

## **Socio-politics and land use systems**

G.H. Jackson

Deputy Chief Executive, The Royal Agricultural Society of England, National Agricultural Centre, Stoneleigh Park, Warwickshire CV8 2LZ England

### **Issues and priorities in the flux of change**

Relationships in the world have changed at a dramatic rate over a very short space of time. In the Northern Hemisphere the politics of relationships for more than four decades were dominated by the balance between the Western industrialized democracies and the central command economies of the East. In the last three years we have seen the dramatic turn of events in the combined economies of Central and Eastern Europe as they seek to move towards market orientation and different expressions of the emotion which we describe as freedom for the individual. It is difficult to say whether the expressions of people-power in the principal cities of Russia in August 1991 or the reunification of Germany a short while earlier were the high points: it does not matter, for the spirit of change, and the painful period of adaptation which accompanies that expression, is under way.

For the industrial economies, particularly perhaps the Group of Seven, these changes throw up a set of new issues and priorities. The North is moving towards a better understanding of social goals and the political and economic means of achieving them. In consequence, world statesmen have to take into account the very real needs of these countries in the balance as well as the continuing struggle with the politics of poverty as it affects particularly the less developed economies of sub-Saharan Africa.

There is also a growing commitment to the liberalization of trade amongst nations and it is not without significance for agronomists that agriculture is included in the latest round of the GATT discussions. Underlying it all is the need to encourage both steady growth and stability in both the national and international economies, for it is economic growth which enables the expression of the social goals of nations and people as a whole.

Insofar as those of us concerned with agriculture - a global business - are concerned, there are two important issues which overhang the future. The first is the steady growth in world population. The second is the effect of man's agricultural and food chain activities on the local, national, regional and global ecosystems. Both of these issues imply that a series of judgments will need to be made at some stage on criteria which include moral and ethical considerations as well as economic and political ones. For the scientist there are very real challenges ahead, for progress will undoubtedly demand not only the advancement of knowledge but the emergence of technologies which allow science to be applied in more precise ways, albeit that for some time the principle will be Best Available Environmental Practice at Acceptable Cost.

### **Forces, demands, outcomes and responses**

It might be useful here to make a shorthand analysis of the forces, demands, outcomes and responses which shape what we describe as the socio-political influences on systems of land use. These all make a complex web rather than a series of chains and all stem from human aspirations and activities. The major force which spins the web is almost certainly global population growth, coupled with the needs for improved nutrition and health and the desire for higher living standards. To these are added the various national, political and social aspirations of each country or group of countries. In turn, these forces are translated into demands - for more food and improved variety, for cultural change usually associated with more consumables, leading in turn to higher economic activity, improved mass communication and increase in trade, higher levels of income - the market-driven economy.

The outcome of these demands are a series of symptoms or expressions with which we are all familiar - higher levels of consumption and more waste, an increase in the use of renewable resources, especially

fossil fuels, more competition for resources, with an increasingly unequal distribution of wealth, changes in social groupings to extend political influence, consumerism, trigger economic groupings to increase size of the market and, not least, serious threats to the ecosystem. The major industrialized countries are in this phase now, and seeking to make responses.

These responses are reflected in changing attitudes and priorities, usually evidenced first by social pressure groupings. National desires for food self-sufficiency translate to a philosophy of food security (money = food), pressure to exercise conservation of resources, populations become static and have a higher proportion of elderly; scientific knowledge advances, providing a range of options which will allow evolution from an industrial to a technological society. Coupled with this is the growing understanding that world trade should be freed to allow a more efficient use of global resources and increase the size of the economic cake. Most significant amongst the responses, however, is the spending of the capital of the earth's resources, rather than the income from it, and it is the industrialized countries which are both the major consumers and despoilers.

It is incumbent on these countries, therefore, to exercise fine and responsible judgments. Eighty-six per cent of the world's gross domestic product is accounted for by 23% of the world's population and the disparity grows at an alarming rate. In 1880 the ratio of real per capita income between Europe on the one hand and India and China on the other was 2:1. By 1965 this ratio had become 40:1. It is now nearly 70:1 (1).

It is thought that world population might stabilize at around 11 billion a century from now (2). Consider these central challenges: if we take cereal production as a simple common currency, the present output is reckoned at about 1.9 billion tonnes from some 700 million hectares, or about 2.5 t/ha. Projecting forward and allowing for progress in economic growth and living standards (the reason for population to stabilize), the need will be for some 5.0 billion tonnes from, say 1 billion hectares. This implies that yields will need to double, arguably, technically feasible. On the calculation that 1.9 billion tonnes of cereals contain 30 million tonnes of nitrogen, then 5.0 billion tonnes will contain 75 million tonnes of nitrogen, an increase of 45 million tonnes (3).

**Table 1. Projections for population, cereal production and nitrogen.**

	1990	2050	2090
Population (bn)	5.0	9.5	11.0
Area under cereals (m.ha)	700	850	1000
Average yield (t/ha)	2.5	4.0	5.0
Production (b.t)	1.8	3.4	5.0
Production (kg/head) = demand	360	421	454
Nitrogen in crop (m.t)	27	51	75

These projections are crude but serve to illustrate the size of the problem, the additional nitrogen will need to be inserted into the cycle in a manner which is more benign than current technologies permit. The population stability assumes an improvement in living standards. If the present trends in urbanization continue, the food chain will need to develop to meet the demands of such urban consumers. It is well known that agriculture uses some 3.5% of the world's energy consumption, but if food chains develop along the lines of European and Australian, let alone American, processing and distribution, the use of energy will be prodigious. Of course, the energy will be found, at a price, but it will need to be in ways which have a neutral balance, that is, renewable energy.

Will science be able to advise society on the options and methodologies available? Will society at large be informed enough to exercise the necessary priorities? Is society resourcing science to identify and

quantify the problems, let alone the solutions? It is very important to be able to ask the right questions if we are to have the right answers. If we do not yet have an understanding of the degree or scope of our dependence on other organisms in the ecosystem, how can we carry out any risk analysis of the effect of reducing biodiversity on the quality of life for future generations?

These are some of the fundamental questions which are beginning to impinge through sociopolitical influences on land-use patterns. It would seem logical to move forward in our thinking on global land-use patterns through, first, a series of economic and political groupings. As can be observed from watching the growth and development of the EC of Twelve, the politics of this kind of development are never easy. To harmonize the economic, technical, social and political goals of twelve different countries is a daunting task. Even if it were easy, new external challenges arise. The EC has been seeking to deepen its integration. Events now raise the alternative of broadening rather than deepening the Community; by the end of this century it may be a grouping of 24-30 countries rather than only twelve.

## **Europe**

Europe, the Europe of Twelve, a population of some 350 million people, is a favoured continent. I will set aside the economic and cultural North-South issues of Europe, except to note that the science, the technologies, the income and the wealth, and the population, tend to be concentrated in the Northern temperate regions.

The Community of Twelve accounts for some 2% of the world land mass but some 5% of its arable area, and about 7% of population. The existence of technology, capital skills and motivation have brought the Community to major producer status, indeed the Community is now the most significant agricultural trader in the world, accounting for about a tenth of the exports, and a fifth of the imports. The way in which this has been achieved is a matter of great concern to both the United States and the Cairns Group of countries in particular, although perhaps the concerns arise from different reasons. It is important to recognize the motivation in Europe: agriculture has been the economic dynamo on which other industry grew. If this view is challenged, a study of the problems of centrally commanded economies which attempt to create industrial, urbanized societies without getting agriculture and the food chain effectively organized will provide the answer. It was and remains necessary to restructure agriculture, and, whilst that process is well advanced in the UK, much remains to be done in many other of the Community States.

## **Agriculture in the community**

With the Community there is a growing awareness, not simply amongst the literati, nor the Commission, but amongst people as a whole, that the Common Agricultural Policy is due for revision. The internal forces for this are probably as strong as the external forces. It is simply that the structures of the system result in gross inefficiencies; a policy designed to provide farmers with a reasonable standard of living does not do so; less than a third of the cost of the CAP (taxpayer transfers) and much less of consumer transfers finds its way to the farm gate. Where thinking is now is that the time is approaching when the Community industry should be exposed to greater price pressures; it is thought that the efficient Community producer can compete in more open markets. The process will be gradual, clearly, for there is a long way to go in creating a level playing field internally, let alone internationally. Achievement of biological optima in internal markets is no match for the political and fiscal manipulations which so affect the terms of international trade. Moreover, the cultural position of agriculture in the different Member States varies, as does its political influence.

It is useful to illustrate the role of agriculture in the EC, using some general indicators (Table 2).

**Table 2. Some indicators of agriculture in the economy.**

	EC - 12	Australia	U.K.
Real Gross Domestic Product (\$ bn) (1)	2668	169.6	492.6
Gross Value Added in agriculture (\$ bn) (1)	72.0	6.9	6.6
GVA agriculture as % GDP (1)	2.7	4.1	1.3
Employment in agriculture (mn) (1)	9.7	0.4	0.6
% employed population in agriculture (1)	7.8	5.8	2.4
GVA per person employed in Agriculture (\$'000) (1, 2)	7423(4)	17250	11000
Agriculture trade as % total merchandise trade (1)			
Exports	7.7	37.0	6.1
Imports	11.4	4.7	
Producer Subsidy Equivalent (3)			
\$ mn	53016	1304	-
%	38	10	

Source: OECD, 1990 (4)

Notes: (1) 1987.

(2) Unadjusted for purchasing power.

(3) 1989. Producer subsidy equivalent measures total transfers from taxpayers in price support etc. and from consumers in food prices.

(4) Increasing at a rate of 3.7% or thereabouts per annum.

What this table does not illustrate is the size of the social problem which is facing agriculture's policy-makers and which is one of the reasons for what appears to be the politicization of the system. It can be explained quite simply.

In 1987 the EC had still 6.9 million farms, of which 79.5% were under 20 hectares, accounting for 25% of the agricultural area. On the other hand, 1.4 million farms account for 74.3% of the land area. The reality is that the EC requires perhaps 1.5 to 2 million farmers, but the *total* number of people *employed in* agriculture is 17.8 million (5).

If the UK type of structure were to apply across the Community, then some 12 million people, at least, would be displaced, a scale similar to that of the Second World War. The social costs would be immense if this level of displacement were brought about too quickly when, within a decade, age will resolve much of the problem. Already abandonment is common.

Put another way, imagine the displacement of two thirds of the population of Australia in a situation where you were also coping with the influx of millions of immigrants at the same time. As it is, a farmer goes out of the EC industry every minute, and that rate will increase sharply in the next decade, for there are some two million farmers over the age of 55 and with no successors.

These arguments are not put forward in a defensive way but simply to illustrate some of the social factors which lie behind the Community's approach to the liberalization of trade. Australia is one of those countries that expresses frustration at Community attitudes and argues for 'a level playing field'. It must be said that the competitiveness of agriculture in international markets is influenced not only by trade agreements but also by the strength of the internal economy. Australia accounts for about 2.9% of world trade against, say, the United Kingdom's 3.3% (6). The difference lies not in volume but in value added. One effect of more liberal trade policies is likely to be that basic commodity prices become more volatile, not less, whereas value added products are generally more stable. Thus, one direction of change might be the sale of cloths and carpets rather than wool, or wheat derivatives (or breakfast cereals), rather than wheat. The trend is towards processing or part-processing, to retain as much as possible of value added in the country of origin.

For Australia there are options for land use which are of immense potential importance: first, because Australian agriculture is, overall, relatively 'clean', although some on-farm animal welfare practices may need to attune to slightly different perceptions insofar as they are a part of the synthesis of wholesomeness; second, although water may be the limiting factor on production, overall Australia is rich in biodiversity. It is these environmental and landscape, factors which have great value, and the north is moving towards a public perception which recognizes that these products too have a price.

The Landcare program in Australia must be recognized as a significant step forward in the recognition that the conservation of farming's resources require not only a change in attitude but also the implementation of appropriate practices, and then promotion through peer groups, and to the public at large (7).

One difficulty which agriculture faces is the continuing decline in the proportion of consumer expenditure on food which reaches the farm gate. It is well established that as disposable incomes rise the proportion which is spent on food declines, although the amount spent will rise in absolute terms, because of purchasing higher value products and the services which go with them. There is nothing new in this trend, it has been established for centuries and is a continuing one, as Table 3 indicates for the United Kingdom:

**Table 3. Consumers' expenditure on food in the United Kingdom.**

	Average of 1979-81	1987	1990 (provisional)
At current prices (£m)	38,869	64,485	85,100
At current prices (£m)	54,104	59,046	63,900
% consumer expenditure of which	28.1	24.3	23.0
household food	16.8	13.0	11.3
meals out	4.2	4.7	5.9
alcoholic drinks	7.2	6.6	5.8
RPI (1985 = 100)	75.5	106.4	125.4

Source: Agriculture in the United Kingdom (8).

The cost of food has risen more sharply than producer prices across the EC as a whole. Whilst the cost price squeeze on producers varies somewhat between Member States, it does exist and is likely to sharpen as exposure to market forces increases. However, prices have not fluctuated to such an extent as in Australia.

**Table 4. Australian farm sector indices (1986/87 = 100).**

	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92
Prices received by farmers	100	118	132	129	112	106
Prices paid by farmers	100	104	114	121	124	128
Terms of trade	100	113	115	106	90	83

Source (9)

The differences in the terms of trade reflect partly the effect of the difference in PSE and partly the effect of price changes on several of the commodities pre-eminent in Australian agricultural production.

An inevitable outcome of socio-economic pressures and the influences these create in turn on political and policy decisions, is that the number of farmers in all agricultural economies will decline. It is clear that the decline will continue in industrialised economies as it will as less developed economies also progress, agriculture will become increasingly marginalized in both economic and political terms, if all economies follow the pattern of trends in the North and the West. It will decline even if values are attached to environment management as a product: nor must it be thought that only farmers have the will and ability to manage land.

Dietary patterns are changing too. The trends in the industrialized economies are now quite clear. Sedentary life styles, concerns with health the convenience factor of processed foods, which reflect demographic change, and the concentration of food processing and distribution all influence dietary choice. Decreases in red meat consumption (which in part reflect processing, e.g., bone out); increases in fish and poultry meat consumption, skimmed rather than whole milk; increases in vegetable, salad crop and food consumption; all continue to influence farming practices and land use patterns.

### **Socio-economic trends**

In the mature economies (and the lapsed time between industrial and industrializing economies is perhaps less than half a century) we see the following socio-economic trends emerging, or in some cases hardening:

- a reduction in the number of people employed in agriculture;
- an increase in industrial activity and a decline in primary activity;
- the substitution of capital for labour, to enhance productivity.

In the mature economies:

- the beginnings of evolution from an industrial to a technological lifestyle;
- an increase in the number of people employed in service as opposed to manufacturing and primary industry;
- increasing per capita income, coupled with an increase in leisure time;
- smaller families; more single parent families, an increase in one or two person households; increased overseas travel: culture absorption;
- the concentration of economic power into larger corporations;
- demands for space - access to land in heavily populated countries. In the UK there is about 1 acre of space per head of population, in Australia 129 acres;
- a move to counter urbanization, for example in the UK rural population is growing but not with people who work in the countryside.

In industrializing economies:

- an increase in the rate of urbanization, with consequent food chain implications;
- an increase in urban lack of understanding about agriculture, and the way food is produced.

Conversely:

- a growing interest in the relationship between diet and health and the effect of farming and processing systems on the wholesomeness of food;
- the emergence of significant, powerful and professionally managed groups who exert political (voting) pressure as well as well articulated argument to exercise their viewpoint (10,11);
- a rapid growth in the communications industry - probably now the second largest industry in the world next to agriculture;
- a growing awareness that food security is related to ability to purchase rather than ability to produce;
- most recently, especially in the industrialized countries, a deepening concern about the effect of man's activities on the environment, with agriculture providing a relatively easy target for pressure;
- a growing concern, especially amongst urban populations of the extent to which they have lost control over the basics and necessities of life. This creates reactions against other groups who appear to have control, and renders people open to manipulation through the dissemination of misinformation or disinformation.

I could go on - but we must all now become aware that the agronomic practices which we employ on farms are not, and have never been, the exclusive preserve of farmers.

All this adds up to a decline in the power of the farming industry. In most countries farming is regarded as *enjoying* apolitical influence far beyond its economic importance, where the rural workforce has declined. This is not yet true in less developed economies, nor indeed in those European countries where command economies have retained high rural populations.

### **The EC as a single market**

In the European Community, the Single Market is the route that policy makers have chosen to fulfil social goals. The weight of evidence suggests that internal markets need to grow - and the removal of barriers to competition is a necessary step - for it is competition which makes markets grow, however painful this might be for some sectors of the economy or groups of individuals. It follows that agriculture policies in the Community will also change so as to allow the resources and abilities of the land and the people to be exploited to best effect. To be realistic, it may take a decade or more before the impact of these measures begins to become positively evident, but the Community can then begin to address the priorities and issues of the future as a whole rather than in the piecemeal fashion of the past. What the Community represents is cultural diversity, product diversity and market diversity and this must be an advantage in the longer run, even if it does produce challenges at the individual level.

There is already a widespread recognition that, insofar as rural Europe is concerned, what is needed is as much a rural development policy as an agriculture policy. This reflects the realization that people are needed to care for the countryside, its landscape and the environment it represents. There is also the beginnings of recognition that a beautiful landscape, a diversity of wildlife, the provision of access for public enjoyment are non-food products of agriculture to which a value can be attached. Thus, environmental and landscape protection and enhancement will attract support from tax-payers and consumers. Moreover, there are strong arguments being advanced to decouple agriculture, environmental and social support mechanisms within the CAP (12).

Nevertheless, the drive for change may be stimulated less by agricultural policy than the recognition by politicians that the conflict between the forces created by population pressures and the environment as a whole must be resolved if life systems are to be sustainable in the future. The difficulty of legislating to meet moral judgments, which will vary with individuals as well as cultures, is immense. However, there is a growing recognition that a balance must be found.

### **Socio-political influences on systems**

The opportunities for the exploitation of land for energy production will be realised through the EC energy policy, which seeks to reduce dependence on fossil fuels in an era where, post-Chernobyl, concerns about the safety of nuclear power and waste disposal remain. The Community policy for biotechnology and its applications seeks not only to advance knowledge but to stimulate applications. It is clear that agro-industry applications will only grow when the economic thresholds encourage uptake; in a market-led economy this is inevitable. There is a growing understanding, however, that such policies would make more sense than policies which pay farmers to leave land idle.

It is often said that European cultures are such that removing land from agriculture to create wilderness would be unacceptable, but there are many who doubt whether that is really the case. Indeed, the ideas have already been promulgated in the UK and are an existing feature in France. Such land would, at least, represent a land bank for a future generation or unforeseeable crisis. In the UK, alone, it has been suggested that as a result of changing market circumstances policy and technical advance, by the end of the next decade an area of land extending to 4-5 million hectares may be excised from mainstream food production (10).

The response to this kind of prediction, coupled with a desire to reduce the impact of agriculture on the environment, leads policy makers to encourage forms of extensification by limiting price support. The difficulty, which even the non-farming pressure groups realize, however, is that this is likely to make agriculture less competitive, and, furthermore, suggests a transfer of consumer and tax-payers' resources on an increasing rather than diminishing scale. It is difficult to hazard any view on what the final outcome will be but, if speculation is permitted, then almost certainly the effect of market forces will prevail. This does not mean that land will fall out of production, more probably it will allow others to take the land and operate it on a different economic investment base. As long as urban people attach social values to owning a piece of land and an attractive farmhouse as their primary or second home, the housing stock will underwrite values.

Others advance the arguments that production should be restricted by more quota applications, but as long as quotas are transferable they create yet another artificial value into which resources will flow. Still others advance the argument that organic methods of food production will provide at one and the same time wholesome, 'natural' foods and production limits in an environmentally benign way.

Political will has placed restrictions on nitrate limits in the Community's water, based on slim medical evidence but, one must admit, visible environmental evidence in some regions. Attempts to establish limitations on fertilizer nitrogen have been debated at a variety of levels but, so far, rejected, in the knowledge that, using good agricultural practices, fertilizer nitrogen is not the immediate problem. The problem is one of the leakiness of some farming systems, noticeably those which involve the grazing animal using either fertilizers or grass clover swards. Organic systems are just as leaky, since they must rely on organic manures from livestock and the ploughing in of legumes. Indeed, insofar as soil fertility is concerned they are unlikely to be sustainable in the long run.

Relatively modest changes to farm systems can be used to address this problem in the short term, without returning to the 18th century and the Norfolk four-course rotation. As experimental work has shown, that system had such negative nutrient balances that only the introduction of superphosphates and potash fertilizers in the 1840s saved a considerable erosion of fertility (13).

There is much discussion amongst the media, policy makers and politicians about the farmer's role in the stewardship of the land and the duality of his responsibilities. There is a less understanding that the prime responsibility of the farmer is to safeguard the fertility of the land, and this has to be a prime ethic of the husbandman. This is not to say that wildlife habitat, biodiversity and other elements of stewardship should be ignored, as a recent attitude survey amongst RASE members shows (Tables 5 and 6):

**Table 5. Nitrogen use (%)**

	All farms	NSAs <sup>1</sup>
Reduced N on crops	8.2	30.0
Reduced N on grassland	12.8	20.0
Altered timing on crops	27.7	50.0
Altered timing on grass	14.9	30.0

<sup>1</sup>Nitrate sensitive areas; source (14)

**Table 6. Hedges and trees**

	Average per farm	Range
Length of hedge planted (m)	600	50-2,500
Length of hedge removed (m)	400	20-2,400
Trees planted	4,660	3-500,000
Trees removed	55	1-400

Source (14)

Moreover, quite a high, but not uniform, degree of sympathy amongst farmers exists for other countryside bodies.

**Table 7. Percentage sympathy with countryside organisations in the UK. (All those listed below had a high awareness status, except the Association of Agriculture.)**

	Percentage
Royal Society for Protection of Birds	89.7
Farming and Wildlife Trust	87.8
Countryside Commission*	85.4
Nature Conservancy Council*	84.5
National Rivers Authority*	78.9
Council for the Preservation of Rural England	68.1
Friends of the Earth	31.0
Association of Agriculture	26.8
Ramblers' Association	21.6

\*Statutory Bodies; source (14)

### Socio-politics and land use

So many of these influences are based on deductive rather than inductive reasoning that it is difficult to predict the outcome with any degree of precision. It must be borne in mind that the NGO interests referred to in Table 7 reflect a voting power perhaps 10 times that of farming.

It is some years since land use predictions for the UK were made, and since that time environmental legislation has had further impact. Nevertheless, agriculture is still seen as the most important land use (Table 8).

**Table 8. Land budget for the UK 2015 (m.ha).**

	1985	2015	
		'Extensive' Market Forces	
Cereals	4.0	3.1	1.7
Milk	2.2	0.9	0.6
Beef	1.6	1.1	1.1
Sheep	6.6	4.7	4.7
TOTAL	14.4	9.8	8.1

Source (15)

Possible alternative land uses were put forward:

**Table 9. Possible alternative land uses.**

Option	Hectares
Woodlands and forestry	1,000,000
Urban development	300,000
New food crops and fibres	200,000
Food for horses	300,000
Increased protein and oil crops	300,000
Cereals for export and industrial use	800,000

Source (15)

In practice, in the five years which have elapsed since this study the rate of timber planting has slowed down, the equine industry is estimated to utilize in excess of 500,000 ha, whilst the cereal acreage is unchanged. But that is not to say that these land patterns may not emerge. The land-use pattern in the EC of Twelve (excluding what was East Germany) in 1989 is summarized in Table 10.

**Table 10. Land-use pattern in EC in 1989:**

	1,000 hectares
Total utilised agricultural area	127,485
of which	
Arable land	67,381
Permanent meadow and pasture	48,021
Permanent crops	11,744

Source: European Community (5)

Farm woodland in Britain occupies only about 2% of the farm area, on average, and this is very low for a European country. Table 11 illustrates some example proportions.

**Table 11. Mean area of woodlands on farms compared with mean farm size (ha).**

	Mean farm size	Mean area of woodland per farm
Belgium	15	0.2
Canada	202	12.1
Denmark	25	2.5
Finland	57	33.0
New Zealand	303	9.1
United Kingdom	69	1.4
West Germany	15	2.0

Source: ETSU (16)

The use of short rotation coppice as a renewable energy source in the UK has been studied at considerable depth. Yields averaging 10.7 tonnes per hectare per year (dry) are possible from willow, poplar and eucalypt clones. Studies indicated that, taking into account the various influences on land use and on the assumption that timber prices remained constant, in real terms at 1977 prices, with subvention at existing levels, 2.26 million hectares (9.4%) of other land in Britain might become available for energy forestry, with wood at a market value of ?20 tonne at the forest gate (16). Of this land 90% involved modification to conventional forestry and 10% (266,000 ha) coppice plantations. The land changes perceived were as follows:

Arable cropping	No change
High-grade pasture	No change
Good hill sheep pasture	25% change
Intermediate pasture	12% change
Rough grazing	37% change

Source: ETSU (17)

About 46% of the land would lie in Scotland. It should be noted, however, that forest planting over the 800 ft. contour is prohibited by law in some areas.

### Expressions of social and political pressures

It is unlikely that land will move into such systems without subvention as part of an overall land use and energy policy and there appears to be no fiscal policy to encourage such developments, although this may well appear as an EC initiative. It should be noted that public concerns about the appearance of conifer forests in the UK and concerns that such forests provided a tax shelter for the rich and famous was reflected in a recent budget which imposed curtailments on concessions.

Social pressures are eventually translated into political action and there is no doubt that land use patterns will gradually change in consequence. Whilst environmental concerns are translated into agriculture policies which seek to 'extensify' systems, social and political awareness of the impact of such policies on small farms and farmers make it difficult to devise means of implementation which do not discriminate against the larger, more efficient, holding.

There will be a period of adjustment of, say, up to six years but it is clear that price pressures will prevail and this will accelerate structural change and open the way for more rational resource use policies. Almost inevitably, too, there will be an increased diversity of land use patterns, with those areas of popular interest employing multiple use. The uplands, in particular, represent an important lung for urban

populations, especially in Britain. The few square miles of the Derbyshire Peak District, for example, will have over 22 million visitors per year.

Sporting and leisure interests are an obvious combination with agriculture and bring with them environmental benefits, although blood sports are a matter of ethical concern to an increasing number of people in Britain. In the same way, animal welfare concerns, and legislation, influence systems for both ruminants and non-ruminants. The rapid increase in the number of outdoor sows in recent years reflects in part these pressures and also the decline in cereal profitability. It is thought that perhaps 25% of sows may be on the outdoor system in the UK by the end of the decade, concentrated in areas where soils are suitable. Other imaginative schemes, such as *the* proposed Midlands Forest, seek to integrate farming, woodland, access, sporting, amenity and landscape interests.

In farming terms, almost certainly, the requirements of the processing and distribution sectors of the food chain in responding to the demands of consumers will require to exploit all the production diversity which Europe can offer, leading to the exploitation of comparative advantage. Within the environmental constraints which will undoubtedly be imposed, agriculture will seek to remain as competitive as necessary to exploit mainstream markets.

### **Threads of current concern**

There are two main threads to current pressures and these are likely to remain, and indeed increase, in the decade ahead. The first is a concern for the quality, safety and wholesomeness of food. This is not just a matter of pesticide residues; there are good reasons to believe that case, together with the effects of pesticides on biodiversity, has been overstated. The concerns are at the more fundamental level of wholesomeness, which implies judgments on the ethics of production; the increase in vegetarianism is not isolated to the UK.

The second is a genuine concern for the environment, and this should be regarded on a global, or at least regional, basis. European Community legislation is designed to bring about a concerted change in both farm systems and land use patterns. In the management of the carbon and nitrogen cycles there is a need to create stores - extensive permanent pasture land for nitrogen and timber for carbon. It is not without note that coppice, for example, already referred to, will take up some 135 kg nitrogen/ha.

Both of these issues provide challenges to science and to those who are concerned with the development and integration of technologies into land use systems. In global terms the amount of food which it will be necessary to produce will continue to increase: the additional nitrogen must come from somewhere, and systems will require, globally, steadily increasing energy inputs in order to improve productivity. More of this energy will need to come from renewable resources.

Finally, it may well be, if the scientific and technical community can be inspired to communicate and extend the public understanding of scientific issues, that society as a whole will recognize that it is not food production systems alone which will have to adapt; policy formulators and policy makers will need to consider the food chain as a whole.

In the meantime, the effects of social change, expressed through political instruments and the influence of the media are creating a period where agriculture and land use systems are in both a disrupted and adaptive state. For the agronomist, that presents an area of opportunity and a window of influence which will last into the foreseeable future. Science is providing some signposts already but the pathways of progress have yet to be built. It is important that they be constructed on a foundation of inductive reason rather than the deductive processes which characterize so much of socio-political thinking. What we must all appreciate is the reality that, if new pathways are not built, socio-political concerns will be expressed in an ever more closely woven basket of legislation which will control ever more rigidly what practices are permissible and what are not.

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