ENVIRONMENTAL ISSUES AND AGRICULTURE IN THE UK

This section focuses on environmental issues in the UK, such as how soil erosion and nitrate enrichment have been brought about. It also considers the effect of the European Union's Common Agricultural Policy on the growth of intensive farming and the associated soil erosion and eutrophication. Changes in farming policies have led to some environmentally beneficial farming but have also forced many farmers to change their farming activities, diversify or leave farming altogether.

The Common Agricultural Policy

The Common Agricultural Policy (CAP) was set up in 1957:
- to increase agricultural productivity and self-sufficiency
- to ensure a fair standard of living for farmers
- to stabilise markets
- to ensure that food was available to consumers at a fair price.

At the centre of the CAP was the system of guaranteed prices for unlimited production. This encouraged farmers to maximise their production as it provided a guaranteed market. By 1973 the European Union (EU) was practically self-sufficient in cereals, beef, dairy products, poultry and vegetables.

CAP led to intensification, concentration and specialisation. Intensification is the rising level of inputs and outputs from the land as farmers seek to maintain or increase their standards of living (or margins of profitability). The inputs included fertilisers, animal feed, fuel and machinery. The increased levels of outputs were typified by beef and butter 'mountains' and wine 'lakes'. Concentration is the process whereby production of particular products has become confined to specific areas, regions or farms. Specialisation is related to concentration and refers to the proportion of total output of a farm, region or country accounted for by a particular product. For example, wheat has become more concentrated in France and the UK as farmers have specialised in its production.

Since the early 1980s there has been a reform of the Common Agricultural Policy because price guarantees and intervention storage created surpluses in cereals, beef, wine and milk. By the 1990s the EU was overproducing cereals by 20% while demand had dropped. In some sectors, technological and scientific improvements boosted yields, further increasing surpluses. Consequently, a larger proportion of

EU funding was used to store and sell off surpluses at subsidised prices on the world market.

The first modifications came in 1979, with other major changes introduced between 1984 and 1988. In 1984 a system of quotas was introduced in order to reduce overproduction by farmers. Quotas were limits on how much a farmer could produce. Farmers who produced too much were penalised.

The CAP after 1992

The most important changes to the CAP were introduced in 1992. Five objectives were identified:
1. to increase Europe's competitive agricultural base
2. to match production with demand
3. to support farm incomes
4. to stop the drift out of agriculture
5. to protect and develop the potential of the natural environment.

To achieve this, a variety of changes were introduced:
- reduction of price support where surpluses existed
- encouragement of alternative rural land uses
- extensification (less intensive) land use
- reduced quotas on milk, wine, cereals and olive oil
- guaranteed maximum quantities
- concentration on quality rather than quantity
- income support to farmers in less favoured areas
- early-retirement schemes
- training and assistance for young farmers.

The key elements are price cuts and the withdrawal of land from production. For example, between 1993 and 1996, milk quotas were reduced by 2% and the price for cereals and beef dropped by 29% and 19% respectively. The prices paid to farmers were reduced in order to make cereal cultivations and beef rearing less attractive. With lower returns from these types of farming, many farmers switched to other types of farming and other non-farming activities, such as recreation, educational visits and golf courses (Figures 4.28 and 4.29, see pages 70 and 71).

The set-aside scheme was introduced on a voluntary basis in 1988, allowing farmers to take up to 20% of their land out of production and to receive up to £200 for each hectare set aside. The land could be left fallow, converted to woodland or used for non-agricultural production. While many farmers took advantage of set-aside, many intensified production on the other land and made their least favourable land the set-aside!
The environmental effects of agriculture

Soil erosion

Soil erosion is widespread in the UK on sandy, loamy and peaty soils which are vulnerable to erosion by wind and water (Figure 4.23). Since 1945, the potential for overland run-off and soil erosion has increased as pasture has been converted to arable land and more winter crops are sown.

For example, on the South Downs, traditional sheep pastures have been replaced by arable fields on slopes as steep as 20°. There the switch to winter crops in the mid-1970s was accompanied by hedgerow and bank removal and field enlargement. The use of heavier, more powerful machinery not only compacts the soil but creates ‘tramlines’ for overland run-off to follow. The use of fire to burn stubble (which was banned in the early 1990s) briefly enriched the soil but removed organic content from it. This organic material bound the soil and helped it to resist erosion. The optimum growth of winter crops requires light, fine soils and the selective use of herbicides. However, fine soils are easily eroded whereas coarser soils with stubble can resist most storms. The consequences are striking: soil losses of up to 250 tonnes per hectare have been recorded on the South Downs and gullies several metres deep have been initiated in storms.

Elsewhere in the UK, soil erosion is a familiar problem: in the Midlands it is associated with potato and sugar beet fields in the summer months after the harvest.

Future levels of soil erosion in the UK largely depend upon whether there is a return to grass or whether the acreage of arable crops continues to expand, which in turn depends to a large extent on the CAP.

The nitrate issue

There is a very distinct geographic pattern in the level of nitrates in Britain’s water (Figure 4.24). Highest levels, over 11.3 mg/l-1 (milligrams per cubic litre) are mostly found in eastern parts of England, whereas the lowest levels, less than 2.8 mg/l-1, are found in Scotland, north-west England and central Wales. In general, there is an east-west trend with higher values in the east and lower values in the west. There are, however, certain anomalies. Parts of south-east England have very low values, less than 2.8 mg/l-1, while there are quite high rates, 5.6-11.3 mg/l-1, in the south-west and in parts of north-west England.

Nitrogen is a key component for plant growth and so farmers are keen to apply nitrogen fertilisers. Moreover, national and European policies promote agricultural self-sufficiency and the manufacturers of nitrate fertilisers are also keen to see an increase in their use. In the UK their use rose from just 200,000 tonnes in 1945 to a peak of about 1.6 million tonnes in the late 1980s (Figure 4.25 on page 68). However, there are serious ecological, economic and health
effects as a result of this increase, and recent legislation has curtailed their use.

**Eutrophication**, or nutrient enrichment, of bodies of water has led to algal blooms, oxygen starvation and a decline in species diversity. This is most evident in poorly circulating waters, especially ponds and ditches. While there is a strong body of evidence to link increased eutrophication with increased use of nitrogen fertilisers, some scientists argue that increased phosphates from farm sewage are the cause.

The concern for health relates to increased rates of **stomach cancer**, caused by nitrates in the digestive tract, and blue baby syndrome, **methaemoglobinemia**, caused by oxygen starvation in the bloodstream. However, critics argue that the case against nitrates is not clear — stomach cancer could be caused by a variety of factors and the number of cases of blue baby syndrome is statistically small.

Of more general concern is the amount of nitrates in tap water. The pattern of nitrates in rivers and groundwater shows marked regional and temporal characteristics. In the UK, it is concentrated towards the arable areas of the east, and concentrations are increasing. In England and Wales over 35% of the population derive their water from the aquifers of lowland England and over 5 million people live in areas where there is too much nitrate in the water. The problem is that nitrates applied on the surface make their way slowly down to the groundwater zone, and this process may take up to forty years. Thus, increasing levels of nitrate in drinking water will continue to be a problem well into the twenty-first century. The annual cost of cleaning nitrate-rich groundwater is estimated at between £50 million and £300 million.

Since the late 1980s, the problem has been tackled in a number of ways:

1. changing land use — less arable land, either due to set-aside, afforestation or pastoral farming
2. changing inputs — extensification of agriculture
3. giving preference to winter crops
4. sowing cover crops (crops grown to prevent soil erosion) early
5. avoiding the use of nitrogen fertilisers between mid-September and mid-February when rainfall is higher
6. applying fertilisers in early spring when plants need nutrients most
7. avoiding fertiliser use on riparian (riverside) fields
8. not applying fertilisers if heavy rain is forecast
9. using less nitrogen fertiliser if the previous year was dry.

**BSE**

In the mid-1990s there was a scare about BSE and a related disease, CJD. **Bovine spongiform encephalopathy** (BSE) and **Creutzfeldt-Jakob disease** (CJD) belong to a rare group of diseases called spongiform encephalopathies. These are caused by a misshapen protein called a prion. The link between BSE and CJD is partly medical and partly geographical. The medical link is the shape of the protein that causes the disease. The geographical link is that most cases of CJD have occurred in places where BSE is more prevalent.

In the UK in 1996, ten cases of CJD were diagnosed. CJD is rare: it affects about one person in a million. In Papua New Guinea, CJD is known as *kuru* or *laughing death*. It seems to have been spread by ritual cannibalism.

The first case of BSE in Britain was in 1986. Most of the infection in cattle took place in the late 1980s, peaking in 1992. It takes at least four years for CJD to incubate in humans and therefore at the very earliest it would have peaked in 1996. It is widely believed that BSE was transferred to cattle due to feeding them meal that was infected with scrapie, a disease common in sheep. Cows that were fed on infected sheep tissue developed BSE. As these cows were then slaughtered, crushed and fed back to other cows, some of these became infected.

**Why is BSE/CJD a problem in the UK?**

A number of reasons can be put forward. First, few places outside the UK suffer from scrapie and also raise large numbers of cattle. Second, cattle carcasses in the UK are burnt to make bone meal at a relatively low temperature. Third, cattle in the UK derive up to 5% of their ration from meat and bone meal. These three factors make Britain particularly vulnerable (Figure 4.26).
Feeding animals ground-down meal is not uncommon. However, cattle are herbivores (plant eaters), whereas the meal they consume is ground-up sheep and cattle. Moreover, in the 1970s a new technique for burning carcasses, which involved lower temperatures and was supposed to make the bone meal taste better, became widespread. In the UK, temperatures of less than 100°C were used to incinerate cattle. These temperatures would not kill off all bacteria. In France and Italy, by contrast, temperatures of 130-140°C are the standard.

In 1997, the CJD Surveillance Unit suggested that the rising number of UK cases of CJD might reflect better diagnosis rather than any real change in the incidence of the disease. Another report indicated that the disease may have originally been brought into the UK by infected game from Africa.

As soon as other EU countries suspected that animals might be spreading BSE they banned British beef and bone meal exports. France and Ireland destroyed all animals in any herd that contained even one case of BSE. This was not done in the UK.

The economic and political implications of BSE are severe. To eradicate BSE in the UK could cost up to £15 billion. The problem has not only affected farmers but all those employed in the beef and dairy industry.

Groups such as the National Farmers Union claim that the BSE issue has been exaggerated and blown out of all proportion. Their publications suggest that beef is safe, and that in fact British beef is much safer than beef from elsewhere.

Figure 4.26 a) BSE: reported cases in Europe
Source: Ministry of Agriculture, Fisheries and Food

Figure 4.26 b)
BSE: reported cases in Europe
Source: The Economist, 30 March 1996

Protecting environments in the UK

<table>
<thead>
<tr>
<th>Item</th>
<th>Grant rate (% of standard cost)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hedge planting</td>
<td>80</td>
</tr>
<tr>
<td>2. Hedgerow regeneration</td>
<td>80</td>
</tr>
<tr>
<td>3. Restoration of dry stone walls</td>
<td>80</td>
</tr>
<tr>
<td>4. Restoration of sod banks</td>
<td>50</td>
</tr>
<tr>
<td>5. Tree planting</td>
<td>80</td>
</tr>
<tr>
<td>6. Renovation of heather</td>
<td>80</td>
</tr>
<tr>
<td>7. Control of bracken</td>
<td>50</td>
</tr>
<tr>
<td>8. Protective fencing</td>
<td>80</td>
</tr>
<tr>
<td>9. Renovation of traditional farm buildings</td>
<td>80</td>
</tr>
<tr>
<td>10. Provision or restoration of traditional gates and gateposts</td>
<td>60</td>
</tr>
<tr>
<td>11. Restoration of ponds</td>
<td>50</td>
</tr>
<tr>
<td>12. Creation of reed beds</td>
<td>50</td>
</tr>
</tbody>
</table>

Figure 4.27 Environmentally sensitive areas in the UK
Source: Nagle, G. and Spencer, K., 1996, A geography of the European Union, OUP
The British government has responded to the environmental impact of agriculture with a number of schemes. Along with the expansion of set-aside and environmentally sensitive areas (ESAs) (Figure 4.27 on page 69), a number of measures addressing specific issues have been introduced:

1. **Nitrate sensitive areas scheme** to protect groundwater areas
2. **Habitat schemes** to improve and create wildlife habitats
3. **Organic aid schemes** to encourage farmers to convert to organic production methods
4. **Countryside access scheme** to provide public access to set-aside land and suitable farmland in ESAs.

Payments are available for a variety of activities such as hedge planting, restoration of drystone walls, bracken control and so on (Figure 4.27).

In 1985, the EU agreed to provide farmers with the means to farm ESAs in traditional ways which would preserve important biological and heritage landscapes. Less intensive, organic methods were favoured, with increased amounts of fallow. By 1994, 10 500 farmers in the UK had signed or applied for ESA agreements, and payments during 1994-5 totalled almost £25 million.

**Diversification**

**Diversification** refers to the variety of farming and non-farming activities that farmers adopt in order to make a profit (Figure 4.28). Diversification is a recent trend but is increasingly important. It developed as the costs of farm inputs increased more than the price received for farm products, and profits fell. Diversification allowed farmers to increase their earnings from alternative sources.

There are a number of forms of diversification:
- **direct marketing** – pick-your-own (PYO), farm gate sales and farm shops
- **accommodation** – bed and breakfast, camping and caravanning
- **recreation** – golf courses, ‘horsiculture’, and nature trails
- **commercial** – new crops or livestock.

Diversification requires a number of conditions:
- availability of capital
- effective marketing and advertising
- planning permission to develop on Green Belt land
- no conflict with farming activities at key times of the year.

---

**Figure 4.28 Options for diversification**

Source: Illery, B., 1992, Agricultural change in Great Britain, OUP