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2.3 Agriculture

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2.3 AGRICULTURE

European agriculture is extremely diverse, ranging from large, highly intensive and specialised commercial holdings to subsistence farming using mainly traditional practices. Consequently impacts on the environment vary in scale and intensity and may be positive or negative. There is a legacy of significant environmental damage associated with agriculture in the NIS and CEE, where exploitation of resources (such as freshwater for irrigation) were excessive. The dramatic decline in resource use in these countries, due largely to economic restructuring rather than policy, consumer or technological developments, has scaled back many environmental pressures. However, land abandonment, under-grazing and lack of capital to maintain or improve farm infrastructure are creating new environmental problems.

The Common Agricultural Policy has been one of the important drivers of farm intensification and specialisation in the EU. Intensive farming has had significant impacts on the environment. Public concerns related to production methods and some reorientation of the CAP have created new opportunities, via agri-environment schemes for example, for farmers to reduce pressures on the environment. For the countries of CEE and the NIS the current window of opportunity for ensuring reduced environmental pressures from agriculture may not stay open. Agriculture in the CEECs is likely to intensify when they have full access to the CAP although there is an evolving agri-environmental policy framework and some opportunities under the Special Accession Programme for Agriculture and Rural Development to address this risk. The CAP will apply to new Member States in a modified form, which may reduce incentives for increasing production. There is little or no agri-environmental policy framework in the NIS and few possibilities for farmers to address agricultural pressures on the environment.

2.3.1 General trends

A common policy objective throughout Europe for several decades was to increase food production. Farmers increased agricultural output significantly between the 1940s and 1990s in response to such policies. Supported by public investment, this resulted in mechanisation combined with the abandonment of traditional practices, reliance on non-renewable inputs such as inorganic fertilisers and pesticides, the cultivation of marginal land and improvements in efficiency.

In Western Europe the CAP and several national policies encouraged intensification. This took various forms, including the sustained use of chemical inputs, increasing field size, high stocking densities, discontinuation of crop rotations and fallows, and increased use of silage and maize as fodder crops. Specialisation and intensification has resulted in a decrease in the number of farm holdings and numbers employed.

During the socialist era in Eastern Europe, government planning determined agriculture and food production, with little regard to efficiency or suitability of production to the environment. The area of land farmed and number of livestock in the former USSR increased as a result of land reforms in the 1930s. The expansion of arable land was at the expense of forest and grassland, increasing the pressure on remaining pastures. The development of huge irrigation schemes, farm specialisation and investment in animal production were all associated with the push to increase output and greater reliance on non-farm resources. For example the application of fertilisers nearly trebled and

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pesticides doubled between 1970 and 1987 (Libert, 1995).

2.3.2 Pressures on the environment

The extent and causes of the environmental impacts of agriculture practices vary significantly across Europe, notably by farm and crop type. Nevertheless, the continuing search for efficiency, lower costs and increased scale of production is resulting in substantial pressures on the environment, landscapes and biodiversity, particularly in the most intensively farmed areas. At the same time, agriculture remains essential to the maintenance of many cultural landscapes. This dual role is relevant throughout Europe, with farming systems of high nature value found mostly in areas with low input, more traditional agriculture.

Agricultural production throughout the continent continues to rely on non-farm resources such as inorganic fertilisers and pesticides (Figure 2.3.1 and 2.3.2). However, there has been a decline in the use of these resources and, particularly in the NIS and CEECs, a reduction in the pressure on the environment.

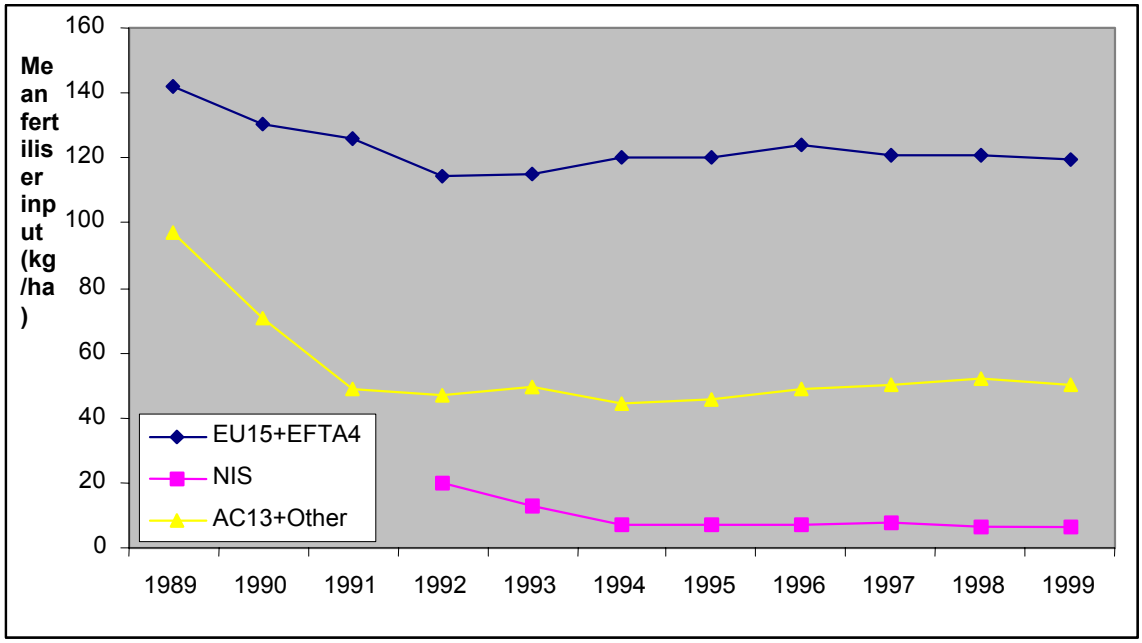
2.3.2.1 .Fertiliser and pesticide consumption

Enrichment of waters by nitrogen and phosphorous is widespread despite reductions in fertiliser use. Diffuse losses from agriculture continue to be the main source of phosphate pollution in European waters since the treatment of sewage and industrial effluent has become very effective. For instance, more than half of all nutrient inputs to the Danube River are from agriculture (Haskoning, 1994), with substantial amounts also entering the Baltic Sea from the nine bordering countries (Baltic 21, 2000). Fertiliser inputs to the Danube basin will have to be maintained at about half of their 1991 levels in Bulgaria, Romania and Hungary to prevent further eutrophication of the Black Sea (WWF, 2000).

EU legislation, such as the Nitrates Directive (EC 91/676), seeks to limit nutrient losses from farming to freshwater bodies by restricting nutrient use in designated Nitrate Vulnerable Zones. However, more progress by Member States is required before this policy response can be classed as fully satisfactory (EEA, 2002). The decline in fertiliser use in the NIS and CEECs is attributable more to reduced market opportunities for agricultural products, the declining profitability of agriculture, reduced state support and the widespread reorganisation of farming in the region. However, consumption in the CEECs is expected to increase as a response to expected new market opportunities and integration with the CAP (EFMA, 2001).

😐	Overall consumption of fertilisers has stabilised in recent years following a significant decline during the first half of the 1990s in CEE and the NIS countries. . Without appropriate management the current fertiliser input in Western and Eastern Europe may still be too high to be environmentally sustainable in the longer term.

Figure 2.3.1 Fertiliser input per hectare of agricultural land



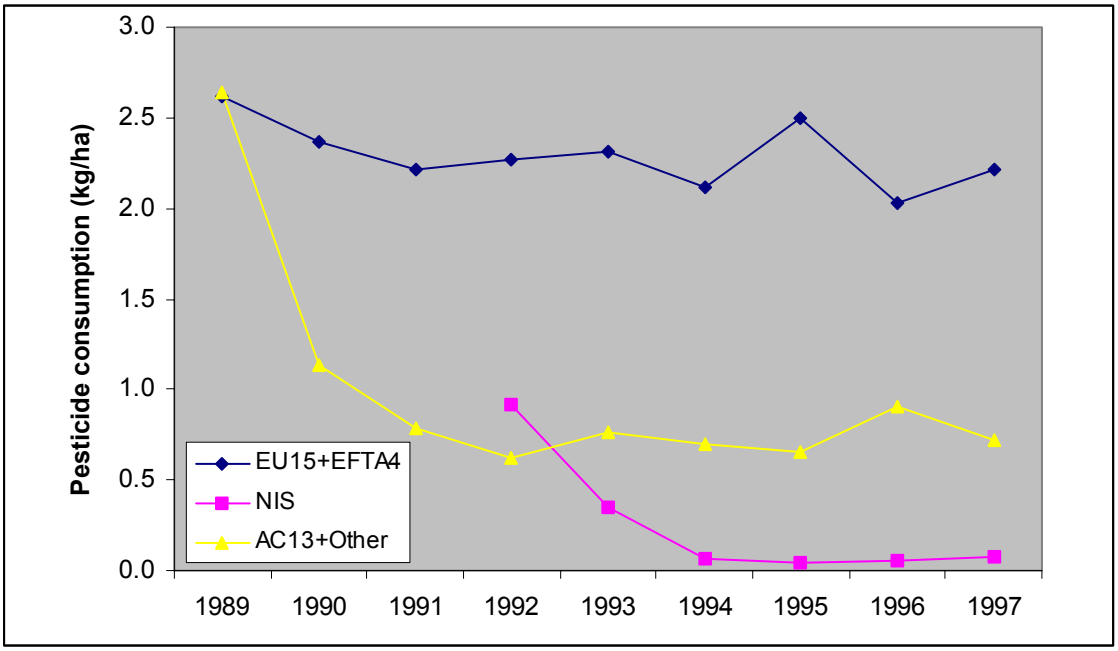
Note: Both fertiliser and agricultural area data available for Estonia, Latvia, Lithuania, and Slovenia from 1992; for Slovakia and the Czech Republic from 1993; and for members of the NIS country group from 1992. The "Other" country group includes Albania, Bosnia and Herzegovina, Croatia, Macedonia and the Federal Republic of Yugoslavia. The graph expresses total fertiliser consumption (N, P and K) per hectare of agricultural land (a complete time series of the UAA was not available) for all countries where data were available.
Source: FAO

Pesticides may pollute drinking water, surface and ground waters. Many groundwater supplies in EU countries exceed the EC (Drinking Water Directive 98/83/EC) maximum of 0.1 ug/l for a single pesticide (EEA, 2002a).

New management practices, such as Integrated Crop Management (ICM), have evolved as a response to the need to reduce dependence on pesticides. Although only covering about 3% of Utilised Agricultural Area (UAA) in the EU, ICM encourages more targeted use and reductions in application rates of pesticides (Box 1). In the NIS and CEECs there are initial training programmes to support the uptake of ICM practices although the main reason for reduced pesticide use is economic restructuring. However, there is a significant environmental legacy for many of the CEECs and the NIS where localised hot-spots of contamination are commonly associated with the storage and disposal of pesticides. For example there are estimated to be 60 000 tonnes of obsolete stocks of pesticides in Poland, 20 000 tonnes in Russia and 20 000 tonnes in Ukraine (Jensen, 2000).

😐 The intensity of pesticide use has declined in many countries as a result of environmental concern and legislation, economic pressures and the introduction of active ingredients with lower dosage requirements. However, much agricultural production still relies heavily on pesticide applications to achieve higher economic returns.

Figure 2.3.2 Total pesticide consumption per hectare of agricultural land



Note: The pesticide and agricultural land area dataset is incomplete for all NIS and AC13 countries and all EU15 countries except Finland and Denmark. Data for 1998 and 1999 are too sparse to be plotted on a country group basis. The graph expresses mean consumption of pesticides (active ingredients classed as insecticides, herbicides, fungicides and others) per hectare of total agricultural land (a complete time series of UAA was not available). "Other" includes Albania, Bosnia and Herzegovina, Croatia, Macedonia and the Federal Republic of Yugoslavia.
Source: FAO

Box 1

Changes in pesticide use – Central Asia
The use of pesticides has been an important feature of agricultural production in Kazakhstan. The government financed pest control campaigns against exotic insects such as locusts and Colorado Beetle. However, since 1992 farmers have had to buy the pesticides themselves. Due to economic circumstances this resulted in a dramatic reduction of pesticide consumption. Between 1985 and 1997 the pesticide input decreased from 0.57 to 0.13 kg of active ingredient per hectare. Despite the reduced pressure from pesticides their legacy persists, with many water courses, including the Syr-Darya, heavily polluted with DDT, DDD and DDE. The same is also true for large expanses of soil contaminated with organo-chlorine pesticides.
Source: L. Pak, Proceedings of regional awareness raising workshop on POP's, UNEP-Chem (1998)

…and Europe
The ICM concept is slowly gaining acceptance in the EU countries and ICM methods are now applied on about 3% of the UAA. Evidence suggests that practising ICM can lead to a reduction in pesticide leaching and, through general reductions in the application of pesticides, to a reduction in the risk of pesticide residues building up in the soil. Since ICM systems promote a reduction in the use of pesticides and fertilisers they are also likely to have positive side effects for biodiversity.
Source: ICM systems in the EU – amended final report for EC DG Environment (2002)

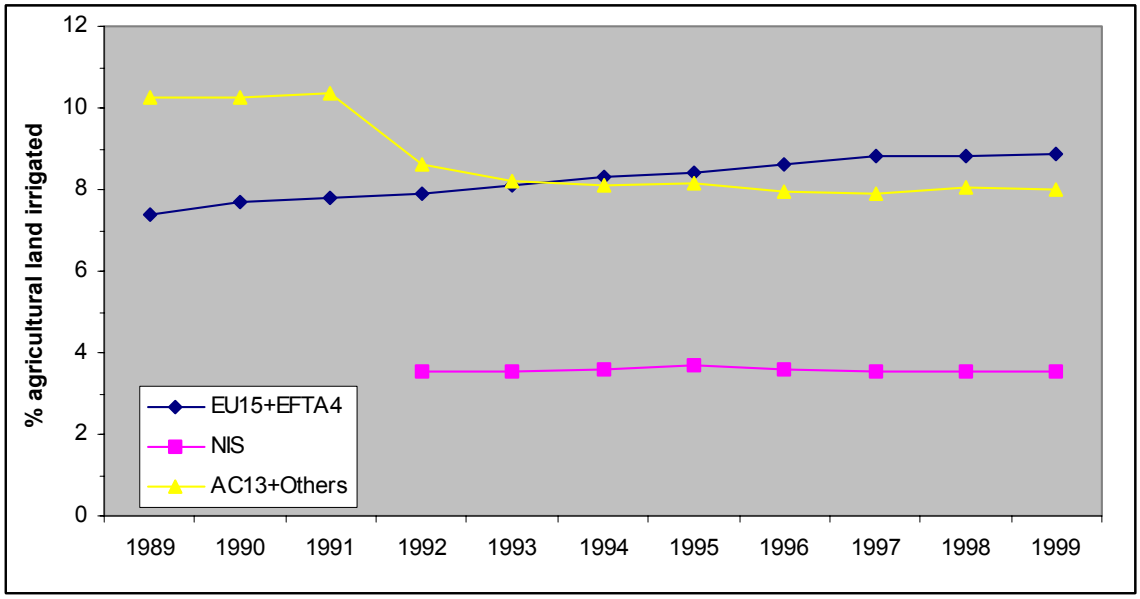
2.3.2.2. Irrigated area

The scale and importance of irrigation in the EU is substantially greater in the southern countries but also significant in several northern regions. The irrigated area has increased most notably in France, Greece and Italy. There has been an overall decrease in the

accession countries (Figure 2.3.3). In southern Europe and Central Asia irrigation is essential for achieving economic yields and results in high water demand. In central and western Europe irrigation is often used to ensure yields in dry summers. The largest irrigated areas are in Russia, Kazakhstan, Ukraine, Uzbekistan, Romania and Turkey.

Many heavily irrigated regions of the NIS and southern Europe are characterised by a lowering of water tables, land degradation and desertification, salinisation and the destruction or degradation of wetlands and aquifers (Box 2).

Figure 2.3.3 Average irrigated land area as percent of agricultural land area



Note: Irrigated area data was not available for Estonia, Latvia, Lithuania and Slovenia until 1992; Czech Republic and Slovakia until 1993; for the NIS until 1992; for Bosnia and Herzegovina, Federal Republic of Yugoslavia, Former Republic of Macedonia, Croatia and the NIS until 1992. The EFTA4 group only includes Switzerland and Norway. The graph expresses total irrigated area as a percentage of total agricultural land (a complete time series of UAA was not available). No distinction was made between total irrigation areas and actual irrigation volumes. "Other" includes Albania, Bosnia and Herzegovina, Croatia, Macedonia and the Federal Republic of Yugoslavia.
Source: FAO

☹ Irrigated land has a significant share of the agricultural area in the EU15 and EFTA4 and accession countries. Substantial increases in irrigated area are still occurring in some western and Mediterranean countries. The NIS has the largest area of irrigated land, with serious implications for demand on limited water resources.

Box 2

Southern Europe

Arable production in Spain has become more intensive through the expansion of irrigated crops, resulting in a loss of steppe habitats, traditional dryland crops, and breeding areas for birds such as the Great Bustard (*Otis tarda*). The wetland area of Las Tablas de Daimiel, which is a Natura 2000 and Ramsar site, has been reduced by 60 % as a result of agricultural overexploitation of the aquifer that feeds the La Mancha wetlands. Salinisation of the subterranean water and contamination and eutrophication of the surface water has also occurred, in addition to a reduction in nesting areas due to changes in vegetation, including peat fires, and land subsidence.
Sources: Baldock et al (2000) and WWF (2000)

Central Asia

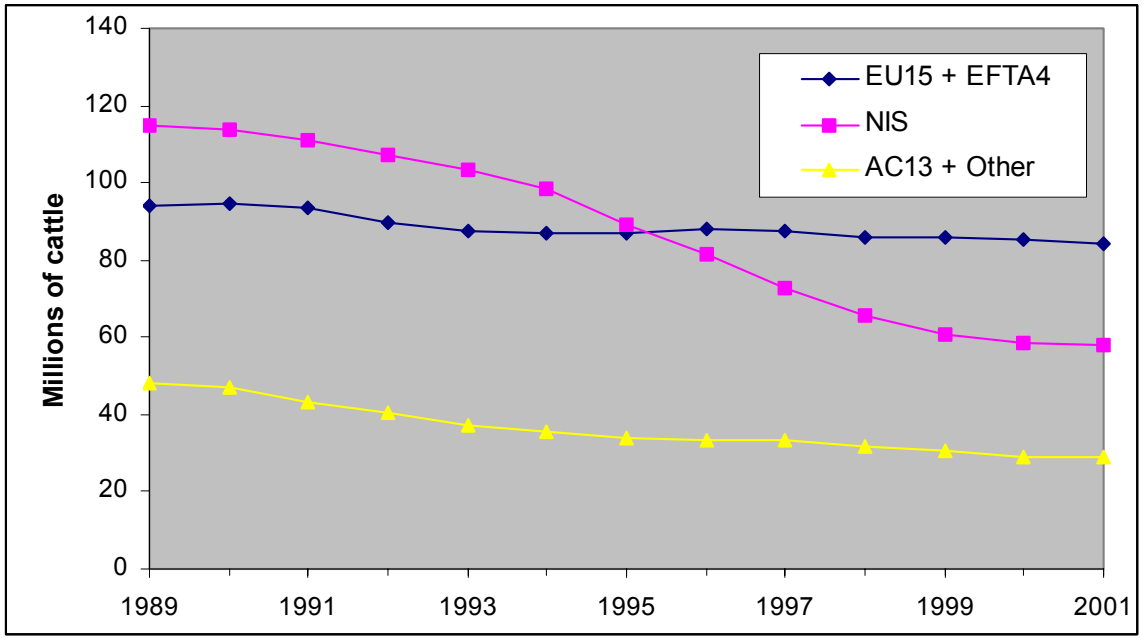
Central Asia, under the former Soviet Union, was allocated the role of raw material supplier, principally cotton. An extensive irrigation scheme encompassing the Amu-Dar and Syr-Dar river catchments was undertaken to ensure competitive yields. The irrigated area increased from 4.5 million ha to 8 million ha between 1960 and 1995. Among irrigated crops, cotton has the highest requirement of fresh-water per kilogram of product. In Uzbekistan, freshwater consumption by agriculture amounted to 84 % of total water use in 1989, largely attributable to cotton production. Drainage systems are used to avoid waterlogging and salinity of soils, and the fields were irrigated with additional freshwater to remove salts from the soil. The returned salt-contaminated drainage water contains pesticide residues and fertiliser and have a severe impact on the rivers and wetlands. The traditional ecosystems of the two deltas of the Amu-Dar and Syr-Dar have perished and the Aral Sea is drying up as a result of excessive water demands.
Sources: http://www.fao.org/ag/AGL/aglw/aquastat/regions/fussr/index.htm and WWF (1999)

2.3.2.3. Livestock numbers

The total numbers of cattle, pigs, sheep and goats in the CEECs and NIS have decreased; numbers in the EU have been nearly stable since 1990 (Figure 2.3.4). High livestock population densities are associated with excessive concentrations of manure, leading to an increased risk of water pollution. Poor or non-existent containment of manure in CEECs such as Poland and Romania are giving rise to localised hot-spots of nutrient loading (JRC, 2000). This is also the case in the NIS, particularly in Belarus and regions of Ukraine and Russia specialising in animal production. The loss or intensification of traditional extensive livestock grazing systems have had particularly negative effects on biodiversity. Overgrazing in certain vulnerable environments (such as parts of the UK uplands and heather moorlands) has damaged these habitats. The contribution of livestock to gaseous emissions is also significant: 94 % of total EU ammonia emissions (from housed animals) and 49 % of total methane emissions arise from animal husbandry (EEA, 2002).

Livestock production in the EU has become more specialised and intensive. Overstocking can be partly attributed to the provision of production incentives, including payments per head of livestock under the CAP, although socio-economic drivers have also encouraged some regionalisation of livestock production and localised over-grazing.

Figure 2.3.4 Million heads of cattle by country group, 1989-2001



Note: Similar declining trends are reported for pigs, sheep and goats in AC13 and NIS countries, while in the EU there was little net change in pig, sheep or goat numbers. "Other" includes Albania, Bosnia and Herzegovina, Croatia, Macedonia and the Federal Republic of Yugoslavia.
Source: FAO

😐	Livestock numbers fell markedly between 1989 and 2001 in the NIS and the AC13 and Balkan countries. However, high pressure on the environment persists from intensification and concentration of livestock production in large units and poor animal waste management, especially in the NIS and AC13countries.

2.3.2.4. Biodiversity and semi-natural grasslands

Much of the biodiversity in Europe is found on or adjacent to farmland and is therefore considerably affected by agricultural practices. Agricultural habitats support the largest number of bird species of any broad habitat category in Europe, including the greatest number of threatened species (Heath and Tucker, 1994). Species dependent on farmland are, however, threatened by changes in management practices, such as the time of sowing and harvesting of crops, intensification, abandonment, loss of field boundaries, conversion of grassland into arable land and a decline in habitat diversity due to increased mechanisation (Nagy, 2002).

In CEECs and the NIS the status of farmland biodiversity is better than in the EU, although a problem is emerging with land abandonment and undergrazing. This is resulting in forest and scrub encroachment on flower-rich grassland areas, and a consequent loss in biodiversity. In general, it may be assumed that extensively managed farmland, important for biodiversity, is more often affected by this process than overall land abandonment figures suggest.

On the other hand, semi-natural grassland can also be threatened by conversion to arable land, as shown by an example from Hungary. In the protected Hortobagy-Puszta, return to private ownership and market pressures have led to a shift to cash-crop production, and the conversion of grassland to maize and sunflower production. Approximately 75 000 ha of semi-natural grassland were lost between 1987 and 1994. Conversion to arable is a continuing threat to the high ecological value of semi-natural grassland of the region,

which still harbours the Great Bustard (*Otis tarda*) and Imperial Eagle (*Aquila heliaca*), among many other species.

Box 3

Semi-natural grasslands

Due to the relatively small area of undisturbed natural habitat that remains in Europe, semi-natural habitats are particularly important for nature conservation. Semi-natural grassland depends for its maintenance on appropriate management by farmers through mowing and/or grazing, and is therefore particularly sensitive to intensification or abandonment. The area of semi-natural grassland has fallen in recent decades across Europe. In the UK, for instance, semi-natural acid grassland declined by 17 % between 1990 and 1998 in England and Wales (DEFRA 2000). In Finland many areas of semi-natural grassland have been converted into arable land, and the area of hay fields has fallen from 13 000 ha in 1970 to just 6 000 ha in 1997 (Pitkänen and Tiainen 2001)

The proportion of semi-natural grassland in the CEECs, Turkey and the NIS is high relative to most EU countries, and the total area far exceeds the area in the EU. Some CEECs have a relatively high proportion of semi-natural grassland, amounting to more than half of the UAA in Slovenia (Veen, 2001).

Table 2.3.1 Estimated distribution of agricultural areas, permanent grassland, semi-natural and natural grasslands in CEE countries in 1999

Country	total agricultural area (UAA) (ha)	total area of permanent grasslands (ha)	total semi-natural grassland area (ha)	total mountain grassland area (ha)	Semi-natural grassland % in total UAA
Bulgaria	6 216 664	1 163 455	444 436	332 071	7.2
Czech Republic	4 258 656	946 368	550 000	1 750	12.9
Estonia	1 533 400	315 700	73 200	0	4.8
Hungary	6 233 144	1 116 384	850 000	0	13.6
Latvia	2 454 382	775 068	117 850	0	4.8
Lithuania	3 134 400	848 900	167 933	0	5.4
Poland	18 762 000	4 040 410	1 955 000	413 600	10.5
Romania	11 846 945	4 987 500	2 332 730	285 000	19.7
Slovakia	2 451 800	833 612	294 900	13 100	12.0
Slovenia	500 383	495 000	268 402	29 822	53.6

(Source: Brouwer et al 2001)

Such habitats will, however, come under considerable pressure if agriculture becomes more intensive, giving rise to significant biodiversity loss (Donald et al, 2001). On the other hand land abandonment is currently a bigger problem in the region, and is likely to remain so during the transitional years after EU membership. In Estonia, for example, about 30 % of the 1.5 million ha of farmland is presently abandoned (source: Estonian Ministry of

Agriculture). This proportion is even higher for permanent grasslands (56 %). Among semi-natural grasslands of medium or high nature value (37 000 ha) only 40 % is still under management (Mägi *et al*., 2001).

South-eastern Europe and the NIS show two opposing trends. The surviving natural steppe grasslands remains threatened by conversion to arable and local overgrazing, but the collapse of many collective farms has led to the re-establishment of communal, semi-subsistence pastoral systems. This extensive land use favours the maintenance of biodiversity-rich semi-natural grassland systems that depend on traditional grazing and/or haymaking. Case studies from the Ukraine and elsewhere show the high plant and butterfly diversity of such systems, most of which has already been lost in western Europe (Elligsen et al., 1998).

2.3.3 Policy response

Reforms of the CAP (e.g. in 1992 and Agenda 2000) aim to shift the emphasis of the policy from market-based support (e.g. intervention to maintain producer prices) towards direct income support (e.g. payment per hectare or unit of livestock). These changes, together with public concerns related to production methods, have encouraged the EC to provide new opportunities to finance agri-environment schemes as part of rural development programmes. These are obligatory under the EU rural development Regulation 1257/1999 and take up about 50 % of planned rural development expenditure in the EU Member States in 2000-2006.

Throughout the CEECs and NIS an increased environmental awareness and recognition of the complexity of rural socio-economic problems is apparent while agri-environmental policy development is still at an early stage. There are also significant regional disparities, with accession to the EU being a major influence on agricultural policy and activities in all Accession Countries. Pre-accession instruments, notably SAPARD (the Special Accession Programme for Agriculture and Rural Development) are assisting this process in CEECs, although most countries have chosen to give higher priority to improving the competitiveness of the agri-food sector than to agri-environment measures. Nearly all CEECs included agri-environment measures in their proposed SAPARD programmes, but there have been considerable delays with implementation, and some countries have abandoned the measure altogether. The obligation to implement EU legislation such as the Water Framework, Nitrates, Birds and Habitats Directives after accession will, however, make it necessary to integrate environmental considerations into agriculture policy.

For the NIS, it has been market reforms, rather than agri-environmental policy or the integration of environmental actions into the agricultural sector that have been the principal drivers of change. Many of the International Financing Institutions co-operate with the NIS in providing grants and loans to develop strategies and actions to mitigate the impacts of agriculture on the environment.

The situation in the Mediterranean accession countries is different, with wide variation in the economic significance of agriculture, production patterns and environmental problems. Unlike the CEECs and NIS, which have gone through major reductions in the use of inputs, one of the main issues for Cyprus, Malta and Turkey is prevention or control of the detrimental effects of likely future agricultural development on water resources and other aspects of the environment. Agriculture has become significantly more intensive and, in Turkey for instance, the area of steppe grassland fell from 60 % to 31 % of total agricultural land between 1950 and 1984. No agri-environment initiatives have been established in these countries, partly because so far they have not been eligible for EU funds for developing agricultural methods that protect the environment.

2.3.4. Outlook

EU agriculture is likely to continue to specialise, but reforms of the CAP should seek to further integrate environmental measures into agricultural policy. The currently widespread low input and extensive agriculture in the CEECs provides a window of opportunity for the development of environmentally sustainable agriculture. Future EU membership could result in a return to more intensive agricultural practices unless policies are adapted to promote the more harmonious coexistence of farming with biodiversity, for example through agri-environment measures. There is a large untapped agricultural potential in the NIS that may give rise to intensification as their economies strengthen. For both the Accession/Other countries and the NIS, continued support is needed to integrate the environment into the agricultural sector. This would help to develop an agri-environmental policy framework, strengthen the extension services, particularly in the provision of agri-environmental advice and training materials, and provide grants to improve or construct animal waste storage units. Improved monitoring and data are needed to enable a more detailed assessment of the impact of agriculture on the environment in Europe as a whole. For Member States and the Accession Countries elements of such a monitoring system are under development, but measures should be extended, through co-operation, to ensure similar progress in the NIS.

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