Future Directions for Joint Agricultural-Environmental Policies: Implications of the United Kingdom Experience for Europe and the United States

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South Dakota State University Economics
Research Report 2001-1

and

University of Essex Centre for Environment and
Society Occasional Paper 2001-5

August 2001

Abstract

Major agri-environmental programs tried in the United Kingdom (UK) since the mid-1980s are examined in this report. Special attention is given to the Environmental Sensitive Areas (ESA) scheme, the Countryside Stewardship Scheme (CSS), and schemes to promote organic agriculture—first the Organic Aid Scheme and, following that, the Organic Farming Scheme. Several major studies and reviews of these and other agri-environmental schemes in England, Scotland, and Wales have been conducted in recent years. These studies and reviews are drawn upon to examine both the successes and shortcomings of various schemes in drawing farmers into more environmentally sound farming practices and systems. In conducting this review and examination, primary attention is given to farmers' income, risk reduction, and stewardship goals. Contextual factors given special attention include the following: prices and access to markets; technologies; the structure of agriculture; and social and human capital. Lessons for future agri-environmental strategies in the UK, elsewhere in Europe, and the United States are derived from this review. The emerging 'multifunctionality' approach to agricultural policy is emphasized. Among the lessons are ones dealing with: legume-based rotations in arable areas; financial assistance to organic farmers beyond the transition period; continued reform of the European Union's Common Agricultural Policy; possible merging of the ESA scheme and the CSS; extension/technical assistance institutions and strategy; and social and human capital for environmental change. Several issues and challenges in greatly expanding agri-environmental policies and making them more effective in the future are analyzed and explained. Those issues and challenges pertain to: the compatibility of production support and stewardship support policies; balancing stewardship support and 'environmental compliance'; opportunities for programs to contribute jointly to social and stewardship objectives; the compatibility of World Trade Organization rules with stewardship schemes; capitalization of scheme benefits into land values; how to gain from bottom-up planning and subsidiarity; and stewardship payments for farmers already practicing good stewardship.

Contents

Acronyms, Abbreviations, and Symbols

AAPS	Arable Area Payment Scheme
ADAS	Agricultural Development and Advisory Service
BSE	bovine spongiform encephalopathy ('mad cow disease')
CAP	Common Agricultural Policy
CFO	Conservation Farming Option
CLA	Country Landowners' Association
CPS	Countryside Premium Scheme
CRP	Conservation Reserve Program
CSP	Conservation Security Program
CSS	Countryside Stewardship Scheme
CTE	Contrats Territoriales d'Exploiration
CWS	Cooperative Wholesale Society
DEFRA	Department for Environment, Food and Rural Affairs (starting in 2001)
DETR	Department of the Environment, Transport and the Regions (formerly the DoE; now part of DEFRA)
DoE	Department of the Environment (to 1997)
EA	Environment Agency
EC	European Commission
EQIP	Environmental Quality Incentives Program
ESA	Environmentally Sensitive Areas
EU	European Union
Euro	Common currency unit for a number of European Union countries (equaled approximately 0.61 British pounds or 0.88 US dollars in August 2001)
FAIR Act	Federal Agricultural Improvement and Reform Act of 1996 (in the US; also sometimes referred to as the 1996 Farm Bill)
FAO	Food and Agriculture Organization of the United Nations
FFA	Family Farmers' Association
FWAG	Farming and Wildlife Advisory Group
ha	hectare (equivalent to 2.47 acres)
HC	House of Commons
IAFS	Integrated Arable Farming Systems
IATP	Institute for Agricultural and Trade Policy
ICM	Integrated Crop Management
IEEP	Institute for European Environmental Policy
IFM	Integrated Farm Management
IIED	International Institute for Environment and Development
IPM	Integrated Pest Management
Kg	kilogram (equivalent to 2.2 pounds)
Km	kilometer (equivalent to 0.62 miles)
LEAF	Linking Environment and Farming
LIFE	Less Intensive Farming for the Environment
MAFF	Ministry of Agriculture, Fisheries and Food (now part of DEFRA)
N	Nitrogen
NAAS	National Agricultural Advisory Service (predecessor of ADAS)

NALMI	Norfolk Area Land Management Initiative
NGO	non-governmental organization
NPA	National Park Authority
NSA	Nitrate Sensitive Area
NVZ	Nitrate Vulnerable Zone
OECD	Organization for Economic Cooperation and Development
PIU	Performance and Innovation Unit
RASE	Royal Agricultural Society of England
RCEP	Royal Commission on Environmental Pollution
RSPB	Royal Society for the Protection of Birds
RSS	Rural Stewardship Scheme
SAC	Scottish Agricultural College
SSSI	Site of Special Scientific Interest
USDA	United States Department of Agriculture
WES	Wildlife Enhancement Scheme
WQIP	Water Quality Incentive Program
WTO	World Trade Organization
WWF	Worldwide Fund for Nature
£	British pound (equaled approximately 1.43 US dollars in August 2001)
$	US dollar (equaled approximately 0.70 British pounds in August 2001)

Acknowledgements

The research on which this report is based was initiated while Thomas Dobbs was a Fulbright Scholar at the University of Essex's Centre for Environment and Society during January-June 2000. In addition to support from a Fulbright Scholar grant, research support has been provided from South Dakota State University's Agricultural Experiment Station Project H-056, entitled "Implications of Risk and other Factors for Diversified and Sustainable Farming Systems".

Numerous individuals provided advice and assistance to Dobbs while he was collaborating with Jules Pretty in the United Kingdom (UK). Dobbs had interviews or informal discussions about UK and other European agri-environmental policies with many of these individuals. Others recommended or provided relevant reference material to us. We are especially grateful to Jilly Hall (Countryside Agency), Sarah Skerratt (Royal Agricultural College), and Evert van der Sluis (South Dakota State University), each of whom reviewed all or most of a draft of the manuscript.

In addition, we sincerely thank the following individuals (listed in alphabetical order of their institutions) for the assistance each provided: Ciaran Gannon, Eunice Lord, and Mark Temple (ADAS); Uwe Latacz-Lohman (Cambridge University, formerly of Wye College); Lucy Morgan Edwards and Marie-Helene Baneth (Country Landowners' Association); Sue Cornwell, Rosie Simpson, and John Terry (Countryside Agency); Alison Bailey (Cranfield University); Ian Hutchcroft (Devon County Council); Clive Peckham (East Anglia Food Links); Pippa Woods (The Family Farmers' Association); Janet Dwyer and David Baldock (Institute for European Environmental Policy); Bill Vorley (International Institute for Environment and Development); Sue Armstrong-Brown and Vicki Swales (The Royal Society for the Protection of Birds); David Oglethorpe (Scottish Agricultural College); Robert Henderson (Scottish Executive Rural Affairs Department); Ian Skinner (UK Environment Agency); Colin Sage (University College Cork, National University of Ireland); Tim O'Riordan (University of East Anglia); Nick Hanley (University of Glascow, formerly of University of Edinburgh); Nic Lampkin, Peter Midmore, and Susan Fowler (University of Wales); Natacha Yellachich (Worldwide Fund for Nature); and Clive Potter (Wye College). Rachel Hine, at the University of Essex, has been a constant source of ideas, stimulation, and friendship.

We greatly appreciate the time and ideas of the many farmers who interacted with us at various meetings and informal settings in England and Wales during the first 6 months of

2000. Their suggestions and feedback were much appreciated. Many valuable ideas also were obtained in formal sessions and personal discussions at conferences of the Soil Association (January 2000) and the Agricultural Economics Society (April 2000).

Finally, it is important to acknowledge the critical office and secretarial support provided throughout this study by Barb Dininger, in the Economics Department at South Dakota State University, and Marie Chan-Tso-Sye, in the Centre for Environment and Society at the University of Essex. Marie provided innumerable acts of support to Tom and Beverly Dobbs during their stay at the University of Essex.

TLD and JNP

August 2001

1. Recent Policy Challenges in Agriculture

1.1 Emergent Pressures on Both Sides of the Atlantic

Agricultural policy makers on both sides of the Atlantic are now faced with fundamental pressures and choices about farming and the environment. Modern agriculture in the 20th century was highly successful at increasing food production, with per hectare cereal yields increasing two-three fold in the United States (US) and Europe over 50 years. But at the same time, these improvements have come at considerable cost to the environment. Recently, though, policy makers have begun to see new opportunities to achieve food and environmental outcomes with more coordinated policy instruments.

Since the mid-1980s, there have been major reforms in both agricultural and environmental policies in the European Union (EU) and the US. The first step was the establishment of a wide range of agri-environmental initiatives, most dating from the Food Security Act of 1985 ('1985 Farm Bill') in the US (Dobbs, 1993, pp. 2-3) and from countryside preservation measures begun in the mid-1980s in the United Kingdom (UK) (Potter, 1998, pp. 82-92; Pretty, 1998, pp. 74-78). Later, in the 1990s, both the EU and the US began to break the ties between agricultural income supports and commodity production.

In Europe, the 1992 MacSharry reforms of the Common Agricultural Policy (CAP) weakened the link between production and farm income which had contributed to the process of agricultural intensification since the 1950s (Pretty, 1998, pp. 72-73). Income supports under the CAP have been shifting increasingly to 'area-based' payments, in order to reduce the incentives for intensification. US farm bills in 1985 and 1990 took small steps to weaken the links between production and income supports, but a major break was made in the 1996 farm bill. Under provisions of the Federal Agricultural Improvement and Reform (FAIR) Act of 1996, crop specific deficiency payments were replaced by production flexibility contract payments which are decoupled from production and price levels of particular crops (Dobbs and Dumke, 1999, p. 1; Harwood and Jagger, 1999, p. 57).

In spite of these two major trends that have emerged in Europe and the US, increased emphasis on agri-environmental measures and decoupling of income support from production, the process of reform is far from complete. Major decisions face policy makers over the next several years. The FAIR Act expires in 2002, forcing critical decisions in the US at least by then. Agenda 2000 CAP reforms agreed to in Berlin and Helsinki in 1999 call for further cuts in support prices and introduction of rural development measures in Europe (Pretty, 2000). Accession to the EU of new member states from Central and Eastern Europe

over the next few years will force further reforms because of increased budgetary pressures. European policy makers will need to decide how to allocate scarce resources among more countries, continue the process of decoupling income supports from production, and meet growing environmental and rural development demands.

In addition, World Trade Organization (WTO) negotiations will continue to place pressure on both European and North American agricultural policy makers to complete the decoupling process, remove remaining trade barriers, and reduce domestic subsidies affecting international agricultural trade. However, the trade liberalization process is complicated by growing ethical and environmental concerns (Swinbank, 2000; Latacz-Lohmann, 2000). It is becoming increasingly clear that seemingly simple notions of 'free trade' will have to be re-formulated to accommodate societal concerns about the environmental and ethical dimensions of food and fiber production.

All of these policy pressures are converging at a time when many farmers on both sides of the Atlantic and elsewhere are experiencing severe economic distress. Crop prices that have fallen dramatically since 1996 have hit grain and oilseed producers hard all over the world. Weather and crop disease problems have compounded the economic distress in some parts of the US. The glut in hog production, and consequent effect on prices, has squeezed incomes of many North American and European farmers. Of course, the bovine spongiform encephalopathy (BSE) crisis represents a blow from which the UK's livestock sector is still in the process of recovering. The more recent foot-and-mouth epidemic has further compounded economic stress in the UK rural economy.

The US agricultural sector went through a period of major economic adjustment in the early 1980s, whereas EU agriculture has not previously gone through such an adjustment since the inception of the CAP. The current economic 'farm crisis' is probably more severe in Europe than in the US. Nevertheless, many farm groups in the US, like their counterparts in the UK and other parts of Europe, are demanding government assistance and a slow-down in the decoupling and trade-liberalization processes. They are also more resistant to environmental restrictions, unless accompanied by generous compensation, given that many farmers are experiencing economic distress.

Continued reduction in farm income support and associated re-structuring and adjustment in the UK is expected to lead to policy problems in several areas:

> *"First, there will be losers from the process of adjustment (both short-term and long-term); these will include farms which are unable to fully adapt to meet the needs of a more competitive market or those who see the value of their assets (in land or quota for example) diminished. Second, more broadly, there will be some rural economies that are unable to*

adapt sufficiently quickly to a reformed farming industry. Third, the process of economic adjustment to CAP reform may reduce the wide range of environmental and amenity goods provided by the agricultural industry" (MAFF, 1999d, p. 9).

These problems could be addressed by policies which (1) provide assistance for the transition process; (2) encourage forms of rural development, so that rural areas are less dependent on agriculture; and (3) increase payments to farmers for the provision of environmental goods (MAFF, 1999d, p. 10).

The focus of this paper is on possible policies in the third area. Agenda 2000 Reforms of the CAP include the Rural Development Regulation, essentially a second CAP pillar that allows member states to shift some of their CAP funds to rural development and agri-environmental programs. In the UK, government plans are to shift 2.5% of all direct payments to farmers under CAP commodity regimes to rural development and agri-environmental initiatives in 2001, with this proportion to rise gradually to 4.5% in 2005 and 2006 (MAFF, 1999a, p. 5). However, some individuals and groups would like to see much larger portions shifted[1]. The UK Country Landowners' Association (CLA), for example, advocates shifting one-third of the funds to rural development and agri-environmental measures (CLA, 1999, pp. 1 and 3). If funds that previously have gone to production-related supports were to be shifted to rural development and agri-environmental measures, how could the environmental portions of those funds most effectively be spent? The same question applies to the US, as policy questions about income and other supports for farmers in the next farm bill are faced.

Before addressing this question, we will briefly review the emergence and evolution to date of agri-environmental programs in the UK and the US.

1.2 Agri-Environmental Programs in the UK

The principal goal of agricultural policy throughout Europe in the last century was to provide a plentiful and secure food supply through increased productivity. Financial support from the state, and later the European Community and then Union, was tied to output, with guaranteed markets for produce. In Britain, this began in the 1940s when provisions were made under various acts. The historic 1947 Agriculture Act was a landmark, as its principal objectives were raising food production and combating the chronic balance of payments deficit. Provisions were made in this and later acts for ploughing grants, for price

[1] This contrasts with France, where 20% of the agricultural budget was put into the Rural Development Regulations budget in early 2000.

subsidies of crop and livestock products, for grants for field drainage and other investments in fixed assets, for subsidies of fertilizers and lime, for per capita payments for beef calves, and for hedgerow removal. An annual price review guaranteed prices so that farmers would have *"at least a modest prosperity and insulation from economic factors"* (Bowers and Cheshire, 1983).

It was not until after Britain entered the European Community that many of these direct grants and subsidies were discontinued, such as for fertilizers and lime in 1974. Nonetheless, the Common Agricultural Policy continued to support agricultural prices, protect markets, and provide for export subsidies. The guaranteed prices have generally been well above world market prices. But the policy climate began to change in the early 1980s. Food commodities were beginning to accumulate at an alarming rate in the European Community, producing the first 'food mountains'. It became increasingly clear that something was wrong with a system that produced too much food and which therefore necessitated great expenditure on both storage and subsidizing exports. By the early 1990s, these surpluses were absorbing 20% of the Common Agricultural Policy budget for storage alone. A further 28% was expended on export subsidies.

The Common Agricultural Policy objectives, as outlined in Article 39 of the Treaty of Rome, are to increase agricultural productivity, secure EU food supplies and stabilize prices, and ensure a 'fair standard of living' for the community's farmers. The 1992 MacSharry reforms of the CAP did not change these objectives. But the reforms did begin to weaken the core CAP objectives by introducing a system of direct payments to farmers and a move away from market support as a means of securing farm incomes. To qualify for these payments, farmers had to comply with a range of specific controls that were intended to restrain production—arable production was restrained by set-aside, and livestock production by quotas and headage payments. Incentives were put in place for farmers to comply with new practices, and so reduce food production. Sustainable technologies and practices represented only a very small element of these compliancies.

The CAP reforms, therefore, lightly 'greened' agricultural policy by including for the first time policy measures designed to fulfil environmental objectives. Regulation 2078/92 required member states to implement an 'agri-environmental' program. This obliged governments to offer farmers voluntary incentive schemes for adopting environmentally-friendly forms of land management. The amount of farmland designated under these agri-environment measures varies across member states. In the late 1990s, the average for the EU as a whole was about 13% of total farmland, ranging from 0.2-0.4% in Belgium and Spain,

8% in the UK, 10-20% in France and Portugal, 30% in Germany, 74% in Finland, to 100% in Austria (Pretty, 1998). These designations, however, do not guarantee that all farmers have adopted conservation friendly farming.

The Environmentally Sensitive Areas (ESA) scheme preceded these measures. When it was launched in 1986, the ESA scheme was the first agri-environmental program in the EU. It has since grown to cover 22 designated areas in England (MAFF, 2000a) and 10 in Scotland (Wynn and Skerratt, 2000). There are 43 ESA designated areas in the UK as a whole (Hanley et al., 1999, p. 69). ESAs cover specified areas of designated high landscape or ecological value. These ESAs encompass about 14% of the total agricultural land in the UK (Pretty, 1998, pp.75-76).

The Countryside Stewardship Scheme (CSS) was established in 1991, and is available only in England outside ESAs. It aims to protect and enhance valued landscapes and habitats, and improve the public enjoyment of the countryside. The scheme targets chalk grasslands, waterside landscapes, lowland heaths, coastal lands, uplands and historic landscapes, and orchards and meadows. Again, farmers receive payments for entering management agreements, usually 10 years in length.

The Welsh equivalent was the Tir Cymen scheme administered by the Countryside Council of Wales, which had some 900 agreements to the end of 1996. This scheme had a substantial positive effect on farmers' incomes, on the environment, and on local job creation. In Scotland, the Countryside Premium Scheme, launched in 1997, sought to integrate all environmental schemes, and was open to all 15,000 farmers and crofters currently not in designated ESAs (some 80% of land is not covered by ESAs). A prior conservation audit is required with a 5-year plan, and a range of payments is available for both management options and capital works.

The Organic Aid Scheme, introduced in 1994, was open to all farmers, and offered incentives over a 5-year period to convert to organic production. The payment levels were, however, so low that few farmers appeared able to afford to risk conversion. This scheme was replaced by the Organic Farming Scheme in 1999. With more attractive payment rates, this scheme is proving to be quite popular with farmers.

Nitrate Sensitive Areas (NSAs) were designed to limit nitrate leaching to aquifers used to supply drinking water. Farmers were offered voluntary incentives for following strict practices that limit leaching. Prior to regulation 2078/92, 10 pilot NSAs were set up in 1990 on 10,700 hectares. Later, a further 22 were designated, covering 25,000 hectares of agricultural land. In addition to the NSAs, 68 Nitrate Vulnerable Zones (NVZs) covering

600,000 hectares have been designated under the EC Nitrates Directive (EEC/91/676), where mandatory uncompensated measures apply. NVZs apply to any catchment where drinking water abstractions exceed 50 mg of nitrate per liter. Denmark, Germany, and Netherlands have indicated that all their land will be designated as NVZs and so subject to compulsory measures, and France intends to designate 10 million hectares, some 50% of agricultural land.

There have been a range of other schemes of a more targeted nature, including:

1. the Moorland Scheme, designed to pay farmers outside ESAs for each ewe removed, so as to encourage restoration and conservation of heather and other shrubby moorland;

2. the Countryside Access Scheme—restricted to guaranteed set-aside land considered suitable for new or increased access.

3. support for Sites of Special Scientific Interest (SSSIs) in which English Nature, Scottish Natural Heritage, the Countryside Council of Wales, and the Department of Environment in Northern Ireland provide payments for the adoption of management practices to protect habitats and species on 45,000 hectares;

4. the Arable Incentives Scheme, in which farmers are able to apply for funding to test methods for protecting wildlife, especially birds, during arable farming;

5. the Farm and Conservation Grant Scheme and the Farm Woodland Premium Scheme, both run by MAFF; the Woodland Grant Scheme run by the Forestry Commission; and various National Nature Reserve Agreements administered by English Nature.

1.3 Agri-Environmental Programs in the US

Both soil conservation and farm income support programs date back to the 1930s in the US. The initial legislation under the Franklin Roosevelt Administration to raise farm prices by taking land out of production was separate from the legislation creating the Soil Erosion Service in the US Department of Agriculture (USDA). However, the initial production control provisions were struck down by the US Supreme Court. Policymakers then found a way to get around this barrier by combining soil conservation and supply control measures to support farm income. The Soil Conservation and Domestic Allotment Act was enacted in 1936. Under this act, farmers were paid to reduce the area planted to 'soil depleting' crops and to replace them with 'soil conserving' crops such as grasses. Since the soil depleting crops generally were the ones in 'surplus', supply control was accomplished

as a byproduct of soil conservation. (Committee on Long-Range Soil and Water Conservation, 1993, pp.150 and 152)

"*Not until the 1985 Food Security Act . . . was there an emergence of erosion control and water quality as independent objects of agricultural policies*" in the US (Committee on Long-Range Soil and Water Conservation, p. 152). Agri-environmental policies in the US, in the modern sense, thus date to this legislation. The 1985 legislation contained several major initiatives, as follows, which remain in effect (Dobbs, 1993, p. 3; Knutson, et al., 1998, pp. 354-357 and 384; Schaller, 1993, p. 6):

1. Conservation compliance. Farmers who wished to participate in price support and other USDA programs were required to develop and comply with conservation plans for all 'highly erodible' cropland. In many cases, particularly on the US Great Plains, conservation compliance has meant leaving more ground cover on fields. This has resulted in widespread expansion on various forms of reduced tillage farming practices. In some areas, conservation compliance has involved construction of terraces or such practices as planting alternative strips of row crops and cover crops.
2. Sodbuster provision. The 'sodbuster' provision severely limits farmers' ability to bring highly erodible land that has not previously been tilled into crop production. Farmers can become ineligible for Federal farm program benefits if they bring such land into crop production without an approved conservation plan.
3. Swampbuster provision. Farmers are prevented—at the risk of foregoing farm program benefits—from converting 'wetlands' to crop production by the so-called 'swampbuster' provision. Interpreting just what is a 'wetland' for purposes of this provision has proven to be one of the most controversial agri-environmental components of the 1985 legislation. There is no doubt, however, that this provision has helped to dramatically change the agricultural landscape. Halting or greatly slowing the conversion of wetlands has improved wildlife habitat, decreased erosion, and—in the opinion of many people—reduced flooding risks.
4. Conservation Reserve Program. The Conservation Reserve Program (CRP) was established to remove highly erodible land from crop and livestock production. This program, modeled in part on the earlier Soil Bank program that had been enacted in 1956, had as its goal removing 40 to 50 million acres of land from

production. Farmers could bid for 10-year CRP contracts. Land under CRP contract must be planted to grasses, legumes, or trees, and generally can not be grazed by livestock or harvested for hay. Although purportedly a soil and water erosion program, there is no doubt that much of the initial political support for the CRP from farmers was based on the expected supply-reduction byproduct of the program. The initial CRP was very successful in taking a great deal of cropland subject to wind erosion out of production in the Great Plains. As a result of the bid ceiling and selection process, it was much less successful in removing from production land that is subject to water-born soil erosion in the highly productive Midwestern 'Cornbelt'.

Several additional agri-environmental initiatives followed in the early 1990s (Dobbs, 1993, pp. 4-5; Dobbs and Bischoff, 1996, pp. 1-3; Knutson, et al., 1998, pp. 385-386):

1. Integrated Crop Management program. The USDA began offering the Integrated Crop Management (ICM) program under its Agricultural Conservation Program starting in the 1990 crop year. Participating farmers were eligible for cost-share payments for crop consultants and other costs associated with such practices as pest and nutrient management, cover crops, improved rotations, and green manure crops. The program originally was limited to a few counties in participating States and to a fixed number of farms in some of the counties. Later, States were allowed to make all counties and farms eligible.
2. Water Quality Incentive Program. The Food, Agriculture, and Trade Act of 1990 ('1990 Farm Bill') contained authorization for the Water Quality Incentive Program (WQIP). Many of the WQIP practices that qualified for funding were the same as those that qualified under the ICM program, such as soil testing, cover crops, and integrated management of crop rotations. In addition, various practices specific to water management qualified for financial assistance, including well testing, filter strips, and irrigation water management. Like the ICM program, multi-year contracts paying up to $3,500/year were allowed.
3. Wetland Reserve Program. A Wetland Reserve Program (WRP) also was enacted in the 1990 Farm Bill, in which farmers are paid a rental fee for converting farmland into wetlands. Originally, agreements consisted of easements of 30 years or longer. The program was modified somewhat in the 1996 FAIR Act,

splitting the program into three equal portions—"*permanent easements, 30-year easements, and restoration cost-share agreements*" (USDA, 1996, p. 17).

Several previous agri-environmental programs, including the ICM program and the WQIP, were combined and expanded in a new Environmental Quality Incentives Program (EQIP) under the 1996 FAIR Act. Shortly after passage of the FAIR Act, the program was described as follows by the USDA:

> "*EQIP is authorized at $1.3 billion over 7 years to assist crop and livestock producers with environmental and conservation improvements on the farm. The program is to be operated to maximize environmental benefits per dollar expended. At least half of the funding is for environmental concerns associated with livestock production. The program awards 5- to 10-year cost-share or incentive payment contracts for certain land management and structural practices based on a competitive application and evaluation process. The farmer must implement an approved plan stating intended practices. Producer payment limits are $10,000 per fiscal year or $50,000 for any multiyear contract. Large operators, as defined by the Secretary, will be ineligible for cost-sharing assistance to construct animal waste management facilities. However, they are eligible for technical assistance, educational assistance, and incentive payments for animal waste facilities, as well as cost sharing for approved practices.*" (USDA, 1996, p. 17)

Livestock practices were not eligible for cost-share assistance under most of EQIP's predecessor programs, such as ICM and WQIP. The livestock component of EQIP was quite controversial during the rule-definition phase of implementation. Sustainable agriculture groups were very concerned that if the 'large operator' cutoffs were set at quite high animal unit numbers, the program would serve to subsidize the continued 'industrialization' of animal agriculture in the US.

Funding for the agri-environmental programs which were consolidated into EQIP had averaged approximately $1 billion per year (1992 constant dollars) over the period 1983-92 (Heimlich and Claassen, 1999). EQIP has been funded at only about $200 million per year, compared to historic farm income support payments in the US of $7 to 12 billion per year (Batie, 1998). In recent years, EQIP has been funded at $174 million per year (Henry A. Wallace Center for Agricultural and Environmental Policy at Winrock International, 2000 and 2001a), compared to production-related direct and emergency aid payments to US farmers totaling $22.9 billion in 2000 (Ferguson, 2001).

1.4 The Emerging Debate on the Multifunctionality of Agriculture

Agriculture is inherently multifunctional—it does more than just produce food, fiber, oil, and timber (FAO, 1999; Whitby, 2000). It has a profound impact on many other aspects

of local, national, and global economies and ecosystems. These side-effects can be either positive or negative.

An agricultural system that depletes organic matter or erodes soil while producing food externalizes costs that others in society (and the system itself, in a later stage) must bear; but one that sequesters carbon in soils through organic matter accumulation contributes to both the global good by mediating climate change and the private good by enhancing soil health. Similarly, a diverse agricultural system that protects and enhances on-farm wildlife contributes to wider stocks of biodiversity, while simplified modernized systems that eliminate wildlife do not. And agricultural systems that offer labor-absorption opportunities—through resource improvements or value-added activities—can help to encourage rural economic growth.

But agriculture's multifunctionality also suggests that it can deliver valued non-food functions that cannot be produced by other economic sectors. Much of the 'natural' biodiversity in Europe is the result of centuries of farming, and agriculture has created and shaped the landscape and countryside. There are many other positive side-effects of agriculture, including values derived from aesthetics; recreation and amenity; water accumulation and supply; nutrient recycling and fixation; soil formation; wildlife, including agriculturally beneficial organisms; storm protection and flood control; and carbon sequestration by trees and soils. Positive social externalities include provision of jobs, contribution to the local economy, opportunities for businesses, and contribution to the social fabric of rural communities (OECD, 1997; PIU, 1999).

Sustainable agriculture is multifunctional within landscapes and economies—it produces food and other goods for farm families and markets, but it also contributes to a range of public goods, such as clean water, wildlife, carbon sequestration in soils, flood protection, and landscape quality. It delivers unique non-food functions that cannot be produced by other sectors (e.g., on-farm biodiversity, groundwater recharge, social cohesion).

An emerging policy challenge for UK agriculture is to find ways to maintain and enhance food production, while seeking both to improve the positive functions and to eliminate the negative ones, so improving the overall sustainability of livelihoods and economies (Carney, 1998; Pretty, 2000). This has recently entered policy reality, with the November 1999 communiqué of the EU Agriculture Council agreeing that:

?? sustainable agriculture ensures that agriculture's natural base remains productive and agricultural production can be competitive in the future and that farming works to promote positive environmental impacts;

?? the role of agriculture is broader than that of simply producing food and non-food products. Agriculture is multifunctional and clearly has effects on the environment and rural landscape. Furthermore, it has a fundamental role to play in the viability of rural areas;

?? agriculture plays an important role in contributing to the maintenance of employment in rural areas and in the whole food and non-food production chain;

?? economic, environmental, social, and cultural services provided by farmers must be recognized; for these services farmers should be adequately remunerated.

This is a major new advance for agricultural policy, as it offers new opportunities for widespread improvements.

1.5 Where Next? Towards More Widespread Use of 'Stewardship Payments'

Many of these joint agri-environmental programs of the past 15 years in the UK and the US have involved, to varying degrees, some form of 'stewardship' or 'green' payments. The UK's ESA and CSS programs, in particular, have been based on payments to farms to practice particular kinds of agricultural stewardship. The US EQIP program, and its predecessor ICM program and WQIP, have been less ambitious, but they also have used forms of stewardship payments to induce changes in farming practices.

A special focus of this report will be the potential for expanded use of stewardship payment programs to help bring about more sustainable farming systems in 'arable crop farming' areas. Farming in arable areas of Europe and the US has become increasingly specialized over recent decades—with fewer crops in each region accompanied by narrow rotational patterns (Dumke and Dobbs, 1999; Pioret, 1999a and 1999b). CAP policies that provided aid for cereals, oilseed crops, and protein crops helped lead to an increase in crops sold, while the fall in grazing livestock contributed to a decrease in permanent grassland in Europe. The growth in average farm size in Europe, together with increased mechanization, have contributed to ever more specialized farm operations.

There was a major increase in cereal production in Europe between 1975 and 1990, partly due to increased use of inorganic fertilizers and pesticides and other changes in crop cultivation methods. The CAP aid led to substantial growth in area devoted to sunflowers, field peas, and rape during the 1980s. The area under fodder maize also has grown in many

EU countries, further contributing to the decline in grassland area. The growing size and specialization of European farms has been accompanied by increased intensification in the use of purchased inputs such as nitrogen fertilizer. The CAP reforms of 1992, entailing lower support prices in combination with set-asides, curbed the overall growth in European cereal production. However, they did not noticeably alter the general trend toward specialization and away from grassland and perennial crops (Poiret, 1999a and 1999b)

This trend has many negative implications for agricultural sustainability in arable areas. Of central concern are the implications for soil health and biodiversity. Scientific knowledge of exactly what constitutes soil health and about all of the ecological ramifications of biodiversity is still patchy (Cobb, et al., 1999a, pp. 216-217). However, there is growing understanding of how the two are interrelated. Complex, biologically diverse crop systems contribute to soil structure and microbial life. Soils, in turn, serve as biological habitats and gene reserves (Montanarella, 1999, p. 1). A 'healthy' soil therefore contributes to biodiversity.

If there is disagreement about what constitutes soil health, it is understandable why there are different opinions about the severity of soil-related sustainability problems. However, various indicators suggest that the next phase of agri-environmental reforms should pay special attention to soil concerns in the arable areas. According to Montanarella (1999, p. 4): *"Soil erosion is a major socio-economic and environmental problem through Europe."* Soil erosion by water is a problem on more than half the land in Europe, and about a fifth of Europe's land has been damaged by wind erosion. The Mediterranean region suffers more serious water-born soil erosion problems than does northwestern Europe. Wind erosion of topsoil occurs mostly in southeastern Europe; however, significant wind erosion events do occur in some other parts of Europe, such as the eastern area of England (Evans, 1995; Montanarella, 1999).

Soil erosion does not appear prominently among the concerns addressed by many of the UK's agri-environmental schemes over the last 15 years, despite a recent Royal Commission on Environmental Pollution (1996) report on soil. There is, however, reason to be concerned over the long run. Erosion at rates which exceed the rate of new soil formation increased in many areas of the UK over the last several decades (Baldock, et al., 1996, p. 80). Erosion rates are above the tolerance value on about 37% of the arable land in England and Wales (Montanarella, 1999, p. 7). Organic matter is at significantly low levels in many lowland soils, particularly in East Anglia (Baldock, et al., 1996, p. 82). Agriculture in this eastern region is some of the most productive in England, and diversification has not been

attractive to the region's farmers (MAFF, 2000b, p. 52). Also, due to the intensive farming practices there, some of the UK's Nitrate Vulnerable Zones are located in the eastern part of England (MAFF, 1999e, pp. 8-9).

Pretty, et al. (2000) report nearly £100 million in annual externality costs related to agricultural damage to soils in the UK. Costs related to organic matter and carbon dioxide losses from soils are estimated to be over £80 million, and off-site damages from soil erosion are approximately £14 million per year. They also estimate that the annual external cost of pesticides and nitrates in drinking water in the UK is approximately £136 million.

Modern farming has also had a significant effect on the rural landscape and biodiversity. The countryside provides food, timber, wildlife and habitats, jobs, landscape, and opportunities for recreation. In most parts of Europe, these goods and services have been maintained by traditional farming systems. In Britain, the patchwork quilt lowland fields, the moorlands and hill pastures, the blanket bogs and sandy coastal pastures, the acid heaths and the woodlands? all of these have been created and maintained by farming.

In the British countryside, every habitat is in decline. Hedgerows and drystone walls are cherished features of the landscape. In Britain's 450,000 km of hedgerows, there are some 600 plant, 1500 insect, 65 bird, and 20 mammal species. A few are relics of ancient woodland that covered Britain until about 3,000 years ago. But these are being lost. In 50 years, Britain has lost over 40% of its hedgerows. The losses continue, despite increasing public concern, and may even be increasing. Some 13-16,000 km were being lost each year until the late 1990s, of which two-thirds were uprooted and one-third disappeared through neglect. There was anecdotal evidence that some farmers were actually accelerating removal in late 1996-early 1997 prior to the passing of a law to protect hedgerows. Much of the recent loss, though, is due to neglect rather than deliberate removal.

Modern farming has had a severe impact on wildlife. It has been estimated that 170 native species in the UK became extinct during the 20th century, including 1 in 14 of our dragonflies, 1 in 20 of our butterflies and 1 in 50 of our fish and mammals (Fuller, et al., 1994; DoE, 1996). Since 1945, the UK has have lost 95% of its wildflower-rich meadows; 30-50% of its ancient lowland woods; 50% of its heathland; 50% of lowland fens, valley and basin mires; and 40% of its hedgerows. Despite increasing public concern, losses continue. Species diversity is also declining in the farmed habitat itself. There was a 30% fall in the number of plant species in arable fields from the late-1970s to 1990 alone (Barr, et al., 1993). Overgrazing of upland grasslands and moorlands has reduced species diversity. Draining

and fertilizers have replaced floristically-rich meadows with ryegrass monocultures. There are also fewer butterflies and, most noticeably, fewer bird species.

Farmland birds appear to have particularly suffered. Wild birds are killed in three way[2]—by direct poisoning, by indirect effects on their reproductive systems, and by destruction of their habitats (Conway and Pretty, 1991). Direct poisoning was common in the 1950s and 1960s, but less so now that most pesticides are less directly toxic to birds. Indirect effects on reproduction have also been important. Eggshell thinning was recognized during the late-1960s as the main cause of the collapse of predatory bird populations. With the withdrawal of the organochlorines, most populations of peregrines and sparrowhawks have now returned to their pre-1940s levels.

Destruction of habitats and loss of food sources are now the causes of population decline among birds. Many studies now show that there have been rapid declines in the numbers of many threatened birds dependent on farmed habitats throughout Europe? from the songbirds of England to the bustards and birds of prey of the Spanish steppes (Tucker and Heath, 1994; Pain and Pienkowski, 1997). There have been particularly heavy losses of farmland birds over the past 25 years. The familiar and best-loved birds are being lost at an alarming rate; the corncrake, snipe, yellow wagtail, and corn bunting are now rarities. The numbers of skylarks, a symbol of summer for so many, have fallen by nearly 60%. Pesticides have affected these birds by reducing the abundance of invertebrate food sources during the breeding season; herbicides reduce the number of host plants, so affecting the invertebrates that depend on them; and herbicides reduce the abundance of weeds and seed important as foods for birds in winter. Several studies have now shown that there is more bird and other wildlife, particularly butterflies, on organic compared with conventional farms (Chamberlain, et al., 1996).

Baldock, et al., (1996, p. 84) say *"It would appear that incentives for soil protection need to be strengthened significantly."* Soil constitutes part of the 'natural capital stock' (Costanza, et al., 1997 and 1999; Cobb, et al., 1999a, pp. 219-220; Pretty, 1998, pp. 7-8) that is vital to the long run sustainability of agricultural systems. We will pay special attention to the maintenance and creation of soil health in arable areas as we review the UK experiences with agri-environmental schemes. Do lessons learned from any of the UK schemes provide insights for the design of new or broader stewardship payment programs intended to maintain this vital form of natural capital in arable areas?

[2]In addition to hunting of some species by 'sportsmen', more common in the US than in the UK.

1.6 Organization of the Report

The next section of this report contains our conceptual framework for understanding farmers' goals and incentives, objectives of agri-environmental policies, and contextual factors that influence farmers' adoption of practices and systems promoted through different schemes. We then apply that conceptual framework to major types of agri-environmental schemes in sections 3 to 7. Some impressions from other UK agri-environmental schemes are included in section 8. Section 9 of this report contains our summary of lessons from the UK experience, with emphasis on policy implications for arable areas. Next, in section 10, we present some issues and challenges confronting policy makers in Europe and the US in attempts to broaden and deepen agri-environmental stewardship payment schemes. The final section (11) contains our overall conclusions and policy recommendations.

2. Conceptual Framework for Analyses

2.1 Schemes and Goals

Agri-environmental schemes based on stewardship payments, technical assistance, and other forms of positive incentives are based, at least implicitly, on an assumed set of farmer goals and contextual factors that are likely to affect scheme participation. Goals to maintain or increase profits are central to virtually all analyses of farmers' propensity to adopt new or different technologies or systems. However, it is well recognized that goals related to risk also play an important role in farmers' decisions. The risk averse behavior that farmers (like other people) often exhibit can have substantial implications for agri-environmental policy. Oglethorpe (1995), for example, has demonstrated that greater variability in the market for agricultural goods can be more conducive to farmer-adoption of less intensive practices than would be case with more stable markets. The implication of this is that if government income protection policies take most of the risk out of intensive, specialized farming, the costs of inducing farmers voluntarily to adopt agri-environmental policies can be high.

Many farmers obviously have other goals, as well—including having adequate leisure and family time and having a sense of independence. A set of goals with special relevance to this paper, however, is those related to stewardship of natural resources. In a recent Presidential Address to the Agricultural Economics Society, David Colman (1994) discussed the implications of farmers' ethics for agri-environmental policy. He indicated that some farmers base their stewardship decisions on ethical grounds to a much greater extent than do others, where ethical is meant to include reasons other than pure self-interest. In his view, it is important that public policies support, and not tend to erode, such stewardship goals based on ethics and public service.

Cary and Wilkinson (1997) examined the role of Australian farmers' environmental or stewardship goals in adopting conservation practices. They found no significant relationship between environmental orientation of individual farmers and decisions to plant trees, and a significant but only modest connection between environmental orientation and decisions to plant deep-rooted pasture. Although they concluded, not surprisingly, that profit motives constitute a stronger driving force in adoption decisions than do environmental motives, they noted that *"environmental orientation is often reinforced by engaging in conservation behavior"* (Cary and Williams, 1997, p. 19).

In a different context, Darling and Topp (2000) recently examined both users' and farmers' views on whose responsibility it is to bear the cost of maintaining a 'quality' countryside landscape in Scotland. Interestingly, *"the majority of farmers did not believe they should be paid for public access as it was considered morally important that access should be free"* (Darling and Topp, 2000, p. 8). However, half of the farmers believed they should be compensated for nuisance and damage. Most of those felt that the compensation should come from park, government, or heritage funds, rather than from the visitors.

Our conceptual framework is based is focused on three sets of goals thought to be most relevant to farmers' decisions about adoption and continued use of sustainable farming practices. The goals are:

1. To maintain or increase net income (profits) from farming;
2. To avoid 'excessive' risk with the income-generating activities of the farm;
3. To maintain sound stewardship of the farm's natural resources.

The stewardship goal can be interrelated with goals to have social standing in the local community, where the public values sound stewardship. Other considerations certainly also enter into farmers' decisions about adoption of sustainable practices, including the ability to maintain flexibility and not be tied down by bureaucracy. While those considerations should not be ignored, our primary focus in this report is on the three goals listed.

2.2 Differing Farm Systems

Depending on agro-climatic and other circumstances, farmers can choose among many different farming systems in attempts to achieve some satisfactory balance of goal achievement. For simplicity, we conceive of four types of systems on a scale from less to more sustainable:

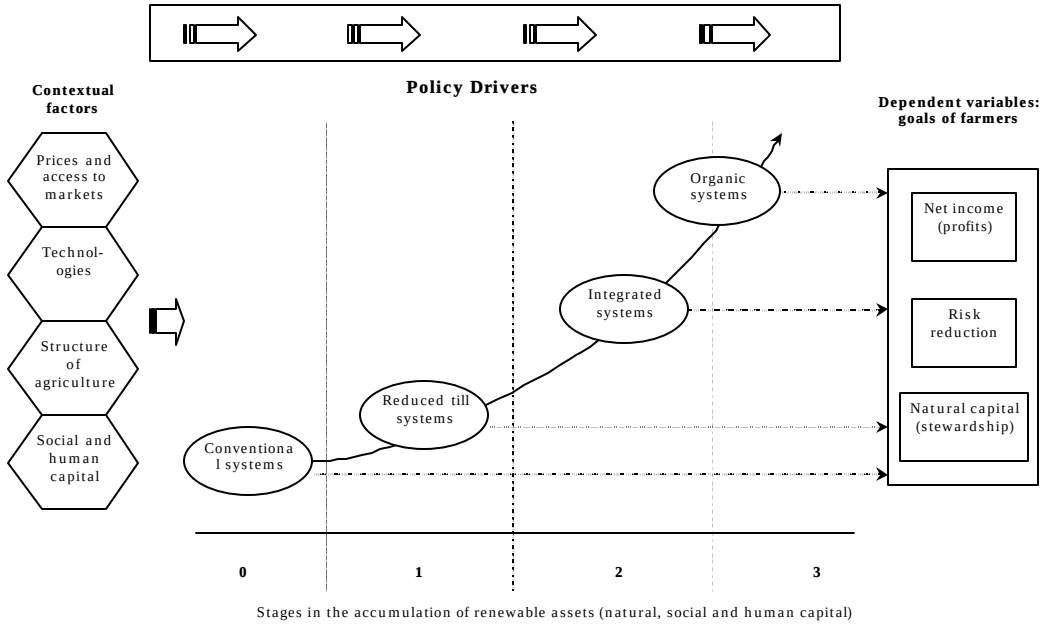
1. Conventional systems, involving very narrow rotations and intensive use of inorganic fertilizers and pesticides;
2. Reduced-tillage systems, which minimize turning of the soil, thereby reducing erosion and preserving moisture, but which (like conventional systems) have narrow rotations and substantial use of chemical fertilizers and pesticides
3. Integrated systems, which involve more diverse crop rotations (often including a forage or green manure legume) and lower, more precise applications of pesticides and inorganic fertilizers than in conventional and reduced-tillage systems;
4. Organic systems, in which diverse crop rotations and mechanical (and sometimes hand) tillage replace all agrochemical inputs that would otherwise be used for pest control and

fertility.

The four systems are shown in Figure 1, where they represent different stages in accumulation of renewable assets (see Pretty and Frank, 1999, for discussion of this concept of 'stages in the accumulation of renewable assets'). Conventional systems are in Stage 0, where commodity output (e.g., grains and oilseeds) may be high but renewable assets are being depleted. Reduced tillage systems may be in Stage 1 or on the border of Stage 2, with commodity output levels about the same as conventional systems but with modest renewal of some natural assets (e.g., soil). Integrated and organic systems may be in either Stage 2 or Stage 3, with commodity output possibly even higher than conventional and reduced tillage systems and with accumulation of natural assets definitely being greater. The objective of agri-environmental policies in this framework is to encourage adoption of integrated and/or organic systems, where the process has a dynamic element; i.e., policies are used not only to encourage farmers to initially adopt particular systems, but to engender a dynamic process that eventually moves farmers into Stage 3—the active, redesign, interdependent stage.

We take farm and agri-environmental policies to be 'independent variables' in this conceptualization (Figure 1). Both general farm policies and policies aimed at specific environmental goals clearly have potential to strongly influence—for better or worse—farmers' decisions about what farming system to select and, thereby, their achievement of income, risk, and stewardship goals. These goals are considered the 'dependent variables'. We can envision different potential levels of achievement with respect to each of the goals.

Figure 1. Conceptual framework for examining agri-environmental policies



2.3 Contextual Factors

Impacts of the independent variables (policies) on the dependent variables (farmers' goals) are mitigated, however, by four major sets of factors. We refer to these as contextual factors, since they provide the context in which policies operate and in which different crop and livestock systems function and perform—effectively or ineffectively—in enabling farmers to reach different levels of goal achievement (Figure 1). The sets of contextual factors are as follows:

1. Price relationships and access to markets. Relative prices of the various inputs and outputs of any given farming system obviously exert major influence on levels of farm income and risk. For example, price premiums for organically grown crops enabled many American and European organic farmers to achieve relatively high gross and net farm incomes during the late-1990s. However, access to such markets varies among organic farmers, and can diminish in a short period of time if there is rapid expansion of crop area devoted to a particular organically grown crop.
2. Technologies. The evolution of various technologies involved in the practice of farming sometimes strongly influences the attractiveness of particular crop systems. For example, in research recently completed in South Dakota (US), farmer focus groups emphasized that the prevailing large, expensive, specialized farm machinery

that is now commonplace inhibits shifts to more diverse crop rotations which might require several lines of equipment (Dobbs and Dumke, 1999).

3. Structure of agriculture. Various factors constitute the 'structure of agriculture' and exert a profound influence on the feasibility of different cropping systems. Among these factors are farm size, ownership and tenancy patterns, employment patterns within the family, and the concentration or dispersion of livestock feeding. A highly concentrated livestock feeding structure, for example, makes it more difficult to find local markets for the forage legumes that play key roles in many integrated and organic crop systems.
4. Social and human capital. Both social and human capital are vital for the transition of agriculture towards more sustainable practices. *Social capital* comprises the cohesiveness of people in their societies, and comprises relations of trust, reciprocity, and exchanges which facilitate co-operation; the common rules, norms, and sanctions mutually agreed or handed-down; and the connectedness, networks, and groups which may be formal or informal, horizontal or vertical (Pretty and Ward, 2001). (For example, the decline in social capital in many rural areas has contributed to the difficulty and reluctance of farmers to come together in cooperatives to add value to and market the diverse crop products of integrated and organic farming systems.) *Human capital*, by contrast, is the status of individuals, and comprises the stock of health, nutrition, education, skills, and knowledge of individuals; access to services that provide these, such as schools, medical services, and adult training; the ways individuals interact with productive technologies; and the leadership quality of individuals.

2.4 Review of Agri-Environmental Schemes

In a broad sense, agri-environmental policy deals with all of the above and other contextual factors that either enhance or diminish the likelihood of farmers adopting integrated and organic farming systems. We will pay particular attention to these four contextual factors, however, as we review the evidence regarding various UK agri-environmental schemes that have been tried since the mid-1980s. Figure 1 will be used as a framework as we review each agri-environmental policy scheme. The schemes for which we will review recent evidence are these:

1. The Environmentally Sensitive Areas Scheme
2. The Countryside Stewardship Scheme

3. Organic agriculture schemes
4. Integrated farming systems initiatives
5. The Nitrate Sensitive Areas Scheme

We also will make some observations about other agri-environmental schemes in the UK, including the Arable Stewardship Scheme, Land Management Initiatives, Tir Gofal (in Wales), and the Countryside Premium Scheme (in Scotland).

Our review of studies and evaluations of these schemes will be focused on farmer acceptance of the schemes, in light of the farmer goals and contextual factors framework detailed above. We will be especially concerned about the likely implications of such schemes for progression along the stages in asset accumulation continuum (Pretty and Frank, 2000). Given the importance of crop system diversity and soil health in arable areas that was noted in the introductory section, we will pay special attention to studies' findings with respect to apparent scheme impacts on accumulation of natural capital related to soil. Natural capital is central to most recent discussions of agricultural sustainability (e.g., Cobb, et al., 1999a; Pretty, 1998; van der Hamsvoort and Latacz-Lohmann, 1998; Webster, 1999; Whitby and Adger, 1996).

We also will be concerned about what Whitby (2000, pp. 325-329) calls the 'end of contract problem'. After an agri-environmental scheme based on voluntary participation has contributed to growth in the stock of natural capital, how is the public's interest in this stock to be protected after the contract period ends? Does it appear that farmers who have participated in particular schemes will have adopted strong stewardship ethics by the end of the contract period and be in Stage 3 of the renewable assets accumulation continuum, or will governmental bodies be faced with either on-going voluntary contracts or regulations to protect the natural capital that has accumulated?

3. Environmentally Sensitive Areas Scheme

The Environmentally Sensitive Areas (ESA) scheme was first set up in 1986, following various protests about the draining and ploughing up of the Halvergate marshes in Norfolk. In the early-1980s, farmers were paid to drain marshland and convert it to cereal production. The damage caused to Halvergate led directly to the establishment of the Broads Grazing Marsh Conversion Scheme in 1985—the forerunner of ESAs. This offered farmers a flat rate hecterage payment in return for cutting stocking rates and reducing pesticide and fertilizer use. Some 5,000 hectares were designated, and 90% of farmers came into the voluntary scheme. When ESAs were then mooted for sites across the country, a wide range of bodies were involved in the design process, choosing 160 sites. But these were then cut to only 10 covering 738,000 hectares, the management prescriptions were simplified, and the final design centrally imposed (Blunden and Curry, 1988).

3.1 Participation

Participation in England's ESAs had grown to over 10,000 agreements by 1999, covering 539,518 hectares (Table 1)—47% of the eligible area. Total area entered under ESA contracts in the entire UK was 34% of the eligible area as of 1997 (Hanley, et al., 1999, p. 69).

Under the current ESA system, farmers enter 10-year voluntary management agreements in return for annual payments. Payments to farmers under the England ESA schemes had grown to approximately £36m by 1999 (Table 1). The England Rural Development Plan for 2000-2006 (MAFF, 2000b) projects those payments to rise to £48m by 2001 and then level off. At present, there is no plan to increase the number or area coverage of England's ESAs (MAFF, 2000a).

The primary focus of the ESA scheme was protection of landscape and wildlife habitat. Incentives offered have induced enrollment of substantial portions (40-90%) of eligible areas in England ESAs characterized by grazing and generally less intensive agriculture, but enrollment has been lower in areas characterized by more intensive arable production, such as the Essex Coast (Lobley and Potter, 1998, pp. 416-417).

Table 1. Participation and expenditures in England for Environmentally Sensitive Areas (ESA) scheme

Year	----------Coverage----------			
	Designated (hectares)	**Enrolled (hectares)**	**Agreements (number)**	**Payments to farmers* (£1,000)**
1992	405,317	129,358	3,265	
1993	831,217	266,458	4,514	1,641
1994	1,149,208	346,391	6,144	16,547
1995	1,149,208	424,567	7,834	20,100
1996	1,149,208	433,637	8,198	28,329
1997	1,149,208	469,121	9,201	27,951
1998	1,149,208			32,984
1999	1,149,208	539,518	10,323	36,376
2000				46,000
2001				48,000
2002				48,000
2003				48,000
2004				48,000
2005				48,000
2006				48,000
2007				48,000

*Data reported by fiscal year, so 1992/93 considered 1993, etc; 2000 and beyond are forecasted or planned.

Sources: MAFF, 2000a; MAFF, 2000b, p. 141 and Annex V, p.30; MAFF 2000e (31 March 2000)

One study of the Welsh Cambrian Mountains ESA by Geoff Wilson and colleagues at Kings College found that, although the uptake at 48% was high relative to other ESAs, it was the larger farmers who were benefiting most (Wilson, 1997). The ESA, by targeting specific habitats such as semi-natural rough grazing or woodlands, tends to favor larger farmers, as they are more likely to have farms with these habitats. As a result, larger farmers get more income from the ESA scheme, and some have now bought smaller family farms. This has brought new divisions to the close-knit rural communities. Wilson put it this way: *"some participants . . . were getting increasingly disillusioned with farming since the ESA scheme started. They felt insufficiently rewarded for their environmental management practices as stewards of the*

land". Even more importantly, participation in the ESA appears not to have affected the attitudes of farmers: *"only a small fraction seem to be influenced in both their attitudes and behavior by the scheme"*.

Moreover, most of the land under ESA agreements in England has been in the basic entry tiers (Lobley and Potter, 1998, p. 416; Potter, 1998, p. 88). The basic entry tiers generally halt the process of agricultural intensification, but do not require farmers to revert to a less intensive level. The regional participation patterns and the fact that most agreements are at the basic level suggest that monetary incentives have been adequate to arrest intensification in more marginal areas—where it might not have been profitable to increase the level of intensification, anyway, but not adequate to slow or reverse intensification in more productive arable areas. However, most ESA evaluations we have reviewed covered periods before the dramatic commodity price reductions of the late-1990s. If those low prices persist, and EU subsidies continue to decline and be further decoupled, ESA participation could start to become attractive to more farmers in the arable areas.

Skerratt (1998) has discussed the role of risk and other contextual factors in farmers' decisions about whether to participate in the ESA in one of Scotland's designated areas. She notes that there are risks involved in farmers' decisions during the process of negotiating an ESA agreement, but the fact that environmental policies could become more restrictive in the future also presents risks in not entering into an agreement at the present time.

3.2 Evaluations

Hanley, et al. (1999) recently summarized a review by Stewart, et al. (1997) of the major cost-benefit analyses of agri-environmental schemes in the UK. Ten of the 12 schemes covered in this review were ESA schemes. The Contingent Valuation Method (CVM) was used in most of the studies to place monetary benefits on the schemes. In many of the evaluations, a range of benefit estimates was presented. Benefit estimates at the upper ends of those ranges exceeded costs for each of the ESA schemes, sometimes by many times the costs. Inclusion of non-use values caused some of the benefit estimates to become very large. In both the South Downs and Somerset Levels and Moors ESAs, for example, non-use or passive benefits constituted 39% and 79% of total estimated benefits (Garrod and Willis, 1995, p. 171). Hanley, et al. (1999) discuss a number of problems associated with such evaluations, as does Whitby (2000, pp. 324-325), who notes that most evaluations of UK agri-environmental schemes have not actually been able to value benefits at the margin. In other words, even if an ESA scheme in one area has produced more social benefits than costs, how

would expanding that scheme or adding new schemes elsewhere affect social benefits and costs?

Scotland's ESAs have been designed and delivered in somewhat different ways than those in England and Wales. The Scottish Executive Rural Affairs Department (SERAD) organizes delivery, but the Scottish Agricultural College (SAC) and the Farming and Wildlife Advisory Group (FWAG) have major roles in developing the individual farm plans that become part of ESA agreements. SAC both promotes the scheme and assists farmers in preparing applications. FWAG is typically subcontracted by SAC to undertake the conservation reports (audits) that become part of the application, though in some cases FWAG assists farmers with the entire application. The role and mix of responsibilities of SAC and FWAG vary among Scottish ESAs (Crabtree, et al., 2000, p. 19).

Wynn and Skerratt (2000) examined the diversity of strategies employed in promoting ESA participation in Scotland. They concluded that *"there was indirect evidence that flourishing partnerships achieved increased uptake, critical in the context of a voluntary scheme"* (p. 19). They went on to note that the partnerships between these different agencies are fragile, however, and there is danger that the complementarity may be lost in delivery of Scotland's new Rural Stewardship Scheme (RSS). The RSS combines and replaces the ESA and Countryside Premium Schemes in Scotland. Delivery mechanisms under the RSS involve more competition and less mutual dependency. This illustrates the trade-off that sometimes exists between increasing competition and maintaining valuable social capital.

The Macaulay Land Use Research Institute recently released a major evaluation of the 10 Scottish ESA areas which comprise the revised scheme launched in 1993 (Crabtree, et al., 2000). Approximately 24% of eligible farm holdings in these areas had joined the ESA scheme by November 1997, when the evaluation began. The portion of the eligible area enrolled was considerably higher than that (statistical problems preclude knowing the exact percentage of eligible area enrolled). The scheme raised household income of participants by an average of £3,359 in 1997. Average ESA payments of £5,837 that year were partially offset by reduced farm gross margins and increased farm fixed costs. There also were significant positive impacts on income and employment in ESA local economies. These local area impacts were due primarily to spending by farm operators on conservation-related investments, increased consumer spending as a result of higher farm household incomes, and expenditures by additional visitors drawn to the ESA areas. (Crabtree, et al., 2000, pp. 1-4 and 59-95)

Environmental benefits of the Scottish ESAs were primarily in the form of preserving

environmental features already in place. Most of the Scottish ESAs were in areas already farmed rather extensively. There were some reductions in agricultural output where stock removal occurred, and fertilizer and spray levels were changed by about 12% of farmers. However, most participating farmers found ways to develop ESA agreements that did not require major changes in their farming operations. Some operators did forgo land use changes such as drainage and reclamation that would have had adverse environmental impacts, in the absence of ESA agreements (Crabtree et al., 2000, pp. 2 and 49-57).

Overall, most of the UK ESA schemes have made positive contributions to 'greening the edges' of farming with consequent benefits for habitats and wildlife, but the relatively low take-up of tiers above the base level and the limited impacts on arable areas indicates much less progress in 'greening the middle', that is, in fundamentally changing the sustainability of the crop and livestock operations. Potter put it this way (1998, p. 91):

> *"Generally, ESAs are seen to have been most successful in maintaining the environmental capital which already exists on farms but have been much less successful in adding to or enhancing that capital".*

The ESA approach is basically a 'wide and shallow' approach, designed primarily to protect key environmental feature over a wide landscape. In some cases, farmers have participated in higher level tiers, contributing substantially to biodiversity objectives, particularly farmland birds (RSPB, 1996, p. 23). Even participation in the basic maintenance tiers, however, may gradually lead farmers to have more positive attitudes toward conservation (RSPB, 1996, p. 23). Therefore, as the forerunner to other agri-environmental schemes in the UK, the ESA program may have helped create conditions that aid movement along the renewable assets continuum shown in Figure 1.

Pretty (1998, pp. 292-93) cites evidence of shortcomings to a number of ESAs, including a lack of flexibility. At least in the early stages, many ESAs employed a more or less 'top-down', prescriptive approach. This may have been inevitable, given the desire to protect certain key environmental features in each designated area and, probably, a concern that requirements appear credible to non-farm groups. However, approaches that are unduly top-down create resentment and also discourage innovative solutions that may be cost-effective at the local or individual farm level.

To some people, participation is simply a matter of paying enough, and so getting farmers to do what they want. But this type of 'bought' participation simply does not work. Payments tend to buy short-term acquiescence, but not long-term changes in attitudes and

values. Two farmers at the same meeting were able to be clear about what was needed. One said *"I am a victim of an ESA"*. Another put it this way *"ESAs should be FSAs—farmer sensitive areas. The schemes must be flexible and farmer friendly. The most important thing is the project staff: they must be sympathetic, knowledgeable, flexible and consistent"* (quoted in Pretty, 1998, p. 293).

In Scotland, the conservation management plans that have been a feature of ESAs have allowed flexibility to fit prescriptions to individual sites and circumstances (RSPB, 1996, p. 24). This approach can be more expensive in the initial implementation phase, but it allows farmers to 'buy into' the process, increasing the chances that they will stay with the general conservation strategy after the contract period. In the recent Macaulay Land Use Research Institute evaluation of Scotland's ESA scheme, 41% of surveyed participants indicated that the scheme had increased their interest in conservation (Crabtree, et al., 2000, p. 57). And in the Exmoor National Park, plans are developed jointly by the authority and farmers. As a result, farmers are presented with a range of alternative practices from which they can choose. Whole-farm plans are drawn up around the kitchen table, each reflecting the individual farm conditions, and 20-year index-linked agreements are signed. The plans have joint ownership, and Exmoor National Park Authority (NPA) officials are flexible. Says David Lloyd of the NPA, *"if things don't work, we change them"*. The pilot scheme was more expensive in management terms, as this type of interactive participation costs more than imposition. But the long-term returns are likely to be much greater. Similar principles were adopted by the Tir Cymen project in Wales and the North Yorks Moor Farm Scheme. Both sought to develop whole-farm plans with the full involvement of farmers, but with clear principles and objectives about what is a desired outcome for natural capital.

3.3 Conclusions about ESA Schemes

Our conclusions about UK ESA schemes—based upon the various studies reviewed and our general observations and interactions with many people—can be summarized with reference to the variables and contextual factors in Figure 1. The ESA schemes in many areas have had a positive effect on farmers' net income goal. The principal exception would be for farmers in more productive arable areas, where it appears payments often have not been sufficient to induce participation. CAP income supports tied to production have no doubt inhibited ESA participation by many farmers—especially participation in the higher tiers. This effect is weakening as production related supports fall and 'decoupling' continues.

The ESA program also has helped farmers avoid excessive risk. This is especially true for farmers in more marginal production areas, for whom the income certainty provided by

ESA payments (at least over the life of their contracts) appears attractive. The 'prices and access to markets' contextual factor probably has both risk increasing and risk decreasing effects. Falling market prices increase farmers' risk from 'conventional' farming practices, making the less intensive features of ESA schemes more attractive. However, the continued presence of CAP production supports reduces farmers' risk exposure in conventional agriculture. The rapidly evolving industrialized structure of agriculture can increase risks for some farmers, especially the smaller ones who have serious concerns about access to markets. Paradoxically, increased risk may help 'push' at least some of the smaller farmers into agri-environmental schemes that call for less intensive farming systems. The general absence of social capital in rural areas increases farmers' risks of deviating from the current norm in farming, thereby inhibiting participation in programs like the ESA.

Finally, the ESA program certainly makes a positive contribution to achievement of farmers' stewardship goals. However, many of the contextual factors in which the ESA program must operate tend to inhibit participation in stewardship programs. CAP supports, large-scale and specialized farm technology, an increasingly industrialized agricultural structure, and absence of local social capital all tend to increase the direct or opportunity costs of practicing sound stewardship. As already noted for risk, the 'prices and markets' contextual factor has mixed effects, in that the current 'low' market prices actually may make some forms of stewardship more attractive. In the short run, however, as farmers go through very difficult periods of financial adjustment, they may cut back on stewardship practices for which there is not full compensation.

We turn next to the Countryside Stewardship Scheme. This program in England and similar programs in other parts of the UK are increasingly becoming the central foci of joint agricultural-environmental policy in Britain.

4. Countryside Stewardship Scheme

The Countryside Stewardship Scheme (CSS) is a countrywide program, unlike the ESA program. Also, it puts more emphasis on enhancement of environmental features, rather than simply preserving what is presently in place. It is concerned with a broad set of objectives, but these become translated into environmental concerns that are specific to each 'agreement farm'. In practice, agreements usually involve only part of each farm (Baldock and Mitchell, 1998, pp. 7 and 13; Short, et al., 2000, pp. 86-100) The CSS was the first national agri-environmental scheme in the UK that sought to *"buy environmental and public access 'goods' from farmers and other land managers on a targeted and discretionary basis"* (Harrison-Mayfield, et al., 1998, p. 157).

4.1 Participation

The CSS began with 783 agreements covering 25,404 hectares in 1991. More than 1,000 agreements were added most years thereafter in the 1990s. By 1998, there were 8,614 agreements—most running for 10 years—covering 143,055 hectares in England. Payments to farmers were totaling a little over £15 million by 1998. (Table 2) Future plans for the CSS are now under consideration within the UK government. The first 10-year agreements begin to expire in 2001 (Short, et al., 2000, p. 39). Most of the expanded funding for agri-environmental efforts in England is expected to be concentrated on the CSS (MAFF, 1999a, p. 3). CSS expenditures are projected by MAFF to reach £35 million in 2001 and to exceed £100 million by 2006 (Table 2). Depending on the proportion of CAP production-related income support shifted to rural development and agri-environmental programs by the middle of this decade, expenditures on CSS could even be much higher.

4.2 Evaluations

A major socio-economic evaluation of the CSS was conducted before its transfer from the Countryside Commission to MAFF in 1996 (see Table 3). Slightly more than half of the survey respondents in the study indicated changes in the use of agricultural inputs since entering into CSS agreements. Spending was up for machinery purchases and repairs and for fencing, and spending was down for fertilizers and crop protection products. Fewer, a little more than a quarter, of the respondents said that their farm sales had declined; most of the sales changes that did occur were decreases. Decreases in sales tended to be relatively greater in England's most productive regions—the Southeast, Eastern, and Midlands—than

in other areas. Household incomes also were reported to have changed by slightly more than one-fourth of the respondents; 60% of those indicated that their incomes had increased (Harrison-Mayfield, et al., 1998, pp. 157 and 161-63).

Table 2. Participation and expenditures in England Countryside Stewardship Scheme (CSS)

Year	----Annual Coverage---		----Cumulative Coverage----		
	Enrolled (hectares)	Agreements (number)	Enrolled (hectares)	Agreements (number)	Payments to farmers* (£1,000)
1991	25,404	783	25,404	783	
1992	28,504	1,425	53,908	2,208	
1993	20,417	1,289	74,325	3,497	5,330
1994	11,662	1,034	85,987	4,531	8,500
1995	5,167	496	91,154	5,027	10,510
1996	14,893	1,117	106,047	6,144	11,625
1997	13,794	1,195	119,841	7,339	10,926
1998**	23,214	1,275	143,055	8,614	15,078
1999					19,896
2000					26,066
2001					35,000
2002					51,000
2003					66,000
2004					81,000
2005					98,000
2006					111,000
2007					126,000

*Data reported by fiscal year, so 1992/93 considered 1993, etc.; 2000 and beyond are forecasted or planned—and may not be only "payments to farmers", like the data prior to 2000.

**1998 figures do not include 78 Agreements under the Arable Stewardship pilot scheme, involving 2,472 hectares.

Sources: MAFF, 2000a; MAFF, 2000b, p. 223 and Annex V, p. 30; MAFF, 2000e (31 March 2000)

This evaluation also indicated a rough balance between jobs lost and jobs gained due to the CSS. However, the distribution of estimated job impacts was revealing:

> *". . . the largest negative impact on employment results from the effects of reduced output and thus reduced consumer spending by those earning profits and wages from firms upstream and downstream from farming. These are likely to be located among larger businesses in distant or urban centers and hence fairly dissipated in nature . . . On the other hand, job gains tend to be concentrated in the locality of the farms, in areas and sectors perhaps more peripheral and remote . . ."* (Harrison-Mayfield, et al., 1998, p. 166)

Table 3. The impacts of the Countryside Stewardship Scheme

Farming performance	

Farm income	up 10-15% for 60% of CS farms; neutral or down for the other 40%
Fertilizer use	down £704 per farm
Pesticide use	down £389 per farm
Veterinary medicine use	down £119 per farm
Machinery	up £1349 per farm
Feedstuffs	up £1141 per farm
Fencing	up £1935 per farm
Net expenditure	up £152 per farm
Labor and businesses	
Farms with increased on-farm labor	10% farms with increase = 0.013 jobs per farm
Jobs created in local communities	220 new jobs created = 0.056 jobs per farm
Local expenditure	
Proportion of inputs and services purchased from small settlements	
Before CS	71%
After CS	80%
Proportion of inputs and services purchased within 15 km of farm	
Before CS	43%
After CS	59%
Proportion of farms reporting more visitors and greater spread during the year	85%

Source: Harrison-Mayfield, et al., 1996

The evaluators went on to note that the CSS appears to have contributed to job maintenance and security, and that CSS-agreement farms have tended to maintain or increase farm labor use (Harrison-Mayfield, et al., 1998, p. 168).

Another major economic evaluation of the CSS has just been completed for MAFF by the Cheltenham and Gloucester College and ADAS (Short, et al., 2000). This evaluation—which we will refer to as the CG/ADAS evaluation—entailed surveys, case studies of selected areas, and personal interviews. Postal surveys were conducted of CSS agreement holders, unsuccessful applicants, and non-applicants. Survey forms were mailed to 7,500 people or entities, with a response rate of 25%. In addition, interviews were conducted with 15 agreement holders, 5 unsuccessful applicants, 5 non-applicants, project officers, organizations that cooperate with MAFF in the CSS, and MAFF personnel administering the CSS. Four case studies were selected where an ESA designation covered at least part of the area. A fifth case study area did not have an ESA designation, but did have a Community Forest designation. The four main types of ESAs in England were represented in the case studies: Upland, Chalk or Limestone Grassland, River Valley, and Wetland.

The CG/ADAS evaluation found CSS farms to be larger, on average, than the population of farms in England. Some 20% of CSS farms are over 300 hectares in size,

compared to only 3% of all farms. At the other end of the size scale, only 36% of CSS farms are less than 50 hectares, compared to 65% of all farms. However, authors of the CG / ADAS study note that definitional problems could have distorted these findings[3].

Short, et al. (2000, p. 19) found little land tenure difference between CSS farms and other farms. Roughly a third of CSS agreement holders' land is rented, as is that of unsuccessful CSS applicants, non-applicants, and the population of England's farmers.

CSS agreements appear to include a disproportionately high number of cattle and sheep farms and a disproportionately low number of crop and dairy farms, compared to the overall population of England farms. The evaluators indicate that, to some extent, this is not surprising, given that CSS landscape targets and prescriptions often are associated with less intensive grassland. However, there has been enough land area targeted where dairying is important to warrant a higher number of dairy farm CSS agreements. Dairy farming was relatively profitable, compared to some other types of farming, during the period covered by the evaluation. This may have caused CSS payment rates to be unattractive to many dairy farmers. The attractiveness of CSS payments to dairy farmers could be changing, though, as dairy farming is becoming less profitable. (Short, et al., 2000, pp. 18-19 and 23)

What kind of stewardship can we expect CSS agreement holders to practice once their agreements run out—if the agreements are not renewed? This is the 'end of contract' issue discussed earlier. Most CSS agreement holders indicated that there would be little or no change in cropping and stocking intensities on their farms in the absence of future agreements. Some 26% and 32%, respectively, did indicate that there would be moderate to major *increases in intensity* of cropping and stocking. However, much larger percentages of CSS agreement holders said that there would be moderate to major *decreases in levels of stewardship* in the following areas, in the absence of a continued CSS agreement: conservation land management (53%); provision of public access (45%); maintenance of hedgerows, walls, and field boundaries (59%); management of specific environmental features, such as traditional buildings (43%); and field margins (70%). (Short, et al., pp. 32-33) Of course, there is always a strong possibility of bias in questions asked to people about what they will or will not do in the absence of financial compensation. What these questions do not address, though, is the more complex issues of changes in farmers' long-term attitudes.

[3] The Census of farms, for example, records holdings rather than businesses; a business may contain several holdings, and a farm business responding to the survey may include several holdings. Also, the Census includes a large number of minor holdings—of which owners or managers are unlikely to bother entering into CSS agreements. Another potential bias results from the fact that farmers with larger holdings are more likely to respond to some surveys than are farmers with small holdings.

Additional analysis of the CG/ADAS evaluation data led to the conclusion that the likelihood of decreases in stewardship—following the end of CSS agreements—is greatest *where CSS investment was highest*. However, no link was found between farm size and the likelihood of subsequent declines in stewardship (Short, et al., 2000, pp. 33-34).

4.3 Payment Rates

Related to the 'end of contract problem' is the issue of how high payments need to be. Changes in EU CAP policies during the CSS's 1991-1996 pilot phase decreased the attractiveness of CSS participation; therefore, payment rates were increased during the pilot phase (Countryside Commission, 1998). Some 64% of respondents in the CG/ADAS evaluation said they definitely would re-apply for a CSS agreement (if allowed) when their current agreements run out. Only 3% said they would not reapply, and 33% were undecided. This would imply that current payment levels are adequate for nearly two-thirds of current agreement holders. Of those who were undecided about re-applying and who gave reasons, nearly half ranked 'too expensive/payments insufficient' as their major reason. Within that group, two out of five want a 20% increase in payment levels and nearly the same proportion want more than a 20% increase. Any changes in payment rates to induce re-enrollment would no doubt need to vary by farm type and practice. For example, slightly less than half of dairy farmers indicated that they definitely would re-apply. Also, farms that are smaller (in terms of hectares) and ones whose total CSS payments are lower than average presently seem less likely to re-apply. (Short, et al., 2000, pp. 39-42)

The CG/ADAS survey of non-applicants and face-to-face interviews with some non-applicants also revealed a widespread willingness to participate in many aspects of the CSS at current payment rates. Interviews with Project Officers indicated that payments may need to be higher for some items in some areas—such as stone walling in the Lake District. (Short, et al., 2000, pp. 50-52)

Of course, decisions about participation in the CSS and other agri-environmental schemes are based upon a complex set of factors, as discussed earlier in this paper. Lobley and Potter's survey of farmers in Southeast England shed light on participation decisions in the early stages of the CSS. They found that farmers who were enrolled in the CSS emphasized conservation motivations more than did ESA enrollees. At that time, the CSS was a relatively new program, and the ESA program was not. Lobley and Potter grouped participants in CSS and ESA programs into 'Steward' and 'Complier' categories, and found 41% of CSS farmers to be in the Steward category. Both Stewards and Compliers were

concerned with how well the agri-environmental scheme (either CSS or ESA) provisions fit their existing farming systems, but Compliers were more likely to be very concerned with the level of stewardship payments than were Stewards. (Lobley and Potter, 1998, pp. 425-26)

However, it is reasonable to expect that as CSS and other agri-environmental schemes mature, and attempts are made to draw in ever larger numbers of participants, new enrollees must increasingly come from the Complier pool. That means that financial rewards become increasingly critical. It would be hoped, though, that the collection of joint agri-environmental schemes being offered in the UK will, over time, broaden and strengthen the stewardship ethic. If ever-larger portions of the farm population consist of Stewards, rather than Compliers, movement along the stages in accumulation of renewable assets in Figure 1 is hastened.

The general conclusion of the CG/ADAS evaluation is that CSS annual payment rates presently are generous for many practices, in relation to farmers' opportunity costs. As income from 'conventional farming' declines, opportunity costs go down and, hence, levels of CSS payments necessary to attract participation also probably go down.[4] However, farmers have come to view agri-environmental payments as more or less permanent sources of income. If CSS payment rates were reduced in future agreements, farmers probably will feel that they have been penalized twice, once by falling commodity prices and profits and again by falling agri-environmental payments (Short, et al., 2000, p. 52).

4.4 Partner Organizations

Numerous public and private agencies and organizations partner in some way with MAFF in shaping or promoting the CSS. Among these agencies and organizations are local authorities, the Farm and Wildlife Advisory Group (FWAG), English Nature, the Countryside Agency, the Environment Agency, the Wildlife Trusts, the National Farmers Union, and the Royal Society for Protection of Birds. The primary functions of most of the partner organizations consist of consultation on targets, promotion, and advice to applicants. The FWAG has been an especially important partner in promoting the CSS and helping farmers understand how to use it (Hall, personal communication, 2000).

A truly participatory process involving various organizations has the potential to build horizontal and vertical social capital, thereby laying a foundation for on-going, dynamic agri-environmental programs. The CG/ADAS evaluation found that partner

[4]This refers to opportunity costs for use of land within agriculture, assuming other restrictions will keep the land in agricultural uses of some kind.

organizations appreciated their involvement in the consultation phase, though there are some problems with tight deadlines. Some organizations felt that their involvement was weak beyond the consultation phase, and wanted more feedback on decisions made by MAFF. Consultation without adequate feedback on decisions made, and the reasons for those decisions, can lead to the feeling that participation is *for show* rather than *for real*.

4.5 Selection Process

A critical issue facing all stewardship payment schemes is how to obtain value for the money expended. Many trade-offs between administrative feasibility, resource allocation efficiency, and equity are involved in policy decisions about the approach to use. The CSS uses a two-stage scoring system. The first stage involves assignment of tentative scores to determine which applications warrant site visits. Only those receiving site visits are considered for approval, and they are then assigned numerical scores. Points are assigned based on the following criteria: historic features, landscape, public access, wildlife, target area, and 'other priorities'. The first four in this list, which correspond to the major objectives of the CSS, each have roughly the same potential weight in the scoring system.

The CG / ADAS evaluation identified some shortcomings in this scoring scheme and its application in the decision making process. One shortcoming is the awarding of points for application features, such as being within a 'target area', that are means, not ends, of the CSS. A second shortcoming is that the system does not explicitly account for conflicts between objectives. This shortcoming could be obviated by allowing negative scores for some features, when positive effects in one area (e.g., wildlife) simultaneously result in negative effects in another (e.g., public access). A third shortcoming is that the potential weights attached to each criterion appear to be de facto assignments of relative value, rather than the result of some explicit recognition of priorities. Another shortcoming in the scoring system is that it conflates quantity and quality, rather than explicitly assessing them separately. (Short, et al., 2000, pp. 71-76)

Finally, it appears that little attention is given to relating priority scores to agreement costs when MAFF considers CSS applications. Although the list of 'Other Factors' used for scoring includes 'exceptional value', this is not a very systematic way to compare overall benefits and costs of applicants' proposed activities (Short, et al., 2000, p. 74). This is not to suggest that it generally would be feasible to assign monetary values to the expected outcomes of each proposed agreement. It is simply to say that some explicit comparison of

the costs of each proposed agreement and the expected quantity and quality of benefits could increase the 'value for money' in the CSS portfolio.

4.6 Conclusions about Countryside Stewardship Scheme

Of special concern in our review of UK agri-environmental schemes is the impacts on arable areas. Like the ESA program, the CSS appears to have had limited impacts on arable farming practices. CSS-funded management practices for arable land are limited to 'arable reversion, field margins, and some special projects for selected species' (e.g., support for the increasingly rare farmland birds, cirl bunting and lapwing) (Short, et al., 2000, p. 96). There has been little focus on crop rotations and other measures for the purpose of building soil health. In fairness, improved soil health was never a primary goal of the CSS (Hall, personal communication, 2000). UK agri-environmental schemes generally, including the CSS, often have not been financially attractive to the highly productive, intensive arable farms (Potter, 1998, p. 103; Baldock and Mitchell, 1998, p. 25). At least partly in response to this concern, a pilot Arable Stewardship Scheme—under the CSS—was introduced in 1998 in parts of England's East Anglia and West Midlands regions. Under this scheme, arable farmers are paid to manage their land in ways intended to encourage wildlife. (Baldock and Mitchell, 1998, p. 11; MAFF, environmental website, 2000) We will discuss this scheme in a later section.

Another area of weakness in the current CSS, identified by the CG/ADAS evaluators, concerns watershed land. To deal effectively with watershed problems, it is necessary for groups of farmers along a waterway to act collectively, and so jointly sign up for agri-environmental programs. Grouping of farmers along waterways was attempted in many areas—sometimes successfully (Hall, personal communication, 2000). However, because of the fertility and, hence, profitability of land along some waterways, it can be difficult to induce adequate numbers of farmers in a watershed to participate (Short, et al., 2000, p. 57). One approach is more aggressive targeting, and higher payment levels may be needed in some such instances. Another is to focus on building social capital among farmers as a prerequisite for improvements to natural capital over whole watersheds.

In the US, there are said to be more than 1,000 farmer-led watershed initiatives and councils (IATP, 2000). And in Australia, the National Landcare Programme, begun in 1989, has led to the formation of 4,500 local groups, with one third of all Australian farmers now members. The only such equivalent program in the UK is the SWARD program in Devon and Cornwall, where some 400 farmers have been organised into 36 producer groups to act

on a wide range of agricultural and environmental activities (David Thomson, personal communication, 2000).

Effects of the CSS on farmers' achievement of their goals, as well as the possible effects of contextual factors on farmers' participation in the CSS, are similar to those already described for the ESA program. The CSS appears to at least modestly increase net farm income, reduce farmers' overall risk, and help farmers achieve their stewardship goals. However, like the ESA, targeting and economic incentives are not particularly strong for arable areas, however, except for measures like field margins (Short, et al., 2000, p. 58). Current CAP supports, even though less distorting than in the past, still constitute an inhibiting contextual factor for farmer-participation in the CSS.

5. Organic Agriculture Schemes

Organic farming in the UK has a long tradition (Balfour, 1943). However, the proportion of agriculture covered by certified organic farming methods has been lower than a number of other European countries. Organic production methods covered just over 100,000 hectares in the EU in 1985, but this had grown to 3.5 million hectares by the end of 1999? a 35-fold increase. Austria's organic hectarage increased from 2-3% of its agricultural area in 1993 to over 8% in 1999. Increases in several other EU countries between 1993 and 1999 were: Sweden, from a little over 1% to over 7%; Denmark, from less than 1% to nearly 6%; Finland and Italy, less than 1% to over 5%; and Germany, a little less than 2% to a little over 2%. Organic agriculture has increased quite rapidly in just the last few years in the UK, going from less than one-half of 1% of agricultural area in 1993 to over 3% by the end of 1999. This put the UK sixth among the 15 EU countries in terms of percentage of area covered by organic methods. Nearly 3% of the agricultural land in the EU as a whole was farmed organically by the end of 1999. (Lampkin and Midmore, 2000, pp. 2-4)

5.1 Government Assistance in Europe

This rapid growth in a number of European countries in recent years has been driven by both markets and policies. Denmark was the first European country to provide financial assistance to farmers for conversion to organic production, and Germany introduced support in 1989. France and Luxembourg followed with small conversion assistance programs in 1992. Austria, Sweden, and Finland all had national programs to support the conversion to organic agriculture before they came into the EU in 1995. Sweden's program included support for the continuation of organic production. EC Regulation 2092/91, which defined standards for organic crop production, also contributed to European trade and growth in production of organic products following its implementation in 1993. The livestock sector recently became included within the scope of the original organic standards legislation, also, by EC Regulation 1804/99. (Lampkin and Midmore, 2000, p. 4)

Levels of funding have varied too. For many years, per hectare payments in the UK were the lowest in the EU—some 82 Euros/ha in the mid-late-1990s, compared with an EU average of 190 Euros/ha, with four countries exceeding 275 Euros/ha.

5.2 Markets

Demand for organic food has been growing rapidly in recent years throughout Europe and many other parts of the industrialized world, including the US and Japan. Sales of organic food in Western Europe were expected to be 70% higher in 1999 than just 4 years earlier. This has been reflected in the growth of retail offerings of organic foods. In the UK, organic retailing has followed primarily a supermarket approach. Safeway was the first major supermarket to stock organic food, starting in 1981. Virtually all the major supermarkets in the UK were selling organic foods by the end of the 1980s. (USDA, 1999, p. 5; Latacz-Lohmann and Foster, 1997, p. 277) In the past few years, supermarket chains in the UK (such as Waitrose, Sainsbury's and Tesco's) have begun to stock and promote organic foods more actively than ever before. Total retail sales of organic food in the UK reached £390 million in 1998-99, 70% of which was imported (Soil Association, 1999c, p. 9).

5.3. Organic Assistance in the United Kingdom

The UK Organic Aid Scheme provided financial assistance to farmers in conversion, starting in 1994. Farmers could receive assistance for 5 years on land undergoing conversion, up to a limit of 300 hectares. Also, starting in 1996, MAFF launched an Organic Conversion Information Service. This service provides helpline advice through the Soil Association and

technical advice from experts of the Elm Farm Research Centre. (Baldock and Mitchell, 1998, pp. 10 and 12; Pretty, 1998, p. 76) The Organic Aid Scheme was replaced by the Organic Farming Scheme in 1999. As in its predecessor program, financial assistance is offered for 5 years for organic conversion (MAFF, 2000c; MAFF, 2000d, p. 25).

Signup for the Organic Aid Scheme was limited—fewer than 500 farmers in England—during the 5 years of its existence (MAFF, 2000b, Annex V, p. 32). However, first-year (1999/2000) money initially allocated to the new Organic Farming Scheme was fully committed within 4 months of the scheme's introduction. Funds from subsequent years were then committed over the following months, and 1,270 farmers were allocated £30 million under the schemes first round. (MAFF, 2000a; MAFF, 2000c; MAFF, 2000d, p. 25; Morley, 1999; Soil Association, 1999b, p. 8) For fiscal year 2000/01, £12 million was budgeted (Lovelace, et al., 2000, p. 8). England's Rural Development Plan calls for increased expenditures on the Organic Farming Scheme, reaching £23 million annually in 2005 to 2007 (Table 4).

Table 4. Expenditures on England Organic Aid and Organic Farming Schemes

Year	Payments to farmers* (£ 1,000)
1995	26
1996	261
1997	374
1998	571
1999	1,026
2000	12,000
2001	12,000
2002	18,000
2003	20,000
2004	22,000
2005	23,000
2006	23,000
2007	23,000

*Data reported by fiscal year, so 1994/95 considered 1995, etc.; 2001 and beyond are forecasted or planned for the Organic Farming Scheme and (presumably) for remaining payouts under the Organic Aid Scheme.

Sources: Lovelace, et al., 2000, p. 8; MAFF, 2000a; MAFF, 2000b, p. 116 and Annex V, pp. 30 and 32; MAFF, 2000c

Because of strong farmer interest, the Welsh National Assembly allocated an

additional £1 million to the Organic Farming Scheme in Wales in early 2000, bringing the total to £3 million for fiscal year 1999/2000. The amount budgeted for the scheme in Wales that fiscal year originally had been less than £300,000. (Welsh organic cash, 2000) Annual expenditures on organic incentives for farmers in Wales now run around £11.5 million (Christie and Adams, 2000, p. 8).

5.4 Evaluations

The figures just cited indicate both growing farmer interest in and expanding government support for organic agriculture in the UK. But, what can be said about the actual effectiveness and value of the UK organic aid schemes? Foster and Mouranto (1997, as cited in Stewart, et al., 1997, pp. 102-07) used the contingent ranking method to establish some of the value associated with reduced pesticide use in organic agriculture. The reduced pesticide values they estimated were those associated with fewer numbers of bird species in decline and fewer cases of human illness. The authors interviewed 504 people in 1996 to estimate willingness to pay for bread using different levels of pesticides. Stewart, et al. (1997, p. 111) used the Foster and Mouranto (1997) estimate of the value of saving just one bird species to place a potential value on organic agriculture in the UK. The value was over £17 million, at a time when the UK was spending less than £0.5 million on aid to farmers for organic conversion. While this exercise did not result in a valuation of the net benefits of the Organic Aid Scheme, it did make the point that very little government money was being spent on an agri-environmental scheme with relatively high potential benefits.

The Royal Society for the Protection of Birds (RSPB), at about the same time that the Stewart, et al. (1997) report was published, released a set of recommendations to MAFF for the Organic Aid Scheme which included the following:

- *"support farmers during both the conversion period to organic farming and afterwards on the basis of the environmental benefits they deliver;*
- *offer higher rates of payment than at present and bring the UK in line with average EU payments of £132/ha.*
- *make payments on a flat-rate basis rather than degressive as at present;*
- *offer capital payments to help businesses restructure and offer payments for training"* (RSPB, 1997).

Adequacy of payment levels is a key issue with any joint agri-environmental scheme. Are payments adequate to attract farmers into a scheme, thereby foregoing the profits of continuing to farm the way they have been? MAFF funded three projects beginning in the early 1990s to provide data for economic and other comparisons of organic and conventional

farming systems (MAFF, 1998b, 1998c, and 1999c). These projects consisted of the following:

1. hill beef and sheep farming at ADAS Redesdale in Northumberland;
2. dairy farming at IGER Trawsgoed; and
3. arable farming at ADAS Terrington.

Results indicated that the organic beef and sheep systems can produce equal or higher net farm incomes than comparably managed conventional systems—when organic price premiums, reduced forage costs, and payments from the former Organic Aid Scheme are factored in. In addition, organic systems produce environmental benefits such as increased heather cover on open moor where stocking rates have been reduced (MAFF, 1999c).

Results of the project in which dairy farms in transition from intensive to organic methods were studied indicated that profitability had been maintained, despite reduced stocking rates. Organic price premiums and Organic Aid Scheme transition payments both helped make that possible. Environmental and ecological benefits associated with dairy farms converting to organic production included: (a) improved potassium and phosphorus nutrient balance on whole-farm systems; (b) reduced use of antibiotics (without reduced animal health); and (c) greater diversity of plant species in permanent pastures (MAFF, 1998b).

Economic results also have been good for the project examining organic arable systems. Profitability was much reduced during the 2-year conversion period, when red clover was used for fertility building, even when accounting for Set-aside and Organic Aid payments. But, after the initial phase of the conversion process, results were much better. Although crop yields averaged 60% of conventional levels, lower growing costs and good price premiums have allowed profitability of the organic rotation to be significantly higher than that of the conventional rotation each year following conversion.

Environmental benefits of the arable organic system included: (a) increased earthworm numbers and improved soil structure; (b) elimination of pesticides except for a copper-based fungicide on potatoes; and (c) introduction of beetle banks to encourage beneficial insects. Ten commercial organic farms also are being investigated to determine the wider applicability of these findings for arable systems on a range of soil types that are lighter than the silty clay loam at ADAS Terrington. Those organic farms are generating similar profits to conventional farms. MAFF concluded this summary of findings for organic arable farm systems by stating:

"Currently, organic farming in the UK is predominantly on mixed and livestock farms in

the West and North. To meet increased requirements for organic arable and vegetable products, more organic conversion will be needed in the arable East. These areas are also arguably those where the environmental benefits will be greatest" (MAFF, 1998c).

Researchers at the University of Wales' Institute of Rural Studies have conducted economic analyses based in part upon these MAFF organic projects. Fowler, et al. (2000) recently presented a summary of their findings on factors affecting the profitability of organic farming systems in the UK.

They used whole-farm data for 26 farms in 1995/96 and 1996/97 and enterprise gross margin data (including some 1997/98 data) for 6 different types of organic farms. Case study and modeling approaches were used for some of the analysis. The relative profitability of different types of organic farms in 1995/96 and 1996/97 was found to be similar to the ordering of conventional farms of the same types. Organic horticultural farms were the most profitable, on average, followed (in order) by dairy farms, mixed crop and livestock farms, cereals farms, and cattle and sheep farms. In the paired comparisons of organic and conventional farms, mixed and dairy organic farms were more profitable (Occupiers Net Income per hectare) than their conventional counterparts in half or more of the instances (in 1996/97). Organic horticultural and cropping farms were more profitable than the conventional farms with which they were paired in 40 and 33% of the instances, respectively. The lowland cattle and sheep comparisons showed conventional farms to be the more profitable in most instances. However, subsidies provided a substantial proportion of net income on the cattle and sheep farms.

The University of Wales researchers concluded that the following, along with **experience** and **productivity**, were factors affecting profitability of organic systems:

> ***"-Price premiums*** *Price premiums were important for the financial success of some farm types. There is need for better data on the labor and cost implications of realizing the price premium through various marketing channels.*
>
> ***-Enterprise mix*** *and the role of high value crops, but technical details and resource implications need to be investigated"* (Fowler, et al., 2000, p. 5).

One of the issues they identify is how the benefits of enterprise diversity and integration compare to the benefits from economies of scale and specialization within an organic system—and the implications for public policy. Researchers in the US have identified this tradeoff as one of the factors holding farmers back from greater crop diversification, even with farm income supports being more decoupled from production now than they were prior to the 1996 Farm Bill (Dobbs and Dumke, 1999).

Other studies in the UK indicate that organic systems may be competitive with conventional systems in arable areas, but the price premiums and conversion payments play critical roles. It has recently been reported that the Cooperative Wholesale Society's (CWS) all-arable organic farm near Leicester earned about the same level of profits in the early-1990s as comparable conventional farms.[5] Results covered the farm's conversion period and first rotation completed in 1996. The organic conversion payments and price premiums both contributed to the organic system's economic viability. Set-aside payments also were valuable to this system without livestock, in that they allowed some payment to be received during the fertility building part of the rotation when green manure crops are grown. (Soil Association, 1999a) Dobbs, et al. (1988) found a similar pattern for stockless arable systems in the US, when Federal farm programs of the 1980s and early-1990s required set-aside but allowed the unharvested green manure crop to count as set-aside. Cobb, et al. (1999b, p. 208), however, indicate that organic systems tend to be at a disadvantage to conventional systems in the UK because the clover/grass leys that are typical in organic rotations do not qualify for CAP arable area payments, and if the ley is grazed or put up as hay or silage, it does not qualify as set-aside. Such policy distortions have also occurred in the US farm programs prior to the 1996 decoupling of income supports.

Payments in the early years of the UK's Organic Farming Scheme probably were too low to provide much incentive to farmers to undertake the costs and risks associated with conversion (Cobb, et al., 1999b, p. 208; Pretty, 1998, p. 76), especially in arable areas. Cobb, et al. (1999b) modeled a case study farm in Gloucestershire to improve understanding of the economic viability of mixed farms under different policy scenarios. The farm had 132 ha of permanent pasture and 280 ha in an arable/ley rotation. Arable crops were winter wheat, winter barley, spring oats, oilseed rape and winter beans. Some modeling was necessary, because not all of the farm had yet been through a complete organic rotation. The analysis showed significant financial pressures on the farm during the conversion process. Area under crops decreases, stocking rates are reduced, and, initially, crop and livestock products are ineligible for organic price premiums.

There also may be increased labor costs and, though machinery fixed costs may go down over time, there could be increased costs initially for some different types of equipment. Factoring in the Organic Aid Scheme payments that were available in 1996 caused gross margins to improve by £35 per hectare in the mid-years of the conversion, but this was not enough to offset the average reduction of £100. However, the present Organic

[5]The CWS organic farm benefits from a high level of skill and managerial attention to detail (Hall, pers. comm., 2000).

Farming Scheme has payment levels (heavily front-loaded) that total (over 5 years) roughly double the payment levels of the original Organic Aid Scheme (MAFF, 2000c).

Further analyses by Cobb, et al. (1999b) examined the possible profitability of the case farm on an organic basis *after the initial transition years*, relative to the likely profitability of the farm had it continued with conventional agriculture. In these analyses, the organic system was found to be more profitable than the conventional system would have been in 1994 and 1995. This was due primarily to the organic price premiums and to the lower direct or variable costs for the organic arable crops. The organic system was more profitable than the conventional system on a whole-farm basis, both with and without inclusion of CAP support payments for both systems. When CAP payments were omitted from the analysis, the organic system was favored even more strongly. Because the conventional (non-organic) system had a greater arable area than did the organic system, it was more severely effected by the loss of area payments.

5.5 Economics of Organic Agriculture Elsewhere in Europe

Offermann and Nieberg (2000) recently have examined the relative profitability of organic and conventional (non-organic) farming systems across a number of European countries. Their study concluded:

> *"on average the profits of organic farms are very similar to those of conventional farms, [but] significant differences exist for different farm types and regions. Organic arable farms have in the past often been more successful than the average, due to the high price premia realized for crop products and the design of the general CAP. The implementation of Agenda 2000 seems likely to further increase the relative competitiveness of organic management systems"* (Offermann and Nieberg, 2000, p. 1).

They do say, however, that it would generally not be profitable, at present, for specialized, highly intensive farms to convert to organic farming.

Price premiums for organic crop products have been quite high in Europe over the last several years. For example, average farm-gate prices for organic wheat have been 50-200% higher than for conventional wheat. And organic potatoes have brought 50% up to more than 500% more than conventional potatoes. Organic price premiums account for 40-73% of profits for arable farms in the UK and Germany. Organic livestock prices were good, but generally not quite as high as for crop products. Organic milk, on average, received 8 to 36% more than conventionally produced milk, organic beef brought 30% more, and organic pork brought premiums of 20-70%. However, most recently, the prices of some organic crop products have come under more downward pressure than have organic livestock products.

(Offerman and Nieberg, 2000, pp. 4-5 and 7)

The study by Offermann and Nieberg (2000, pp. 5 and 7) found that, in addition to price premiums, profitability is significantly influenced by government support payments for organic farming in most countries. Such payments contribute approximately 16 to 24% of organic farm profits in Austria, Denmark, Germany, and Switzerland. Most European countries provide government support for both conversion to and continuation of organic farming. France and the UK, however, provide only conversion support.

5.6 Ongoing Organic Subsidies?

Work by Rigby, et al. (2000) suggests that the lack of on-going organic payments in the UK could be an important contributing factor to 'reversion'—the phenomenon of some farmers reverting back to conventional farming after first converting to organic production. Farmers who convert to organic production primarily for 'economic' reasons and then encounter problems with market outlets or lower than expected price premiums may need the added incentive of some on-going payments for continued organic production. Also, the on-going costs of organic inspection/registration can be a substantial problem for the smaller organic farming operations; this provides another rationale for on-going government payments. Cobb, et al. (1999b, p. 219) suggested that a permanent government organic farming payment of £25 to £40 per hectare per year makes good sense.

A number of sustainable agriculture and environmental organizations joined together in 1999 to promote an 'Organic Food and Farming Targets Bill' in the UK[6] (Hird, 1999; Organic Food and Farming Targets, 1999; Soil Association, 1999e; Steering Group, 1999; Steering Group The Organic Food and Farming Targets Bill Campaign, nd). The bill, if enacted into law, would establish the following targets for 2010 in the UK:

> *(a) "not less than 30% by area of agricultural land in England, Wales and Northern Ireland is certified as organic or is in the process of being converted to this status; and*
>
> (b) *not less than 20% by volume of food consumed in England, Wales and Northern Ireland is certified as organic"* (Organic Food and Farming Targets, 1999, p. 1).

The Steering Group estimates that the government budgetary cost of achieving this target at current conversion payment rates (5 years per agreement) would be about £1 billion per

[6] Organizations represented on the Steering Group include: Elm Farm Research Centre, Friends of the Earth, Henry Doubleday Research Association, Pesticides Action Network, Soil Association, Transport and General Workers Union, and UNISON. Sustain serves as the Secretariat.

year. If on-going payments were made to organic farmers, at a rate of approximately £40 per hectare, continuing budgetary costs would be around £700 million. (Steering Group The Organic Food and Farming Targets Bill Campaign, nd)

5.7 Conclusions about Organic Assistance Policies

Suppose organic farming and food targets along these lines were to be established in the UK, either by law or by administrative policy. What does our review imply about obstacles to be overcome and needed policies?

The UK's revised Organic Farming Scheme is much improved over the original Organic Aid Scheme. Annual payment levels over the 5-year conversion period now average £90 per hectare for land eligible for AAPS or under permanent crops, £70 per hectare for improved land not eligible for AAPS, and £10 for unimproved land. Additional payments of £300 per organic unit in the first year, £200 in the second year, and £100 in the third year are available to help cover costs associated with such items as training and organic certification. (MAFF, 2000c) These payments help farmers achieve their goals of maintaining or increasing net income, reducing the risks associated with conversion, and improving natural resource stewardship.

The 'prices and access to markets' contextual factor, however, provides mixed signals to farmers about conversion to organic farming. Fairly strong price premiums for arable crop products (at least until recently) and reasonably strong premiums for some organic livestock products support the maintain/increase income goal, making organic agriculture attractive. This is especially true, at present, when most conventional farmers face extremely depressed prices for their products. However, the recent downturn in the prices of some organic crop products serves to illustrate the greater volatility and, hence, greater risks associated with organic markets. The relatively high organic prices tend to support stewardship goals, but the increased risk tends to inhibit farmers from converting to organic. This may be especially true of farmers in arable areas.

The uncertainty of receiving substantial organic premiums, together with the growing understanding of organic agriculture's multiple external benefits, provides a strong argument for revising the Organic Farming Scheme to provide on-going, or 'maintenance', payments. Some argue against this, suggesting funds would be better spent elsewhere. Latacz-Lohmann and Foster (1999, p. 281) feel that government policy in the UK should increasingly emphasize development of a more diverse market structure. We agree that that is important, but, on balance, feel that a program of on-going organic payments should be

implemented. The payments should not be so high that they, by themselves, become the driving forces behind expansion of organic agriculture. But, such payments are needed to level the playing field, given the high external costs arising from conventional agriculture.

The other major policy area related to prices and access to markets is that of continued CAP reform. Some aspects of CAP policy still provide price and income signals to farmers that make it more profitable and less risky to stick with intensive, conventional farming systems, rather than less intensive, more ecologically sound systems like organic agriculture. Although Agenda 2000 plans for further reforms of the CAP give higher priority to rural development and agri-environmental measures than in the past, it is not clear that member states will shift policies and funds as quickly as necessary to enable rapid growth in organic agriculture. If governments are slow to make shifts in funds from commodity supports to agri-environmental supports, as Agenda 2000 allows, then organic schemes are likely to compete for resources with other agri-environmental schemes. Growth in organic farming could be slowed by the consequent shortage of money for conversion payments, training, and development of inspection and certification procedures. (Lampkin and Midmore, 2000, pp. 8-10) There are continued pressures from the WTO to further decouple CAP income supports from production, and planned EU enlargement to include Central and Eastern European countries adds financial urgency to further reductions in commodity supports (Pretty, et al., 2001). If the decoupling process continues, farmers will have less incentive to continue intensive farming systems with narrow rotations, and organic agriculture will become a more attractive alternative.

As with the ESA scheme and the CSS, the 'technologies' contextual factor tends to increase the risks associated with organic agriculture and inhibit farmers from adopting the kinds of diverse rotations associated with organic systems. A walk through the fairgrounds at a recent Suffolk Show vividly illustrated the kind of large scale, expensive machinery that is associated with 'modern', specialized agriculture. Organic farmers need more pieces of equipment, but they generally do not need large equipment. They need 'appropriate technology'. By this we mean technology that helps remove much of the 'drudgery' associated with agriculture in the past. We do not mean technology designed for nearly complete elimination of labor from agriculture.

The current 'structure of agriculture' also, for the most part, makes it more difficult for farmers to achieve their goals through organic agriculture. This is most serious in the UK's arable regions. The once close interconnections between crop and livestock enterprises have largely been lost in such areas as East Anglia, just as they have in the vast US 'Corn

Belt'. Organic agriculture thrives on and contributes to these interconnections. Yet public policies have contributed mightily to destroying those interconnections and creating highly specialized crop farms and, increasingly, similarly specialized livestock farms. This has not only been the result of 'farm policies', but also many other policies—including those dealing with transportation, antitrust, and waste disposal. Thus, while agri-environmental policies like the Organic Farming Scheme can play important roles in building more sustainable agricultural systems, governments must soon address more clearly and forcefully the multitude of policies that shape the 'structure of agriculture'.

Finally, we turn to 'social and human capital'. Here, the picture is improving. There is far more social and human capital to support organic agriculture in the UK, and in much of the rest of the world, than there was 10 years ago. Farmer networks are expanding and gaining increased confidence. Most importantly, the general public atmosphere is increasingly supportive of organic agriculture. Organic farmers can be openly proud now of what they are doing and how they contribute to society's objectives. Farm organizations and farm magazines are much more supportive of organic agriculture than in the past. All of this contributes to an atmosphere in which the whole can become more than the sum of its parts.

The most glaring weakness for all types of more sustainable agriculture, however, is the lack of a comprehensive public agricultural extension service.[7] While public extension services in some other parts of the world, including the US, have been slow to adjust to the needs of organic and other forms of sustainable agriculture, they do constitute an existing institution that can provide continuity. The UK's piecemeal approach to funding and providing technical assistance for organic and other forms of sustainable agriculture certainly can not be very cost-effective. In the UK, a range of other organizations have stepped in, but this inevitably leads to gaps in coordination and joint action. Farmers get information from a wide variety of government, non-government, and private agencies[8].

This completes our review of the UK's, and England's in particular, three major agri-environmental schemes—the Environmentally Sensitive Areas Scheme, the Countryside Stewardship Scheme, and the Organic Aid (now Organic Farming) Scheme. Some other agri-environmental initiatives in the UK deserve attention, however. We turn first to some of the initiatives for 'integrated farming systems'.

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[7]For insights on farmers obtaining knowledge for sustainable agriculture, see Hassanein and Kloppenburg (1995) and Heinze and Voelzkow (1993).

[8] (1) Countryside Agency's Land Management Initiatives; (2) National Parks; (3) Farm NGOs, such as Soil Association, Elm Farm, LINK, etc.; (4) Environmental NGOs, such as Farming and Wildlife Advisory Group, Wildlife Trusts, RSPB; (5) the Extension system of the Scottish agricultural colleges; (6) agricultural colleges; (7) private companies; (8) Internet; (9) government bodies.

6. Integrated Farming Systems

Integrated farming systems comprise a stepwise approach to agricultural sustainability, and are located somewhere between conventional and reduced-tillage systems, on the one hand, and organic systems, on the other (Figure 1). They generally are thought to be more ecologically sustainable than conventional and reduced tillage systems, and some people feel that they can be just as profitable. There is a vigorous and often contested debate about the relative merits of integrated and organic systems. Integrated systems normally require less drastic changes in farmers' agronomic and management practices than do organic systems, but whether they can deliver sufficient ecological benefits depends on a number of circumstances.

Integrated farming systems have emerged in recent years as another more environmentally-friendly approach to farming. Once again, the emphasis is upon integrating technologies to produce site-specific management systems for whole farms, incorporating a higher input of management and information for planning, setting targets, and monitoring progress. There are important historical, financial, and policy reasons why still relatively few farmers have taken the leap from 'modern' high-input farming to organic agriculture. But it is possible for anyone to take a small step which can, in theory, be followed by another step. Integrated farming in its various guises represents a step or several steps towards sustainability.

6.1 Schemes

Schemes to promote the use of integrated farming systems in the UK go by various names. LEAF (Linking Environment and Farming), a non-profit organization, uses the terms 'Integrated Farm Management' (IFM) and 'Integrated Crop Management' (ICM) to describe the farming systems approaches it promotes. IFM and ICM are described as approaches that include:

?? use of crop rotations

?? appropriate cultivation techniques

?? careful choice of seed varieties

?? minimum reliance on fertilizer, pesticide, and fossil fuel inputs

?? maintenance of the landscape

?? enhancement of wildlife habitats

To the list for IFM is added 'good husbandry and animal welfare'. Both IFM and

ICM are considered whole-farm approaches to managing resources for profitability and environmental sensitivity. LEAF has demonstration farms and offers consulting assistance and a LEAF Audit. The Audit is a management package that farmers can use to record, evaluate, and improve their farming practices. LEAF also is exploring the use of quality assurance logos to help add market value, similar to ones now used in organic agriculture. (Blake, 1999a, 1999b, and 2000; LEAF, nd,a and nd,b)

The Farming and Wildlife Advisory Group (FWAG) is another non-profit organization that has provided conservation advice to farmers. FWAG, in existence for more than 25 years, has a network of trained advisors located with local groups throughout England and Scotland. It provides guidance on farming practices intended to enhance wildlife without compromising productivity or profitability. Advice is offered in areas such as field margins, wetlands, hedgerows, watercourses, moorland, and woodlands. FWAG's 'LANDWISE' advisory packages take a whole-farm approach to identifying opportunities for enhancing wildlife. Farmers can choose from three different LANDWISE packages, which include: (a) a 'Report', that provides a starting point for farmers wanting to assess their environmental assets and opportunities; (b) a 'Review', that helps a farmer update his plan or develop a rolling program of environmental improvement; or (c) a 'Plan', that is a detailed analysis and plan of action for the farm. While many of the approaches FWAG advisers might recommend are more in the nature of 'practices' (e.g., ones concerning field margins and hedges) than 'system changes', some could be considered *integrated cropping systems* approaches. For example, advise for arable cropping systems includes considerations about rotations, fertilization, pesticide spraying, ploughing, and cultivation. (FWAG, 1998, 1999, nd,a, and nd,b)

6.2 Evaluations

Research in the UK is providing important lessons about integrated crop management approaches (MAFF, 1999b). In the first instance, it appears that farmers can make some small cuts in input use without negatively affecting gross margins. By adopting better targeting and management methods, there is less wastage and the environment benefits. Yields may fall initially, but rise over time. Farmers can then make greater cuts in input use (20-50%) once they substitute some regenerative technologies for external inputs, such as legumes for inorganic fertilizers or predators for pesticides. And finally, they can replace some or all external inputs entirely over time once they have learned their way into a new type of farming characterized by new goals and technologies. But if too many changes

are made too quickly? such as before natural capital in the soil is rebuilt or beetle banks established for predator management? then integrated farming can result in lower yields and lower gross margins. (Pretty, 1998)

Researchers are also learning that while minimal tillage is suitable for many soil types and crops, some soils may require more intense cultivations to maintain structure and create the tilth that is necessary for certain crops; rotational ploughing also may be necessary in some farming systems. Crop diseases often can be managed with integrated approaches that allow the amount of fungicides to be greatly reduced. And, of course, crop rotations play critical roles in pest and disease control. *"The ideal rotation integrates cereals and broad-leaved crops and should include grass or a leguminous crop"* (MAFF, 1999b, p. 11). Research tends to show that output may sometimes drop when integrated crop management is used, but so do costs (MAFF, 1999b, p. 10).

Bailey, et al. (2000) recently summarized economic analyses of the most 'notable' *integrated arable farming systems* (IAFS) experiments in the UK.

> *"The most notable projects investigating IAFS in the UK include the Long Ashton Low Input Farming and the Environment experiment (LA-LIFE) (1989-1999), the LINK Integrated Farming Systems project (LINK IFS) (1992-1997), the CWS Focus on Farming Practice project (CWS-FOFP) (1993 onwards) and the Rhone Poulenc Management Study (RPMS) (1994 onwards)"* (Bailey, et al., 2000, p. 2).

These projects all involve comparisons of integrated farming systems with conventional systems. Design and management of the integrated systems emphasize multifunctional crop rotation, minimal soil cultivation, and integrated nutrient management and crop protection. Both the conventional and the integrated systems involve crop rotations, but the crops and sequences for the integrated systems often differ from those for their conventional counterparts—because of the emphasis on less intensive practices in the integrated systems.

Relative profitabilities of conventional and integrated systems in these studies were analyzed by comparing gross margins (monetary value of total output minus variable or operating costs). CAP area payments were included along with market prices when estimating the value of gross output for each system. Overall conclusions of the baseline analyses were summarized as follows:

> *"The general observations that emerges from these results is that yields are generally reduced in the integrated system, but this is compensated for by reduced variable and operating costs and, in certain cases, by growing the crop for a quality market or for premium prices. The resulting margins in the integrated system are similar to those for the conventional system, sometimes higher, sometimes lower, but not significantly different statistically. This suggests that IAFS can be as financially viable as current conventional farm practice"* (Bailey, et al., 2000, p. 6).

Bailey and colleagues also conducted sensitivity analyses for some of the systems comparisons, to estimate the implications of possible changes in certain policies and exogenous factors. A policy scenario based on world market prices, no (or decoupled) government support payments, and no set-aside resulted in greater reductions in gross margins of the conventional systems than of the integrated systems. Fifty percent increases in chemical input prices reduced gross margins of all systems, of course, but the reductions averaged about £100 per hectare more for conventional systems than for integrated systems. (Bailey, et al., 2000, pp. 6-7)

As did we early in this paper, Bailey and colleagues note the role of risk in farmers' decisions about adoption of new systems. They indicate that conventional arable crop production is getting increasingly risky—as prices fall and fluctuate more due to reduced government intervention, at the same time that costs continue to rise. This increases the incentive for farmers to closely examine profitability, and the resulting focus on cost reduction and careful use of inputs might lead more farmers to integrated crop management approaches. However, attempts to move to substantially different systems generally involve risks, either real or perceived. In fact, early failures within some of the projects examined demonstrate that risks can be real. Moreover, there are no government support schemes in the UK similar to the Countryside Stewardship and Organic Farming schemes to help reduce some of the risk during the transition to new systems. Also, thus far, most integrated systems do not result in any price premiums for the resulting crop output, though quality assurance schemes such as the one planned by LEAF could begin to change that. (Bailey, et al., 2000, pp.7-8 and 14; Blake, 2000)

Bailey, et al. (2000, pp. 8-9) also discuss the increased management skills (human capital) and time involved in integrated arable farming systems. The opportunity costs of farmer time spent in increased management and the out-of-pocket costs for such services as agronomic consulting advice and soil testing add to costs of the integrated systems. These costs often do not show up in gross margin and other types of profitability comparisons. It could be argued that at least some of these costs should be covered by a government agri-environment scheme, at least during a transition period. The strength of that argument depends a great deal on the magnitude of environmental benefits resulting from adoption of integrated systems. Bailey and colleagues examined a number of environmental indicators, and they cite some evidence of environmental benefits? such as reduced nitrogen fertilizer and pesticide use. However, overall, environmental impacts appear inconclusive to them at

this time. They state that some impacts may only be clear over time periods extending beyond a single rotation.

6.3 Conclusions about Integrated Systems

Part of the problem in determining an appropriate agri-environmental policy for integrated farming systems is a definitional one. Some might argue that every 'modern' farmer employs *integrated* systems. Otherwise, he or she simply could not remain competitive. However, such an all-inclusive use of the term integrated is hardly meaningful from the standpoint of ecological sustainability. At the other extreme, some might argue that only organic systems are integrated in the most complete sense. Yet, surely, there are many farmers employing systems which fall short of being organic but which are sufficiently integrated to provide real environmental benefits. The practical problem for policy is how to establish definitions and indicators that allow meaningful distinctions among various systems between the two extremes. If such distinctions can be made, then a policy approach that includes some forms of transition assistance is possible.

7. Nitrate Sensitive Areas Scheme

The Nitrate Sensitive Areas (NSA) scheme in England started with 10 pilot areas in 1990, and expanded to a total of 32 in 1994. By the time the scheme was closed to new entrants in 1998, 447 farmers had participated in NSA agreements. This was 73% of the farmers who were eligible to participate, and the 28,241 hectares of land included in agreements constituted 80% of the eligible area. Payments to farmers in England under the NSA scheme totaled £3.6 million in 1996, and had risen to over £6 million by 2000 (Table 5). A little more than 200 NSA agreements were still in effect in 2000, and payouts will continue until those agreements are completed. (MAFF, 1999e, pp. 4 and 43; MAFF, 2000b, p. 129 and Annex V, pp. 30 and 32; MAFF, 2000e; Pretty, 1998, p. 76)

Table 5. Expenditures on Nitrate Sensitive Areas (NSA) scheme in England

Year	Payments to farmers (£1000)
1996	3,625
1997	4,077
1998	4,680
1999	4,748
2000	6,150

*Data reported by fiscal year, so 1995/96 considered 1996, etc.; 2000 is forecasted.

Source: MAFF, 2000b, Annex V, p. 30

Unlike the Nitrate Vulnerable Zones (NVZ) program, the NSA was a voluntary scheme. Farmers could receive payments, under 5-year agreements for three different types of voluntary measures (MAFF, 2000e):

i) The Premium Arable Scheme. This provided payments for converting arable land to extensive grass. Enrollment under this option totaled 7,442 hectares.

ii) The Premium Grass Scheme. Under this option, farmers were paid for extensification of grass that had been managed intensively. Fewer than 600 hectares of land were enrolled in this option.

iii) Basic Scheme. Most land under NSA agreements—20,217 hectares—was enrolled under this option, which provided incentives for low-nitrogen arable cropping. Payment rates depended on the rotation and degree of nitrogen restriction. Farmers could receive £80-105 per hectare per annum (depending on the geographic

area) if no potatoes or vegetable *brassica* crops were grown and nitrogen was limited to 150 kg per hectare per year. Payment rates were £65 per hectare if nitrogen was limited to 150 kg per hectare per year in 4 out of 5 years and 200 kg in the fifth year.

7.1 Evaluations

Uptake by farmers in the NSA scheme was high, and MAFF has reported a 20% reduction in fertilizer N use during the scheme, as well as reductions in nitrate losses (MAFF, 1999e, pp. 43-44). An evaluation of the initial 10 pilot NSAs indicated that nitrate losses were reduced by approximately 30%, considering all land within those NSAs. Reductions brought nitrate concentrations in about half of the 10 pilot NSAs to below or very close to the EU's 50 mg/l limit for drinking water. (Lord, et al., 1999, p. 207) This evaluation concluded:

> *"The pilot NSA Scheme demonstrated the effectiveness on commercial farms of several measures designed to reduce nitrate losses from the soil zone. The greatest single contribution to the reduction in nitrate loss, especially on four of the NSAs, was improved management of the very large local quantities of manure from pig and poultry holdings. Conversion of arable land to low-input grassland reduced losses by at least 80%, and thus made a substantial contribution although limited areas were involved. Within the Basic option the greatest reductions resulted from the use of cover crops over winter on land which would otherwise be bare; and improved management of livestock manures and fertilizers.*
>
> *The study demonstrated that nitrate loss control measures can be incorporated within commercial farming systems, subject to recompense for income foregone and extra costs incurred"* (Lord, et al., 1999, p. 207).

Although the NSA scheme seemingly was successful, reliance is now being placed on the NVZ program. There are 68 NVZs in England and Wales, 1 in Scotland, and 3 in Northern Ireland. A mandatory 'action program' of measures for controlling nitrate concentrations in surface waters and groundwaters came into effect for the England and Wales NVZs, covering about 600,000 hectares, in December 1998. The NSAs all fall within the NVZs. (MAFF, 1999e, pp. 3 and 43; MAFF, 2000e) Therefore, the emphasis is shifting from voluntary measures to mandatory measures. This seems to be in line with EU policies for controlling nitrate contamination of drinking water.

7.2 Conclusions about Nitrate Schemes

MAFF argued that the incentive-based NSA scheme made it possible to induce

farmers to go beyond simply 'good agricultural practices', to carry out practices that otherwise would not otherwise be economically justifiable (MAFF, 2000e). It is not clear if dropping the NSA Scheme and placing full reliance on the NVZ mandatory measures is a partial retreat from control measures that (in the absence of compensation) adversely affect farmers' profits or if it is, in effect, a move closer to 'polluter pays'. If, indeed, the UK is moving closer to the polluter pays principle for reducing nitrate externalities, is this a forerunner for other areas of agri-environmental policy?

That depends a lot on how the emerging co ncept of 'multifuntionality' is interpreted and applied. It is quite possible, and not necessarily inconsistent, to move in two different directions at the same time. One direction, exemplified by the current policy direction for nitrate externalities, is to require farmers to avoid practices that have clearly adverse effects on society at large. The policy mix in such a polluter pays approach could include a combination of regulations and taxes on practices and inputs that cause public harm.

The other direction, which has predominated thus far in Europe and the US, is to pay farmers for utilizing practices that produce public goods and positive externalities. With this perspective, producing wildlife habitat or scenic vistas is considered to be 'producing a good', rather than 'avoiding a bad'. The *multifunctionality* concept views agriculture as a sector that is capable of producing many different 'goods'—in addition to marketable food and fiber—thereby providing a rationale for public compensation, rather than regulation. Whether a particular agricultural practice or system is viewed as 'producing a good' or 'avoiding a bad' is clearly a matter of perspective. Nevertheless, in the real world of policy, we are likely to see public support for paying farmers to do some things that are 'good' for the environment, at the same time that public sentiment insists on uncompensated regulations to prevent certain practices or systems considered 'bad' for the environment.

8. Brief Summaries of Other UK Joint Agri-Environmental Schemes

Several other agri-environmental schemes have been or are being carried out in the UK, some on a pilot basis. Evaluation evidence is as yet quite limited for these schemes, but some may hold out real promise. Therefore, we briefly discuss here the Arable Stewardship scheme, one of the Countryside Agency's Land Management Initiatives, Wales' Tir Gofal scheme, and the Countryside Premium Scheme in Scotland.

8.1 Arable Stewardship Scheme

The Arable Stewardship scheme was introduced in 1998, as a 3-year pilot program under the Countryside Stewardship Scheme. One of the primary objectives of this program (which comprises a collaboration between MAFF, the RSPB, English Nature, and the Game Conservancy) is provision of improved habitat for farmland birds. The program is intended to enhance wildlife habitats on arable farms through improved plant, insect, and spider biodiversity. Farmers can sign up for a number of different options, normally under agreements that last for 5 years. There are two pilot areas, one in the West Midlands and one in East Anglia. The latter project covers an area primarily south and east of Cambridge, with Bury St. Edmunds on the NE corner, Braintree on the SE corner, and Bishop's Stortford on the south-center edge. Only £0.5 million per year was initially budgeted for the Arable Stewardship scheme. By the end of 1998, the first year of the scheme, there were 78 farmer agreements covering 2,472 hectares. (Baldock and Mitchell, 1998, p. 11; Hanley, et al., 1999, p. 71; MAFF, 1998a; MAFF, 2000a; MAFF, 2000b, p. 32 of Annex V)[9]

A central issue in policy decisions about possible broadening and extending the Arable Stewardship scheme concerns the level of payments. Payment levels are shown in Table 6. Most of the options and supplements involve 'greening the edges' to provide bird and other wildlife habitat. Payments for these individual practices run from £55 to £200 per hectare, and field margins and strips are compensated at rates ranging from £15 to £70 per 100 meters of length (width ranges shown in Table 6). Option supplements that come closer to 'greening the middle' by altering rotations are much more expensive. Supplements that involve spring/summer fallow or keeping a ley until the following summer involve annual payments of £540 - £600 per hectare. Many observers feel that the payment rates for this scheme are so high that the program simply is not replicable on a much wider scale. It also

[9]The RSPB reviewed progress under the Arable Stewardship scheme through 1999, and staff shared with us a January 2000 draft of the report which covered this and other principal agri-environmental schemes in England. However, the final version of RSPB's report was not yet available in early 2001.

represents much higher payments than those to farmers arising from conversion to organic practices.

Table 6. Payments allowed under Arable Stewardship scheme options

Options	Total payment rate (£/hectare/year, except where indicated)
1. Overwintered stubbles	55
plus restricted use of herbicide in previous crop	80
plus a spring cultivation followed by spring/summer fallow	540
plus followed by a spring crop	90
Maximum when some of the supplements are combined	**565**
2. Undersown spring cereal crop	180
plus preceded by overwintered stubbles	200
plus keeping a ley until the following summer	600
Maximum when some of the supplements are combined	**620**
3. Insecticide restricted cereal crop margins	20
plus restricted herbicide use (i.e., a conservation headland)	100
plus restricted herbicide use and no fertilizer applications	150
4. Field margins and strips	
a. Grass margins 4 – 12 meters wide	£23 - £70/100 meters
b. Beetle bank	£15/100 meters
c. Uncropped wildlife strip 4 – 12 meters	£23 - £70/100 meters
5. Wildlife seed mixtures	agreed costs of proposals

Source: Adapted from MAFF, 1998a

8.2 Land Management Initiatives

England's Countryside Agency was established in early 1999, the result of a merger of the former Rural Development Commission and Countryside Commission. This new agency has lead responsibilities for conserving and enhancing the English countryside and for promoting social and economic opportunities for people in rural areas. It is in a position to help integrate agri-environmental and rural development concerns and strategies. The Countryside Council for Wales has similar responsibilities in Wales (Countryside Agency, nd,c and nd,d).

As part of its efforts to establish sustainable agriculture approaches and influence reforms of the CAP, the Countryside Agency is in the process of launching a set of Land Management Initiatives across England. Twelve different initiatives were scheduled to be launched between 1999 and 200l; this has been changed to nine initiatives. Arable, lowland pasture, upland, and wetland agricultural conditions will be represented. The Countryside Agency will work with the Environment Agency, MAFF, and other government and non-government organizations in carrying out these initiatives. (Countryside Agency, nd,b;

Countryside Agency, nd,d, p. 11; Countryside Agency, 2000)

One of the first of these initiatives to be launched, the Norfolk Arable Land Management Initiative (NALMI), is of special interest to us because of our concerns about agri-environmental policy for arable areas. Countryside Agency staff for NALMI are working in a mid-Norfolk area consisting of 13 parishes and approximately 90 farmers[10] to strengthen agriculture, both economically and environmentally (Countryside Agency, 2000; Hall, personal communication, 2000). Examples of ways in which they plan to accomplish this are shown in Box 1.

Box 1. Description of Norfolk Area Land Management Initiative (NALMI)

?? Working with farmers, landowners, and local people, the principle aim of the NALMI is to develop a new policy framework capable of encouraging and supporting sustainable land management. The NALMI is generating and testing innovative ideas from farmers and local people that will demonstrate the multifunctional nature of land management, illustrate the importance of sustainable resource use, contribute to sustainable development of the local economy, and help to meet the stated needs of local communities.

?? The project is developing a set of practical indicators of sustainable land management (working with the University of Essex/Unilever initiative) that will stress the multiple benefits to farmers themselves of changing to more sustainable land management. In addition, the project is helping to formulate the basic 'Duty of Care' for farmers, which will form the baseline upon which agri-environmental payment will be based.

?? Technology transfer is an important part of the project, and training is provided to farmers to support the use and understanding of agricultural techniques (such as Integrated Crop Management) to promote more diverse arable systems, improve the efficiency of use of all agricultural inputs, benefit landscape and wildlife, and enhance the sustainability of resource use. Farmers will be encouraged to work in groups, particularly in watersheds, but also in groups meeting the needs of particular communities or providing for new markets.

?? The NALMI conducts an annual research program which has identified local issues (such as climate change, rural stress, rapid farm restructuring, unsustainable soil and water management, and problems associated with planning restrictions) and seeks practical solutions to these problems when drawing up whole-farm plans with each of the farmers. This research program includes a search for new farm income from non-traditional sources such as carbon sequestration and water harvesting.

?? An important part of the project is finding out the distinct needs of the 13 local communities and then seeking natural linkage between rural policy and land management policy to meet these needs. A community officer is employed to listen full time to people's needs and aspirations for their community and the surrounding land. Village appraisals identify which features of their surroundings people most identify with and value. Where possible, local people are encouraged to offer voluntary work to care for key landscape features, thus regaining feelings of 'ownership' that have been lost for many years. Poverty in the area is dispersed, and the NALMI is looking for new ways to meet the needs of those who are socially excluded.

?? Finally, the NALMI seeks to integrate sustainable resource use together with economic development, environmental enhancement, and social progress in each of its small pilot projects. From the success or failure of each of these projects (to be judged by the people involved in the projects), policy guidelines will be drawn with the aim of widening the scope of the Common Agricultural Policy to include integrated and sustainable rural development that meets the needs of farmers and local people in an area of intensive arable production.

Source: Hall, personal communication, 2000 (near-direct quote)

An important feature of NALMI is its emphasis on a combined whole-farm and whole-region approach. The process on each farm starts with a whole-farm survey.

[10]This was the approximate number of active farmers in the project area as of 2000, about 10 fewer than when baseline research for the project was conducted in 1997.

Following that, and based on the survey, a list of environmental and developmental opportunities is identified. NALMI staff help participating farmers identify and acquire new techniques and skills they may need to capitalize on these opportunities. Since new farming system approaches may cost farmers time and money, NALMI will help offset these costs, in large part by helping farmers to gain access to funds from other programs such as the CSS and from EU sources. NALMI's whole-farm approach relies heavily on self-auditing. The initiative involves partnerships with such projects as LEAF, discussed in an earlier section of this report. NALMI staff expect to use holistic approaches with about 50 farms in the project area. (Countryside A gency, nd,a, 1999, and, 2000).

If successful, the NALMI could set the stage for broader agri-environmental efforts in arable areas of the UK. The whole-farm approach being used is a necessary, but not sufficient, condition to really 'green the middle' in arable areas by fostering more diverse rotations and mixed farming. It remains to be seen if NALM will be able to help farmers gain access to sufficient financial incentives and strengthen their stewardship orientation sufficiently to induce such major changes in arable farming systems.

8.3 Tir Gofal, in Wales

Tir Gofal ('Land in Care'), and its predecessor Tir Cymen ('Tidy Land'), in Wales is a good example of a whole-farm agri-environmental approach. Tir Cymen was the Welsh companion to England's CSS. Tir Cymen showed how environmental management can by integrated with agricultural production. It provided annual payments in return for farmers agreeing to follow sustainable management guidelines as part of a whole-farm plan. Priority was given to activities which offered the most public benefit in environmental terms. Farmers were obliged to follow the scheme's code on the whole farm for 10 years, making improvements to arable and livestock components, woodlands, archeological features, stone and slate walls, and buildings. The management guidelines encouraged environmental improvements throughout farms, including the transition to more sustainable in-field farming practices. (Pretty, 1998, pp. 76 and 297-98)

The Tir Cymen scheme was very successful in many respects. In addition to the environmental benefits provided, the scheme had a substantial positive effect on farmers' incomes and on local job creation. There were substantial multiplier effects on local communities through purchases of materials and services by farmers in the scheme and through other purchases. (ADAS, 1996, as cited in Pretty, 1998, pp. 76, 259, and 298-99) The strong multiplier effect on local communities may have been due in part to Tir Cymen's

whole-farm agreements and close partnership between farmers and external authorities.

Tir Gofal is the new agri-environmental scheme that replaces Tir Cymen, ESAs, and the Habitat Scheme in Wales (Short, et al., 2000, p. 94). It was launched as a nationwide scheme in 1999.

> *"The new scheme offers annual whole farm area payments of up to £3000 a unit, plus a mixture of payments for mandatory and optional habitat management agreements and capital works. Individual farms can also boost total grants to a ceiling of £5000 a year by providing permissive access"* (Tir Gofal's £12.4m budget . . ., 1999)

Like Tir Cymen, Tir Gofal has a *"mandatory land management requirement which applies to all land under the same management regime"* (Short, et al., 2000, p. 94). The £12.4 million budget that initially was established for the first 3 years of Tir Gofal was very quickly fully subscribed. Only 1,800 farmers were able to get in on the enrollment that committed those initial funds. (Tir Gofal's £12.4m budget . . ., 1999) The enthusiasm for the newly launched Tir Gofal attests to the success and popularity of its predecessor Tir Cymen scheme.

The annual budget for Tir Gofal is projected to rise from £5.5 million to £16.4 million in 2006/07. Modulation (shifting of CAP funds from agricultural production supports) is expected to make an additional £18.5 million available for Tir Gofal over the 5-year period to 2006/07. (Christie and Adams, 2000, pp. 6 and 33)

8.4 Countryside Premium Scheme, in Scotland

The Countryside Premium Scheme (CPS) in Scotland was launched in 1997. The scheme combined elements from several previous schemes, including Scotland's Habitat, Heather Moorland, and Set-aside schemes. It was open to all farmers and crofters who are not in designated ESAs. Participation was voluntary, and applications were considered in relation to local conservation priorities. As part of their application, farmers submitted a Conservation Audit, which was an inventory and conservation assessment of the habitats and features of the farm. In some cases, a Moorland Management Plan also had to be submitted with the application. If accepted into the scheme, farmers committed themselves to 5-year management agreements. (Baldock and Mitchell, 1998, p. 8; Pretty, 1998, p. 76) Participating farmers had to agree:

> "not to undertake new drainage works, ploughing, clearing, levelling or re-seeding; not to apply pesticides (without written permission from local agricultural officials), lime or fertiliser to any kind of grazing land, pastures, water margin, wetlands, woodlands, or scrub; not to clear hedges, woodland or scrub; not to remove or destroy designed landscapes, drystone walls, individual trees, or parkland fencing without written permission; and to protect features and areas of

historical or archaeological interest" *(Baldock and Mitchell, 1998, p. 8).*

A range of payments was available for both management options and capital works. The CPS also included some free conservation awareness training for farmers and crofters (Baldock and Mitchell, 1998, p. 8).

There was significant interest in the CPS, but only about 50% of the applications were approved. Consequently, only around 1,300 farms were enrolled by the end of 1999—approximately 8% of the potential units in Scotland. CPS expenditures were approximately £3 million, £6 million, and £7.8 million in 1997/98, 1998/99, and 1999/2000. Expenditures for future management agreements will be under the CPS's successor, the new Rural Stewardship Scheme for Scotland. (McKnight, 2000, pp. 5-6)

9. Lessons Learned

The UK's major agri-environmental schemes of the past 15 years have contributed substantially to 'greening agriculture's edges', but they often have fallen short of 'greening the middle', particularly in the more productive arable areas. The potential interplay of agri-environmental policies and several major contextual factors was discussed toward the beginning of this report, with reference to Figure 1. We have now summarized some of the results of our assessment with respect to the ESA, CSS, and organic agriculture schemes in Table 7. This summary seeks to demonstrate why the 'middle has not yet been greened'.

Table 7. Effects of agri-environment policies on farmers' goals, and the influence of contextual factors

Contextual Factors	Effects of different agri-environmental policies on farmers' goals								
	ESA Scheme			CSS Scheme			Organic Agriculture Schemes		
	Income	**Risk**	**Stewardship**	**Income**	**Risk**	**Stewardship**	**Income**	**Risk**	**Stewardship**
	Increases farm income in marginal areas	Decreases risk in marginal areas	Supports creation of natural capital	Increases farm income in marginal areas	Decreases risk in marginal areas	Supports creation of natural capital	Organic Farming Scheme supports income more effectively than former Organic Aid Scheme	Decreases risk during the transition stage	Supports creation of natural capital through emphasis on rotations, etc.
Prices and access to markets	Hard to compete with CAP income supports in arable areas	CAP policies reduce risk of conventional agriculture, and make ESA less attractive		Hard to compete with CAP income supports in arable areas, except for field margin payments	CAP policies reduce risk of conventional agriculture, and make CSS less attractive		Organic price premiums enhance farm income, on average; however, CAP supports still inhibiting	Organic price premiums more volatile, especially compared to CAP supports	
Technologies			Current technologies not friendly to sound stewardship			Current technologies not friendly to sound stewardship		Current technologies reduce risk of conventional agriculture	Expensive, large-scale machinery not friendly to rotations
Structure of agriculture		Changing structure may make ESA more attractive to small farms	Large-scale, industrial style systems not friendly to sound stewardship		Changing structure may make CSS more attractive to small farms	Large-scale, industrial style systems not friendly to sound stewardship			The decline of mixed crop and livestock farming in arable areas makes organic farming more difficult
Social and human capital		Lack of social capital makes it more risky to deviate from conventional norm			Lack of social capital makes it more risky to deviate from conventional norm			Networks and public attitudes have decreased social risk of converting to organic agriculture	Social and human capital now much more supportive of organic ag than in the past; however, extension a weakness

Although the ESA and CSS schemes have somewhat different purposes and design, their overall effects in the UK have been similar. The stewardship payments offered

under these schemes have generally been attractive to farmers in the more 'marginal' agricultural areas; the payments tend to raise and stabilize overall farm incomes for farmers in hill areas and lower-yielding arable areas. The planning and technical assistance offered support the achievement of stewardship goals. However, in the more productive arable areas, such as East Anglia, it has been difficult for the stewardship payments offered under the ESA and CSS schemes to compete with the income support and risk-reducing CAP policies available to specialized, conventional farmers. Just as in the US Midwest, it is difficult to induce farmers away from systems that involve only a few crops, relatively routine operations, and substantial government subsidies. The fossil-fuel and agrochemical-based technologies and large-scale agricultural structure which have evolved over the last 50 years also inhibit a return to more diverse and management-intensive farming systems. There also is too little social capital adequately to support movement to more complex, integrated farming systems, though necessary networks, marketing institutions, and support groups are beginning to take shape.

The overall trend toward large-scale, 'industrial-style' agriculture could make schemes like the ESA and the CSS more attractive to operators of small farms. Those farmers may find it more attractive to accept stewardship payments in return for farming less intensively than to continue farming very intensively and scramble for access to markets in the 'industrial' agri-business system. Unfortunately, for reasons of impact and costs of administration, these schemes have been biased toward large farms.

The Organic Farming Scheme replaced the earlier Organic Aid Scheme in the UK in 1999. Payments to farmers undergoing the shift to organic agriculture are now much more attractive than were payments under the previous scheme. These payments raise the profitability and reduce the risk for organic farmers during the transition stage. Once farmers qualify to sell their products as organically certified, average profits in many cases may exceed those of conventional farmers with roughly equivalent land, especially during this period of extremely depressed prices for many conventional agricultural commodities. However, price premiums and access to organic markets involve greater risk than farmers face when marketing conventional commodities. The greater market and price risk of organic farming is especially apparent when comparing an organic crop or livestock product that receives little support under the CAP with conventional crops and livestock to which generous income supports are still tied. As long as CAP supports remain at least partially coupled to production of crop and livestock commodities, there will be fewer incentives to switch to the more diverse—and often 'mixed' crop/livestock—organic systems.

The structure of agriculture which has evolved since World War II in the UK, especially in the principal arable areas, with larger farms and much less mixed farming than in the past, is 'unfriendly' to organic farming. Similarly, production technologies geared to large-scale machinery inhibit the adoption of crop rotations involving several different types of crops? a central feature of many organic crop farms. Also, the emphasis of most public and private sector agricultural research on chemical pest control has reduced the short-term risk to farmers with narrow, specialized systems, thereby reducing the need for diversity as a risk management tool.

On the positive side, social and human capital to support organic agriculture has increased greatly over the past decade. Farmers in the UK have witnessed growth in the 'social acceptability' of organic farming, as well as an expanded network of support institutions. Largely as a result of their own experience and mutual support, farmers themselves now have much more knowledge of *how* to farm organically than they did in the recent past. One noticeable remaining weak link in the area of social and human capital for organic (and other forms of sustainable agriculture) in the UK, however, is the quasi-private and fragmented system of extension services.

What lessons can be drawn from the UK's experience with the ESA, the CSS, organic agriculture, and several other agri-environmental schemes that we reviewed for this report? The following lessons, in our view, stand out.

9.1 Legume-based Rotations in Arable Areas

A bold initiative to reintroduce legume-based rotations in the UK's arable areas is needed if the trend of ever-increasing dependence on chemical inputs and continued decline in soil quality is to be altered. UK agri-environment schemes available to date have not been up to that task, though the Countryside Agency's NALMI offers promise? if it can draw on sufficient financial resources to provide adequate incentives for farmers. We propose the creation of a new pool of agri-environmental money, labeled the *Natural Capital for Food Security Fund*. Such a label would provide recognition that a high public priority should be placed on protecting any nation's soil, for the security of long-run food production capacity. It has long been known that cropping systems which include regular rotation of forage or green manure legumes contribute greatly to creation of the soil's natural capital (Balfour, 1943; Doran and Werner, 1990, p. 217; Power, 1990; Pretty, 1998; Peterson, et al., 2000).

More systematic and widespread use of legume-based rotations in the UK's arable regions would offer other public and private benefits in addition to enhancing soil quality.

Habitat for birds and other wildlife would be enhanced, and externalities associated with soil erosion would be reduced. The accompanying decrease in manufactured fertilizers and pesticides needed for fertility and pest control would most likely improve water quality.

Moreover, having a higher proportion of arable hectarage in forage and green manure legumes would inevitably mean some decline in hectarage of grain and oilseed crops(unless more can be done with intercropping and / or break crops). That would reduce supplies of grains and oilseeds entering the market. If similar policies and shifts took place throughout the EU and North America, the prices farmers receive for those grains and oilseeds should then rise. In the short term, at least, market prices for forage legumes would fall. However, over time, the increased forage hectarage would make it more attractive for livestock to return to the arable areas, thereby causing a resurgence in mixed farming. Mixed farming, as we know, contributes to nutrient recycling and, in turn, further enhances the creation of natural capital.

Widespread adoption of a voluntary legume-based agri-environment scheme could eliminate the need for mandatory land 'set-aside' programs to reduce 'surpluses'. However, the EU or individual member states may wish to continue set-aside requirements for wildlife habitat or other purposes. Current set-aside rules call for a number of environmental measures aimed primarily at protection of habitat and species (Dwyer, et al., 2000, pp. 25-26 and 28-29). For farmers choosing the 'rotational set-aside' option, more stringent soil building requirements? such as the use of green manure legumes? could be established.

The *Natural Capital for Food Security Fund* could be established and implemented in one of two ways. The first way would be to create a new, freestanding agri-environment program, with its own rules and criteria for expenditures from the fund. With this approach, the program would be designed to complement other schemes like the CSS and the Land Management Initiatives. The other, and probably preferable, approach is for this fund to be created as a distinct entity within an expanded CSS. New (or revised) rules and criteria would need to be developed, but the funds would be administered under the CSS and could be drawn upon by programs like NALMI. The important point is that the specific purpose of this new fund would be to aggressively promote legume-based crop rotations in the arable areas.

Some moves, thus far very tentative, have been made in the US in recent years specifically to target support for diverse crop rotations. The 1996 FAIR Act included a Conservation Farm Option (CFO), which was intended to offer a flexible and innovative approach to encouraging environmentally sound farming practices. Farmers would be able

to receive 10-year contracts containing incentives for approaches that might include long-term resource conserving crop rotations based upon whole-farm plans (Center for Rural Affairs, 1998, p. 1). Rules for implementation of the CFO finally were completed by 1998, but no funds have ever been expended on the program.

The Conservation Security Act, first proposed by Senator Tom Harkin, of Iowa, in 1999, was introduced in the US Senate and House of Representatives in May 2001. The proposed Conservation Security Program (CSP) could represent a dramatic break with past US farm policies if it were to become the centerpiece of legislation replacing the 1996 FAIR Act after 2002. The proposed CSP would pay participating farmers based upon three alternative classes or tiers. Tier I practices such as nutrient management and soil conservation in the CSP would qualify farmers for up to $20,000 in annual payments for 5 years. Those participating in Tier II practices, which could include controlled rotational grazing and partial-field practices like buffer strips and windbreaks, would qualify for up to $35,000 per year for 5 to 10 years. Farmers participating at the Tier III level would need to have a whole-farm plan covering all resource concerns of the operation, and could receive up to $50,000 each year for 5 to 10 years. Legume-based crop rotations presumably would fit very well in the Tier II and III categories. (United States Senate, 2001)

It remains to be seen if the Conservation Security Act will become law in the US, but Senator Harkin now Chairs the Senate Agriculture Committee, and the proposed legislation is receiving major attention in Washington and throughout the US. Even if passed and enacted, there is the question of 'How aggressively will soil building rotations be pursued in Tier II and Tier II contracts?' If both the US and EU member states were simultaneously to pursue aggressive soil building programs centered on legume-based rotations, then within a few years a new trans-Atlantic consensus might begin to emerge about more sustainable farm policy for the 21st century.

9.2 Financial Assistance to Organic Farmers beyond the Transition Period

The UK's recently introduced Organic Farming Scheme, with its higher conversion payment levels, is attracting much more farmer interest than did the previous Organic Aid Scheme. Part of the interest is due to the depressed condition of markets for conventionally grown crop and livestock products, together with expectations for substantial organic price premiums once farmers have gone through the conversion stage and become certified. However, if some of the more ambitious targets for expanded organic production in the UK and elsewhere in Europe are achieved in the years ahead, organic price premiums for many

commodities may be rather modest. Interest in organic agriculture could then wane, and we might even see significant reversion to 'conventional' production by farmers who had made the conversion to organic? especially in the more productive arable areas.

We believe there is a strong case for ongoing payments to organic farmers once they are beyond the transition stage, and that the Organic Farming Scheme should be amended accordingly. There is ample evidence that organic agriculture has strong natural capital-building properties, and that negative externalities are substantially less (and positive externalities greater) than with conventional agriculture (Lampkin and Padel, 1994; Pretty, et al., 2001). Therefore, it is in the public interest to have some significant portion of the UK's hectarage under organic production methods. Organic 'maintenance' payments can be justified to help achieve that objective. Payment levels, of course, should be lower than those of the transition period. Also, care must be taken not to set the payment levels so high that farmers use organic methods only, or primarily, to qualify for the payments. If organic assistance programs are truly successful, they will have gradually induced a different way of thinking about agricultural production. Farmers who have gone through the transition stage for a few years and have successfully produced organically hopefully will see the multiple benefits and satisfactions of the more ecologically-based approach to farming, and will *want* to continue in organic production. The maintenance payments would be intended to provide partial compensation to organic farmers for their production of positive externalities (and reduction of negative externalities), and to help make it feasible for them to remain organic in times when price premiums may be modest or non-existent.

If a system of organic maintenance payments were incorporated in the Organic Farming Scheme, farmers receiving the maintenance payments would not <u>also</u> qualify for payments under our proposed *Natural Capital for Food Security Fund* (described in the previous section). To quality for organic aid, arable farmers generally must have systematic rotation plans that include forage or green-manure legumes. Therefore, there would be no point in paying them twice for using legume-based rotations. However, policies for establishing payment rates under an 'integrated' but non-organic scheme (i.e., under the *Natural Capital for Food Security Fund*) and an organic assistance scheme would need to be closely coordinated. Organic agriculture has a more complete and demanding set of standards than would an integrated scheme calling only for legume-based rotations. There could be more yield reduction for organic farmers, but often they may benefit from price premiums. Organic agriculture probably results in greater positive externalities than does integrated agriculture. Therefore, several factors w ould need to be taken into consideration

in setting relative payment levels. On balance, we would envision organic maintenance payments being somewhat higher than payments merely to maintain legume-based rotations.

9.3 Continued Reform of the European Union's Common Agricultural Policy

Even major agri-environmental initiatives like the creation of a *Natural Capital for Food Security Fund* and the addition of 'maintenance' payments to the Organic Farming Scheme are likely to have quite limited impacts in the UK's major arable areas unless there is further reform of the EU's Common Agricultural Policy (CAP). Although major reforms were begun in 1992, CAP policies still heavily reward and reduce the risks of conventional production systems.

Some 'decoupling' of income supports from production decisions did arise after the 1992 MacSharry reforms. Commodity-specific price supports were lowered, and to compensate farmers for the income losses thereby incurred, the Arable Area Payment Scheme (AAPS) was created. Under the AAPS, farmers receive flat, per-hectare payments for various 'eligible' crops on 'eligible' hectares. The 'Main' scheme has land set-aside provisions, but operators of relatively small farms (with the equivalent of cereal production up to that obtainable on approximately 16 eligible hectares, in England) can choose the 'Simplified' scheme that does not require set-aside. Per hectare payments differ for cereals, oilseeds, and proteins, so farmers' decisions about how much land to devote to each of those crop categories still influence the total payments they receive (and equally, payments influence farmers' choices).

Moreover, the area devoted to forages is influenced by livestock 'headage' payments under programs such as the Beef Special Premium Scheme and the Sheep Annual Premium Scheme. Within the headage payment schemes, there are complicated provisions consisting of both ceilings and incentives to reduce stocking densities. The ways in which these various CAP crop- and livestock-based payment schemes and provisions interact to influence farmers' enterprise allocation decisions is extremely complex, making predictions about farming systems very difficult. (Vavra and Colman, 2000)

As in the US, where a greater degree of 'decoupling' actually has occurred, powerful incentives remain in the EU to 'farm the farm programs, rather than farm the land'. Thus, these programs have numerous distorting effects, including discouragement of biologically diverse and ecologically sound crop and livestock systems. Risks for 'eligible' crop and livestock enterprises are substantially reduced, relative to enterprises not eligible for income

support. Also, program complexities reward size, as the larger and more specialized farming operations can best afford the management time and money for consulting assistance to maximize returns from the 'farm programs'. We noted at several points in this report that CAP policies have been especially inhibiting in major arable areas for schemes like the CSS and Organic Aid. Farmers in areas like England's East Anglia generally have been too well protected by the CAP to find it economically attractive to make the major farming system changes that would be called for if they were to accept organic conversion payments or participate in the higher payment tiers of other agri-environment schemes. The EU presumably will find it necessary to continue on the 'decoupling' path because of World Trade Organization (WTO) agreements. However, even aside from WTO considerations, it is imperative for 'headage' payments to be eliminated and for the various subsidy mechanisms that induce farmers to focus on just a few major crops to be discontinued. Until that happens, obtaining high farmer participation rates in agri-environmental schemes or tiers that 'green the middle' in major arable areas will require such high payment rates that they are likely to be deemed politically unacceptable.

We are not naïve about the political difficulty of completing the CAP reform process that began in 1992. Nor are we advocating that farmers be left totally to the mercies of the market. What we are advocating is a major shift away from production-oriented policies and toward policies that directly support stewardship and social concerns. Even though the 1996 FAIR Act constituted a major step in the US toward decoupling income support from production, there are still strong political pressures there to, in effect, recouple. It will only be politically possible to complete the decoupling process in both the US and the EU if there is a shared perception that the decoupling is 'for real' on both sides of the Atlantic.

9.4 Merge the ESA and the CSS

It is probably time to merge the ESA and CSS schemes in England. The ESA scheme was created to target designated habitats and landscapes in England, Scotland, Wales, and Northern Ireland. Later, the CSS was created to provide environmental protection for landscapes and habitats outside the designated ESAs in England. More emphasis is placed on environmental *enhancement* in the CSS than in the ESA scheme. However, the ESA and CSS schemes have evolved in such a way that their objectives and approaches are very much alike. There appears to be growing sentiment for merging the schemes. Judging by projected expenditures of future funding of agri-environmental schemes in England, it appears that the CSS will be the central focus. It would appear to make a great deal of sense to let current

ESA contracts expire and to fold all new enrollments or re-enrollments into an expanded, countrywide CSS. The CSS would cover a wide range of environmental concerns and would cover all of England, including agricultural land that had been within designated ESAs.

Combining major agri-environmental schemes into a single, comprehensive scheme is the approach being used in Scotland. There, the Countryside Premium Scheme and the ESA scheme are being combined in a new Rural Stewardship Scheme. In Wales, Tir Gofal has now combined and replaced several major agri-environmental schemes, including Tir Cymen and the ESA scheme. It is a logical progression to experiment with several different schemes, as was done in the UK from the late-1980s through the 1990s, and then combine what works best into a single major scheme or, at least, fewer schemes. At that point, the various scheme elements can be more efficiently targeted and coordinated than would be possible by continuing several parallel schemes.

It might also make sense sometime to fold the Organic Farming Scheme into an expanded CSS. However, now is not the time. Organic farming will continue to need its own distinct focus during the first decade of the new millennium. However, if maintenance payments are added to the Organic Farming Scheme, as we have proposed, it will be especially important for regulations and payment rates to be closely coordinated with stewardship regulations and payment rates under the CSS.

We recommend an increased emphasis on *whole-farm* planning in a revised and expanded CSS. The *whole-farm* approach is emphasized in Tir Gofal, and this should be a priority throughout the UK. Even if key agri-environmental concerns and remedies directly effect only portions of particular farms, a whole-farm ecological and economic plan can help to create complementarities and avoid unintended adverse outcomes. Nutrient recycling, for example, might be enhanced when an entire farm's crop and livestock enterprises are considered? rather than only the cropping systems? when soil erosion or nitrate leaching problems are addressed.

Whole-farm approaches, such as those being used in the NALMI, may be slower and more administratively expensive than approaches which address only the portion of the farm and the problem that are of central concern. However, the whole-farm approach must increasingly take center stage, because many agri-environmental problems and solutions are inherently *systems-based* in both ecological and economic dimensions.

Whole-farm planning under an expanded and revised CSS should take place within the context of a regionally devolved administrative structure that focuses on the various agri-environmental priorities of each region. The priorities and emphases of England's East

Anglia, for example, may be somewhat different than those, say, of the South Midlands. Some overall priorities, guidelines, and criteria would continue to be established for all of England. Detailed solutions and plans, however, often are most effectively developed in a bottom-up fashion within relatively homogeneous regions, where practical realities are understood and unintended consequences are less likely to be overlooked.

A regionally devised administrative structure also is conducive to the kind of targeting and coordination that are needed to accomplish environmental goals for watersheds and agro-ecological regions with very specific, interconnected problems. Improving water quality in a particular watershed, for example, may require that some minimum percentage of arable land in the watershed be enrolled in certain 'improved practices' for minimum drinking water standards to be achieved.

9.5 Extension/Technical Assistance Institutions and Strategy

The agricultural extension system that was built up in England and Wales following World War II, first as the National Agricultural Advisory Service (NAAS) in 1946 and subsequently as the Agricultural Development and Advisory Service (ADAS) in 1971, evolved largely into a fee-based system during the late-1980s and early-1990s. Fees for services from which farmers benefit were introduced in 1987. ADAS became an 'Executive Agency' of the MAFF in 1992, and became responsible for its own budget. This quasi-government agency was expected to cover its budgetary costs through private sector contracts and fees, as well as government contracts. MAFF and other government departments would let contracts for services aimed at 'public goods' such as environmental improvements. ADAS now competes with the private sector for both government contracts and a wide range of land-based services to farmers, agri-businesses, and others. (Dancy, 1993)

The philosophy of having farmers pay for technical assistance and advice that is largely for private gain makes a great deal of sense. Scarce government funds can then be devoted to assistance and advice for environmental and other public goods from agriculture. As noted earlier in this report, in the section on organic aid, a variety of public, non-government, and business organizations have evolved to provide environmental advice and assistance to farmers in the UK. This plurality of services is a strength, in some respects.

However, the UK still remains the only industrialised country without a public extension system. This raises questions about the effective delivery of advice relating to public goods?both in terms of maximizing farming's positive effects on environments,

communities and economies, and in terms of minimizing negative effects. There are also concerns about the cost-effectiveness of a system that is inherently lacking in assured continuity. We are not recommending recreation of a government or quasi-government monopoly on agri-environmental advisory services in England and Wales. Nevertheless, we do urge the new Department for Environment, Food and Rural Affairs (DEFRA) and other departments with agri-environmental responsibilities to develop a long-range strategy to assure accumulation and effective utilization of human capital for environmental technical assistance and advice. The Countryside Agency appears to be taking on a lead role for agri-environmental technical assistance. If that, indeed, is going to be England's lead agency for such assistance, it is important that there be a long-range strategy for funding and career development. It is important for Wales and other parts of the UK also to have clearly identified lead agencies and strategies for agri-environment extension-type activities. In Scotland, the agricultural colleges-based extension system may continue to be in a leading role.

Sustainable agriculture is *human capital intensive*. Farming in an ecologically-sound manner requires continuous learning and accumulation of knowledge. Moreover, many of the benefits of sustainable agriculture are in the nature of 'public' and 'externality' goods. Therefore, farmers in the UK must always have access to sound and either free or easily affordable agri-environmental advice. This advice generally should be in a *whole-farm* context, much as was the farm management assistance provided by the NAAS during the 1950s and 1960s (Dancy, 1993). The likelihood of high quality advice being available on an on-going basis will be increased if UK governmental bodies make long-term commitments to funding and personnel for appropriate lead agencies. This is not to imply that existing institutions or agencies are failing to provide 'sound' or 'high quality' advice. Rather, the concern is with consistency, accessibility, and continuity over the long run.

9.6 Social and Human Capital for Environmental Change

There has been a rapid growth in interest in the term 'social capital' in recent years. The term captures the idea that social bonds and social norms are an important part of the basis for sustainable livelihoods. Its value was identified by Jacobs (1961) and Bourdieu (1986), later given a clear theoretical framework by Coleman (1988, 1990), and brought to wide attention by Putnam (1993, 1995). These writings center on the notion that aspects of social structure and organization can act as resources for individuals to use to realize their personal interests.

As it lowers the costs of working together, social capital facilitates cooperation. People have the confidence to invest in collective activities, knowing that others will also do so. They are also less likely to engage in unfettered private actions that result in negative impacts, such as resource degradation. Although there are already many different descriptions of social capital, four central aspects have been identified (Pretty and Ward, 2001): i) relations of trust; ii) reciprocity and exchanges; iii) common rules, norms, and sanctions; and iv) connectedness, networks, and groups.

An important question, therefore, is to what extent are social and human capital prerequisites for long-term improvements in the natural capital necessary for a successful agriculture? Natural capital can clearly be improved in the short term with no explicit attention to social and human capital. Regulations and economic incentives are commonly used to encourage change in behavior, and include establishment of strictly protected areas, regulations for erosion control or adoption of conservation farming, economic incentives for habitat protection, and pesticide taxes (Pretty, et al, 2000). But there is considerable evidence to show that though these may change behavior, there may be little or no positive effect on attitudes. Farmers commonly revert to old practices when the incentives end or regulations are no longer enforced.

The social and human capital necessary for sustainable and equitable solutions to natural resource management comprise a mix of existing endowments and that which is externally facilitated. External agencies or individuals can act on or work with individuals to increase their knowledge and skills, their leadership capacity, and their motivations to act. They can act on or work with communities to create the conditions for the emergence of new local associations with appropriate rules and norms for resource management. If these then lead to the desired natural capital improvements, then this again has a positive feedback on both social and human capital.

Although there is now emerging consensus that social capital and human capital manifested in groups do pay (Narayan and Pritchett, 1996; Rowley, 1999), for farmers to invest in these approaches, they must be convinced that the benefits derived from group or joint or collective approaches will be greater that those from individual ones. External agencies, by contrast, must be convinced that the required investment of resources to help develop social and human capital, through participatory approaches or adult education, will produce sufficient benefits to exceed the costs (Grootaert, 1998; Dasgupta and Serageldin, 2000).

Although agri-environmental regulations play an important role in encouraging

adoption of sustainable practices, they must be supplemented with processes that support communication and learning among farmers for maximum impact. Many surveys show that the relationship between attitudes and behavior are weak—farmers may adopt new practices, but may do so only grudgingly. Many others do not bother at all.

Recent research on Danish and Dutch farming found that many farmers adopted practices that resulted in the minimum change to conventional practices. Many farmers perceived environmental regulations as a constraint on them. Several 'soft' mechanisms help to increase uptake of more sustainable practices:

?? Encourage farmers to work together in study groups, which have proven valuable for engaging farmers in voluntary adoption of environmentally-friendly practices (Bager, et al., 1998) (see Box 2);

?? Investing in extension and advisory services encourages greater interaction between farmers and extensionists, leading to increased uptake of sustainable practices;

?? Encourage new partnerships between farmers and other rural stakeholders, as regular exchanges and reciprocity increase trust and confidence, and lubricate co-operation.

Box 2. The components and values of farmer study groups

?? Study groups comprise learning groups of 5-15 farmers.
?? They replace the linear model of science-based innovation and unidirectional extension.
?? Advisers from research, extension, and/or NGOs operate as facilitators.
?? The process facilitates and accelerates farmers' adoption of sustainable agriculture.
?? The process empowers farmers at the local level, opening up new opportunities for problem-solving and collective sharing.
?? Study groups improve the economic performance of farms.

Sources: Bager, et al., 1998; Pretty, 1998

Research from Denmark has shown that farmers organised into crop protection groups and who access information from extension systems have shown the greatest reduction in pesticide use (both doses and frequency) and input cost (Just, 1998). There are 620 crop protection groups in Denmark with 4,300 members (1 in 7 of all full-time farmers). Good advice clearly gets costs down for farmers while protecting the environment. The importance of learning and maintenance of social capital has been shown clearly by research into the conversion to organic farming in Denmark (Lemvig, West Jutland) and in France (Drôme Department in southeast France) (Assouline, 1997; Just, 1998). Several factors were important in the transition process:

i) the presence of good local pioneers who could demonstrate that their sustainable farming works and pays? as one farmer put it, *"if they dare, so do we"*;

ii) the presence of effective consultants and extensionists, who could give back-up support and provide economic data and technical advice when needed;

iii) those engaged in the transition deliberately stayed in touch with conventional farmers so as to prevent the emergence of ideological divisions; and

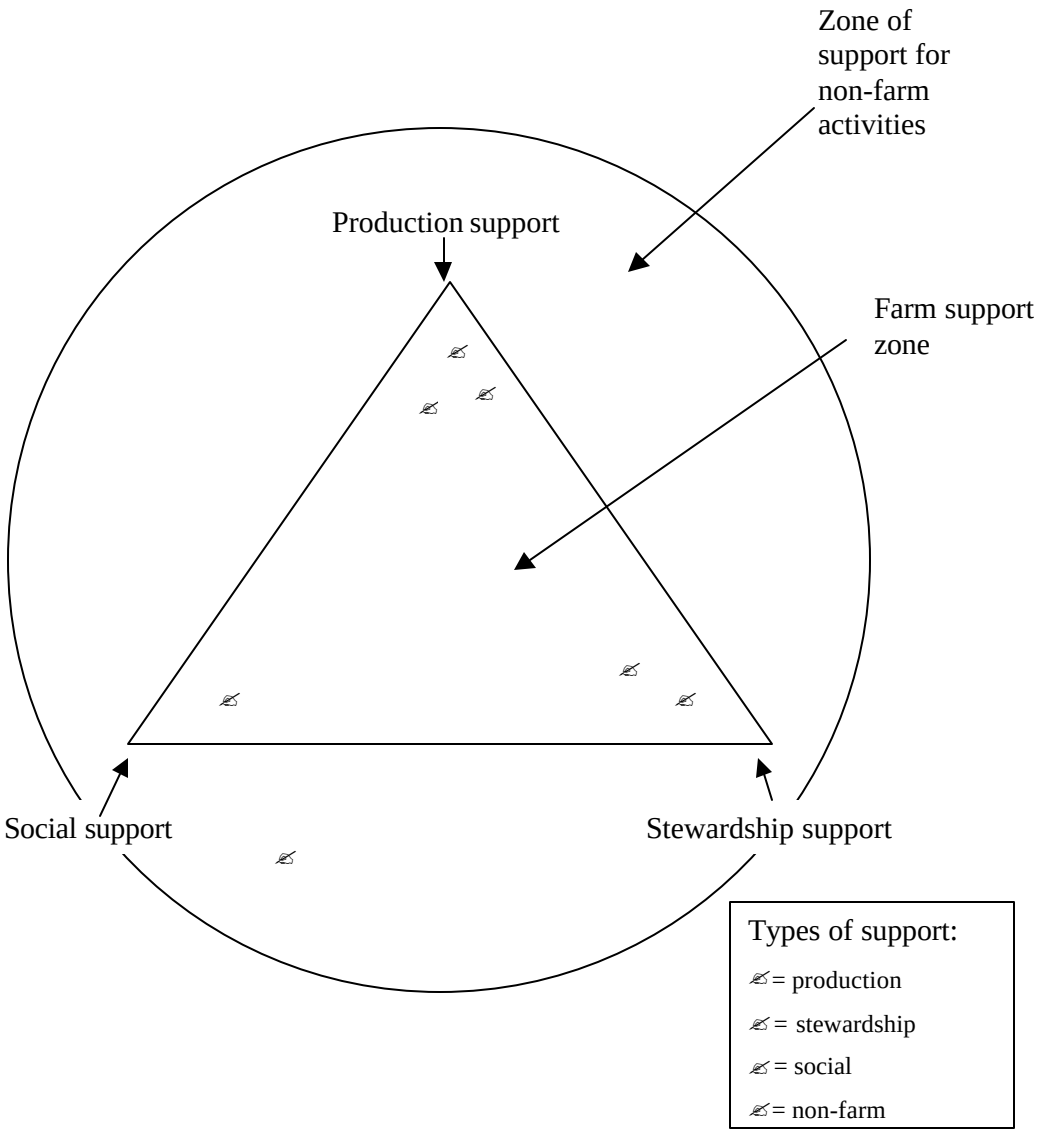
iv) sustainable agriculture spreads more quickly among farmers organized in groups—in mountainous Diois, farmers chose to work together in groups, so advancing the shift towards sustainable farming; but in nearby Val de Drôme, where farming is more intensive, farmers work less together and the spread of sustainable technologies is slower.

The Danish experience reinforces the importance of organized groups and other forms of social capital.

10. Issues and Challenges

Several major issues and challenges face policy makers in the UK and elsewhere in attempts to restructure agricultural support based on the 'multifunctionality' perspective. The movement of multifunctionality to center-stage in EU agricultural policy discussions implies that income support to farmers will increasingly be tied to stewardship and social objectives, rather than to the production objectives that dominated from the 1940s to the late-1980s. However, agricultural policies often do not serve just one public policy objective. Figure 2 can be used to illustrate the point that different agricultural policies rest along a continuum. Some policies serve primarily to support food and fiber production objectives, some support primarily stewardship (environmental and ecological) objectives, and others are intended to support particular social objectives. In addition, some policies are designed explicitly to support a combination of two or all three of these objectives. The overall challenge with which we have been concerned in this report is how to make the transition from policies clustered at the top of the triangle in Figure 2 (production support) to policies closer to the lower right-hand corner (stewardship support).

Figure 2. Location of agricultural/rural support according to production, stewardship, and social objectives



As we think about that challenge, it is useful to have in mind exactly what kinds of policies tend to be clustered in the different corners of Figure 2. Major examples are listed in Table 8. Various kinds of grain and oilseed price supports that were used in the EU and the US during the last half of the 20th century clearly served primarily to increase food and fiber production. Livestock headage payments in the EU also have been explicitly tied to levels of production. The US 'deficiency payment' policy of the 1980s and early-1990s, based on the differences between target prices and market prices of various commodities, had the social objective of supporting farmers' incomes but was still closely tied to production. US crop insurance schemes in the 1980s and 1990s, and income insurance schemes that began to be piloted in the late-1990s, represent some movement along the continuum from production support toward social support; however, unless very carefully designed, they risk being tied primarily to levels of production of particular commodities. The EU's area payments, under the AAPS, are less tied to production than have been its price support policies, but they still tend to be closer to the production end of the triangle in Figure 2 than to the social or stewardship ends.

Table 8. Typology of public policies/schemes according to primary objective supported

Policy objective with which the policy/scheme is most closely connected			
Production support	**Stewardship support (* = UK schemes)**	**Social support**	**Support for non-farm activities**
Price supports	Organic Farming Scheme*	Fully decoupled income support payments	Support for rural infrastructure
Livestock headage payments	Tir Gofal*	Beginning "small-farmer" loans	
Deficiency payments	Arable Stewardship scheme*	"Capping" price or income support by farm size or income	Education in rural areas
Crop insurance	Norfolk Area Land Management Initiative*	Support for farmers' markets	Rural health care
Income insurance	Countryside Stewardship Scheme*		
	Environmentally Sensitive Areas Scheme*		
Area payments	Countryside Premium Scheme*		
	Integrated farming schemes*		
	Nitrate Sensitive Areas Scheme*		
	Landcare (Australia)		
	Conservation compliance		

The focus of this report has been on a host of policies that emerged in the UK during

the 1980s and 1990s that are clustered closer to the stewardship support corner of the triangle (Figure 2 and Table 8). The Organic Farming Scheme and its predecessor, the Organic Aid Scheme, clearly have been tied to particular stewardship farming systems. So have other schemes in the UK, including Tir Gofal in Wales. As we read down the stewardship support column in Table 8, the policies listed are still primarily related to stewardship support but some have social or production elements, as well. Australia's National Landcare Programme, for example, is aimed primarily at society's stewardship concerns, but it also has strong social support elements. The 4,500 farmer groups formed in the past decade, comprising one-third of all Australian farmers, have effected remarkable environmental transformations as well as social ones. 'Conservation compliance', as incorporated in US farm policy since the mid-1980s, has been aimed at stewardship support, but has not been designed to fundamentally alter basic production systems; therefore, we can envision that policy as being somewhere on the continuum between the production and stewardship corners of the triangle in Figure 2.

Since the 1930s, US farm policy has always been wrapped in rhetoric of social support, particularly for the 'Jeffersonian' ideal of 'family farms'. There appear to have been greater attempts to integrate production support and social support in the US than there have been in the UK. US efforts to maintain or raise farm income through schemes tied primarily to production, in combination with farm lending and other schemes, may genuinely have helped moderate-sized family farms until about the early-1950s. However, in spite of various supposed payment limitations that existed throughout most of the last half of the 20th century, US production support policies probably have done as much? or possibly more? to undermine moderate-sized 'family farms' as to support them.

As interest in sustainable agriculture has increased in the US, since the 1980s, stewardship and social concerns have been closely intertwined? more so than apparently has been the case in the UK. Most US sustainable agriculture 'advocates' see stewardship and family farm-based social policies to be mutually-reinforcing. They believe that moderate-sized, owner-operated family farms are the kind most compatible with ecologically-based farming systems. If that belief is correct, then though some policies may be intended primarily for stewardship purposes, others primarily for social purposes (e.g., preservation of family farms), and still others for a combination of those purposes, there will not always be tradeoffs as we move along the continuum between the social and stewardship corners in Figure 2.

An important element in the emerging EU multifunctionality thrust is support for

rural development that is more broadly based than on-farm activities alone. These 'non-farm' rural development activities are represented by the space outside the triangle but within the circle in Figure 2. A few broad examples of such activities are listed in the last column of Table 8. The first example in that list consists of government support for communications, waste treatment, and other kinds of physical infrastructure that make living and operating non-farm businesses in rural areas attractive and affordable. Non-farm businesses include ones related to agriculture, such as food processing operations. The other two examples listed consist of support for human and social capital related to education and health care in rural areas.

Some of the major issues and challenges that are emerging as governments attempt to broaden the emphasis on stewardship programs within a multifunctionality policy framework are discussed below.

10.1 Compatibility of Production Support and Stewardship Support

We have emphasized elsewhere in this report that CAP production support policies, though less distorting than in the past, continue to stand in the way of successful implementation of stewardship support policies. Clearly, there must be more complete 'decoupling' of income support from production before farmers will voluntarily participate, on a wide scale, in stewardship programs that call for less intensive and more biologically diverse systems. Well-intended calls for stronger 'safety nets', both in the UK and the US, tend to venture onto a slippery slope towards the area of production support. In an otherwise generally excellent discussion of policy options for UK agriculture, a recent report of the Royal Agricultural Society of England (RASE) justifies the need for a stronger safety net system, but is vague about how such a safety net would be constituted. The report states that *"any safety net should set a floor or minimum price, but is by definition coupled to production"* (RASE, 2000, p. 17).

Authors of the RASE report (pp. 17-18) suggest the possibility of using crop and revenue insurance schemes like those being tried in the US, to strengthen the safety net for UK farmers as conventional CAP price supports are phased out. However, those schemes also can inadvertently encourage overly specialized production systems if coverage is too narrow or premium subsidies are too high for particular crop or livestock enterprises.

Another option mentioned in the RASE report (pp. 13-14)? to support social and stewardship objectives while avoiding ties to production of agricultural commodities? is for the government to pay farmers a 'salary' (e.g., £20,000 / year). In return, farmers would be

expected to manage their land for 'environmental purposes'. The idea would be simultaneously to accomplish environmental objectives and the social objective of keeping people in rural communities. Willard Cochrane, the highly respected, long-time agricultural policy economist at the University of Minnesota, has proposed a similar policy for the US. He recommends that the US government provide a cash subsidy of $15,000-$25,000 for all 'family farms'. This subsidy would not be tied to production of particular commodities. The purpose would be to maintain a structure of agriculture in the US in which small- and moderate-sized farms could compete with larger 'industrialized' farms. These family farmers, in Cochrane's view, have key roles to play in programs of sustainable agriculture (Cochrane, 2000, pp. 11-12). They also contribute to the viability of rural communities at large (Goldschmidt, 1978; Labao, 1990).

Potter and Goodwin (1998) stress that merely abandoning production supports is unlikely to accomplish the range of stewardship objectives desired in Europe. It could, indeed, lead to less intensive production (at least after a time), thereby reducing negative externalities related to chemical fertilizer and pesticide use in some areas, for example. However, the overall effects on the range of features that Europeans desire in their managed agricultural landscapes are less clear. Most of the beauty and biodiversity of landscapes in the UK and elsewhere in continental Europe depends on the continuation of certain types of active farming. It is restoration or maintenance of a certain kind of farming that is desired in Europe, not the kind of extensification that would amount to abandonment of farming. The desertification of rural areas in southern Europe in the past decade or so has already demonstrated that this is not a desirable option. 'Liberalization' of farm policy, by itself, could *"wipe out much of the human capital necessary for the effective conservation of the European countryside"* (Potter and Goodwin, 1998, p. 291). The implication is that stewardship programs are required to counterbalance some of the cost-price squeeze effects of more market-oriented farm policies.

10.2 Balancing Stewardship Payments and Environmental Compliance

A critical issue facing UK policy makers is what environmental standards should be required of farmers without direct compensation and for what environmental services should farmers be compensated? A three-fold categorization is likely to be the most useful in thinking about this issue (Dwyer, et al., 2000, p. 32). The base category consists of those farming practices covered by regulations. Restrictions on pesticides or on fertilizer applications in Nitrate Vulnerable Zones would be examples. The next category consists of

good practices that go beyond regulatory requirements, but for which there are no agri-environmental payment programs. Examples in England would be *"retaining traditional field boundaries, or maintaining green cover over winter on erodible soils"* (Dwyer, et al., 2000, p. 32). The third category contains practices providing environmental services that are covered by incentive-based compensation schemes. 'Cross-compliance' requirements for farmers receiving CAP production support payments could be applied to practices in either of the first two categories.

The debate about which farming practices belong in each category is both philosophical and economic in nature. In the UK, managed countryside is a result of generations of farming practices, and so it is a matter of philosophical perspective whether one feels a particular agricultural practice? say, one that preserves bird habitat? constitutes avoidance of harm (and, therefore, is not 'deserving' of compensation) or whether it constitutes provision of a public service (and, hence, is 'deserving' of compensation). Which perspective is taken also has economic implications in terms of government budgetary costs and agricultural competitiveness, to cite but two examples.

Environmental groups in the UK have argued that some environmental conditions should be attached to CAP support payments farmers receive; i.e., that there should be 'cross-compliance' (Potter and Goodwin, 1998, p. 293; RASE, 2000, p. 15). The Cabinet Office Performance and Innovation Unit (PIU) recently recommended that the UK government should explore the possibility of conditioning CAP payments on farmers complying with certain minimum environmental standards (PIU, 1999). The UK government, as noted previously in this report, plans a major expansion in funding for agri-environmental schemes under the new Rural Development Regulations. It also has been considering new cross-compliance measures (MAFF, 1999a, p. 5).

Environmental cross-compliance in the UK currently exists in the following two areas:

> *"a) The receipt of all headage payments for beef and sheep under the Sheep Annual Premium Scheme (SAPS), Beef Special Premium Scheme (BSPS), Suckler Cow Premium Scheme (SCPS), Extensification Premium and Hill Livestock Compensatory Allowances under the Less Favoured Area (LFA) scheme, is conditional on not causing significant overgrazing of the land used by livestock upon which these payments are claimed.*
>
> *b) The receipt of Arable Area Payments, including set-aside payments, has been made conditional on farmers obeying certain conditions for the management of set-aside land. These are designed mainly to protect habitats and species in cropped landscapes. Conditions include the retention of traditional field boundaries adjoining set-aside land, and restrictions on the timing of certain operations on the land, including ploughing and spraying, in order to minimize damage to ground-nesting birds and other species which*

may breed or feed in set-aside fields." (Dwyer, et al., 2000, pp. 25-26)

Dwyer, et al. (2000, pp. 81-83) recommend that the UK government should consider several additional cross-compliance measures. One would be to reinforce key environmental regulations with cross-compliance conditions, for example regulations related to hedgerow and groundwater protection. A second measure would make it a general duty for farmers to observe major codes of 'good agricultural practice' that already are in place in the UK. The third measure would be a requirement that farmers draw up a specified whole-farm plan. This might consist of a whole-farm conservation plan or report similar to those of the Farming and Wildlife Advisory Group (FWAG) (as discussed earlier). The intent, at this stage, would not be to require farmers to implement all of the actions suggested by such a plan, however. Finally, they recommend consideration of a cross-compliance measure requiring margins of specified widths around all fields eligible for Arable Area Payments.

As long as CAP support payments remain high, cross-compliance measures effectively serve as *regulations*for most farms that are eligible for payments, just as they have in the US since they were introduced with agricultural policy legislation in 1985. Therefore, environmental services brought forth as a result of cross-compliance are obtained with substantially less government budgetary cost than if they were obtained through expanded stewardship payment programs. However, if and when production-related support payments dramatically decline or disappear in the EU and the US, cross-compliance loses much or all of its leverage. (Some leverage would remain if significant *social* objective payments exist for farmers and are tied to environmental cross-compliance.) Therefore, long-range agri-environmental planning must be based on a collective vision of which environmental conditions or outputs should be obtained through regulations and which ones should be 'purchased' from farmers through stewardship payments.

As we think about 'stewardship payments', it is instructive to examine recent Swiss policy. In Switzerland, the key environmental policy mechanism in agriculture has been an expansion in environmental payments to farmers, tied to a menu of options for farmers. This progressive policy reform was made during the late 1990s—a package supported by 78% of the public in the 1996 referendum (Swiss Agency for Environment, Forests and Landscape, 1999; Dubois, 2000).

The Swiss Federal Agricultural Law was first reformed in 1992 to target subsidies towards ecological practices, and then amended in 1996, following a national referendum. Policy now differentiates between three different levels of public support depending on the

sustainability of agriculture. Tier one is support for specific biotypes, such as extensive grassland and meadows, high-stem fruit trees, and hedges. Tier two supports integrated production with reduced inputs, meeting higher ecological standards than conventional farming. Tier three is support for organic farming.

There are eight minimum conditions necessary for farmers to receive payments for integrated production, the so-called 'ecological standard' of performance (Box 3). A vital element of the policy process is that responsibility to set, administer, and monitor is delegated to cantons, farmers' unions and farm advisors, local bodies, and non-government organizations. By 1999, 90% of all farms were able to comply with the basic ecological standard (which allows them to receive public subsidies). Some 5,000 farms (8%) are now organic (up from 2% in 1991), and most farmers are now expected to meet the 'ecological standard' during the year 2000. Pesticide applications have fallen by 23% since 1990, and phosphate use is down from 83 to 73 kg/ha.

Box 3. Conditions farmers must meet to receive public support in Switzerland

1. Provide evidence of balanced use of nutrients with fertilizer matched to crop demands, and livestock farmers having to sell surplus manures or reduce livestock numbers.
2. Soils must be protected from erosion—erosive crops (e.g. maize) can only be cultivated if alternated in rotation with meadows and green manures.
3. At least 7% of the farm must be allocated for species diversity protection through unfertilized meadows, hedgerows, or orchards.
4. Use of diverse crop rotations.
5. Pesticides have to be reduced to established risk levels.
6. Livestock husbandry must meet defined 'animal friendly' conditions.
7. Records must be kept of all technical aspects of the farm.
8. Participation in extension groups on integrated production is compulsory.

10.3 Opportunities for Programs to Contribute Jointly to Social and Stewardship Objectives

Are there policy opportunities to more explicitly link social and stewardship objectives? Can stewardship payment programs be designed, for example, to simultaneously strengthen the viability of small- and moderate-sized farms in the UK? There is concern among operators of some small farms in the UK that current agri-environmental programs help large farms more than small farms. They argue that operators of large units can afford to farm at least some of their land less intensively, in return for stewardship payments, whereas for many operators of small units, the payments are not generous enough for them to be able to forego intensive production techniques (FFA, 2000, p. 3).

One approach that could help tie social and stewardship objectives in the UK would be to make a greater reduction in the CAP support payments of large farmers than in the

payments of small farmers, as funds are shifted from production supports to rural development and agri-environmental programs under the Rural Development Regulation of Agenda 2000 CAP reforms. The UK government has decided, at least for now, to implement 'modulation' by making flat rate (equal percentage) cuts across the board, rather than placing steeper rates of reduction on those receiving larger support payments or establishing ceilings on production support payments (FFA, 2000, pp. 2-3; MAFF, 2000b, p. 208). Some would feel that this is a missed opportunity to make a shift toward smaller farms in the balance of overall government support in agriculture. However, the record of accomplishment from the US experience over the years in 'targeting' support to 'family' farms is not very good. There always seem to be ways to get around payment ceilings, by various kinds of business reorganizations and redefinitions of ownership. Part of the explanation for the dismal US record, however, may rest on a lack of collective and political will to design and enforce really meaningful payment restrictions? and to recognize that closing loopholes is, necessarily, an on-going process.

Another approach would be to provide higher rates of payment for small farmers under agri-environmental schemes or to limit the total stewardship payments any one farm or farmer could receive. However, policy makers face the same kind of farm organization and definition problems that they would need to contend with in limiting CAP production support payments. Ownership and tenancy relationships are extremely complex in the UK (Vaze, 1998), as they are in the US, making it very difficult to establish operational criteria. Criteria generally need to address such issues as these: (a) if and under what circumstances different members of a family qualify as separate entities for payment limitation purposes; and (b) under what circumstances landlords qualify for stewardship payments, and how payments are to be shared between landlords and tenants. Moreover, in contrast to the US, many people in the UK apparently believe that large farms are better able than small farms to carry out sound stewardship practices. According to that view, public policies should not discourage large farms from taking full advantage of available agri-environmental schemes. In Scotland, however, there is a ceiling on ESA payments individual farmers can receive.

Regardless of whether UK agri-environmental schemes are designed to favor small farmers or merely not to discriminate against them, rules of participation must not be so complex that only the large farmers can afford the necessary management time and consulting assistance to determine if and how they should become engaged. Also, a large portion of the planning and technical assistance associated with participation in agri-environmental schemes should be covered by stewardship payments, at least for the smaller

farms.

There are programs outside what is normally thought of as agri-environmental policy which can directly support both social and stewardship activities. Programs to support farmers markets' constitute a good example (Table 8). Small farmers normally are the most active participants in such markets, and many of those farmers use organic or low-chemical input production methods. Also, more government supported research and development focused on 'appropriate-size' technology could be of great benefit for operators of small- and moderate-sized farms who are attempting to employ integrated or organic farming systems. Smaller-scale, affordable machinery for these diversified farming systems is a particular need.

One of the most effective ways to simultaneously support stewardship objectives and social objectives related to small farms and rural employment is through the kinds of non-farm activities listed in the last column of Table 8. Physical, human, and social capital all are critically necessary for small farms and related service, marketing, and processing businesses to operate profitably in rural areas. Economically healthy farm and non-farm businesses provide the population, income, and tax bases that are so important for the sustainability of rural communities. Many farm families would prefer to make their living completely from the land. When that is not possible, however, the presence of viable off-farm jobs can enable one member of a family to contribute financially by working off the farm and another member to farm a small holding in an economically viable and ecologically sustainable manner.

10.4 Compatibility of World Trade Organization Rules with Stewardship Schemes

As governments shift more of their agricultural support to agri-environmental schemes, increasingly complicated issues of compatibility with World Trade Organization (WTO) rules are emerging. The Uruguay Round 'Agreement on Agricultural Trade' set out a series of decoupled payments that are considered compatible with WTO rules. This zone of compatibility is the so-called 'Green Box'. Among the payments that fall in the Green Box are ones for environmental programs (Swinbank, 2000, p. 16).

However, it is not entirely clear just which policies the WTO will consider to be in the Green Box as Europe advances new policies under the 'multifunctionality' banner. Figure 2 seeks to bring clarity to this issue. An agri-environmental policy that is fully

'decoupled' from production support would be one that is in the lower right-hand corner. Such a policy would advance society's environmental goals? say, by producing positive externalities or reducing negative externalities? without also increasing agricultural production. Stewardship payment schemes that provide incentives to restore hedgerows and increase field margins are good examples.

Some other agri-environmental policies are likely to be more controversial with respect to Green Box classification. There is considerable concern in Europe that the movement toward free trade and farmers having to depend on world market prices could *"lead to marginalization of agriculture and rural areas, resulting in land abandonment"* (Latacz-Lohmann, 2000, pp. 3-4). The European idea of a 'managed countryside' is one in which, over some range, the joint production of food and environmental goods is complementary, rather than competitive. If agricultural support falls too low, it may no longer be economically viable for farms in some areas to produce either conventional agricultural commodities or the kinds of landscape and habitats European societies have come to value (Latacz-Lohmann, 2000, pp. 3-4; Swinbank, 2000, p. 16). In such a situation, does an agri-environmental scheme designed to maintain multifunctional agriculture? in the Cotswolds region of Western England, for example? fall inside or outside the WTO's Green Box? A number of agri-environmental schemes in Europe may be like this? toward the stewardship support corner of Figure 2, but part way up the continuum running to the production support corner.

Latacz-Lohmann (2000, pp. 9-14) has listed a number of suggestions for determining which kinds of agri-environmental policies legitimately belong in the Green Box. In essence, these suggestions call for policies that focus primarily on stewardship support while limiting, to the extent possible, 'trade-distorting' commodity production and price effects. Payments should be coupled to stewardship and decoupled from production, even though, in practice, stewardship payments will sometimes cause agricultural commodity production to be higher than it otherwise would be. Some middle-ground interpretations, recognizing and accepting this inherent joint production, will be necessary on the part of the WTO. This world body is an institution created by governments, and as such, it must respond to values that are strongly felt in the societies those governments represent. The WTO will lose credibility if it does not respond to some of the social values that fall outside narrow interpretations of the market and comparative advantage (Swinbank, 2000).

10.5 Capitalization of Scheme Benefits into Land Values

A long-standing issue is how to design programs that support farmers' income without causing land values to increase because of the 'capitalization' effect (Dobbs, 1993, pp. 6-7; RASE, 2000, p. 32). A farmer's wealth is increased if he/she already owns land when a support scheme is created or support payments are increased. In addition, access to farming by potential new entrants to agriculture is hindered by the higher purchase or rental costs of land. More importantly, the capitalized values of these income support streams serve as a major political barrier to change. Reductions in supports or outright elimination of the programs would cause land values to decrease, thereby eroding the wealth (and planned retirement) base of those who own farmland. In part to cushion and make politically acceptable that type of impact, the 1996 US FAIR Act's elimination of crop deficiency payments was accompanied by a government commitment to very generous 'production flexibility contract payments' for a 7-year period.

There will be strong political pressures to 'hold harmless' both individual farms and farming regions as UK CAP funds are shifted from production support to stewardship support. To some extent, it may be possible to do this in the case of farming regions. Environmental issues most relevant to each region can be identified and, at least for a number of years, roughly the same amount of money that had gone for production support could be redirected to stewardship support in each respective region. This would be more difficult to accomplish on a farm-by-farm basis, however. To count as environmental expenditures for 'Green Box' purposes, funds must be used to address specific environmental or ecological concerns. It is unlikely that very many farms would qualify for nearly the same amount of CAP funds, based on environmental criteria, that they had qualified for under commodity support rules. Some would qualify for substantially less, and some might qualify for much more.

It may be possible, however, explicitly to link some of the funds shifted away from production support to individual farms by using the broader rubric of 'rural development'. Recall that the Agenda 2000 Reforms allow member states to shift CAP funds to rural development and agri-environmental programs. Rural development could include both on- and off-farm activities. On-farm activities could include various kinds of attempts to economically diversify. A liberal interpretation of the Agenda 2000 Rural Development Regulation might allow funding to be earmarked for social support (Figure 2) of individual farms or farmers, to provide temporary cushion for the decrease in production support and to help enable diversification or preparation for off-farm employment. That kind of social support should be time-limited, as the US 1996 FAIR Act production flexibility contract

payments were *intended* to be.

Assuming funds intended for social support are time-limited, would that also be the case for agri-environmental funds? If agri-environmental funds are not limited to a particular period of time, do they also simply become another form of entitlement, and thereby also become capitalized into land values in the same way that have production supports? If stewardship payments are based on opportunity costs? i.e., the profits foregone by farming in an ecologically beneficial manner, rather than in the 'conventional' way? there may not be any 'extra' profits to become capitalized into land values. When a farmer fails to renew an agri-environmental agreement (or is not offered renewal), he or she stops receiving payments. If payments were just covering the opportunity costs associated with participation in the agri-environmental scheme, net returns to the farm would be unchanged when participation ceases, and land values would be expected to remain unchanged.

Successful agri-environmental schemes often will have created or enhanced natural capital (Figure 1), which may produce on-going streams of both public and private (farmer) benefits. Improved soil structure and organic matter content that reduce erosion, for example, can improve crop yields (a private benefit to the farmer), as well as decrease offsite negative externalities and increase positive externalities through carbon sequestration (both public benefits). How to assure continuation of the public stream of benefits is the 'end of contract problem' discussed earlier in this report (Whitby, 2000, pp. 325-329). To the extent this natural capital continues to enhance farm profitability after the end of the agri-environmental contract, we would expect that profit stream to be capitalized into land values. But, the fact that the farmer has a private stake in protecting the natural capital which has been created means that the public stream of benefits may also continue without the need for on-going stewardship payments.

Of course, not all agri-environmental schemes operate in this way. Some schemes may create natural capital that produces only or primarily public benefits. Improved bird habitat sometimes fits this description. Then, the public policy issue of how best to protect that natural capital arises. Renewed or new contracts providing additional stewardship payments imply that farmers should continue to be compensated for any on-going private opportunity costs associated with protecting that capital. Regulations that place limitations on farming practices, to protect that capital, imply that the initial contract payments are sufficient compensation and the public does not expect to 'pay twice'.

Realistically, most voluntary agri-environmental schemes will need to do more than simply offset farmers' opportunity costs if they are to be successful in attracting widespread

participation. Stewardship payments generally will need to either increase profits or reduce risks somewhat, or both (Figure 1). The important thing is for government bodies not to imply that these stewardship payments are open-ended. The goal should be for farmers to eventually *take ownership* of the environmentally-friendly farming systems being promoted. It may, indeed, be the case that some practices which provide public benefits are so costly to farmers that they will always need to be compensated. Even there, however, the payments generally should not come to be viewed as entitlements. If farmers only are *assured* of payments for the length of each contract, there is less likelihood of *expected* income streams beyond the contract periods being capitalized into land values.

10.6 How to Gain from Bottom-up Planning and Subsidiarity

To what extent should agri-environmental agreements with farmers reflect detailed *top-down* guidelines as compared to farm-specific plans developed in a more *bottom-up* fashion? Top-down guidelines might reflect budget priorities of the EU, the UK government, or governing bodies and agencies whose mandates specifically cover England, Scotland, Wales, or Northern Ireland. It would be unrealistic to expect money for agri-environmental schemes from any of these 'higher' levels of government to come without conditions attached. In fact, without some top-down guidelines and related expectations of accountability, taxpayers are unlikely to provide sustained political support for the schemes.

However, guidelines from the top that are excessively detailed and rigid will not be efficient in providing the environmental goods society desires. Regional differences among ecosystems and rural economies necessitate some flexibility in developing specific goals and means of meeting those goals. This implies the need for regional and local bottom-up input in the planning and implementation process.

We can carry this argument for flexibility all the way to the individual farm level. Since individual farms within any local area differ in soils, topography, distance to groundwater, access to transportation, and other characteristics, the most cost-effective way to achieve societal stewardship expectations will vary from farm to farm. However, agri-environmental agreements tailored to each farm can be expensive to develop.

'Transactions costs' are key in thinking about the best mix of top-down guidelines and bottom-up processes for agri-environmental schemes. These include the public and private costs associated with (a) gathering and providing information needed by both the implementing agencies and farmers, (b) negotiating agreements, and (c) ensuring compliance. The orthodox view is that bottom-up approaches which allow greater site-

specificity in schemes will be more costly because of high transactions costs. Standardized contracts based heavily on top-down guidelines or menus are assumed to have lower negotiating costs. However, they may provide fewer environmental benefits, or require higher stewardship payments to provide equivalent benefits, because farm heterogeneity is neglected (Falconer and Saunders, 2000, p. 4). Therefore, it is the total costs?not just transaction costs? in comparison to environmental benefits that must be considered in thinking about the appropriate mix of top-down and bottom-up processes for agri-environmental schemes.

Falconer and Saunders (2000) have suggested that the most cost-effective approach is one which is both targeted to specific kinds of environmental improvements and focused on contracts which are tailored to each farm. They compared transactions and compensation (stewardship payment) costs of two different approaches that have been used in the north of England. The Sites of Special Scientific Interest (SSSI) scheme, based on individually tailored and negotiated farm contracts, was compared to the Wildlife Enhancement Scheme (WES), which uses standardized (menu-driven) contracts. Transactions costs examined by Falconer and Saunders included both negotiation and on-going management costs. WES agreements were found to have lower negotiation costs than SSSI agreements, but the on-going agreement maintenance (management) costs for WES agreements were higher. When all costs were considered, WES agreements were not the cheapest.

Falconer and Saunders raise related concerns about approaches that utilize fixed menus of standard payments. Such approaches can be inflexible in terms of possible prescriptions that can qualify for stewardship payments. There may be questions of fairness, if the menus and related prescribed payment rates do not adequately account for differences among farming systems. Moreover, *"it is difficult to attract intensive farmers into a scheme with sufficiently attractive payments while not over-paying less-intensive participants"* (Falconer and Saunders, 2000, p. 13). We have noted repeatedly in this report the problem of obtaining meaningful participation of intensive farms in the UK's more productive arable areas.

The Norfolk Area Land Management Initiative (NALMI), described elsewhere in this report, is one promising approach for including bottom-up processes that recognize both regional and individual farm differences. Stewardship funds will come from higher-level government programs, such as the Countryside Stewardship Scheme (CSS), but there is a strong element of 'subsidiarity'? in that responsibility for identifying local priorities and individual farm plans has been devolved to the local level. How NALMI and the Countryside Agency's other Land Management Initiatives in England perform, in practice,

over the next several years could have critical bearing on the direction to be taken by expanded agri-environmental schemes.

Also worth noting in the EU are France's new Contrats Territoriales d'Exploitation (land management agreements, or CTEs). Implementation of Agenda 2000's Rural Development Regulation in France will focus heavily on these CTEs. There is a single national plan for implementation, but a very devolved pattern of application. The intention is to create action plans to achieve sustainable management and development based on strong notions of 'place'. Devolution allows plans to vary according to the resources and needs of 26 different regions and more than 100 Départements (counties) in France. Farmers can enter into CTEs, each of which will last for 5 years. Each farmer's CTE will contain two elements: (a) a plan to develop the farm in a way that will directly benefit the farm business; and (b) a plan that addresses the farm's role in helping to meet collective environmental and economic needs of the area. Each county will have a committee to establish the range of measures that will be offered to farmers in CTEs. Committees will be comprised of farmers and representatives of local government bodies, environmental groups, and consumer groups (Dwyer, 1999; Dwyer, 2000). The French approach could provide valuable lessons for bottom-up agri-environment planning and implementation.

In attempts to achieve the most cost-effective mix of top-down and bottom-up elements for agri-environment schemes, two additional considerations are important. One is that truly lasting change is more likely to be achieved through a bottom-up approach, in which farmers and other local people develop and 'take ownership' of the detailed strategies, than it is through a top-down approach that is perceived as heavy-handed. The second, however, is that an approach dominated by bottom-up elements must not simply become a covert way to sanction stewardship payments for 'business as usual' farming.

10.7 Stewardship Payments for Farmers Already Practicing Good Stewardship?

One final issue to be noted here is that of how *additionality* is to be interpreted. A provision of the Uruguay Round Agreement on Agriculture limits agri-environmental payments to the extra costs of complying with government programs (Latacz-Lohmann, 2000, p. 11). The UK Treasury also is insisting on additionality. Except in the ESAs, simply maintaining habitat is not considered sufficient to qualify for agri-environmental payments. There must be additional public benefits over and above what is already provided by the farmer without payment. This results in contradictions: farmers who had previously removed hedgerows could be paid to restore them, but those who had maintained

hedgerows at their own expense would not qualify for payments (RASE, 2000, p. 34). Similar contradictions have long plagued conservation policy in the US.

This issue must be addressed head-on if agri-environmental policy is increasingly to take center stage. In the interests of fairness and consistency, it is clear to us that all farmers must be equally eligible for payments for providing particular environmental services, whether or not they were already providing the services without compensation. This is not to say that every environmental service or externality-avoidance merits compensation. It is simply to say that if one farmer is eligible for compensation to begin providing a service, every other farmer (in like areas and circumstances) who is already providing the service must also be eligible. 'Additionality' needs to be interpreted with respect to *normal* farming practices, not with respect to particular farms. For example, if our recommendation to create a fund to pay farmers for legume-based crop rotations in arable areas were adopted, all farmers in designated areas should be eligible for payments, including those who already were using qualifying rotations. If this common sense position is incompatible with additionality interpretations of the WTO or other governing bodies, then those interpretations need to be rethought and changed.

Our position does not make life easy for policy makers and agri-environmental agencies, however. First, of course, are the budgetary implications. Making everyone eligible would be expected to add to the expense of providing a particular set of public environmental services. However, in the long run, government costs might not be greater, because farmers would come to see that 'bad environmental behavior' is not rewarded? or, conversely, 'good environmental behavior' is not penalized.

Second, establishing what is *normal* and what are *like circumstances* is not easy, in practice. Normal rotations for one set of farms in a local area, for example, may be different from what is normal for other farms in the same vicinity because of subtle differences in circumstances. Those circumstances include soils, slopes of terrain, and drainage, to name a few. There are substantial administrative costs in taking all of these circumstances into account to establish and implement agri-environmental program eligibility criteria. Using eligibility criteria derived from comparisons of what is 'additional' relative to 'normal farming practices' is doable, but not without some difficulty.

11. Trans-Atlantic Implications

> *"Given the long history of antagonism over agricultural policy between the European Union (and its predecessors) and the United States, it might be considered foolhardy to suggest that there is any possibility of achieving a transatlantic understanding in this area. From the western reaches, agricultural policy in Europe is typically characterized as inward looking, designed to protect conservative and inefficient farmers from competition. The United States is portrayed as the champion of free trade. Its vision is a world in which a progressive modern agricultural sector provides consumers with wholesome food at bargain basement prices; managing to make a healthy profit in the process. From the eastern shores, European agricultural policy is portrayed as the guardian of the environment and rural areas, and the protector of human health. The image is one in which agriculture produces a wide range of desirable outputs of which food is just one; in the process safeguarding all that is valued by the European public at large.*
>
> *Neither of these two cartoon characterizations comes close to reality. Europe and the United States are both grappling with finding a way forward on agricultural policy that will permit their agricultural sectors to prosper economically, yet at the same time address critical environmental and social concerns."* (Blandford, 2000, p. 1)

The next steps forward on both sides of the Atlantic will need to be rooted in a deeper understanding of shared goals and problems as we begin the 21st century. Further, substantial policy reforms are required on both sides of the Atlantic if shared goals are to be accomplished. This means that European and North America policy makers must be willing to learn from the past and from each other as they craft new directions in agri-environmental policy. Our purpose in preparing this report has been to contribute to that learning process by examining the UK experience since approximately the mid-1980s. We think there are lessons in that experience with various types of 'stewardship' schemes that are applicable to the next phase of reforms, both in the US with a new farm bill in 2002 and in Europe with the next round of reform following Agenda 2000. If the EU and the US were able to develop a rough consensus on a mutually-shared direction for policy reform—one in which farmers on both sides of the Atlantic perceive the playing field to be more or less level—then the political feasibility of enacting needed reforms would be greatly enhanced.

One very clear lesson is that much remains to be done to complete the 'decoupling' of income support for farmers from production (see Section 9.3). Although there have been significant first steps at decoupling under the EU's CAP and the US's 1996 Farm Bill, strong incentives remain for farmers in the main arable areas to continue farming intensively

in both the UK and the US. Farmers in the UK's arable regions still benefit too much from production-related CAP supports to take up the higher tiers of agri-environmental schemes, and to diversify with crop rotations. The same is true in the US Corn Belt, where farmers have adopted many 'Best Management Practices' but they are still too tied to production-related price supports to diversify out of the narrow and inherently chemical-intensive corn-soybean rotation. We are not optimistic about prospects truly to 'green the middle' of arable areas unless and until policy makers are willing to complete the decoupling of farm income supports from production. The irony is that if the decoupling process were completed, not only would stewardship objectives be more easily achieved, but so would purported social objectives such as maintaining a moderate-sized, 'family farm' agricultural structure.

In conjunction with completion of the decoupling process, the US could take a cue from the 'modulation' that has begun in EU member states, by which some portions of funds formerly earmarked for production-related supports are being shifted to rural development and agri-environmental schemes. Planned shifts are thus far much more modest in the UK than in France, but the important point is that the process has been set in motion. Farmers are less resistant to decoupling if there is some assurance that a major portion of the funds will at least remain earmarked for agricultural and other rural supports of some kind. Some research on implications of shifting funds to stewardship payment programs was carried out during debates leading up to the 1996 Farm Bill in the US (e.g., Lynch, ed., 1994; Lynch and Smith, 1994). It is time now to re-examine the possibilities for major shifts of funds from traditional production-related supports to rural development and environmental stewardship schemes on the US side of the Atlantic.[11]

UK agri-environmental schemes such as the Environmentally Sensitive Areas (ESA) scheme and the Countryside Stewardship Scheme (CSS) have contributed greatly to 'greening the edges' of Britain's agriculture. Losses of bird habitat, historic features (e.g., hedgerows), and natural and scenic landscapes have been substantially reduced. Special schemes such as those for reducing nitrate contamination also have reduced negative externalities. Where most of these schemes fall short—as have agri-environmental schemes in the US—is in restoring the biodiversity that was lost during the 20th century. Where mixed crop-livestock farming has dramatically decreased and crop systems have narrowed to two or three main cash crops, the schemes have either not attempted or failed to restore

[11] Claassen, et al. (2001) have recently provided an excellent discussion and analysis of agri-environmental payment program design options.

much diversity. We have already noted that the failure to complete 'decoupling' in farm policy is at least part of the reason. However, we also recommend an aggressive government effort to restore legume-based rotations in arable areas. We call (in section 9.1) for the creation of a Natural Capital for Food Security Fund to help underwrite this effort in the UK. Such a scheme would have multiple benefits, one of which is the reduction of externalities caused by high application rates of synthetic chemical fertilizers and pesticides (Pretty, et al., 2000). Another benefit is a reduction in soil erosion and related productivity losses and external costs. Most analyses show that deterioration of natural capital in the form of soil can only be effectively tackled through public subsidies if schemes are to be voluntary, because the costs of effective soil conservation measures generally exceed the private benefits to farmers (Whitby and Adger, 1996, pp. 56-59). A third benefit is the wildlife habitat provided by a more biologically diverse crop rotation. Supplies of some crops presently deemed to be in 'surplus' also could be reduced, when rotations systematically make room for forage or green manure legumes, thereby somewhat strengthening market prices. Finally, preserving soil's natural capital by farming less intensively adds to a nation's true food security, in a way consistent with ideas raised by Sturgess (1992, p. 324) in his 1992 Presidential Address to the Agricultural Economics Society.

An agri-environmental scheme such as this to promote legume-based rotations in arable (cropping) areas also is needed in the US Midwest and Great Plains. Although there are a number of design and implementation issues that would need to be resolved (e.g., see sections 10.5, 10.6, and 10.7), multiple benefits similar to those listed above for the UK would be forthcoming. In fact, putting legume-based rotations at the heart of agri-environmental policy for the US, Canada, and the entire EU could provide the basis for consensus on a major new direction. Because it is a 'back to basics', common sense ecological approach, it really should not be all that controversial, in principle. Much of the political controversy, at least, would be removed if this were adopted as a multi-lateral approach—simultaneously pursued on both sides of the Atlantic. The old argument about the 'playing field not being level' would be muted.

Whole-farm planning and agri-environmental planning at regional levels would need to come to the forefront if legume-based rotations were to be the core feature of agri-environmental schemes in arable areas. We have discussed some of the whole-farm approaches being used to promote integrated farming in the UK (section 6.1), as well as the

Norfolk Area Land Management Initiative (NALMI) which combines regional and whole-farm planning in an area of eastern England (section 8.2). Ervin and Smith (1996) and Higgins (1998) have described and analyzed alternative whole-farm planning approaches in North America. While some experimentation with alternative approaches will continue to be warranted, there is enough experience and knowledge now available to move ahead with some major agri-environmental schemes featuring whole-farm planning in the context of regional agri-environmental goals and strategies.

Whatever the exact forms 'stewardship payment' programs take, it is clear that the conceptual basis must be multifunctionality. The idea that agriculture provides a number of 'public goods' and 'positive externalities', in addition to food and fiber, for which farmers might appropriately be compensated has taken root in European policy circles. Although the multifunctionality concept was at first derided in the US as a new European 'protectionist' ploy, it is now starting to receive serious consideration as a possible basis for new US agri-environmental policy in 2002. Multifunctionality certainly embodies complications for WTO negotiations and interpretations (section 10.4). These are complications that can and must be addressed, however, if environmental stewardship in its broadest sense is to take on greater importance on both sides of the Atlantic.

Organic agriculture vividly illustrates both the opportunities for and the complexities of developing sensible agri-environmental policy on the basis of multi-functionality (section 5). The appropriateness of government payments to assist farmers making the transition to organic production is widely accepted within the EU, based on the multiple benefits organic agriculture is believed to offer. Most European countries also provide on-going support beyond the transition period. US policy toward organic agriculture has been largely passive, however. Finally, 10 years after the legislation calling for nationwide organic rules in the US, final rules were issued by the US Department of Agriculture (USDA) in December 2000 (USDA, 2000). The USDA, private foundations, and individual States have funded some research on organic agriculture in the US. Also, the USDA's Foreign Agricultural Service helps facilitate and promote exports of organic commodities and products. Organic production qualifies in at least one State (Iowa) for cost-share support under the USDA's Environmental Quality Incentives Program (Green, 2000, p. 14). Starting in fiscal year 2000/2001, the US Department of Agriculture provided $1 million for farmers in 15 States to cover up to 70% of a farmer's organic certification costs, not to

exceed $500 (Henry A. Wallace Center for Agricultural and Environmental Policy, 2001b). Beyond these modest efforts, US policy at the national level has done little to promote organic agriculture. A logical companion to our proposed stewardship scheme forlegume-based rotations would be a program in the US, like those in Europe, to assist in both the transition to and the on-going economic viability of organic farming. Schemes to promote legume-based rotations and organic agriculture would need to be closely coordinated (see section 9.2).

Finally, we must underscore the importance of strong government support on both sides of the Atlantic for social and human capital, which are so critical to the transformation to more sustainable agricultural systems (section 9.6). Successful stewardship schemes do not just move farmers from one static point to a new static point. Rather, they engender a dynamic process that eventually moves farmers into an active, redesign, interdependent stage in the accumulation of renewable assets (Stage 3 of Figure 1, in section 2.2).

Accounting for this dynamic element requires a transformation in policy thinking**?** away from an overly simplistic, relatively static comparative advantage perspective. The new policy perspective explicitly acknowledges multiple objectives for agriculture (Figure 2 in section 10) and the necessity for continuous learning about what is really 'sustainable'. It also recognizes the need to constantly seek an appropriate balance between flexibility and adaptation to markets, on the one hand, and the needs of farmers and others in rural areas for some degree of stability, on the other hand. This broader perspective adds complexity to trans-Atlantic dialogue, but it also adds realism and thereby provides a stronger basis for consensus about future directions in agri-environmenal policy.

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