Methodology

In this report, we estimated the income of different types of farms when they pursued woodland creation, peatland restoration and agroforestry on their land. We took government data on farm incomes for the 2019-20 year as a starting point. At this time, the EU-style Basic Payment Scheme was still fully operating. To get a broad picture, we studied small and large cereal, general cropping, lowland grazing, upland grazing and mixed farms. We did not study farms specialising in dairy, poultry or pork, since agri-environment schemes are not always relevant to these.

By 2027, income from the Basic Payment Scheme will cease in England. This scheme is being gradually replaced by the Environmental Land Management Scheme. Therefore, in estimating future farm incomes, we excluded income from basic payments. We assumed income from farming (per unit area), and income from diversification activities (per farm), in future years would be equal to income in the 2019-20 financial year. We used this to estimate future farm incomes when some, or all, of the farm is dedicated to woodland creation, peatland restoration or agroforestry. These activities avoid or sequester carbon emissions which we assumed would be compensated according to the average carbon price in the UK's Emissions Trading Scheme in 2022: £75 per tCO_2e (we included all emissions, not just carbon dioxide).

We are not calling for agriculture's inclusion in the Emissions Trading Scheme but, rather, used this rate to reflect the value attributed to emissions abatement elsewhere in the economy. This rate is notably higher than the payments currently offered to farmers through the woodland and peatland carbon code. However, it is much lower than the government's value for carbon in policy assessments, of around £250 per tCO_2e in 2023.

In all scenarios, we assumed farming would continue to generate income (per unit area) comparable to 2019-20 (excluding income from basic payments) on the land that continues to be managed for food production. We assumed no income from farming would be generated on land subject to woodland creation and peatland restoration, but that some fixed costs may still be payable on this land. For the variable costs of food production (such as seed, fertiliser and feed), it is appropriate to assume that these scale with the area farmed and are, therefore, not incurred on the land subject to woodland and peatland restoration. However, some fixed costs (eg rent) are incurred regardless of whether land is used for food production or woodland creation, so we assumed the relevant fixed costs would still be incurred, regardless of how much land is used primarily for food production.

For simplicity, we assumed farms would participate in either woodland creation, peatland restoration or agroforestry. In reality, farms may combine some of these activities.

Estimating income from woodland creation

We estimated the sequestration over time of a newly planted woodland according to the Woodland Carbon Code. We assumed planted broadleaf woodland which is regularly thinned and grows according to the Woodland Carbon Code's yield class 6 rate.

We used the average rate of woodland sequestration over the first 30 years to estimate the annual payments from woodland sequestration. We assumed farmers would be paid for this sequestration using the Emissions Trading Scheme carbon price. To assess what this means for farm incomes, we subtracted capital and maintenance costs. We assumed the £6,000 per hectare capital costs of woodland creation would be covered by a grant in the first year of the scheme, and that this total sum is subtracted equally from all the payments for sequestration delivered in the first 30 years following planting.

We assumed recipients would incur costs of £191 per hectare per year in managing the woodland and subtracted these from the payments for sequestration to estimate farm income. We did not assume any value from timber, although this could add further income. We assumed no income from farming on the land planted with woodland, though complementary food production or tourist activity could add further income.

To estimate total farm income, we added the income from woodland creation to that from diversification and the food production continuing on the rest of the farm.

Estimating income from peatland restoration

We estimated the emissions avoided from peatland restoration according to Evans, et al (2022)[i]. We assumed farmers would be paid for this abatement at the Emissions Trading Scheme carbon price. In estimating consequences for farm incomes, we subtracted one-off capital costs, assuming these would be paid by a grant in the first year of £1,910 per hectare for the lowland peat restoration and £1,030 per hectare for upland peat restoration.

We assumed this capital payment was subtracted equally from all the payments made for the emissions avoided in the first 30 years following restoration. In estimating farm income, we assumed participants would incur annual management costs of £100 per hectare per year.

We assumed no income from farming on the rewetted peatland; this may be an underestimate as very low levels of grazing tend to be needed to maintain peatland condition which may give rise to small volumes of meat sales.

To estimate total farm income we added the payments for avoided emissions (less capital and maintenance costs) to the income from diversification and food production continuing on the remaining farmland.

Estimating income from agroforestry

We assumed agroforestry involved planting apple trees in strips according to the system presented in Staton, et al (2022)[ii]. This system resulted in loss of 11 per cent of the existing yield, but the apple trees create additional yield and a novel form of income. Therefore, we assumed agroforestry provided two sources of additional income: payments for the carbon stored in the planted trees and the value of the sold apples. We estimated the rate of sequestration by planted trees in strips according to Staton, et al (2022). We assumed farmers would be paid for this sequestration at £75 per tCO_2e. We assumed apples bring in a profit of £0.03 per kilogramme and that apple yields are 8.2 kilogrammes per tree. To estimate the total income of a farm implementing agroforestry we added payments for the carbon sequestered by the planted trees, profit from apple sales and income from the farming that continues to take place on the land surrounding the trees.

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This methodology supports the analysis presented in the following report: Farming for the future: how paying for public goods can create a thriving rural economy

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[i] Evans C. et al., 2022, 'Aligning the peatland code with the UK peatland inventory'. Report to Defra and the IUCN Peatland Programme, March 2022.
[ii] Staton T., T. Breeze, R. Walters, J. Smith and R. Girling, 2022, 'Productivity, biodiversity trade-offs and farm income in an agroforestry versus an arable system'. Ecological Economics, vol. 191.