

# **An assessment of the financial resources needed for environmental land management in the UK**

## **Final Report**

**A report for the RSPB, the National Trust and The Wildlife Trusts**

### **Matt Rayment**

Rayment Consulting Services Ltd

Tel: +44 7827 946033

Email: [matt.rayment@outlook.com](mailto:matt.rayment@outlook.com)

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# 1 Introduction

Rural land use and management have a critical role in meeting environmental objectives to tackle climate change, recover nature, reduce air and water pollution and restore the condition of soils. This report presents latest estimates of the financial resources needed to meet the UK Government and devolved administrations' environmental legal obligations and policy priorities through land management in the UK.

The report updates estimates in earlier studies for the RSPB, National Trust and Wildlife Trusts (Rayment, 2017<sup>1</sup> and 2019<sup>2</sup>). The 2017 work involved building an MS Excel spreadsheet model, known as the 'Scale of Need' model, which estimated the extent of land management actions required to meet a range of defined environmental priorities (including for biodiversity/ ecosystems, soil, water, landscape, and the historic environment) and the costs of delivering these actions using appropriate unit cost estimates. Two cost estimates were made – the first (termed "current costs") applied current agri environment and woodland grant payment rates in the four countries, while the second (termed "adjusted costs") re-estimated these costs based on drivers of costs and income forgone (farm output prices and input costs). The overall cost of meeting UK environmental land management priorities was estimated at £2.2bn (based on "current costs") to £2.3bn (based on "adjusted costs") (Rayment, 2017).

A follow-up study in 2019 involved further research and modelling work designed to help to improve our understanding about how and how much the Government should pay land managers to meet environmental land management priorities across the UK. The work built on and refined the model developed in 2017 to assess the financial costs of land management in the UK after Brexit, as well as strengthening the analysis in key areas (notably advisory services, the costs of securing long term changes in land management, and the costs of maintaining land management on marginal high nature value farms). The analysis provided a fuller assessment of the costs of meeting environmental land management priorities, addressing limitations in the current system (such as under-provision of advice and insufficient incentives for long term changes in land management), as well as the need to address future challenges for the provision of environmental public goods after the removal of Pillar 1 subsidies. The study also examined the financial implications of moving from the current costs and income forgone approach to calculating land management payments, to test alternative approaches such as payments based on natural capital values.

Since the completion of the 2019 study, the UK Government and devolved administrations have introduced new environmental commitments and legally binding targets, most notably to achieve net zero greenhouse gas emissions. In addition, factors such as the war in Ukraine and associated cost of living crisis have led to significant changes in the cost drivers impacting UK agriculture.

The objectives of this study were therefore to:

- Update the land management assumptions set out in the MS Excel model to better reflect new environmental targets and commitments made by the UK Government and devolved administrations, including Net Zero, and
- Update the cost drivers to assess the implication of the current economic conditions on financial resource needs.

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<sup>1</sup> Rayment M (2017) [Assessing the costs of Environmental Land Management in the UK](#). Final Report for the RSPB, the National Trust and The Wildlife Trusts.

<sup>2</sup> Rayment (2019) [Paying for public goods from land management: How much will it cost and how might we pay?](#) Final Report for the RSPB, the National Trust and The Wildlife Trusts.

It should be noted that, as in the previous assessments, the cost estimates relate to land use and management only, and exclude capital investments required for pollution control or farm waste management (e.g. investments in slurry storage and treatment, farm buildings, infrastructure and machinery). The estimates relate specifically to environmental land management needs and are additional to any general subsidies for the land management sector, or wider rural development supports, that might be provided in each country.

## 2 Method

### 2.1 The “Scale of Need” Model

The estimates are calculated from the “Scale of Need” model, an MS Excel model, which:

- Quantifies existing land uses, priority habitats, landscape and historic environment features in the four countries of the UK;
- Identifies land management needs to meet legally binding targets and a range of policy objectives for biodiversity, climate, landscape, the historic environment, water quality, soil protection and organic farming;
- Estimates the unit costs of the identified land management measures; and
- Combines these numbers to estimate the overall costs of land management to meet environmental objectives across the UK.

The model includes two sets of unit costs:

- “Current costs” are based on current payment rates in existing land management schemes;
- “Adjusted costs” are based on cost equations based on the resources and income forgone in delivering land management actions. They can therefore be updated to reflect changes in the underlying drivers of costs and income forgone (including crop and livestock prices, and the costs of labour and farm inputs).

The model was developed in an initial study for the RSPB, the National Trust and The Wildlife Trusts in 2016/2017. Full details of the method and construction of the model are set out in Rayment (2017).

### 2.2 This Update

This update presents the results of further work in 2022/23 to extend and update estimates of the financial resources needed to meet environmental land management priorities in the UK. The analysis involved:

- A significant extension of the model to incorporate changes in land use and land management required to meet net zero greenhouse gas emissions targets for the land use sector.
- Updates to reflect latest environmental targets and priorities in each of the UK countries, as far as these are available.
- Updates to incorporate the latest data on current land use and land management in each country, from agriculture, forestry, and land use statistics.
- Updates to incorporate latest agri-environment and land management payment rates in each country (which form the basis for the estimates of “current costs”).
- Updates to reflect latest data on cost drivers (farm output and input prices, based on the John Nix Farm Management Pocketbook 2023<sup>3</sup>, which form the basis for estimates of “adjusted costs”).

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<sup>3</sup> Redman G (2022) John Nix Pocketbook for Farm Management – for 2023. 53rd edition. Agro Business Consultants Ltd, Melton Mowbray, Leicestershire.

- Updates in estimates of the capital costs of habitat creation and restoration, based on latest available documentation and literature.

All the literature sources and evidence used is recorded within the MS Excel 'Scale of Need model'.

### **Incorporating changes in land use and land management required to meet net zero commitments**

The estimates of the costs of land use changes needed to meet net-zero targets are based on the scenarios specified in Finch et al. (in press).<sup>4</sup> This study, the results of which are currently in press, has applied a spatial modelling approach to develop and assess alternative land use scenarios designed to work towards net zero carbon emissions for the land-based sector by 2050.

Finch et al was selected as the methodology has been subject to peer review; it includes model scenarios that achieve net zero on land without requiring the large scale roll out of technology such as DACCs and BECCs that are not currently available at scale; it models the impacts of land use change on nature, food and timber production; and the spatial data is compatible with the 'Scale of Need' model.

The scenario incorporated into the Scale of Need model is the "NBS Extra" scenario which involves a high level of ambition in semi-natural habitat creation and agroforestry. This scenario was chosen as it comes within 1MtCO<sub>2</sub>e of a net zero land sector by 2050 (before taking account of emissions from imported livestock feed or fertiliser manufacture), whilst seeking to minimise trade-offs with food production and nature conservation.

The modelled "NBS Extra" scenario involves large scale land use change across the UK, including, for example, over the period to 2050:

- 1.59 million hectares of bog restoration/ creation
- 2.28 million hectares of woodland creation
- 357,000 hectares of fen creation;
- 125,000 hectares of paludiculture;
- 229,000 hectares of semi-natural grassland creation
- 330,000 hectares of silvo-arable forestry;
- 750,000 hectares of silvopastoral forestry;
- 500,000 hectares of semi-natural wood pasture creation.

These land use changes are achieved through reductions in arable land, improved grassland and rough grazing land. They involve considerably greater levels of land use change than those modelled for habitat creation and restoration in the previous analyses. The additional needs for land use change – above those required to meet targets for priority habitat creation and restoration - have been incorporated into the Scale of Need model.

It should be noted that the modelled changes are calculated by Finch et al as those required to meet net zero ambitions for the land use sector and should not be taken as representing the policy positions of the organisations commissioning this study.

### **Reflecting the latest environmental targets and policy priorities**

This study also updated the Scale of Need model to take account of the latest country level targets, priorities and evidence of land management changes needed to meet them. This includes changes in targets for priority habitat creation and restoration, management of

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<sup>4</sup> Finch, T. et al in press, Co-benefits and trade-offs associated with a net zero UK land sector, One Earth

arable land and grassland for biodiversity and protection of soil and water resources, creation of hedgerows, and expansion of organic farming.

Country level targets and priorities are currently better defined in England (through the targets set in the Environment Act 2021 and Environmental Improvement Plan<sup>5</sup>) than in the devolved nations. Defra also produced a series of evidence packs summarising the evidence regarding the measures required to achieve the Environment Act targets on land<sup>6</sup>. Country level targets and defined policy priorities have been used as the starting point, however, where no targets have been quantified at a country level, it has been assumed that similar levels of ambition to England should be applied across the UK.

As before, the cost estimates take account of overlaps in the land management actions needed to meet different environmental priorities, to avoid double counting. For example, the model calculates the extent of arable and grassland management actions needed at national scale, taking account of that some actions (e.g. field corner management) benefit both biodiversity and water. The estimated needs and costs for land use change to meet net zero targets are in addition to those required to deliver targets for priority habitat creation and restoration.

It should be noted that, as in the previous assessments, the cost estimates relate to land use and management only, and exclude capital investments required for pollution control or farm waste management (e.g., investments in slurry storage and treatment, farm buildings, infrastructure and machinery). Nor does the study seek to estimate the costs associate with the administration of public or privately funded environmental land management schemes. The estimates relate specifically to environmental land management needs and are additional to any general subsidies for the land management sector, or wider rural development supports, that might be provided in each country.

Annex A summarises some of the main land use and land management changes costed in the model, while Annex B summarises Environment Act 2021 and Environment Improvement Plan Targets for England.

### 3 Updated cost estimates of meeting environmental land management priorities in the UK

Table 3.1 presents updated estimates of the costs of meeting environmental land management priorities across the UK, based on the “adjusted costs” in the model, which are likely to provide the best estimate of actual costs of meeting environmental priorities.

**The overall costs of meeting environmental priorities through land management in the UK are estimated at £4.4 billion per annum over 10 years.**

The largest annual costs relate to net zero land use change (£1.2 billion), followed by priority habitat creation, restoration, and maintenance (£1.0 billion), maintenance, restoration and creation of boundary features (£0.7 billion), management of arable land (£0.6 billion) and management of non-priority habitat grassland (£0.6 billion).

The overall total is significantly larger than the previous estimates of £2.3 billion (Rayment, 2017) and £2.9 billion (Rayment, 2019).

The increase compared to previous estimates is largely due to the inclusion of net zero land use change in the model, which adds £1.2 billion to the overall cost estimate. Other cost estimates have also increased, as a result of increases in farm input and output costs, as well as increased levels of ambition in some areas (hedgerow management, water pollution

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<sup>5</sup> <https://www.gov.uk/government/publications/environmental-improvement-plan>

<sup>6</sup> <https://consult.defra.gov.uk/natural-environment-policy/consultation-on-environmental-targets/>

prevention, farmland biodiversity), offset to some extent by reductions in the area of arable land and improved grassland under the net zero scenarios.

The calculated costs are based on the average unit costs of achieving the land use and management changes required, as reflected in current payment rates for environmental land management. This is likely to underestimate significantly the financial resources needed to achieve the scale of land use change required, particularly to meet net zero commitments, which would likely require premiums to be added to current payment rates. The model does not estimate the level of premium that might be needed but does include a simple facility to add a percentage uplift on estimates of costs and income forgone. For example, if it was necessary to pay a premium of 20% over costs and income forgone to deliver the scale of changes required, this would increase the overall cost estimate to £5.1 billion per annum.

**Table 3.1: Estimated overall costs of meeting environmental land management priorities in the UK (£m per annum over 10 years)**

Land management costs	England	Northern Ireland	Scotland	Wales	UK
Priority habitats	396	40	453	107	997
Net zero land use change	642	106	299	147	1,194
Boundary features	407	85	99	72	664
Historic environment	62	5	50	11	127
Arable land	476	7	77	12	571
Grassland	286	66	114	94	560
Organic	53	0	9	5	68
<b>Total land management</b>	<b>2,322</b>	<b>311</b>	<b>1,101</b>	<b>447</b>	<b>4,181</b>
<b>Additional elements</b>					
Environmental land management advice	34	2	22	5	63
Securing vulnerable high nature value farming supplement	58	15	40	42	155
Business advice to vulnerable HNV farms	3	0	1	1	6
Securing long term changes in land use	2	0	2	0	5
<b>Sub-total: Additional cost elements</b>	<b>97</b>	<b>17</b>	<b>65</b>	<b>48</b>	<b>228</b>
<b>Total</b>	<b>2,419</b>	<b>328</b>	<b>1,167</b>	<b>496</b>	<b>4,409</b>
Proportion of total	56%	7%	26%	11%	100%

## Annex A: Estimated environmental land management needs

	Assumed needs	Extent of annual need
<b>Priority habitats</b>		
Maintenance	All land assumed to require annual maintenance	5,430,547 ha
Restoration	Restoration targets according to Environment Act target to create or restore 500,000 ha of priority habitat in England over 20 years, with equal split assumed between creation and restoration, and scaled to other countries based on habitat area. Largest areas are for blanket bog and native woodland, based on area in unfavourable condition.	37,224 ha
Expansion	Creation of new habitat equivalent to 0.7% of existing area annually over 10 years. Two thirds of this is native woodland.	37,224 ha
<b>Net zero land use change</b>		
<i>Restoration:</i> Blanket bog Lowland raised bog	Bog restoration needs, in addition to priority habitats targets, in accordance with Land Use Scenarios Project (Finch et al, in press).	40,324 ha 1,593 ha
<i>Creation:</i> Broadleaved woodland Coniferous woodland Fen Paludiculture: arable Paludiculture: grassland Saltmarsh Semi-natural grassland Silvoarable forestry Silvopastoral forestry Semi natural wood pasture	Habitat creation needs, in addition to priority habitats targets, in accordance with Land Use Scenarios Project (Finch et al, in press).	30,500 ha 34,428 ha 11,545 ha 3,386 ha 1,243 ha 347 ha 4,114 ha 12,218 ha 27,772 ha 16,690 ha
<b>Boundary features</b>		
Maintenance of hedgerow	All hedges require annual maintenance	590,648 km
Restoration of hedgerows and wooded linear features	50% of hedgerow not in good structural condition, and 50% of unmanaged woody linear features, are assumed to require restoration over a 10-year period	25,870 km
Creation of hedgerow	Expansion of hedgerows by 1.6% annually	9,628 km
Restoration of stone walls	Stone walls not in good structural condition are restored over a 10-year period	4,650 km

<b>Historic environment</b>		
Historic features on grassland	Sympathetic grassland management; one third of area assumed to require scrub clearance	610,084 ha
Historic features on arable land	Reversion to grassland (50%); minimum tillage (50%)	151,156 ha
<b>Arable land</b>		
Nature friendly farming practices	10% of cultivated area on 70% of arable farms, with enhanced rates for skylark plots and winter stubbles	1,982,000 ha
Water quality	Riparian buffer strips on arable land	25,516 ha
Prevention of diffuse pollution	85% of arable farmland managed to prevent diffuse pollution (cover crops, winter tramlines, buffer strips, field corners, stubbles)	5,170,600 ha
<b>Improved grassland</b>		
Nature friendly farming practices	10% of area on 70% of improved grassland	435,000 ha
Water quality	Riparian buffer strips on grassland	28,162 ha
Prevention of diffuse pollution	85% of improved grassland managed to prevent diffuse pollution (legume and herb rich swards, buffer strips, field corners, nutrient management, integrated pest management)	5,282,000 ha
<b>Rough grazing</b>		
Rough grazing (non- priority habitats)	Proportion of rough grazing managed with low inputs and mixed grazing	35%
<b>Organic farming</b>		
Organic management	Maintain current area of organic management	464,300 ha
Organic conversion	50% increase in rate of organic conversion	62,900 ha

## Annex B: Environment Act 2021 and Environment Improvement Plan Targets

Environment Act Target	Associated Environment Improvement Plan Target
<p>Recover species abundance by 2030 and increase species abundance by 10% by 2042</p> <p>Reduce risk of species extinction by 2042</p>	<p>65 to 80% of landowners and farmers to adopt nature friendly farming on at least 10-15% of their land by 2030.</p> <p>75% of protected sites into favourable condition by 2042.</p> <p>Create or restore 30,000 m of hedgerows a year by 2037 and 45,000 m of hedgerows a year by 2050, returning hedgerow lengths in England to 10% above the 1984 peak (360,000 miles).</p>
<p>Restore or create more than 500,000 hectares of wildlife-rich habitat outside of protected areas by 2042.</p>	<p>Restore or create more than 500,000 hectares of wildlife-rich habitat outside of protected areas by 2042.</p>
<p>Increase tree cover to 16.5% of England's land area by 2050.</p>	<p>Increase tree cover to 16.5% of England's land area by 2050.</p>
<p>To reduce nitrogen, phosphorus and sediment pollution from agricultural land by 40%,</p>	<p>Restore 75% of our water bodies to good ecological status.</p>