

Summary

The farming, forestry, and game industries have had a profound impact on the English landscape and its wildlife through history. This has been through modifying natural habitats and natural resources, investing in features such as hedgerows, water control structures and drainage, thereby affecting underlying natural processes, leading to landscapes and wildlife that favour species typically dependent on open habitats, early succession and regular disturbance. The variation in the natural environment and differences in the history of how people used the land has resulted in very diverse and distinctive landscapes across England.

Farming, forestry and game management are still the key influence on the character and ecological quality of our rural landscapes, and the way their business practices develop continues to shape landscapes and to change its appearance, character and ecological condition. Modern farming systems and technology allow those managing land to have a much more profound effect on our landscapes and natural processes than was possible in earlier periods. There is a need to design in delivery of landscape character and wildlife and to ensure practices avoid adverse impacts on environmental resources and ecosystem services. It is no longer possible to rely on benign alignment between commercial practices and delivering the desired outcomes for landscapes, wildlife and natural resources.

There is common ground: all these industries depend on a healthy natural environment for their respective harvestable products. Landscapes in good ecological condition, that support wildlife and deliver essential ecosystem services also depend on a healthy natural environment and natural resources in good condition. We believe it should be possible to design in delivery of distinctive ecologically resilient landscapes and enable commercially successful businesses in these sectors. Sympathetic management of natural resources is essential for both, and for the long term sustainability of land based businesses. This report provides a basis from which we can move forward by looking at a number of management systems or activities prevalent in these sectors to identify those that can benefit the natural environment and those that may be environmentally unsustainable. It does not focus on management for delivering landscape and wildlife. This report analyses a number of common aspects of farm, forestry and game management, and summarises the published research that lies behind the current understanding of their environmental impacts. It will examine our understanding of how management practices affect the natural environment, and the results will provide the basis for identifying where climate change will lead to significant changes in the impacts and the risks in future.

Our rural landscapes are largely formed from land managed by farming, forestry and game management businesses in both the lowlands and uplands. These areas are also important for a range of other services, such as water purification, carbon sequestration, and flood mitigation. They also provide a home for biodiversity and a space for recreation and relaxation within a richly detailed landscape. We need to ensure we maintain, and sometimes restore, these services as core elements of successful land based businesses.

The management operations which the report assesses are:

Cultivations

Good soil management involves more than ensuring that loss through erosion is minimised. Soil is a potential carbon sink, a habitat, and a store of nutrients. Soil condition and management has a major impact on water retention, the risk of local floods and the quality of water resources. Sympathetic management involves maintaining or enhancing levels of organic matter, and ensuring that the structure is not damaged. There is increasing evidence that the vast array of organisms living in the soil have the potential to improve soil function. Lack of attention to the loss of soil organic matter can depress fertility, harm soil structure and biodiversity, and potentially increase greenhouse gas emissions. Cultivating in such a way that minimises disturbance of the sub-soil habitat is a possible way of improving structure and productivity, whilst minimising risk of erosion and release of carbon.

Lowland drainage

Historically drainage has made huge changes to the lowlands, providing suitable conditions for intensive cropping and livestock systems. Ponds have also been widely lost, in part because of reductions in mixed farming and in part because drainage has made them less reliable as water sources. Whilst this has seen the loss of the majority of our lowland wetlands, some habitats have evolved with the activity, and have become part of our familiar landscapes. Farming that depends on drained landscapes is incompatible with extensive wetlands. It is possible to incorporate habitats within drainage systems that support some wetland species if designed in and managed accordingly. There are clear tensions between intensive agriculture on drained landscapes, biodiversity, and natural resource management.

Pesticide use in agriculture

Modern agriculture includes highly effective control on weed species and crop diseases. For many systems, this ability is a key factor in terms of profitability. Farmland biodiversity can be affected both directly and through secondary effects such as the loss of insects or weed seeds which otherwise would have contributed to supporting farmland bird populations. There have been significant gains from the replacement of persistent pesticides that accumulate at the top of food chains, but the effectiveness of modern pesticides is such as to affect food sources for farmland wildlife.

The management and use of nutrients in both the arable and livestock sectors

In order to maintain productivity, crops require nutrients. These can be delivered in organic or inorganic form. Recent data show that many of the nutrients applied to cropland and grasslands are not taken up by the growing plants, but are leached into water courses, affecting downstream habitats, as well as drinking water supplies. Fertiliser application benefits a few, aggressive plant species, often at the expense of other flora and fauna, increasing productivity, but depressing biodiversity. Nutrients from livestock (manures and slurries) are generally more beneficial to soils, increasing organic matter, but they also have a price in terms of ammonia, nitrous oxide and methane emissions, respectively a polluting gas, and two potent greenhouse gases.

Intensive grassland production for grazing livestock

Growing the quantity and quality of forage required for intensive lowland livestock farms requires intensive management. Production of silage from grass and maize can have a detrimental effect on species diversity (plants and birds), and needs to be carefully managed to preserve soil function and stability. By contrast, where such systems cannot compete with the profitability of arable farming, grasslands, sometimes with valuable assemblages of plant and animal species are under threat from destruction, or lack of grazing.

Pastoral systems in the uplands

Upland agriculture has always been more marginal than in the lowlands, consequently maintaining a subtle balance of agricultural and natural processes is difficult, and sometimes unpredictable. Most of the upland area is pastoral, which includes moorland grazings, as well as inbye land (valley land, or land near the farm steading) which can include valuable habitats such as species-rich hay meadows, and wet grasslands. Relatively recent grazing management on moorland areas has often involved high stock numbers, and a resulting loss of dwarf shrub habitat. There has been considerable financial pressure for farmers to intensify on the inbye land. Hitherto, agri-environment schemes have provided a financial incentive to reduce stocking rates and maintain traditional practices (such as hay making). We are now increasingly looking to the uplands as a vital area for carbon sequestration, and regulation of water quality and quantity, and we expect grazing managers to be part of that process.

Habitat management for shooting interests in the lowlands and the uplands

In the lowlands the shooting industry is closely linked with agriculture: some of the management of woodlands and field margins owes itself to maintenance of habitat and cover for gamebirds. This can benefit farmland birds, many of which profit from the planting of game cover, and enhanced field margins as well as from gamekeepers activities. In the uplands, shooting over moorlands is a major land use, and the landscape we know is almost entirely shaped by grazing and management for game (mostly grouse) shooting. Moorland drainage and burning are two key management tools of the gamekeeper, both of which are currently subject to considerable research. Drainage as practised in the past caused considerable damage to peat bogs, and water supplies. Currently steps are being made to reverse this damage. Heather burning can be a useful management tool, but if not carried out in sympathy with the vegetation and the location, can be harmful to habitat and wildlife.

Biomass crops

A relatively small area of land is currently being used to produce biomass crops such as Short Rotation Coppice, and Miscanthus. The industry is comparatively young, and it is not yet clear what effect larger plantations might have on the natural environment, and on the wider landscape. Current indications are that, particularly where Short Rotation Coppice and Miscanthus replace arable crops, there are potential benefits to soils, water quality, and to wildlife, even before gains in carbon emissions are considered.

Woodland planting

New woodland has a high potential for environmental benefit, but its creation (whether by planting or natural regeneration) does involve some major changes in surrounding and underlying habitats. These need to be carefully assessed, to ensure that valued features (environmental and historic) will not be lost, that there are not undesirable landscape impacts, or damage to local habitats or biodiversity. By contrast woodland creation in the right places leads to improvements to the soil, through root growth and litter deposition; to the atmosphere, through carbon sequestration and pollutant 'scrubbing'; to water quality and storage through better infiltration into the soil, and interception of sediments and nutrients; and also to biodiversity.

Tree felling

Felling can be a highly disruptive and destructive activity, with heavy machinery exposing and destabilising soils and plant assemblages. Carried out with care it is a highly sustainable operation, which is part of a long history of similar management that has contributed to the development of valued landscapes and habitats. At present only part of the annual increment from English woodland is being used so the annual rate of felling could be increased substantially, with opportunities to increase open ground (both temporary and permanent) within woodland or forest areas. Properly managed this need not prevent an increase at the same time in the amounts of dead timber, providing potential habitat for fungi, invertebrates, birds, and other species.

Withdrawal of management

In England, particularly in lowland areas, the abandonment of traditional land management practices almost inevitably leads to encroachment of scrub, and the development of woodland. As with woodland planting, this can have a detrimental effect on open ground habitats and species, but it may also provide considerable environmental gain in the longer term. Land may become unmanaged through neglect, or by design. All land in England has been shaped by human activities, so any change in that status will inevitably lead to considerable change. Only a few, relatively small areas of land have had management withdrawn as part of a deliberate policy, and there is relatively little documentation of the longer term changes. Where land has been abandoned or neglected in the past some valuable habitats have become fragmented or lost.

A number of the management techniques, or systems assessed in this report can have a damaging or a beneficial effect on natural resources, depending on how, when or where they are practised. This report aims to identify the key issues and natural processes associated with these activities, without being prescriptive. This will allow land managers to make a more informed assessment of the environmental consequences of the management systems they operate.

Much of the evidence presented in this report focuses on damaging effects of management activities. This is largely a reflection of the research that has been carried out in the relevant areas. Land management that has been successfully integrated with natural processes and habitats has generally been less closely researched, and often tends to be specific to local conditions rather than being more generally applicable.

This report will examine our understanding of how management practices affect the natural environment. It will provide robust information that can help policy makers, land managers and others in their work to address the complex and challenging task of developing environmentally sustainable land management practices.