectives of this ESA, which resolve into twelve sub-objectives.

From the comparison of ESAs and Stewardship we conclude that data on uptake of contracts by farm and area *may* be an indicator of the extent to which farmers are likely to undertake environmentally friendly activities. But they may also indicate a calculated gamble on the part of farmers that the level of payment is high enough to make it worth signing the contract in the expectation that monitoring of its outcome will be sufficiently lax to prevent retribution if contract details are ignored: there are items in the standard contracts currently in use which are either very difficult or may be impossible to monitor for compliance. Even where contracts are fully and honestly complied with it is possible that the desired outcome will not appear until well after the end of the contract, if at all. It might be prevented from appearing by adverse weather conditions in particular years or it may fail to materialise for other reasons unknown at the time the contract was entered into. After the end of the contract the farmer is usually free to revert to pre-contract behaviour which may well destroy whatever environmental capital has been produced during the contract. Legally this is difficult to prevent.

4.5 Conclusion

The above discussion of outputs and outcomes shows that, in the case of both the DoE's Indicators for Sustainable Development and the two main agri-environment policy instruments applied in the UK, there is an inevitable tendency to concentrate on crude measures of the more obvious policy outputs. This can be seen particularly in the use of management contracts where policy success is too readily inferred from the number of contracts negotiated and the area covered by them. Policy outcomes generally receive less emphasis, essentially because there are fewer tangible outcomes to be identified at this stage.

Although outcomes may be the legitimate focus of policy efforts, and outputs may offer an apparently convenient means of inferring progress towards outcomes; a third type of indicator, based on policy processes, should also be considered. Process indicators may reflect the potential achievement of outcomes through the implementation of policies. Implementation requires processes: policy makers, institutions and private agents must all behave in a manner conducive to delivering outcomes.

Institutional and attitudinal indicators will reflect these earlier manifestations of the policy process and will therefore avoid the problem of timing referred to above. Moreover they offer a rich complex of evidence of the extent to which necessary conditions for policy success are in place. It will be comparatively rare for such indicators to be measured quantitatively - for example that might require detailed surveys of changing farmers' attitudes to the environment. There may be a more or less widespread conviction amongst the research community that such attitudes have changed in the last decade but there are no repeated surveys from which changes might be deduced. This applies even more to officials dealing with agricultural policies of all kinds. Yet change in these attitudes offers a stronger prospect of sustainable environmental management than the simple measures of output from agri-environmental policies discussed above.

5. PROCESS INDICATORS: AN ALTERNATIVE APPROACH?

5.1 Introduction

Reflecting on the two types of indicator described above it can be seen that each has strengths and weaknesses. Output indicators are perhaps the less useful, dimly reflecting only the intermediate steps towards the potential gaining of desired outcomes. Outcome indicators are, in a sense, the more hopeful option but there will be serious lags before they will reflect desirable outcomes. Given the deficiencies of these potential measures of policy performance we now turn to consider the introduction of attitudinal and institutional monitoring as an alternative. Such process indicators are available as the policy is developed, thus avoiding the 'wait for benefits' and the 'end of contract problem'.

In the rest of this report we draw attention to the rich potential for a more endogenous process of policy monitoring through examination of the policy process as it develops. This would call for the generation and use of attitudinal and social indicators in monitoring the policy process, arguing that adequately functioning institutions are also a necessary condition for policy success and that the time-lags while awaiting outcomes are sufficient to make attitudinal and institutional indicators a vital ingredient in policy appraisal.

Derivation of indicators for the two agri-environmental policy instruments discussed above will have to cope with a number of conditions revealed in the previous section. First, and perhaps of particular present importance, all of the policies have shown a strong propensity to change over the last few years. ESAs have been subject to revisions of payment levels, introduction of new tiers and extensions of designated boundaries whilst Countryside Stewardship has

been evolving during its first few years and new options have been added in and other rules adjusted.

Second, the environment in which farmers take decisions has also been shifting during the last few years under the influence of major agricultural policy changes (Arable Area Payments, Livestock Payment Quotas) to say nothing of the dramatic shifts in the world trade situation and catastrophes such as BSE. It is perhaps remarkable that extremes of weather have not seriously disturbed the attempt to get agri-environmental policies into place in the last few years: they could certainly have interrupted trends judged relevant to monitoring.

Third, the policies under discussion are sufficiently recent that it is not to be expected that many of the benefits from them will yet be evident. This is partly a consequence of the pace of ecological change but also reflects the capital nature of some of the activities expected of farmers through these policies.

These three factors substantially limit the strength of inferences that can be drawn from the conventional monitoring activities of agri-environmental policies undertaken. The factors therefore further encourage the use of process-based indicators, such as attitudinal and environmental indicators, which offer a much stronger probability of effective monitoring.

5.2 Attitudinal and Institutional Monitoring

If we therefore accept that the present output-dominated approach to environmental monitoring is not going to produce what is needed, we are then driven to search for alternatives. The main alternatives come from the realisation that technological paradigms, of the kind experienced in agriculture during the last half-century, depend upon the establishment and maintenance of

local social and institutional networks. Such networks link extension institutions, manufacturers, suppliers, advisors and producers: in large degree they are held together by the regulatory framework. The relationship between this network and farm adjustment is conceived as one of 'structural learning' (Argyris and Schon, 1978) which focuses on changes to the cognitive or normative information held by individuals or collective actors. In such a model learning is equated with the change of interpretive frames held by actors rather than by the achievement of specific tasks. This shifts the correct target for monitoring effective change from events to the extent of learning processes; genuine change will be reflected in new attitudes and approaches.

This approach would suggest that monitoring agri-environmental policies could usefully be based upon the extent to which farmers have genuinely taken environmental attitudes 'on board' as a result of policies. This in turn might be further supported by evidence of training of farmers in agri-environmental management, as provided for in Regulation 2078/92. To be effective, learning programmes have to give weight to structural learning (the why? Of conservation) as well as content learning (the how? Of conservation).

5.3 Attitudinal and Institutional Indicators

To analyse the response of agriculture in a way that centrally addresses the social and political dimensions of integration, we can usefully distinguish the following levels: the individual farmer; the regulation of farming (i.e. the pattern of incentives and controls acting on farmers); and policy making for agriculture. Below, for each of these levels, we consider in turn the sorts of indicators that would reveal significant adaptive responses integrating environmental objectives.

5.3.1 Integration of Environmental Objectives into Farmers' Attitudes

Agricultural policy reforms in general and agri-environment measures in particular should enhance farmers' attitudes towards the environment and clarify their understanding of their environmental responsibilities. It might reasonably be expected that there would already be discernible changes in farmers attitudes, and even in farming cultures, from participation in agri-environment schemes, even where the environmental consequence could still not be gauged. Previous research (see, for example, Potter and Gasson, 1988) suggests that the attitude of farmers entering agreements is a critical determinant of the level and quality of any environmental benefits obtained. Colman *et al* (1992) have argued that "policy measures which encourage positive attitudes to conservation will in the long term be more effective than those that do not, since a positive shift in attitudes will increase the output of conservation goods at any specified level of budgetary cost". Indeed it could be argued that unless they exert such an influence, agri-environmental schemes will inevitably be seen as temporary bribes, shallow in operation and transitory in their effect (Morris and Potter, 1995).

Recording changes in the attitude and outlook of farmers participating in agri-environmental schemes may be used as an indicator of farm-level structural learning. Unfortunately, no research has yet investigated the extent to which environmental attitudes evolve during the course of a management agreement. Work already conducted in the UK, however, has analysed the motives of farmers entering agreements and has sought to measure any differences in outlook and situation compared to non-participants (Morris and Potter, 1995). This more behavioural approach has provided some clues about the depth of

commitment to and engagement with programme objectives, and the likelihood that conservation activity will be sustained in the long term.

Farmers can be placed on a 'participation spectrum', ranging from the most resistant non-adopters through to 'compliers' (farmers who conform to the terms of management agreements in order to receive the payment), and concluding with a small number of self-selecting 'stewards' (farmers who evince a strong conservationist mind set). There is little evidence of any movement between these categories as a result of initial participation in schemes. Comparative research in the UK, Netherlands, Germany, France and Spain (Lobley and Potter, 1998) suggests that the bulk of current participants in most agri-environmental schemes within the EU are effectively 'compliers' on this definition, joining schemes because of the goodness of fit between scheme design and their existing farming system. Stewards are very definitely in the minority, their participation typically being a continuation of a long trajectory of environmental management on the farms concerned.

In additionality terms, policy makers would seem to be caught in a double bind. On the one hand, scheme conditions need to be sufficiently undemanding to attract enough farmers into schemes to make a recognisable impact. This may be environmentally useful, to the extent that existing features and habitat mosaics are maintained, but genuinely additional effects are likely to be difficult to prove empirically. It also encourages compliance behaviour on the part of farmers which can easily be abandoned once contracts expire. On the other hand, more restrictive (usually upper tier) agreements, necessary to engineer more substantial changes in land use and the restoration of landscapes and habitats, appear to be appealing to a much smaller, self-selecting band of farmers. Because many of these would have done what they are doing without

subsidy, through force of circumstance or conviction, it is a moot point whether they are generating more additionality than the compliant majority. However, being much more genuinely engaged with the environmental objectives of schemes, the endorsement of the values of these participants and any additions to their ranks must be counted as achievements in the long-term objective of moving towards a sustainable agriculture.

Training of farmers may be crucial if attitudes are to change more widely. Without appropriate training, the impact of schemes on farmers' attitudes and behaviour may be shallow and temporary. Participation in agri-environmental training programmes is therefore likely to be a better indicator of progress than participation in agri-environmental schemes. It is important that training programmes pay as much attention to structural learning as to content learning (i.e. the why and not just the how of conservation). This points to the opportunity missed in the UK implementation of EU Regulation 2078/92, under Article 6 of which member states "may introduce a separate aid scheme for training courses and traineeships concerned with agricultural and forestry production practices compatible with the requirements and protection of the environment and natural resources and maintenance of the landscape, and particularly with codes of good farming practice or good organic farming practice."

5.3.2 Integration of Environmental Objectives into the Regulation of Farm Management

To achieve sustainability involves not only the encouragement of environmentally sensitive attitudes and practices, but also the assumption by the farmer of the role of the environmental manager. The progress of integrating

environmental objectives into the regulation of farming should be judged in terms of the extent to which it casts farmers in this role. Of central importance is a change in the relationship between technological change and farming practice. Post-war agricultural policy adhered to a model of agricultural innovation in which the dynamic of technological advance was seen to lie outside of farming, in the laboratories of the supply companies, the universities and the agricultural research institutes. Farmers were seen to have little influence over the process or its consequences, other than the rate at which they chose to take up the technologies available. But even in this regard, competitive pressures made them very susceptible to new techniques that lowered production costs and enhanced productivity. The 'technological treadmill' is widely used to characterise this dependency (Ward, 1993).

The role of farmers as environmental managers emphasises a different model of technological change - that of farmers as adapters and not simply adopters of available technology. Whereas a key role of technology in the past has been to overcome and eliminate environmental variability and constraints, now, conversely, the emphasis is on farmers carefully adapting technology to respect environmental variability. The farmers' operational knowledge therefore must not just be derivative of the agricultural scientists' and technologists' but must also draw upon an intimate understanding of the farm environment and its physical, ecological and meteorological variability. Farm-based strategies for environmental management must thus combine scientific and indigenous knowledge (Murdoch and Clark, 1994).

There are various formal methods for integrating the environment into farm management. These include farm waste management plans, farm conservation plans, farm sustainability plans and codes of good practice. One indication of

progress would be the extent to which farmers have taken up and implemented such methods. Conservation advice obviously has an important role to play and is being incorporated into farm advisory and extension services. This can be done to a token or marginal extent, or it can be given a more central role - a possible indicator would be the proportion of farm advice devoted to conservation and environmental protection. At the same time, the vertical integration of farmers needs to be counteracted to reduce their technological dependency and instead horizontal networks promoted that expand the self-monitoring and learning capacity of farmers in relation to their local environment (Winter, 1997). Examples would include farmer self-help groups oriented towards conservation and farmer-environmentalist networks. Another indicator would be the spread of such groups.

5.3.3 Integration of Environmental Objectives into Agricultural Policy Making

Environmental issues and concerns represent a challenge for traditional functions of government that are organised along sectoral lines. The gathering debate over sustainable development led in the 1980s to a new emphasis on seeking to establish a more synoptic environmental policy with co-ordinated environmental goals integrated into each sector. Potentially, this had a number of dimensions: at the strategic level - a global approach to the setting and monitoring of environmental objectives; at the sectoral level - an emphasis on integrating environmental goals into sectoral objectives (e.g. the greening of transport, tourism etc.); at the level of policy instruments - use of tools such as cross-compliance, contracts and environmental assessment procedures.

The commonly identified barriers to integration involve both a political and an organisational aspect. In the case of the former, a traditional problem for

environmental policy has been its relatively low priority on the political agenda, reflecting the dominant attachment of governments to the imperative of economic growth. Environmental protection has generally been treated as something of a luxury to be afforded in times of economic prosperity, or to be traded off against material goals. Moreover, environmental problems are often deep-seated and many environmental policies only promise benefits in the long term which means that they are often ignored or sacrificed in political systems geared up for short term electoral or economic cycles. Sectoral economic policies, on the other hand, tend to be supported by strong producer organisations whose members are usually directly and significantly affected by government action, in contrast to the diffuse public benefits yielded by environmental policy. In consequence, environmental policy may lack the weight to compete for resources or challenge the policy assumptions of other issue arenas and can be marginalised within institutional structures.

In terms of organisational barriers Governmental bureaucracies tend to be highly compartmentalised which means they are not well designed to absorb cross-cutting environmental concerns. The approach to integration adopted will depend upon the degree of formal power or authority at the disposal of the environment ministry. Among EU member states, most environment ministries have only recently been established: the oldest have been in existence for less than 25 years and some (as in Italy and Spain) for less than ten (Wilkinson, 1997). Traditions of policy making and styles of regulation differ between sectors and with the approach adopted in environmental policy. The integration of environmental objectives is therefore obviously not an overnight process. There is likely to be a different pace between states and some policy sectors will respond more readily than others.

In most European countries, agriculture has traditionally been a particularly closed policy community embracing agriculture ministries and mainstream farming lobbies but to the exclusion of other interests. For a long time agricultural policy communities resisted both the imposition of environmental constraints and the incursion of environmental interests. The acceptance of agri-environmental schemes and measures therefore represents a positive departure but does not necessarily imply integration as much as the defensive co-option of certain environmental issues and values by the agricultural policy community.

The devising and implementation of effective agri-environment policies, however, calls for the involvement of organised environmental interests. Where environmental agencies or lobbies are weak or still remain excluded, there are limited counter-pressures to the complete internalisation of agri-environment policies within the agricultural bureaucracy which can result in very little public debate or independent evidence about the nature, purpose or achievements of such policies.

Figure 7 Dimensions of Integration at the Policy Level

- ♦ Environmental Impact Assessments - To what extent are these carried out in the sector? Is their use ex-ante or ex-post?
- ♦ Consultation - What degree of consultation takes place with authorities having environmental competences at the local, national and EU levels? Does it reflect co-decision making or is it merely symbolic?
- ♦ Compatibility - When producing legislation and regulations for the sector, is compatibility with environmental legislation assessed?
- ♦ Monitoring and Evaluation - Is any systematic evaluation of the environmental consequences of policies, research or economic activities conducted?
- ♦ Funding - Is funding made available for environmentally friendly actions in the sector and on what scale?

Source: Liberatore, 1997

Environmental integration must clearly involve institutional change. Liberatore (1997) in attempting to set up a framework for measuring the different degrees of integration across sectors highlights the five major dimensions in Figure 7. Coverage of each of these dimensions in full and on a regular basis would imply complete integration. However, when they are pursued on an *ad hoc* and limited basis then environmental integration may be diluted, having little impact on certain sectors.

Hey (1997) distinguishes three types of approaches to integration that different sectors have adopted: defensive, indirect and active integration. Defensive integration attempts to contain and offset possible environmental side effects arising from the policies already being pursued in the sector; indirect integration arises where existing sectoral policies give rise to positive environmental benefits but largely as unintended side effects; active integration occurs where

planned environmental targets, objectives and policy instruments are adopted within a sector. Such embedding of environmental integration into sectoral decision making processes is likely to require modifications to organisational structure. So far, it would seem, the integration of environmental objectives into agricultural policy has involved varying degrees of defensive and indirect integration.

5.4 Process Indicators in Present Agri-environment Schemes

It is possible to detect features of the present policy situation which provoke optimism in the assessment of agri-environment policy. Thus, in operating ESAs, MAFF has delegated the day to day management of individual sites to managers on the ground who are already well familiar with farmers in the region if not necessarily in the locality to which they are assigned. Further, as part of the process of managing its agri-environment policies, MAFF established a National Agri-environmental Forum, which first met in March 1996, on which twenty organisations are represented. There are also Regional Agri-environmental Consultation Groups in the nine MAFF Regions with the purpose to "review the operation of schemes at the regional level and enable expertise of local organisations to be harnessed" (Agriculture Committee, 1997). The existence of such institutional relationships and groups offers a key opportunity for 'process monitoring' in contrast with the many official studies which assemble information relating to output on a 'top down' basis.

The combination of flexibility and managerial discretion of Countryside Stewardship ensured close working contact between Countryside Commission staff and farmers. Their shared interest in the management process produced a positive 'feel' to the scheme. As it develops under MAFF management it will be interesting to see how the scheme evolves further. For the time being it

retains flexibility and discretion (Coates, 1997). The Stewardship process is also amenable to incorporation of the Countryside Character concept and is now being targeted taking this system into account at the level of Regional Agri-environmental Consultation Groups. This process involves English Nature and the Countryside Commission as well as other agencies and individuals in the establishment of targets for Stewardship.

5.5 Conclusion: Indicator Practice

The effective integration of environmental objectives into agriculture at all levels entails changed social relationships and institutional structures linked to altered interpretive frames on the part of those responsible. While it is possible now to gather systematic evidence of the extent to which these changes towards a sustainable system are taking place, it will be some years before the specific environmental outcomes of recent policy developments can be judged. The current preoccupation with physical environmental indicators is therefore somewhat unfortunate. It represents a typical case of means-ends displacement. After all, it is permanently sustainable socio-economic systems that we should be striving for, not some sort of environmental end-state. But the need for social and institutional change always makes powerful groups and technocrats uneasy, despite its inevitability. The recent institutional changes associated with agri-environmental policy are sufficient to encourage optimism for the final outcomes of these policies, many of which will appear during the next century.

Optimism may be justified by reference to the institutionalisation of the management of ESAs at the national and regional level in England to broaden participation of those interested in the outcome of those policies. The rapid extension of Countryside Stewardship contracts through the non-designated

countryside, increasing the number of flexibly negotiated contracts with individual farmers would also encourage expectations of more sustainable policies.

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