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Agricultural biodiversity – issues to be aware of within MEACAP

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Contents

1 Purpose and intent

The purpose of this brief document is to:

- provide an overview of the issues known to be important for agricultural biodiversity[1] at an EU15 and EU25 level
- provide a focus for the types of biodiversity issues that WP5 within MEACAP should be concerned with
- provide a framework for the types of measures that should be considered, especially from a biodiversity perspective

The main intent is therefore to:

- help set the scene for the agricultural biodiversity work within WP5
- provide a framework for the EU10 to react to (and thereby help prevent duplication of work that has gone before)
- provide a framework for the EU15 work

2 Overview of biodiversity principles

2.1 Ecological characteristics

Within any agricultural landscape, biodiversity is generally greater within areas that (a) contain a wide range of niches (e.g., different habitats, different vegetation structures), (b) are subject to medium levels of disturbance (e.g. through climatic or management factors), (c) occur at a large enough scale to allow enough individuals to survive and maintain viable populations and (d) provide a sufficient amount of similar habitats (though with varied environmental conditions) within close proximity to each other to allow the individuals of each species sufficient choice of potentially suitable habitats at any one time. Many areas of European farmland are of biodiversity value because:

- They continue to utilise and maintain a high proportion of semi-natural vegetation managed at relatively low levels of intensity. This may be largely by default in that climatic and topographic constraints limit the intensification of vegetation management and agricultural practices that can be applied to these areas. However, the outcome is a greater range of ecological niches over much of the area utilised within the farming system.

- These climatic and topographic constraints also generally mean that not all of the land in an area is available for utilisation by all the different land use components of the system (e.g. grazing by domestic animals, growth of crops). Hence, crops, more intensively managed pastures and semi-natural vegetation are generally found within a mix of more natural habitats (not only woodlands but also other landscape elements such as hedgerows and wetlands).

- The constraints imposed on the vegetation by climate and topography control not only the type but, just as importantly, the timing of the management that is applied to the vegetation. Hence, the farm management practices are generally synchronised with the annual natural growth cycle of the vegetation and so are not imposed at a time when it would be detrimental to a wide range of the plant species involved. In addition, soil type and nutrient limitations place limitations on the type of crops which can be grown or the number of years they can be grown in succession. There is therefore also more of a need to include a greater variety of crops in the crop rotation (including periods of fallow in which to build nutrients to a level at which the subsequent crop can be supported).

[1] The biodiversity focus within MEACAP is on the wide range of habitats and wildlife species which are associated with farmland in Europe rather than on the diversity of domesticated livestock and crop types occurring on farms

- For most of the year, the nutritional value of much of the semi-natural vegetation is generally low which places limits on the number of animals and the duration of grazing intervals in a given area. It also leads to a need for larger areas to be utilised. Hence, grazing pressure on any one area is generally either low or (in closely shepherded flocks) only high for a very short period, which leads to a greater heterogeneity of vegetation structures.

- The need to produce fodder to carry livestock through the winter and the constraints on the amount of fodder which can be grown mean that (a) there is a limit to the total number of animals that can be supported and (b) there is a need to move animals to other areas during the period of growth and harvesting of winter fodder in the summer. Both these factors markedly reduce grazing pressure on any one area of land over the course of the year. In addition, not only do the fodder crops introduce further heterogeneity into the landscape, but many of these are also of extremely high biodiversity value in their own right.

- The habitats of many wildlife species are naturally unstable and it is common for populations to disappear from one area and for new ones to appear when a suitable niche becomes available elsewhere. These farming systems and associated farming practices are maintained at a scale and intensity which ensures sufficient area of potentially suitable habitat is available within relatively (in terms of the distance that the species can move) close proximity to each other and thereby allows scope for these cycles of colonisation and re-colonisation to take place.

- By the same token, these systems are much more favourable to a wider range of wildlife species (especially the larger vertebrates) because they are practised over a wider scale and therefore (a) the conditions required at any one time of year (especially by more mobile species) can be found at a wide variety of locations and (b) the different requirements by these species at different times of year are catered for, i.e. through changes in the mix of structures and habitats in any one area through the year.

The biodiversity value of European farming systems therefore relates both to the spatial and temporal diversity that they introduce. In a spatial context, they produce a patchwork of habitats - meadows, grass pastures, crops, fallows, woodland, hedgerows, natural pastures (including alpine grassland, heath, moorland, saltmarsh, marshland, bog, wood-pasture) as well as more intensively managed land around settlements and farmsteads. In a temporal context, not all land is managed in the same way at the same time; so neighbouring farms with essentially the same production systems may sow and harvest crops at different times. This produces a patchwork of the same crop at different stages of development. In a similar fashion, adjacent pasture under different ownership will be grazed in different ways (e.g., with different animals and at different stock densities) and at different times of the year. This diversity provides much more favourable conditions for plants and animals (especially invertebrates) to find areas with suitable conditions for the completion of their lifecycles (Bignal & McCracken 2000).

2.2 Needs of habitats and species

Where there is a mixture and close proximity of arable and grass fields (or indeed any other types of habitat), it means that at any time of the year a farm will generally provide a number of different and varied habitats with the potential to support a wide range of plant, invertebrate and bird species. Some of these species are intimately linked with the annual farming cycle and dependent on the management of each field as whole, while others are associated with the maintenance and management of the surrounding boundary features. However, assessing the impact on biodiversity of changes at the field, farm and landscape level within agricultural landscapes is not straightforward since different species will react to change in different ways and at different scales.

This is particularly true for the fauna, since their relationship with the landscape can be especially complex. For example:

- Individual species may require different habitats at different stages in their lifecyle. Dragonfly larvae develop within freshwater whereas adults require suitable riparian vegetation on which to resting and use as hunting bases. Lapwings nest in short bare vegetation in cereal fields but as soon as the chicks hatch the adults take the to neighbouring grassland fields in order to forage

- Individual species may require a range of habitats at the same stage in their lifecycle. Brown hare utilise a mosaic of farmland habitats throughout the year. Many birds nest in cover (such as hedgerows and woodlands) but need open habitats in close proximity in which to feed

- Individual species may only be present at particular times of the year. Many breeding birds are only present in the spring and summer, many overwintering birds (e.g. geese) only occur in the winter while other species may only pass through on migration in the spring and winter

- Species associated with particularly dynamic habitats (such as arable crops) will need places of refuge that they can retreat to at the times of year that the habitat becomes unsuitable for them (e.g. at harvest or ploughing). For example, it has long been accepted that well managed boundary features and landscape elements in arable situations can serve as a refuge for natural predators of crop pests such as ground beetles.

- Even within the same habitat, many species have exacting requirements. Many bees require bare soil to allow them access to burrows in close proximity to flowering plants as source of foodstuffs

In addition, for many species we have knowledge of their broad habitat associations and needs but other factors which need to be taken into account (such as their mobility and dispersal ability in the landscape) are less well known. For example, many insects are strong fliers or (like spiders) drift with the wind and hence could be thought to not need physical connections in the landscape. However, on cereal farmland some butterfly species have been shown to move along hedgelines and the edges of patches of scrub and wood rather than crossing open ground. In addition, many invertebrates have precise microclimate requirements and those which are slow -moving, in particular, may not be able to traverse extensive areas where temperature and humidity are inappropriate owing to extensive shading or exposure.

It is also important to bear in mind that the impact of habitat loss and fragmentation on species will vary between different types of farmland habitats (Opdam & Wascher 2004). Consequently, species which are adapted to unpredictable habitat availability in space and time generally exhibit high mobility and therefore are less susceptible to fragmentation (irrespective as to whether this occurs due to natural or human-influenced disturbance processes). Hence, species associated with arable habitats (which are generally very dynamic) would be anticipated to be less vulnerable than those associated with less dynamic habitats, such as woodland, marshland, wetlands, heathland and unimproved grasslands. However, the wider landscape context in which these different types of habitat sit will also be important in influencing the scale of the impact of fragmentation upon them.

2.3 Landscape scale issues

No one field or farm in a landscape can be divorced from its surroundings – what is happening in those surroundings will impact on the biodiversity potential of that field or farm (and vice versa). In general, maximising the biodiversity value will be directly linked to the heterogeneity (mixture) of different habitats and the structure of those habitats that occur within that unit area – with a greater mixture allowing more opportunities for other species to occur. However, the size of the unit area

that needs to be considered will vary markedly depending on the type of biota under consideration – so for example, viable populations of a very wide range of invertebrates could potentially be accommodated satisfactorily within an area covering only 10s of hectares while maximising the number and abundance of larger species such as birds and mammals would require consideration of 100s of hectares. Differences in these scale issues will mean that it will not be feasible to consider the requirements of all species. Hence the farmland biodiversity focus should not simply be directed at deciding whether a particular approach will provide the range of conditions required by any target group of organisms but also just as importantly needs to consider whether it feasible to accommodate sufficient amounts of the required resource(s) to maintain viable populations of those organisms in that landscape. The type of issues which need to be taken into consideration in each situation include:

- The current (and potential future) size of existing habitats and features
- What occurs within their immediate surroundings
- The condition of these habitats and features and how this is likely to change with time
- The location of these habitats and features in the landscape, especially with regard to
    - Their proximity to other features in the landscape with which they could interact
    - Potential barriers to movement and/or spread of species across the landscape
    - The potential for making connections between habitats and features of importance
- The topography of the landscape and how this impacts on the potential to maintain or enhance existing habitats or make provision for new habitats

In addition, many habitats and landscapes may be dependent on some form of disturbance in order to periodically (and this may be regularly or irregularly) create conditions favouring a return to more varied mixture of structures and habitats and/or retain parts of a particular habitat in a specific growth form. Such disturbance events may be linked to management (e.g. cutting, grazing, burning) or more 'natural' factors (e.g. exposure, flooding). In either event, it is important to take the need for such 'events' into account and to allow for these in the choice of measures to implement. For example, if maintaining the biodiversity value of a heathland is dependent on periodic burning, then the occurrence of houses or woodland in the immediate vicinity will put limitations on the scope for such practices in the future. Similarly, if a meadow or woodland is dependent on periodic flooding then alterations to the upstream hydrology will have an adverse effect on this

2.4 The importance of timescale

There are three types of timescale (temporal) issue which needs to be taken into account when choosing the measures to implement and the scale at which they should be implemented for biodiversity conservation purposes:

- Some species (even species resident in an area) have different needs at different points in their lifecycle and this may or may not vary with the seasons. In any event, it will be important to recognise what these requirements are and ensure that these are in place when they are required – otherwise it will not be feasible for that species to support itself within that landscape for the full year. Other species may not be resident in the area throughout the year and may only occur within particular seasons – but again it is important that their need(s) during those times are known and accommodated

- Some habitats and landscapes are much more dynamic than others and therefore may be changing over much quicker timescales (seasonal, annual) than others which may change very slowly with time. The species associated with these different type of habitats will be adapted to these different types and hence it may be important (depending on the biota targeted) to include aspects of both types within the planning process.

- In some cases there may be significant time-lags between a habitat being 'placed' within a landscape and it being colonised or utilised by the species associated with it. By the same token, particular examples of different habitats may only be utilised very occasionally (e.g. once every five years when conditions are such that the population of a particular species has a good year) but nevertheless their continued existence in the landscape is essential in order that they can be made use of as and when necessary (e.g. metapopulation dynamics of butterflies)

In addition, it is natural for habitats to change their condition and structure over time and for individuals of particular plant species to grow old and die at individual points within that habitat – the key requirement is that the example of the habitat is large and varied enough to allow this natural senescence to occur in some locations and establishment and growth to occur in other locations

Overall there is a need to consider the short, medium and long term when viewing the potential biodiversity impacts of change – what may be detrimental to some species in the short-term may be advantageous to them in the long term (and vice versa). If the short-term negative impacts are 'buffered' by what surrounds the location of change, then this may be less of an issue (as species could 'move out' during the bad times and come back in when conditions are again suitable). Hence there is a need to consider the potential for any negative impacts to be offset by the surroundings.

3 Overview of main agricultural biodiversity issues – what are the problems

3.1 Background

Europe's countryside and cultural landscapes have been shaped by farming over centuries. Farmland, including arable land and permanent grassland, is one of the dominant land covers in Europe, covering over 45% (180 million hectares) of the EU-25. It has been estimated that 50% of all species in Europe depend on agricultural habitats (Kristensen 2003). Consequently, some of the most critical conservation issues today relate to changes to traditional farming practices on habitats such as hay meadows, lowland wet grasslands, heathlands, chalk and dry grasslands, blanket bogs, moorlands and arable land. All of these habitats have been created and need to be maintained by farming. In all cases taking the land out of agricultural production is not the appropriate choice for biodiversity conservation, but rather it is vital to ensure that the intensity of agricultural management is appropriate (Bignal & McCracken 1996). Table 3.1.1 provides an indication of some of the agricultural biodiversity issues of relevance to broad farm types across Europe.

European agriculture is still very diverse, ranging from large and specialised commercial holdings to part-time farming using mainly traditional practices. However, agricultural modernisation and intensification over the last 60 years have had significant impacts on the biodiversity value of

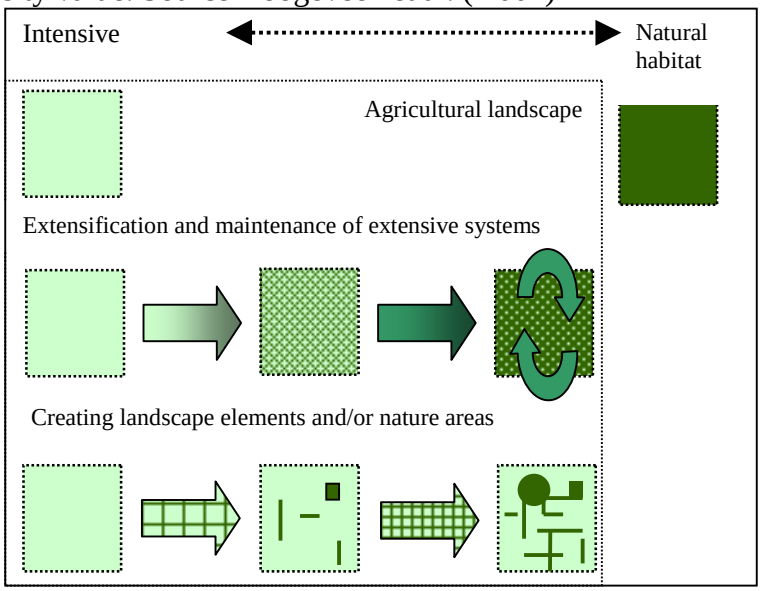
Table 3.1.1. Overview of agricultural biodiversity issues of relevance to broad farm types across Europe

Arable systems	Horticulture and Permanent crops[2] systems	Grazing livestock and mixed systems	Pigs and Poultry systems	Subsistence and semi-subsistence systems
• Increasing size of farms together with specialisation in either crop or livestock production and associated decrease in mixed farms • Increasing size of fields and decreasing amount and/or condition of non-productive landscape elements (hedgerows, woodlands, field margins) • Increasing intensification, especially with regard to drainage, irrigation, nutrient input, pesticide use, grazing regimes and mowing practices • Increasing mechanisation of farming practices and the use of bigger and heavier machinery leading to concerns over soil compaction and erosion • Increasing focus on the more productive areas of farmland and decreasing utilisation of areas less suitable for machinery or too far from the farm • Increasing concern over wider environmental impact of point-source and diffuse pollution from agricultural sources • Decreasing genetic diversity with an increasing focus on fewer crop varieties and livestock breeds[3]				
• Decrease in variety of crops grown on individual farms • Decrease in use of fallow in rotations • Decrease in use of livestock on farm • Decrease in amount and length of time stubbles are left before ploughing • Increase in use of irrigation	• Decrease in variety of crops grown on individual farms • Decrease in association with livestock and cropping systems • Increase in the intensity and scale of practices	• Increase in livestock densities on farms • Increase in mechanisation and intensity of cutting practices • Increase in amount of fodder and forage sourced off-farm • Decrease in semi-natural vegetation on farms • Reduction or total abandonment of grazing practices of semi-natural habitats • Loss of grassland and other open habitats through scrub/woodland encroachment	• Intensification of pig production in dehesa/montado systems • Increase in housing of pigs and poultry and decrease utilisation of farmland habitats • Increase in densities at which animals are kept within houses and hence in volume of waste produced per unit area from such units • Increase in pollution impacts associated with disposal of high volumes of waste from such units	• Decrease in scale of practices • Decrease in number and distribution of systems • Abandonment of individual farms/plots
• All factors resulting in a decrease in the mixture of habitats and structures occurring at the field, farm and landscape scales				

[2] Permanent crops (such as olives, fruit and vines) are an important component of farmland, especially in Mediterranean. Much of this cultivation has been intensified in recent years and the surviving systems of high biodiversity value are generally in the poorer area where farming is less specialised and inter-cropping (for example of olives, almonds, carobs and cereal with livestock grazing) is still practised.

[3] Gay, S H (2004) *MEACAP WP5 Issues Paper: Genetic resources in food and agriculture and the Common Agricultural Policy*.

Figure 3.1.1. Schematic representation of the agricultural landscape and options to maintain and enhance its biodiversity value. Source Hoogeveen et al. (2001)



Europe's farmland. The mechanisation of agriculture has facilitated the elimination of many landscape elements and hedgerows, the drainage of wetlands and the ploughing up of semi-natural grasslands. Species richness and habitat diversity has also declined due to increased pesticide and fertiliser use and the simplification of crop rotations. This development of intensively-managed agricultural land has affected all agricultural sectors and has occurred across most of the lowland areas of Europe, but has been especially dominant in the north and west.

There are, however, still areas of Europe where soil and climatic constraints together with economic and policy constraints have meant that it was not possible to intensify the farming practices to the same extent. In some areas of Europe, planning considerations have also placed limitations (especially in recent years) on the scale of landscape change that can occur. Irrespective of the underlying reasons for their occurrence, such areas not only generally contain more of a patchwork of semi-natural and natural habitats but also the farmland is more varied and subject to a greater range of intensities of management. This diversity in turn leads to the farmland and associated habitats containing a higher biodiversity value than in the areas where intensification has occurred. Although such high nature value (HNV) farmland[4] occurs in association with traditional cropping systems in southern Europe, in general the majority of Europe's remaining HNV farmland is now largely associated with livestock grazing systems on semi-natural habitats in the mountains and other remote areas of Europe.

For most intensively managed areas of farmland, an improvement in biodiversity value can be achieved either by lowering inputs across the agricultural landscape as a whole or by reintroducing a greater range and mixture of habitats into the landscape (Figure 3.1.1). Extensification refers to the lowering of inputs such as fertilisers and herbicides. Alternatively, natural landscape elements may be recreated or reinstated at the expense of the actual utilised area (e.g. the re-establishment of more natural twists and turns in watercourses which had previously been subjected to straightening). This can be done on a small scale (e.g. hedgerow creation) or through large-scale

[4] Three broad types of High Nature Value farmland are recognised in Europe (EEA 2004a): Type 1 - farmland with a high proportion of semi-natural vegetation; Type 2 - Farmland dominated by low intensity agriculture or a mosaic of semi-natural and cultivated land and small-scale features; Type 3 - farmland supporting rare species or a high proportion of European or world populations.

nature development. Conversely, for most high nature value farmland the issues revolve around maintaining the diversity in habitats and farming practices which already exists. It is essential that policy recognises that the approaches that need to be taken differ between these two types of farmland.

3.2 *Drivers of change*

The European Union's Common Agricultural Policy (CAP) and associated national agricultural policies have been the main drivers behind conflicts between farming practices and biodiversity. The CAP initially aimed to increase productivity and provide more food at a lower cost for EU countries, while also achieving a fair standard of living for farmers. This was achieved through stabilisation of markets (through a single market with common prices) and a more autonomous approach with less reliance on imports and preference given to member states as well as free movement of goods (Young et al. in press). However, by the 1980s, the CAP and its market and structural support policies were held responsible for increasing habitat degradation, overproduction of food products, intensification of farming practices, and the concentration of production from fewer, more specialised farms (Bignal et al. 2001).

In the early 1980s the CAP experienced the first of a succession of changes in emphasis when measures were introduced to control surplus production and also to provide compensation to farmers for loss of income as a result of their adopting environmentally sensitive forms of farming. The subsequent 1992 reform further recognised the environmental role of farming by increasing the availability of agri-environmental schemes across the EU. In 1998, the Agenda 2000 reform took this further and introduced elements of environmental cross-compliance[5], as well as the opportunity for farmers to obtain support (under the Rural Development Regulation) for additional activities other than farming per se.

The 'mid-term' review of the CAP in 2003 has served to remove the focus on production and increased the focus on environmental concerns within the CAP. Consequently, from 2005 financial most support provided to farmers will not be dependent on them growing specific areas of crops or retaining a certain number of animals. Instead, farmers will receive a Single Farm Payment (which in the EU15 will largely be based on their historic level of CAP support), provided they undertake to comply with a suite of EU Directives (including the Birds and Habitats Directives) and keep their land in Good Agricultural and Environmental Condition. In addition, the majority of farmers will see the level of their Single Farm Payment decrease annually to allow Member States to fund an increase in the amount of funding available via rural development measures. Although a wide suite of measures can be funded under the rural development heading, it is anticipated that in many Member States this modulation of the CAP will release funds to encourage more farmers to join agri-environment schemes.

3.3 Impacts on agricultural landscapes

The increasing drainage (or in southern Europe use of irrigation) of farmland together with the mechanisation and modernisation of much of Europe's farming practices has resulted in negative effects on a wide range of farmland habitats and associated ecosystems. Of especial importance is

[5] The new Member States are just starting to implement the CAP direct support payments and by 2010-13 the payment rates will be fully aligned with those in EU15 Member States. Most of the new Member States (with the exception of Slovenia and Malta) will start by making these payments under the 'Single Area Payment Scheme' (SAPS), but between 2005 and 2009 will transfer to the 'Single Payment Scheme' (SPS) which now applies to the EU15 Member States. Cross-Compliance will not apply fully to each of the EU10 New Member States until they have converted fully to SPS. See Keenleyside *et al*. (in press) and Gay, S H & Osterburg, B (2004) for more detail

Box 3.3.1. The differing definitions of abandonment

Although abandonment of agricultural land in Central and Eastern Europe has become a major phenomenon over the last 15 years, it has been relatively uncommon in EU15 countries during the life of the CAP. Agricultural land abandonment can be observed as having several forms (from Keenleyside *et al. i*n press):

- Where the land is not used at all by the owner or occupier, it can be called *actual abandonment*. The vegetation can change spontaneously into a tall herb, bush and forest ecosystem after a defined period. This process is connected with abiotic conditions like soil fertility and the level of soil moisture. Rich and wet soils have a strong prevalence in forest ecosystems. By contrast, poor dry soils in southeast Europe can have a 'steppe' like grassland vegetation which is able to survive for many years without any active management, like mowing or grazing.

- Where the land is used by the owner or occupier but with a low level of management, it can be called *semi abandonment* or *hidden abandonment.* The land is not formally abandoned and is subject to some form of management, which might be simply to keep it available for future use, for example in tourism, or to claim a subsidy. Very extensive or intermittent farming operations may also fall into this category, not least on some subsistence farms. Such extensive management is generally associated with very low or zero economic returns but can be of considerable biodiversity value.

- Land abandonment may be permanent or transitional, the latter often as a result of land reforms which are not yet completed and may be influenced by the availability of CAP support payments.

Different authors and authorities use the term 'abandonment' in different senses. One definition adopted by agricultural authorities in parts of Central and Europe is land which has not been used for agricultural production for two years. In the statistics provided by Central and Eastern European countries, land abandonment has only been calculated for *actual abandonment*. The extent of *semi abandonment* is therefore not known, but it appears that the area of semi abandoned land is at least as big as the area of actual abandonment.

the fact that many agricultural landscapes have become simplified through an increase in farm and field size (and the associated removal of features such as small woodlands and hedges) together with an increasing specialisation on either crops or livestock on any one farm. In contrast, high nature value (HNV) agricultural land generally retains a more diverse mixture of habitats in the agricultural landscape. As a result, such farmland maintains a wide variety of species, many of which are of particular conservation concern. According to calculations in a recent study (EEA 2004a), approximately 15–25% of the European countryside is predicted to be under HNV farmland. The largest areas are found in eastern and southern Europe and contain habitats such as semi-natural grasslands, *dehesas*[6], *montados* and steppe areas. HNV farmland is also relatively abundant in mountainous regions across Europe and contain upland grassland and heathland habitats in association with pastures, hay meadows and small areas of crops from which additional winter fodder for the livestock is produced. No pan-European data on trends in the amount and distribution of HNV farmland is yet available, but it is known that such farmland areas are generally under severe pressure due to a vulnerable economy and agricultural depopulation. As a result, some areas are suffering from intensification of the farming practices while others are undergoing

[6] Dehesa and montado is the name given to cork-oak wood pastures in Spain and Portugal, respectively

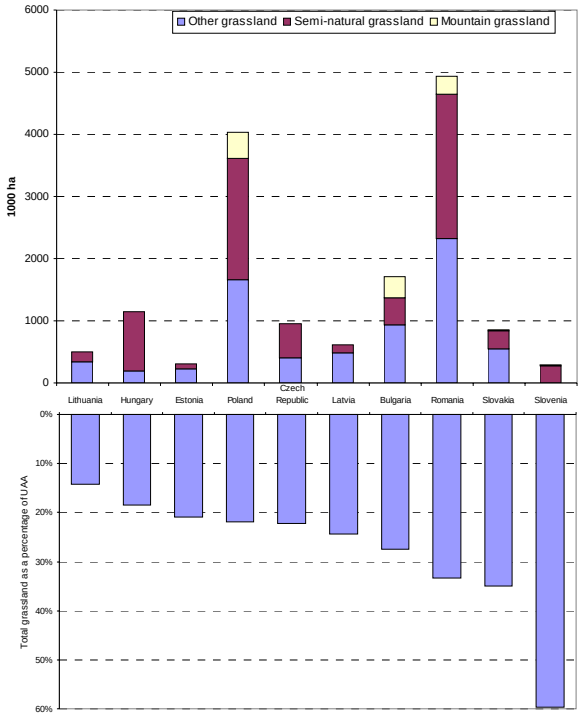


Figure 3.4.1. Total ha of three grassland types occurring in each of 10 Central and Eastern European Countries together with grassland as a percentage of UAA. Adapted from EEA (2004b)

Note: semi-natural grasslands are defined according to their dependence upon continuing agricultural management in order to persist. Alpine pastures above 1,900 m that can be maintained without any human intervention are not included

abandonment of farmland (see Box 3.3.1). In most areas of Europe, both are considered detrimental to biodiversity.

3.4 Impacts on habitats and species

Due to the relatively small area of undisturbed natural habitat that remains in Europe, semi-natural farmland habitats are particularly important as a biodiversity resource. 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 of farming practices. Consequently, in recent decades the area of semi-natural grassland has fallen across most of northern and western Europe. For example, the area of semi-natural acid grassland declined by 17% between 1990 and 1998 in England and Wales, while the area of hay fields in Finland fell from 13,000 ha in 1970 to just 6,000 ha in 1997 (EEA 2003). However, as can be seen in Figure 3.4.1, a high proportion of the grasslands occurring across many central and eastern European countries (CEECs) is still semi-natural (EEA 2004b). In addition, a large amount of the agricultural area of countries such as Romania, Slovakia and Slovenia is composed of semi-natural grasslands. This concentration of semi-natural grasslands in CEECs is an important European biodiversity resource, but one which is coming under increasing pressure from land abandonment as these countries experience the transitional process associated with EU membership .

Farmland birds are one of the few groups for which trend information is available across a number of European countries. Changes in farmland bird populations with time can be used as an indication of the general state of farmland biodiversity, since the diversity and abundance of plant and insect species on farmland directly affects the availability of food for birds. In addition, features such as hedgerows, uncultivated field margins, small woodlands and patches of scrub are important for many species of birds and hence changes in the occurrence and distribution of these habitats will be reflected in changes in the bird population in the agricultural landscape. In general, farmland bird populations have declined markedly over the last 20 years in most EU15 countries (ETC/NPB data in McCracken 2004). An increasing amount of research is showing that the decline of many farmland birds is associated with increased intensification of agriculture. Hence it is therefore likely

that the overall trends are reflecting changes in the agricultural landscapes utilised by the farmland bird.

A wide range of other species dependent upon farmland habitats have been affected by the increasing intensification of farming practices. For example, over 400 species of vascular plants in Germany have declined because of habitat loss or fragmentation due to agricultural intensification, while in the UK there has been a greater decrease in plant diversity in arable habitats than any other habitat Farmland invertebrates have also suffered, with total insect abundance, including moths, butterflies, sawflies, spiders, parasitoid wasps, and aphids decreasing. Agricultural land is increasingly being abandoned across Europe, especially when the landowners find themselves unable to make a living from farming alone. In North Savo (Finland) for example, abandonment of farmland and associated afforestation has resulted in a decline in open space species such as the grey partridge (*Perdrix perdrix*), the corncrake (*Crex crex*), butterfly species and vascular plants associated with arable farming (Young *et al.* in press).

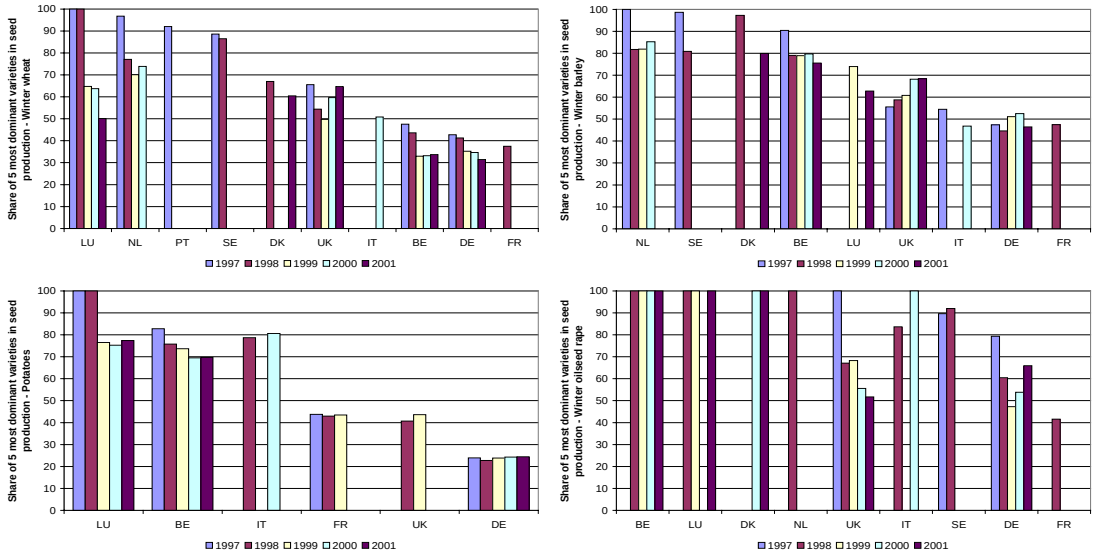
3.5 Impacts on genetic diversity

Europe is home to a large proportion of the world's domestic livestock diversity, with over 2,500 breeds registered in the Food and Agriculture Organisation (FAO) breeds database. This represents almost half of the world's recorded breed diversity (EEA 2003). On the basis of data available for use by EEA in the development of an indicator, it appears that in nearly all EU-15 countries about 50% of all livestock breeds have extinct, endangered or critical status. The highest percentage of the extinct and endangered/critical status categories is found in Austria, the lowest percentages are in Portugal and the Netherlands. It appears that a large number of European breeds are threatened with extinction because of their perceived lack of economic competitiveness. Although some old breeds are still surviving in marginal areas where conditions are unfavourable for intensification, most traditional breeds are maintained nowadays by dedicated rare breed societies and hobby breeders.

The replacement of old livestock breeds with modern breeds is not just of concern from a genetic biodiversity perspective. High nature value pastoral grazing systems depend on hardy breeds that are well adapted to natural conditions and to practices such as transhumance (the seasonal movement of livestock between grazing habitats). For example, Avileña negra cattle in central Spain can walk 20-40 km a day on the journey to their summer mountain pastures. Scottish Highland cattle have big stomachs capable of coping with large quantities of rough vegetation and thick skin and a hairy coat to protect them against the wet and windy Scottish weather. The intensification of European farming practices and the drive for increased productivity has led to the development of modern breeds that can produce a lot of milk and meat but only at the expense of losing the characteristics that allowed traditional breeds to adapt to regional environmental conditions. Modern breeds need large quantities of rich grass and supplementary feeds and cannot cope with the harsh conditions of HNV pastoralism. This switch of breeds has therefore led to the abandonment of remote pastures in many areas and the loss of biodiversity that depends on grazing impacts.

Impacts on agricultural plant genetic resources is poorly documented but it appears evident that there is concentration on fewer crops and varieties. The major drivers of loss of agricultural plant genetic resources are standardisation of production processes, consumer preferences, technological change (e.g. changes to breeding programmes) and international competition. In some countries a wide range of different crops and varieties still exists in predominantly marginal areas. But many local crops that have traditionally been important for feeding the poorest sectors of society are now under-utilised or neglected.

Figure 3.5.1. Percentage share of seed multiplication area for the five most dominant varieties: winter wheat (top left), winter barley (top right), potato (bottom left) and winter oilseed rape (bottom right). Source: EuroSemStats database, maintained and distributed by NIAB (National Institute of Agricultural Botany) and reported in EEA (2004c)



The EEA have used National Institute of Agricultural Botany (NIAB) EuroSemStats database to provide information on seed multiplication areas for specific crops (EEA 2004c). The five most dominant seed varieties were aggregated together to indicate the extent to which these varieties dominate production for the following crops: winter wheat, winter barley, potatoes and winter oilseed rape (Figure 3.5.1). High values indicate that the 5 dominant varieties dominate production, meaning that diversity is low. Low values indicate that the 5 dominant varieties do not dominate production, meaning that diversity is high.

The share of the five dominant varieties in the total crop varieties seems to be less dominating in the larger EU-15 Member States. For the more widespread crops (winter wheat and winter barley) there is also a tendency to less dominance by the five dominant varieties compared with crops like potatoes and winter oilseed rape. On the basis of the current data the share of the five dominant varieties seems to be declining, not only for the winter wheat varieties but also to some extent for winter barley, potatoes and winter oilseed rape. For the latter crops, the share of the five dominant varieties is higher than for winter wheat. This is in particular the case for winter oilseed rape. However, one should take into account that this crop has only been (re)introduced recently in many of the Member States. In Germany, where winter oilseed rape has been grown for a longer time, the five dominant varieties took up 65% of the multiplication area in 2001, a decrease compared to 1997 (79%).

3.6 Increasing pressures on farmland biodiversity

3.6.1 Land-use change

The major pressure currently affecting farmland biodiversity across Europe relates to changes in the type and intensity of farming practices and the associated changes to land cover that occur within agricultural landscapes. Such changes can result either from an intensification or abandonment of agricultural practices, both of which can be detrimental to farmland biodiversity.

To-date, where natural and economic conditions have allowed, farming across Europe has generally intensified and specialised in order to increase yields and overall production efficiency. This has been a continuous process in most parts of the EU for decades, partly driven by the focus of CAP support on production criteria and reflected in steady increases in fertiliser inputs and milk and cereal yields. A similar focus on production also drove increased mechanisation and intensification of farming practices over large areas of lowland CEECs prior to 1990. However, investment in the agricultural sector in these countries dropped substantially due to the political and economical changes during the 1990s, resulting in a general reduction in input rates and hence pressures on farmland biodiversity over the past 15 years.

The current changes to the CAP support mechanism are expected to result in a decrease in environmental pressure from farming practices within the EU. There is therefore the potential to see some reversal in some of the farmland biodiversity declines observed over recent decades. However, any such reversal of biodiversity fortunes is not anticipated to be uniform across all agricultural sectors. Indeed, it is likely that dairy farms in particular will continue to have an adverse impact as economic pressures drive those farmers who continue in this sector to increase herd sizes and the associated area of land that they farm. In addition, although current input rates are relatively low on farmland in CEECs, some intensification is expected under the new economic and political framework following accession of these countries to the EU. It is therefore likely that some areas of HNV farmland will be exposed to intensification in the near future (EEA 2004a).

Decreased management and total abandonment of farmland is already a common feature in regions of Europe where agricultural productivity is relatively low. Irrespective of the current changes to CAP support and the increasing focus in agri-environment concerns, abandonment of farmland (much of it of high nature value) is likely to continue across Europe as socio-economic considerations put increasing pressure on the viability of farming. Low incomes, hard working conditions and a lack of social and rural infrastructure in many remote areas make farming a less attractive option for young people. The situation is not only particularly worrying in southern Europe but also in central and eastern Europe, where political and economic change has negatively affected the viability of high nature value farmland (EEA, 2004b).

Whilst there had been considerable criticism of EU policy on afforestation of farmland in the past, there have been improvements in the relevant legislation, most notably under the Rural Development Regulation. As a result, intensive large scale planting in the EU has declined. However, a focus on commercial objectives and a narrow range of tree species can still result in intrusive planting, damage to sites of biodiversity value and disruption of pastoral agricultural systems, including transhumance. For example, in Ireland progress is being made in developing more sensitive and appropriate approaches to afforestation. However, problems remain, such as the tendency to guide afforestation with conifers onto small blocks of agriculturally unrewarding pasture on farms, even though this may be the most valuable ground for conservation or the last remaining patch of semi-natural vegetation on the farm. Methods of targeting afforestation to suitable sites, avoiding high nature value semi-natural grassland and other farmland for example, could be more widely used to reduce the conflicts between pastoral farming and new woodland (Baldock 2003).

Finally, it is important to bear in mind that new agricultural production methods and irrigation can play an important role in the development of the agriculture sectors in Europe, but that improvements in agricultural productivity often put a great pressure on natural resources. For example, the increase in both irrigation area and the agricultural area installed with irrigation equipment indicated that water use by agriculture increased during the period 1990 -2000. This has put pressure on water resources, especially in southern Europe where a much greater efficiency of water use by agriculture is needed to prevent seasonal water shortages. During the 1990s the land

equipped for irrigation increased steadily but in the last years this trend was less pronounced with the exception of France, which experienced one of the highest increases in its area equipped for irrigation (related to changes in crop cultivation since approximately 40% of the land irrigated at least once a year is now used for growing maize). In 2000, Italy had the highest irrigated area (3.9 million ha) followed by Spain (3.5 million ha) The substantial expansion of the irrigated area in France and Spain was influenced by policy measures supporting the provision of irrigation infrastructure and providing subsidies to farmers installing irrigation equipment, as well as guaranteeing low water prices for agriculture (Campling 2003)

3.6.2 Non-native species

Invasive non-native species can cause conflicts with biodiversity on a wide variety of farmland habitats throughout Europe. However, to-date the problem has been recorded as being especially severe on areas of farmland in central and eastern Europe. For example, in Hungary, the most susceptible habitats to invasives have been identified as mismanaged agricultural and rural areas and wetland ecosystems. Dry grasslands and semi-natural forests have been found to be more resistant to plant invasions, but disturbance of these habitats can greatly increase the probability of invasive species establishing a foothold. The invading species can not only degrade the habitat but also outcompete certain valuable, protected species occupying similar niches in the community. According to recent estimates, about 45,000 hectares of grassland are affected with invasive plants (such as *Solidago* species, *Ailanthus altissima*, *Elaeagnus angustifolia* and *Asclepias syriaca*) in nationally designated sites in Hungary. The Hungarian state nature conservation organisation has initiated several programmes for the mechanical control of invasive plant species in protected areas, but with only locally apparent results so far (Anon 2002).

3.6.3 Climate change

By far the most significant pressures currently affecting farmland biodiversity are habitat degradation, loss and fragmentation of semi-natural habitats, the introduction of invasive species and the direct effects of pesticide or mechanical treatments. However, increases in nitrogen deposition and atmospheric CO_2 concentration favours groups of species that share physiological and life history traits common among invasive species, thus potentially allowing them to capitalise even more on global change in the future. The impacts of nitrogen deposition on plant communities may be greatest in nutrient poor ecosystems where the native plants that are adapted to such soils may not be able to compete with faster growing invasive species when nutrients are no longer limiting (IPCC 2002). However, although climate-change impacts on semi-natural vegetation are likely to occur relatively slowly, the response of farmers to changes in prevailing weather conditions is likely to occur much faster. Hence climate change has the potential to affect the cover and distribution of many agricultural habitats as farmers take the decision to either introduce or cease production of such crops on account of changes in the weather patterns. The prevailing weather conditions will also affect the distribution and range of wildlife species as well.

3.6.4 Changes to rural infrastructure

Finally, it cannot be stressed enough, that even where positive measures are taken to encourage farmers to maintain particular types of habitats, other factors which are not affected directly by the CAP policy can influence whether or not it is viable for the practice to continue. The fact that the approaches being taken within the reformed CAP are not integrated with other support mechanisms is likely to lead to difficulties in maintaining appropriate farming practices on high nature value farmland in the future. For example, a large decrease in animal numbers in CEECs over past 15 years has been accompanied by a loss of rural infrastructure (e.g. local slaughterhouses, milk processing plants). Even if production on farms can be encouraged from an environmental-management perspective and market demand promoted, it will be difficult, if not impossible, to exploit these effectively, and thus maintain existing farmland biodiversity, unless the local infrastructure can be reinstated, enhanced and adapted to future needs. Integral to this process will

be the need to broaden farming activities by, supporting producer groups, and by developing HNV farmland friendly rural development measures to exploit the market potential of locally distinctive crops and products. Strenuous efforts need also to be taken to ensure that discussions over Structural Funds priorities and Rural Development Regulation needs are sufficiently well integrated with one another to foster the development of a 'critical mass' in the appreciation and understanding of farmland biodiversity issues (Hindmarch & McCracken 2004).

3.7 Policy responses

3.7.1 Nature conservation policies

The main policy instruments for site protection at EU level are the birds and habitats directives (79/409/EEC, 92/43/EEC). Annex I of the habitats directive lists natural and semi-natural habitat types that must be maintained in a favourable conservation status by the Member States. The Natura 2000 network will build on the proposed sites of communal interest (pSCIs) that have been listed by the Member States. Out of the 198 habitat types listed in Annex 1 of the Habitats Directive, 65 have been shown to be threatened by the intensification of agriculture practices, whilst 26 grazed pasture habitats and 6 mown grassland habitats are threatened by the abandonment of pastoral management practices (Osterman 1998).

However, despite the dominance of farmland across Europe and its importance from a biodiversity perspective, agricultural habitats only form about 35% of the total area listed as pSCIs across the EU-15 and only three countries (Greece, Portugal and Spain) have included a greater proportion of such habitats within the pSCIs they have listed (ETC/NPB data in McCracken 2004). In addition, it appears unlikely that the choice of farmland to enter into pSCIs has been influenced solely by its biodiversity value, since less than one third of the predicted distribution of HNV farmland areas across the EU-15 has been found to be covered by pSCIs (EEA 2004a). Consequently, it would appear that the site protection measures employed to-date will at best conserve a minority of HNV farmland and do not necessarily appear to be targeted at areas of high farmland biodiversity potential within the more intensively managed agricultural landscapes.

3.7.2 Biodiversity Action Plan for Agriculture

The EC Biodiversity Conservation Strategy (ECBS), adopted in 1998, was developed to meet the EC's obligations as a Party to the Convention on Biological Diversity. Four associated Biodiversity Action Plans (BAPs), covering agriculture, natural resources, fisheries and economic cooperation and development, were adopted in 2001 and each outlines in detail what actions should be taken within each sector to implement the strategy. The ECBS requires the Commission to make an assessment of implementation, effectiveness and appropriateness of the ECBS and BAPs and to report on these every three years. Consultative reviews conducted in 2003 and considered in greater detail at a stakeholder conference in Malahide (Republic of Ireland) in May 2004 have highlighted that although there have been some successes in implementation, there have also been shortfalls in achieving the integration of biodiversity concerns into EU policies[7]. With regard to the BAP for Agriculture, the *Message from Malahide* highlighted that current opportunities under the existing Rural Development Regulation (Regulation1257/99) have not been fully utilised by the Member States (e.g. there has been little progress in implementing Article 16 schemes for areas faced with environmental restrictions in Natura 2000 sites). As a result, it is hoped that even greater emphasis will be placed in the coming years on the need to integrate environmental and biodiversity protection requirements into all aspects of the Common Agricultural Policy.

[7] *Message from Malahide. Halting the decline of biodiversity: priority objectives and targets for 2010*. Outcome from stakeholders conference on *Biodiversity and the EU: sustaining life, sustaining livelihoods* held 25-27 May 2004, Malahide, Ireland

3.7.3 Changes to agricultural support mechanisms

As already indicated, the current reform of CAP represents a radical change in the system of farm support provided within the EU, and has reflected in large part two of the demands of environmental NGOs, i.e. decoupling of support from production and mandatory environmental cross-compliance for all sectors supported by direct payments. There is also some interesting innovation, especially the establishment of a system of advice aimed at facilitating farmers' adaptation to the new environmental, animal welfare and health requirements. Nevertheless, there is also strong concern amongst some environmental NGOs and others that the approach in the current package is a high-risk way of CAP reform, with limited guarantees of sustainability and no fall-back position if things do not work out as planned. The possible effects on farming practices and land-use patterns are largely unknown, and hence the likely impacts on farmland biodiversity is currently unclear. Some environmental benefits (possible reductions in input use, stricter controls on impacts and increased effectiveness of agri-environment payments) are anticipated, particularly on farmland which was previously managed intensively. However, there is also the potential for important farmland biodiversity losses, especially through the decline of socially and economically fragile farming systems of high nature value.

The retention of a focus agri-environment schemes in the rural development measures is also good in principle. However, the reforms to-date have done little to address the question as to whether or not the programmes themselves have been effective in achieving their biodiversity objectives. In particular, many of the wide variety of schemes currently available suffer from the fundamental difficulty in attempting to manage biological features that have evolved as integral functional components of farming systems, as if they were simple material features. As a result, many schemes have a tendency to be over-prescriptive, are targeted too closely at specific material aspects or conspicuous species and some may have been over ambitious in their objectives. The ecological complexity of farmland and the fact that no two farms are the same has been difficult to address, as has making clear the distinction between high nature value farmland and the more impoverished systems of management and production associated with intensively managed areas (Bignal & McCracken 2000)

3.7.4 The way forward

Europe's countryside has been shaped by farming over centuries and a very large proportion of Europe's biodiversity depends in some way on farmland. European agriculture is still very diverse, ranging from intensively farmed monocultures that currently put heavy pressure on the environment to extensively farmed semi-natural areas creating much less pressure. Both types of farmland have important roles to play in the conservation of farmland biodiversity. Current changes to the CAP support mechanisms may possibly lead to some biodiversity gains on intensively-managed farmland but may do little to redress the abandonment of farming (and associated loss of biodiversity) on HNV farmland. There also needs to be a recognition that CAP measures are not the only factors influencing land management decisions on farms across Europe. There needs to be more integration of policies aimed at addressing all the agricultural, economic and socio-economic issues driving biodiversity changes on farmland. In particular, there needs to be closer linkages between the development of Structural Fund and CAP measures to ensure that the local infrastructure required by the farmers is maintained, especially in HNV farmland areas. Overall halting biodiversity loss on farmland is unlikely to be achieved without additional integrated policy efforts, especially with regard to targeting and prioritising actions aimed at both at the conservation of HNV farmland and improving the biodiversity value of intensively managed farmland.

4 The types of biodiversity issues of concern within MEACAP

European agriculture is entering a period of great uncertainty, since it is unclear exactly what impacts the changes to the CAP support mechanisms will have on farming practices, land-use,

agricultural landscapes and farmland biodiversity. There appears to be some scope for biodiversity gains to occur on what was previously intensively-managed farmland. However, any such reversal of biodiversity fortunes is not anticipated to be uniform across all agricultural sectors and farm types. It is also important to bear in mind that that changes will occur in 2007 to the wider package of Rural Development measures available in different Member States. While this may provide opportunities for an increased focus on agri-environment (and hence provide even more of supporting framework on which to base biodiversity conservation measures), the need to achieve a balance in spend between this and other policy priorities (i.e. measures to support restructuring and economic competitiveness; measures to support rural diversification) may possibly lead to some restrictions on the amount of funds which are available specifically for agri-environment approaches.

Changes to both these policies will not only influence the scale and type of agricultural land use changes happening on the ground in different areas of Europe, but just as importantly will have an important influence (through the impacts on farm economics and viability) on the willingness or otherwise of farmers to particpate in biodiversity conservation measures. Although it is unknown at this stage exactly what will happen on the ground, it is important that these factors and the wider ecological and economic context in which they are operating are borne in mind when thinking of the issues and measures to consider during the MEACAP project. To this end, it is possible to highlight a number of specific biodiversity concerns which are likely to continue to hold true as the implications of the changes to these policy drivers become more apparent:

- For parts of the European agricultural landscape, some beneficial land-use change may happen on the ground which either increases the amount and variety of different habitats in the landscape or makes a focus on biodiversity conservation easier (e.g. through freeing up more land for management specifically with conservation objectives in mind). Conversely, some farm types may put an increasing focus on achieving greater productivity (especially by minimising costs in order to maximise their income from marginal enterprises) and may continue to produce landscapes in need of a greater focus on biodiversity concerns. **Farm type will therefore have an important influence on the potential impact on biodiversity of any land use change. It will therefore be important to ensure that measures are selected so that the full range of broad farm types occurring throughout Europe are considered.**

- There are many small-scale (< 1-2 ha), semi-subsistence enterprises across the EU10 countries and the Mediterranean Member States. In the CEECs, these tend to be concentrated in the least 'collectivised' countries such as Poland and Slovenia, and are often traditionally managed privately owned farms that contribute to the maintenance of HNV farmland areas. These farm 'types' are under threat on three main fronts: (a) they may not qualify as 'farms' or be eligible for support; (b) they may decline with the present generation of (pensioner) farmers); (c) it may not be feasible to try to maintain such a scale of farming across such a range of countries (Hindmarch & McCracken 2004). However, small farms[8] are not only an important expression of biodiversity but are also a functionally distinctive component of many HNV farmland areas. **Hence in order to manage much farmland biodiversity and many HNV 'hot spots' effectively, some attention needs to be directed to measures to protect the size and 'type' of farm that has traditionally delivered the appropriate management techniques**

- It is likely that the area of farmland under production will decline and there is particular concern that grassland (and especially semi-natural grassland) under active management will decline

[8] In Europe as a whole, extensive farming systems are not restricted to *small* farms, but in CEECS large farms are mainly related to former collectivisation. Smallholdings may be either traditional or originate from privatisation. It is the first group that is most interesting from biodiversity point of view.

markedly in many Member States. **Attention therefore needs to be directed not only to the types of measures which can be used to maintain or restore such habitats *per se* in the landscape but also to how the relevant grazing and cutting management associated with these habitats can be encouraged or in many cases reinstated.**

- Intensification of agricultural practices has affected soil biodiversity just as much (if not more so) than above-ground biodiversity on farmland. The European Commission are currently working to develop an *EU Thematic Strategy for Soil Protection* and biodiversity will be one of the issues they will be highlighting within the Strategy. **There is therefore a need to ensure that measures that address issues of concern to soil biodiversity are also considered within MEACAP**.

- Whatever the scale of the farming enterprise, it is, however, clear that to obtain biodiversity impact at the landscape scale required, there needs to be a greater collaboration between farmers in any one area with regard to setting priorities and taking action. **Hence there is a need to ensure that development of schemes and approaches involve greater consideration of the scales at which measures need to be implemented.**

- In addition, biodiversity losses will only be halted if appropriate measures are directed where they can be most effective. Site protection under the Birds and Habitats Directives is an appropriate but insufficient conservation tool (since at best only about one third of existing HNV farmland area is likely to benefit from these measures). As a result, conservation of farmland biodiversity outside protected areas depends mainly on the application of rural development measures within the CAP (especially agri-environment schemes). **There is therefore a need for better targeting of site protection and biodiversity measures and for them to be considerd in terms of both HNV farmland and those areas of intensively-managed farmland which have the greatest potential to achieve biodiversity recovery.**

- Upland agricultural landscapes generally contain a high proportion of semi-natural habitats (such as heathland, moorland, bog, semi-natural grasslands) which are dependent on the continuation of some form of agricultural management. There is concern that the reformed CAP will do little to address the partial or total abandonment of farming practices on such habitats and may even serve to accelerate their decline in some areas of Europe (though it is also recognised that abandonment of certain types of farmland or the associated farming practices is not happening consistently across Europe). **MEACAP therefore needs to consider measures which are intended to reverse the abandonment of certain types of farmland habitat or encourage the retention or reintroduction of specific farming practices to such areas.**

- During the 1990s, livestock numbers in the CEECs declined progressively to roughly half their former levels. For example, between 1989 and 1994 in the Candidate countries, cattle numbers fell by 39% (from 30.4 to 18.6 million) and sheep by 57%. Early accession negotiations used the late 1990s as 'reference years' for EU support, which threatened to perpetuate abandonment and make it difficult to deliver locally appropriate management. Although livestock numbers are still an issue, and need to be increased, many countries have still to reach the limit of their current allocations, suggesting an interaction with other factors, possibly related to infrastructure and markets. **There is therefore not only a need to consider measures which are aimed at helping increase livestock numbers to allow for ecologically-sound stocking rates on biodiversity value habitats but also measures which help address the problems of lack of infrastructure of markets for the processing and sale of the products arising from these livestock enterprises.**

- Improved grassland and/or arable crops constitute the dominant features in most if not all lowland agricultural landscapes in Europe. Although there can be a wide range of variation in the characteristics of individual fields, the majority are subject to rather intensive management and relatively uninteresting from a biodiversity perspective. However, their dominance of these landscapes coupled with their biodiversity potential means that it is important to consider measures to improve the biodiversity value of such habitats and not just focus attention on the more biodiversity interesting habitats. **However, given the dynamic nature of fields in such intensive landscapes, there is a need to consider how best to incorporate biodiversity measures within the context of constantly changing landcover in such fields. There is also a need to consider how best to change the type and intensity management practised within such fields.**

- Following the introduction of Cross-Compliance[9] and the need to keep agricultural land in Good Agricultural and Environmental Condition, there will be the potential for much greater control over the occurrence and condition of landscape elements (such as woodlands, hedgerows, field margins, water margins and wetlands). **Such habitats will come under increasing attention and scrutiny and there is therefore a need to consider measures which are focused specifically on these type of elements in the agricultural landscape. The range of measures considered should not just cover the management required for such elements but should also address the spatial location of these in the landscape in order to achieve the best biodiversity benefit.**

- It is clear from the draft text of the Rural Development Regulation that from 2007 there will be the potential for Members States to give greater emphasis in their support schemes to the afforestation of farmland. **There is therefore a need to consider measures which not only address ways to improve the biodiversity value of such plantings but which also take into account the potential conflicts in this approach with preserving the biodiversity value associated with open farmland habitats.**

- It is also likely that from 2007 there will be a new definition of Less Favoured Area in operation in the Member States and that the overall area of farmland under this designation may have reduced substantially. **It will therefore be important to ensure that measures are considered not only address biodiversity concerns within the types of farms and habitats which are currently designated as LFA across Europe, but which are also applicable within the context of a much tighter definition of such farmland.**

- In addition, agri-environment schemes and prescription are only one form of approach which can be used to influence management affecting the biodiversity value of agricultural land**. It will therefore be important to draw on potentially relevant measures from a wide array of approaches or relevance to the biodiversity issues of concern and not just confine attention to what has been attempted via agri-environment schemes in Europe. In particular, there should be a focus on measures which are innovative in their approach and which (just as importantly) have been shown to be successful both in terms of achieving the biodiversity objectives set and encouraging uptake of the measures by farmers.**

- In addition, there will be an increasing focus on the implentation of the Water Framework Directive across Europe in the coming years. It will be important to ensure that an appropriate consideration of biodiversity issues is included in this process. **To this end, it would be useful**

[9] The fact that Cross-Compliance will not become fully operational in the New Member States until they have converted to the Single Payment Scheme may mean that landscape elements come under increasing pressure in these countries in the next few years

to consider some measures which not only achieve the agricultural biodiversity objectives set but which may also have added value in helping Member States address water quality issues under the WFD.

- Finally, it must not be forgotten that the farmland biodiversity aspect of MEACAP is only one part of a much larger project. **In the measure selection process it will therefore also be important to consider some measures which are of potential relevance to the issues and approaches identified under the sections dealing with greenhouse gases and forestry issues in order that the potential conflicts and complementarities in the approaches can be compared and contrasted.**

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