SAVING OUR MAGNIFICENT MEADOWS

The Case for Greater Funding to Conserve and Enhance the UK's wildflower-rich grasslands

Taken from a three year project funded by Natural England, Countryside Council for Wales, Scottish Natural Heritage, Northern Ireland Environment Agency and Plantlife

Summary

Wildflower-rich grasslands are arguably the UK's most threatened habitat. They are recognised as precious and important ecosystems, supporting a rich diversity of wild plants and animals, including many rare and declining species. These habitats are increasingly seen as contributing to the overall well-being of our society, and to the 'services' that healthy ecosystems provide, such as carbon sequestration (capture), amelioration of flooding and a more efficient cycle of nutrients which improves soil health and productivity. Wildflower-rich grasslands also offer a wide-range of public health benefits and are part of our cultural heritage, helping to provide a 'sense of place'. They are seen as vital to the long-term survival of bees, through whose pollination of crops much of our food production depends.

Despite their high nature conservation value, our wildflower-rich grasslands are in decline, both in extent and in quality. Many of our meadows in the UK were lost during the last century. Intense pressure, particularly from changes in farming practices, as well as development and neglect, continue to impact on the remaining areas. Between 1930s and 1980s, 97% (three million hectares) of wildflower-rich grasslands in England and Wales were lost. Despite conservation legislation, including an EU Habitats Directive (which incorporates six BAP priority grassland types in Annex 1), planning legislation and two decades of agri-environment schemes, wildflower-rich grasslands continue to disappear or decline in condition. During the 1980s and 1990s, losses were recorded at 2 – 10% per annum in some areas. High-diversity grasslands now comprise a mere 2% of UK grassland (≥1% of total land area). Once lost, these species-rich meadows cannot easily be recreated.

These declines meant that the UK was unable to meet its national and international commitments to halt the loss of grassland habitat and species biodiversity by 2010.

Why UK's wildflower-rich grasslands need conserving

Despite the range of mechanisms in place to deliver the grassland HAP and SAP targets, there are crucial gaps in the current provision for wildflower-rich grassland conservation. Innovative approaches are needed to bridge these gaps, requiring funding from new and existing sources.

In 2008, the Environmental Audit Select Committee concluded that despite good work, many species and habitats continue to face severe declines and local extinctions across England. The Committee found a compelling economic case for the protection and enhancement of biodiversity, and a need to go beyond traditional nature conservation policies to reverse the decline and enable future growth in biodiversity. They felt that protected area arrangements were largely adequate, but that an ecosystems approach was needed to promote sustainable management of the landscape by ensuring that environmental impacts of all policies are correctly identified and addressed[i].

This thinking is based on the concept of 'ecosystem services', defined as "the wide range of valuable benefits that a healthy natural environment provides for people, either directly or indirectly"[ii]. The most widely accepted framework for describing ecosystem services is provided by the Millennium Ecosystem Assessment[iii]. This recognises that there are various services provided by the natural environment, including provisioning, regulating, cultural and supporting services. These contribute to the constituents of well-being, identified in terms of security, basic material satisfaction, health and social relations.

Ecosystem services

Recognising the value of wildflower-rich grasslands to people and the 'services' that healthy ecosystems afford us, forms a major part of the argument for securing more financial support for these beautiful habitats.

In June 2011, Defra published the UK National Ecosystem Assessment (UK NEA). This is the first analysis of the UK's natural environment in terms of the benefits it provides to society and continuing economic prosperity. Its key messages included:

- The natural world, its biodiversity and its constituent ecosystems are critically important to our well-being and economic prosperity, but are consistently undervalued in conventional economic analyses and decision making.
- Ecosystems and the services they deliver underpin our very existence. We depend on them to produce our food, regulate water supplies and climate, and breakdown waste products. We also value them in less obvious ways: contact with nature gives pleasure, provides recreation and is known to have a positive impact on long-term health and happiness.
- The UK's ecosystems are currently delivering some services well, but others are still in long-term decline. Reductions in ecosystem services are associated with declines in habitat extent or condition and changes in biodiversity.
- The UK population will continue to grow, and its demands and expectations continue to evolve. This is likely to increase pressures on ecosystem services in a future where climate change will have an accelerating impact, leading to more frequent severe weather events with implications for agriculture, flood control and many other services. One major challenge is sustainable intensification of agriculture.
- Recognising the value of ecosystem services more fully would allow the UK to move towards a more sustainable future.

The value to society of functioning wildflower-rich grasslands

Wildflower-rich grasslands are precious and important habitats, contributing many positive ecosystem services:

- **Storing about 34% of the global stock of carbon** in terrestrial ecosystems, compared with 17% for agro-ecosystems. 'Improving' grasslands for agriculture is a significant source of carbon emissions
- **Ameliorate the impact of flooding** and provide greater water infiltration
- Reduced **greenhouse gas emissions due to l**ower grazing stock densities and limited or no fertiliser input, in contrast to agriculturally improved grasslands
- Soil conservation and improvement of water quality by **improved nutrient retention**
- **Increased production** in the absence of fertilisers. One experiment showed a 40% difference in hay yield between species-rich and species-poor plots[iv]

- Evidence is emerging that the species richness of these grasslands not only increases individual ecosystem services, but is required to **maximise a variety of services** within the habitat, such as soil carbon, herbage production, forage quality, and insect richness and abundance[v].

- **Biodiversity**
  Wildflower-rich grasslands are recognised as precious and important habitats, supporting a rich diversity of wild plants and animals, including many rare and declining species. Important species of these habitats include: date waxcap fungus; lady'slipper, monkey, green-winged, and greater butterfly orchids; pasqueflower; adonis blue, large blue, marsh fritillary and silver-spotted skipper butterflies; brownbanded carder, great yellow and large garden bumblebees; stone curlew; skylark; chough; corn crake; and twite. There are 1,150 UK BAP priority species in total. UK BAP priority grassland habitats are home to 247 of these priority species, comprising 11 fungi, 24 lichens and bryophytes, 64 vascular plants, 99 invertebrates, 6 amphibians and reptiles, 34 birds and 9 mammals[vi] . Many of these species are restricted in their ranges, emphasising the importance of the grassland habitat. These habitats are of considerable importance for breeding and over-wintering birds, and as foraging areas for bats. They support a wide variety of moths, spiders, and hoverflies, including UK BAP priority species. According to an index of farmland butterfly abundance compiled by Butterfly Conservation and the Centre for Ecology and Hydrology, the 23 specialist grassland butterfly species have suffered a 36% decline in the period 1990-2009[vii]. There are typically at least 15 flowering plant species per square metre of wildflower-rich grassland habitat. Around 82 species of flowering plants of lowland grassland are threatened. Grassland plants account for approximately 28% of all plant species lost from the UK in the past 100 years.

- **Pollination services**
  Specialist bumblebees have undergone massive declines in both numbers and ranges due to the loss of wildflower-rich grasslands. As crop pollinators, these insects are fundamental to the production of our food. It is estimated that one in every three mouthfuls of food that we eat depends on insects for pollination, and this service is valued at more than £440 million per annum in the UK[viii] . At least half of the UK's 'true' bumblebee species have declined considerably in recent decades, with two species now nationally extinct. Higher plant species richness in grasslands, is linked to increased pollinator species richness[ix]. Many scarce flowers are now 'pollinator limited', because there are not enough of the right insects to propagate them. If this happened to crops it would cost an estimated £1.5 billion to pollinate them manually in Britain. A network of wildflower-rich grasslands, providing nectar and pollen year round (in roadside verges, field corners, churchyards, commons, parks, gardens, allotment edges and nature reserves), is thought to be crucial to the long-term survival of bees and other pollinators.

- **Mental and physical well-being**
  Wildflower-rich grasslands provide recreation opportunities and form a major component of our rural and urban landscapes. The psychological benefits of green-space have been shown to increase with biodiversity[x]. It is therefore probable that wildflower-rich grasslands are more beneficial than, say, single species grass parks, but even these have been shown to be of greater health benefit than a landscape without any greenery[xi] [xii]. With a population suffering increasing levels of obesity and heart disease, recreation in an attractive landscape will have both mental and physical health benefits[xiii]. In addition to the health benefits from enjoying the natural environment, wildflower-rich grasslands are spiritually uplifting, and access, even just visual access has been shown to aid recovery of hospital patients. Recent studies have shown that 'green exercise' as a health-promoting initiative for people experiencing mental ill health is as effective as existing programmes. Combining exercise, nature and social components may play a key role in managing and supporting recovery from mental ill health,

suggesting a potential 'green' approach to mental healthcare[xiv], **and that** the environment provides an important health service through 'green exercise' improving both self-esteem and mood, with the greatest positive change in self-esteem showing in the youngest groups and the mentally-ill[xv].

- **Healthy food**
  Poor diet in the UK costs in excess of £1 billion a year in healthcare and lost productivity through ill-health, early retirement and premature death linked to diet-induced heart disease, diabetes and cancer. Grazing animals provide us with meat, milk, cheese and wool, and the nutritional qualities of wildflower-rich grasslands provide them with a richer, more varied diet. Research has shown that the quality of meat derived from such wildflower-rich grasslands can contribute to good health (increased levels of beneficial polyunsaturated fatty acids, higher levels of antioxidants, anti-carcinogenic compounds etc), improved flavour (related to the concept of 'terroir' or regional foods) and improved shelf life[xvi]. Grazing sheep on biodiverse pasture seems to have a beneficial effect on the lamb produced, as plants such as knapweed and selfheal may affect fatty acid digestion resulting in more unsaturated fatty acids in the meat of the animal[xvii].

- **Healthy livestock**
  The quality of herbage produced is important for livestock production. A high content of lignin and structural carbohydrates lowers digestibility and these constituents are generally higher in hay from semi-natural grasslands than from 'improved' grasslands. Wildflower-rich grasslands are also said to be beneficial to ailing animals, and traditional farmers used these meadows for sick cattle, with the animals benefiting from the variety of plants as a kind of 'herbal remedy'.

- **Stimulus to rural economies**
  It is increasingly clear that consumers will pay more for products that involve positive benefits for the landscape, for the sustainability of rural communities and for human health. Research is underway that seeks to develop opportunities to directly link higher food quality and value to maintaining and improving the biodiversity within production systems, thus having a positive effect for rural economies[xviii xix]. The hypothesis is that the 'quality' of livestock production is higher on species-rich grasslands. Quality refers to the nutritional value, taste, appearance and smell of meat and dairy products. Studies have demonstrated that meat products associated with a particular environment can be sold at a premium and that this can enhance biodiversity protection (because of the habitat's tangible value) and even stimulate the re-creation of biodiversity outside the subsidy payment system[xx xxi]. There is evidence from France that the taste, aroma and texture of cheeses is affected by the botanical diversity of pasture or forage fed to livestock[xxii]. Semi-natural grassland-derived cheeses were less bitter with less rancid odours. These findings provide support for the French terroir movement, which places value on the effects of regional variations in environment and culture on food, wine and other produce.

- **Eco-tourism, art and community**
  Wildflower-rich grasslands form a major component of rural and urban landscapes, particularly in areas of high landscape value such as Areas of Outstanding Natural Beauty (the South Downs, Yorkshire Hay Meadows, the marshy grasslands of Fermanagh, the Great Orme and the machair of South Uist) as well as in places where there is reduced wildlife such as parks in an urban setting (for example, Richmond Park and the Belfast Hills). A survey of all 222 English National Nature Reserves (Natural England unpublished) showed that the 41 sites that contained large areas of semi-natural grassland each had an average of about 21,000 visitors over a 12-month period during 2006/7. An unpublished visitor survey of the South Downs showed that over a 12-month period in 2003, there were about 35 million visitor days

from outside the area and over 4 million visitor days from residents. More than £177 million was spent in the South Downs by these visitors and about 5,200 jobs were supported. More than 90% of those interviewed visited the area to indulge in relaxation or recreation within the landscape.

These grassland habitats help to identify a 'sense of place' and community, forming part of the attraction for tourists, and part of our cultural heritage. Wildflower-rich grassland landscapes have been the source of great inspiration to poets, authors, artists and musicians throughout history, such as Shakespeare and John Clare, Constable, Turner and Tunnicliffe, Vaughan Williams, Elgar, Butterworth, and folk artists such as Kathryn Tickell.

- **Cultural heritage and our history**
  Wildflower-rich grasslands often clothe prehistoric earthworks, ancient field systems and village greens. They even help protect historic sites, as English Heritage has shown. Scheduled Monuments within pasture are likely to be at lower risk than other land uses)[xxiii] Semi-natural grassland is probably the most benign environment for the preservation of archaeology. Natural England (2009a) reports that 59% (by area) of English Scheduled Monuments on agricultural land are under agri-environment schemes, and a large proportion of these sites are showing improved condition. More than 90% of the archaeological sites in Northern Ireland which are specially protected have survived well[xxiv]. Many churchyards and cemeteries comprise wildflower-rich grassland and provide a specific example of the role of these habitats in people's religious and spiritual life. As such, churchyards can provide important areas for recreation and access to nature, especially in urban areas[xxv]. There is much interest in managing churchyards for biodiversity[xxvi]. Indeed, the Church of England has more than 12,000 churchyards in which biodiversity projects are taking place[xxvii].

Loss of our cherished wildflower meadows

Historical declines

The twentieth century witnessed a period of great change in the management of land in the UK, particularly after the Second World War through to the 1980s. The factors that contributed to land-use changes included cheap and readily-available fertilisers and other agro-chemicals, the need to produce sufficient food to support the country's growing population and losses due to development for housing, industry and infrastructure.

There is considerable evidence of the decline of wildflower-rich grasslands in the UK during this period, and we know that from the 1930s to the 1980s, 97% of our lowland species-rich grasslands in England and Wales UK were lost[xxviii]. Losses continued during the 1980s and 1990s, and have been recorded at 2-10% per annum in some parts of England[xxix].

Local examples include:

- a 70% loss of chalk downland and rough grazing in Dorset between 1946 and 2002[xxx]
- a 75% loss of Breckland heaths (which include both acid and calcareous grass heaths as well as heather heathland) during the last century[xxxi]
- For purple moor grass and rush pastures, in Devon and Cornwall, where the habitat is known as Culm Grassland, only 8% of that present in 1900 remains, with 62% of sites and 48% of the total area being lost between 1984 and 1991
- For Northern Ireland it was estimated in 2004 that there had been an overall net loss of about a third of purple moor-grass and rush pastures between 1991 and 1998[xxxii]

The Countryside Survey 2000 showed a decrease of 280,000 hectares in the area of neutral, acid and calcareous grassland from 1990 to 1998. The data also showed a continuing decline in the species diversity of these infertile grasslands.

The Plantlife report 'England's green unpleasant land?', published in 2002, charted the decline of England's grassland and used fresh evidence to show losses were still occurring and in some cases accelerating. It showed that every county in the UK is losing, on average, one species of wild plant every two years, and many of these are grassland species. Beyond the 'hot-spots', wildflower-rich grassland has been whittled away until all that remains are tiny 'islands' of habitat on road verges, village greens and small fields. This fragmentation prevents plants and most animals moving between them, so if a species is lost from one 'island', it becomes difficult or impossible for that species to return. This will lead to extinction of species within counties or even countries.

Action plans respond to the decline

The UK has not been alone in witnessing these declines and became a signatory to the Rio Convention, arising from the 1992 Earth Summit in Rio de Janeiro. Following on from this, the UK Government published the UK Biodiversity Action Plan (UK BAP) in 1994[xxxiii].

Six types of lowland semi-natural grassland habitats have been recognised as priority habitats under the UK BAP[xxxiv] (lowland calcareous grassland, lowland acid grassland, lowland meadows, upland hay meadows, purple moor grass and rush pastures, and Calaminarian grassland).

Estimates of the extent of UK BAP Priority Grasslands in the UK

	Area (ha)				
	England	**Wales**	**Scotland**	**N. Ireland**	**Total**
Lowland calcareous grassland	38,687	1,146	761	-	**40,594**
Lowland dry acid grassland	20,142	36,473	4,357	674	**61,646**
Lowland hay meadows	7,282	1,322	980	937	**10,521**
Upland hay meadows	870	-	27	-	**897**
Purple moor-grass and rush pasture	21,544	32,161	6,768	18,476	**79,392**
Upland calcareous grassland	16,000	700	5,000	936	**22,636**
Totals for priority habitats	104,525	71,802	17,893	21,466	**215,686**

Source: UK BAP (2006)

Around 54 species of vascular plant characteristic of lowland grassland were listed as threatened in the Vascular Plant Red List for Great Britain in 2005[xxxv]. The current figure is thought to be around 82 species of which 43 are listed as priority species under BAP.

In addition, a number of vertebrate and invertebrate taxa associated with lowland grassland are listed as BAP priority species. In total, there are 206 priority species closely associated with lowland semi-natural grassland, while upland semi-natural grasslands are home to 41 species.

Costed habitat action plans (HAPs) for the priority lowland grassland types have been in place since 1998[xxxvi]. Since the creation of the UK BAP, devolution has led the four countries of the UK (England, Northern Ireland, Scotland and Wales) to produce their own country biodiversity groups and country biodiversity strategies[xxxvii]. In 2007, however, a shared vision for UK biodiversity conservation was adopted by the devolved administrations and the UK governments.

In October 2010 the Convention on Biological Diversity (CBD) agreed a new strategy and targets[xxxviii]. In May 2011 the European Union agreed its new EU Biodiversity Strategy[xxxix]. These two advances, coupled with the on-going impacts of devolution within the UK, mean that the UK BAP and reporting will also change. These chages are due to be agreed by the end of 2011.

Continuing declines in grassland habitats and associated species

Evidence from BAP reporting, statutory site condition monitoring and a recent sample survey of non-statutory wildflower-rich grasslands in England has shown that many priority lowland grasslands in the UK, particularly outside of statutory sites, are in unfavourable condition. Furthermore, their decline in terms of extent and biodiversity quality continues.

BAP reporting for the period 2005-08[xl] shows that despite gains from restoration there still appears to be an ongoing overall decline in extent and condition of lowland meadows, lowland acid grassland and purple moor grass and rush pastures. For lowland calcareous grassland in England, losses would appear to have been stemmed, although this is not the case in Scotland. Further research has since indicated that upland hay meadows are still being lost or are declining in condition. Some of the detail can be viewed on the UK BAP website[xli] and a 2007 report summarising the state of lowland grassland in the UK explains that lack of management leading to scrub encroachment and increased dominance of rank grasses is the major cause of poor condition both within and outside the designated sites series[xlii].

Several sample surveys provide some detail to the overall BAP reporting, for example:

- a survey of 500 non-designated, wildflower-rich grassland sites in England in 2005 found that only 21% were in favourable condition[xliii];
- in North Merseyside, 298ha of semi-natural grassland have been lost from a pre-existing 1,270ha (i.e. 23%) since 1990[xliv]; and
- The Grasslands Trust reported from several surveys[xlv] including:
  - a survey of 30 wildflower-rich grassland sites in Oxfordshire in 2008 which revealed that only 45% of lowland calcareous grassland sites were in favourable condition
  - a survey between 2005 and 2008 of 60 Norfolk grassland County Wildlife Sites which revealed that 70% were in poor or declining condition whilst 20% had lost their wildlife interest
  - in Hampshire, chalk grassland wildlife sites in good condition declined from 47% in 1987 to 12% in 2000, whilst 49% of neutral grassland wildlife sites had been partially agriculturally improved or were neglected.

Species associated with wildflower-rich grasslands have suffered similar losses and there are many local examples. One such survey showed that Sulphur Clover (a nationally scarce plant recorded from a variety of grassland habitats) has undergone a loss of 57% in Huntingdonshire between the 1960s and 2007 due to agricultural improvement of meadows and reduced management of roadside verges and green lanes[xlvi].

Specialist grassland butterflies are declining significantly on agriculturally managed grassland sites (including reserves and protected areas), both in recent years and in the longer term. The 23 specialist grassland butterfly species have suffered a 36% decline in the period 1990 - 2009, and during that period the Duke of Burgundy, Grayling, High Brown Fritillary and Northern Brown Argus have shown significant reductions in numbers[xlvii].

Furthermore, since 1990, the European Grassland Butterfly Indicator shows a strong negative trend and has declined by almost 60%[xlviii]. As the majority of grasslands in Europe require active management by humans or their livestock, butterflies also depend on the continuation of these

activities. The European Grassland Butterfly Indicator shows the population trend of butterflies which are characteristic of grasslands in the 14 countries in Europe with a butterfly monitoring scheme (including the UK). The main driver behind the decline of grassland butterflies is thought to be changes in rural land use. In some regions, grassland habitats have deteriorated due to agricultural intensification while in other regions (such as more remote mountain areas) the chief problem is land abandonment. In both cases, the situation for butterflies is the same, as their habitats become less suitable for breeding. When land use is intensified, host-plants often disappear or the management becomes unsuitable for larval survival. In the case of abandonment, the grassland quickly becomes tall and rank, and is soon replaced by scrub and eventually woodland.

Bumblebees are thought to have undergone massive declines, with extinction and near-extinction of several species, due to the widespread loss of flower-rich grasslands that has occurred over the past 75 years. At least half of the UK's 20 'true' bumblebee species are known to have declined considerably in recent decades, two species have become nationally extinct and a further four species have declined in range by over 70%. Only a minority of generalist bumblebee species appear to be thriving, with indications that all bumblebee species are in decline. Of the 24 current UK bumblebee species, six are UK BAP priority species (four with important populations in Wales, and five with populations in England)[xlix].

In April 2002, the parties to the Rio Biodiversity Convention committed themselves to

> **"achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth"[l].**

The declines observed across the UK mean that the government was unable to meet its commitment to halt the loss of wildflower-rich grassland habitat and species biodiversity by 2010. The UK National Ecosystem Assessment published in June 2011 showed that 30% of the social and economic benefits we get from nature are in decline. It also identified that many opportunities to increase these benefits are currently being missed because we take the value of nature for granted.

Issues impacting on wildflower-rich grassland conservation

Without additional action, it is likely that the UK will suffer further losses in extent and quality of these wildflower-rich grasslands together with losses of rare species associated with them, with once-common species becoming rarer.

With the threat of climate change, the vulnerability of fragmented wildflower-rich grasslands will compound the problems. There are increasing calls for networks of well-managed habitats. For example, a recent large-scale study has mapped the effects of three different future climate change scenarios on European butterflies. As temperatures rise in these scenarios, most butterfly species will be forced to head north. However, changes in land use may cause the areas of suitable habitat to be small and too distant for butterflies to move between. According to the model, an average European temperature rise of 4.1^{oC} by 2080 would result in over 95% of the present land occupied by 70 butterfly species becoming too warm for survival. In the best case scenario, Europe would experience a 2.4^{oC} rise in temperature. This would still cause 95% of the land occupied by nine butterfly species and 50% of land occupied by 147 butterfly species to become too warm for survival. The authors state the need to maintain large populations of butterflies in diverse habitats and encourage mobility over landscapes[li].

The 2010 Lawton review, 'Making Space for Nature', reported that the natural environment in England is highly fragmented and cannot respond effectively to new pressures such as climate change and population growth. The review argued that we must:

- improve the quality of current wildlife sites by better habitat management;
- increase the size of existing wildlife sites;
- enhance connections between sites, either through physical corridors or 'stepping stones';
- create new sites; and
- reduce the pressure on wildlife by improving the wider environment.

Advocating for Additional Funding

The aim of **Saving our Magnificent Meadows** is to increase funding available for the conservation of grasslands across the UK in order to meet biodiversity targets. This means to establish potential additional funding streams from known funders and potential new ones. These were identified as falling into the following categories:

- Trusts and foundations - The Environmental Funders network brings together those who specialise in funding 'green' projects. On making contact with them, we were advised to contact the individual funders themselves. Details can be found at www.greenfunders.org.
- Landfill Communities Fund - Regulated by ENTRUST. Distributed by **SITA Trust**, **WREN**, **GrantScape, Biffaward, Veolia, Viridor, Cemex UK Foundation.**
- EU statutory funding - **LIFE+. The** Nature & Biodiversity progaramme- will co-finance best practice or demonstration projects that contribute to the implementation of the Birds and Habitats Directives. In addition it will co-finance innovative or demonstration projects that contribute to the implementation of "Halting the loss of biodiversity by 2010 – and beyond".
- UK statutory agencies (Natural England, Countryside Council for Wales, Scottish Natural Heritage, Northern Ireland Environment Agency) – all have funding schemes for the natural environment. In the Natural Environment White Paper, June 2011, Defra announced it was looking for applications for Local Nature Partnerships together with a £1m support fund.
- Lottery (public) funding – the **Heritage Lottery Fund** have various levels of grant funding, and include the natural environment. All projects must have a strong learning and participation element. They are keen to consider projects that conserve UK's natural heritage, including priority species or habitats. They funded 'Tomorrow's Heathland Heritage', a major habitat restoration scheme, with £14m between 1997 – 2010.
- Agri-environmental schemes - In the Natural Environment White Paper, it was announced that funding for Higher Level Stewardship will grow by over 80% between 2010 and 2014.
- Corporates
- Major donors, for example **Zennstromm Philanthropies, who are interested in** funding environmental work – particularly projects that help combat climate change.
- Other interested parties, such as golf clubs, BUPA etc

Web sites that are a good place to start when researching funding streams include:

www.charitiesdirect.com
www.civilsociety.co.uk
www.fundingcentral.org.uk
www.greenfunders.org
www.charity-commission.gov.uk
www.dsc.org.uk
www.fundraising.co.uk
www.trustfunding.org.uk

References

[i] Environmental Audit Committee (2008) Press release: Government needs new approach to halt loss of species and habitats, say MPs. Select Committee Announcement
[ii] Defra (2007) *Securing a healthy natural environment: an action plan for embedding an ecosystems approach*. 56pp. also available on line at: http://www.defra.gov.uk/environment/policy/natural-environ/documents/eco-actionplan.pdf
[iii] www.maweb.org
[iv] UK NEA (June 2011)
[v] Zavaleta et al (2010)
[vi] Webb et al (2009)
[vii] www.ukbms.org/butterflies_as_indicators.htm
[viii] Buglife (2011)
[ix] Carvell (2002); Potts et al (2003)
[x] Fuller, R et al (2007) *Psychological benefits of greenspace increase with biodiversity*. Biol. Lett. Doi:10.1098/rsbl.2007.0149. Publ online
[xi] Pretty, J et al (2005) *The mental and physical health outcomes of green exercise*. International Journal of Environmental Health Research 15 (5):319-337
[xii] Pretty, J et al (2007) *Green exercise in the UK countryside: effects on health and psychological well-being, and implications for policy and planning*. Journal of Environmental Planning and management 50 (2): 211-231
[xiii] Hine, R. et al (2008) *Green spaces – measuring the benefits: drawing on case studies in the East of England*. Report commissioned by National Trust and published by University of Essex
[xiv] Barton, J Griffin, M and Pretty, J *Exercise, Nature and Socially Interactive Based Initiatives Improve Mood and Self-esteem in the Clinical Population*. Perspectives in Public Health, 2011; DOI
[xv] Barton, J and Pretty, J 2010 *What is the Best Dose of Nature and Green Exercise for Improving Mental Health? A Multi-Study Analysis*. Environmental Science and Technology
[xvi] Wood, J et al (2007) Quality of meat from biodiverse grassland. In '*High Value Grassland: providing biodiversity, a clean environment and premium product'* ed Hopkins, J Occasional Symposium No 38 British Grassland Society, 2007, pp 107-116
[xvii] Rural Economy and Land Use Programme (2009) *Implications of a Nutrition Driven Food Policy for the Countryside*. www.relu.ac.uk
[xviii] Buller, H. and others. *Realising the links between quality food production and biodiversity protection*. http://www.relu.ac.uk/research/projects/Buller.htm
[xix] Buller, H (2008) Eating biodiversity: an investigation of the links between quality food production and biodiversity protection RES-224-25-0041
[xx] Dunn, R.M et al (2007) Can biological diversity act as an input into sustainable rural development? A case study using salt-march raised lamb. In '*High Value Grassland: providing biodiversity, a clean environment and premium product'* ed Hopkins, J Occasional Symposium No 38 British Grassland Society, 2007, pp 158-165
[xxi] Rural Economy and Land Use Programme (2008) *Eating biodiversity: an investigation of the links between quality food production and biodiversity protection*
[xxii] Coulon et al (2004)
[xxiii] Vince Holyoak (2009) pers comm. re English Heritage *Our Heritage at Risk* survey (launched in 2008 and now subject to annual updates)
[xxiv] Gormley et al (2009)
[xxv] Swanwick et al (2003)
[xxvi] Cooper (1995), (1997)
[xxvii] Hansard (2010)
[xxviii] Fuller, R.M. (1987) *The changing extent an conservation interest of lowland grasslands in England and Wales: a review of grassland surveys 1930-1984*. Biological Conservation, 40(4), pp 281-300
[xxix] Lowland Meadows Habitat Action Plan on line at http://www.ukbap.org.uk/ukplans.aspx?id=10
[xxx] King, M (2009) *Can local grassland projects stem the decline in wildlife-rich grasslands?* Conservation Land Management 7 (3), pp10-15
[xxxi] Farrell, L. (1993) *Lowland heathland: the extent of habitat change*. English Nature, Peterborough (English nature Science No 12)
[xxxii] The Northern Ireland Countryside Survey (1992 & 2004)
[xxxiii] Department of Environment and others (1994) *Biodiversity: the UK Action Plan*. London: HMSO
[xxxiv] UK Biodiversity Steering Group (1995) *Biodiversity: the UK Steering Group Report*. *Volume 1: Meeting the Rio Challenge. Volume 2: Action Plans.* London: HMSO

[xxxv] JNCC (2005) *The Vascular Plant Red Data List for Great Britain*) Cheffings, C.M. & Farrell , L. (Eds) with T.D. Dines, R.A. Jones, S.J. Leach, D.R. McKean, D.A. Pearman, C.D. Preston, F.J. Rumsey, I.Taylor. ISSN 1473-0154 & *www.jncc.gov.uk/pdf/pub05_speciesstatusvp**redlist**3_web.pdf*

[xxxvi] UK Biodiversity Group (1998) *Tranche* 2 *Action Plans. Volume II ~ Terrestrial and freshwater habitats*. Peterborough: UKBG/English Nature

[xxxvii] http://jncc.defra.gov.uk/page-5701

[xxxviii] http://www.cbd.int/decision/cop/?id=12268

[xxxix] http://ec.europa.eu/environment/nature/biodiversity/comm2006/pdf/2020/1_EN_ACT_part1_v7%5b1%5d.pdf

[xl] Lowland Grassland HAP Steering Group (2008) *Lowland Grassland HAP Reporting November/December 2008*. Rimes, C. (ed.) unpub

[xli] http://ukbars.defra.gov.uk/

[xlii] Pinches, C. & Rimes, C. (2007) The state of species-rich lowland grassland in the UK: problems at the grass roots. *In*: J.J. Hopkins (ed.) *High Value Grassland: providing biodiversity, a clean environment and premium products*. British Grassland Society Occasional Symposium No. 38. Cirencester: British Grassland Society, pp 301-304.

[xliii] Hewins, E.J et al (2005) *The condition of lowland BAP priority grasslands: results from a sample survey of non-statutory stands in England*. English Nature Research Report No, 636. Peterborough: English Nature.

[xliv] Worswick, G (2009) *Forever Meadows Project Brief*. Unpub

[xlv] King, M (2009) *Can local grassland projects stem the decline in wildlife-rich grasslands?* Conservation Land Management 7 (3), pp10-15

[xlvi] Walker, K. & Pinches, C. (2009) *The status of Trifolium ochroleucon in Huntingdonshire*. Nature in Cambridgeshire No 51, pp 3-12.

[xlvii] https://statistics.defra.gov.uk/esg/ace/de6_fact.htm

[xlviii] Van Swaay, C.A.M. & Van Strien, A.J. (2008) *The European Butterfly Indicator for Grassland species 1990-2007*. Report VS2008.022, De Vlinderstichting, Wageningen

[xlix] Raynor, P (2009) *pers comm*

[l] http://www.cbd.int/2010-target/

[li] Settele, J., Kudrna, O., Harpke, A. *et al.* (2008). *Climatic Risk Atlas of European Butterflies*. Biorisk. Doi: 10.3897/biorisk.1. Available from: http://pensoftonline.net/biorisk/index.php/journal/issue/current