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Woodlands for Wales indicators 2026
Chapter 2: responding to climate change

Mae'r ddogfen yma hefyd ar gael yn Gymraeg.

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Production of these indicators has been led by Forest Research, on behalf of Welsh Government. Views expressed in this report are those of the researcher and not necessarily those of the Welsh Government

For further information please contact:

Trees and Soils Branch
Climate Change and Environmental Sustainability
Welsh Government
Cathays Park
Cardiff
CF10 3NQ

PolisiCoedwigaeth.ForestryPolicy@gov.wales

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Introduction

Chapter 2 of the Woodlands for Wales strategy sets out the Welsh Government's desire to address the twin challenges of reducing net greenhouse gas emissions and coping with changing weather patterns. Woodlands, trees, and the increased use of timber in construction can all play key roles in tackling these challenges. There is only 1 outcome set out in chapter 2 of the strategy, but 2 indicators are used here to assess the contributions made by forestry in Wales to greenhouse gas (GHG) emissions and removals, forest carbon stocks, and the value of climate regulatory services provided by woodland.

Outcome 7: Welsh woodlands contribute to reducing the carbon footprint of Wales

Indicator 7a: carbon removals by forestry.
Additional data and context: forest carbon stocks.
Indicator 7b: value of greenhouse gas regulation.
Additional data and context: value of climate regulation provided by woodlands.

Trends

Trends have been calculated for the indicators using the criteria set out in table 1.

Table 1: description of trend analysis for the Woodlands for Wales indicators

Category	Symbol	Threshold
Improving	↑	>3% positive change since the last WfW indicators
Stable (*i.e.,* little or no overall change)	**=**	≤3% change since the last WfW indicators
Deteriorating	↓	>3% negative change since the last WfW indicators
Not assessed due to insufficient comparable data	**N/A**	Not applicable

Where appropriate data are available, the most recent data point is compared with the value from the last WfW indicators report (or with data from that time period, if that indicator was not previously reported), smoothed using a 3-year average.
For example, a data point from 2025 would be compared to the 3-year average around 2018 (2017, 2018 and 2019). The purpose of this is to reduce the likely impact of individual annual anomalies.
The chapter 2 indicators and the associated trends since the last indicators report are shown in table 2.

Table 2: trends for the Woodlands for Wales indicators

Indicator	Trend since the last WfW indicators report
7a: Carbon removals by forestry	=
7b: Value of greenhouse gas regulation by woodlands	↑

Outcome 7: Welsh woodlands contribute to reducing the climate footprint of Wales

This outcome is assessed by 2 indicators: carbon removals by forestry and value of greenhouse gas regulation provided by woodlands. Additional carbon stock data and value of climate impact regulation data (urban heat regulation and flood regulation) are also included.

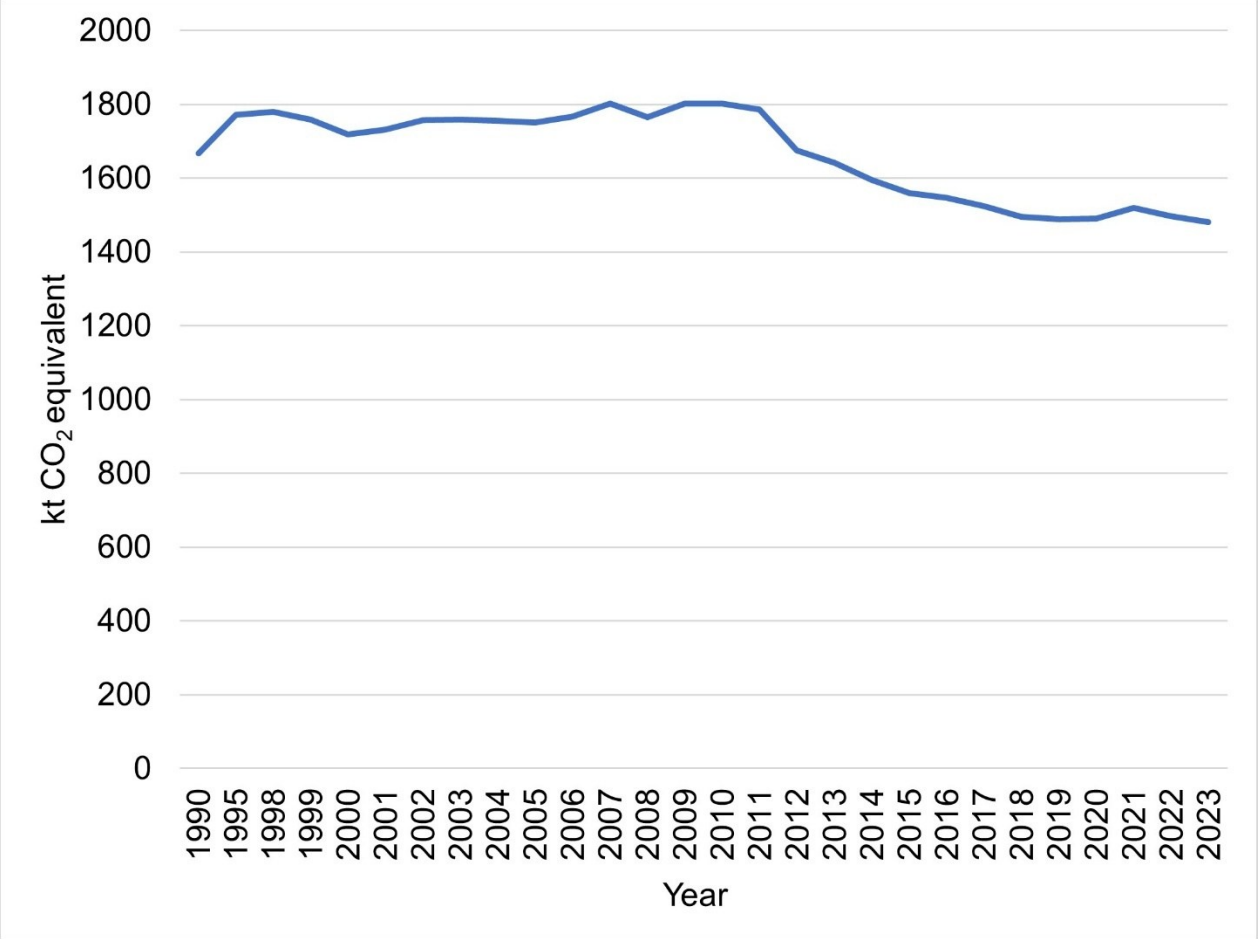
Indicator 7a: carbon removals by forestry

Indicator	Trend since the last WfW indicators report
7a: Carbon removals by forestry	=

Data from the UK GHG inventories will be utilised to monitor the contribution of the forest sector to greenhouse gas (GHG) emissions in Wales. Annual Devolved Government GHG emissions and removals, by source, are published by the National Atmospheric Emissions Inventory (NAEI) on behalf of the Department for Energy Security and Net Zero (DESNZ). The Devolved Government inventories are consistent with the UK inventories submitted to the United Nations Framework Convention on Climate Change (UNFCC). The GHG inventories report emission of 7 GHGs, expressed as carbon dioxide equivalent (CO_2e). Emissions are reported by territorial emissions statistics (TES) sectors, which includes forestry under land-use, land-use change, and forestry (LULUCF). Emissions are reported in line with Intergovernmental Panel on Climate Change (IPCC) reporting requirements.
Figure 1 shows the total removals of GHGs from the atmosphere by forestry, expressed in thousands of tonnes of CO_2e. Removals of GHG emissions for forestry are positive, so overall the forestry sector is a GHG sink. Since the last edition of the WfW indicators, there has been little to no overall change in the annual removal of GHGs by forestry, however a decline is observed since the 2010s. This decline in GHG removals is due to the age structure of forests in Wales. Many productive woodlands in Wales were planted in the 1970s and 80s and are reaching economic maturity and being felled (and restocked). Since then, tree planting rates have fallen, resulting in an uneven age distribution today. The uneven age distribution results in

peaks and troughs in the level of carbon sequestration in Welsh forests over time, due to a changing balance between restocked young woodland (following timber extraction) and more established woodlands.

Figure 1: annual removals of CO_2 equivalent by forestry in Wales, 1990-2023



Description of figure 1: a line chart showing a steady trend initially, then a decline between 2012 and 2023.

Source: National Atmospheric Emissions Inventory, 2025.

Additional data and context

Forest carbon stocks

Forest carbon stocks represent the amount of carbon that has been sequestered from the atmosphere that is now stored within the forest ecosystem, mainly within living biomass and soil, and to a lesser extent also in dead wood and litter. Tables 3 and 4 present estimates of forest carbon stocks modelled by Forest Research (FR). Total forest carbon stocks stored within UK forests are estimated to have increased from 3.2 billion tonnes of CO_2e in 1990 to 4.1 billion tonnes of CO_2e in 2025 (table 3). Table 4 shows Welsh forest carbon stocks, by category. There has been an increase between 2020 and 2025 of total forest carbon stocks in Wales, mainly associated with increases in carbon stored in soils. In 2025, Welsh forest carbon stocks represent approximately 10% of the UK's total forest carbon stocks.

Table 3: forest carbon stock, UK, 1990 to 2025

Unit: million tonnes of carbon dioxide equivalent [note 1]

Carbon stock	1990	2000	2010	2015	2020	2025
Carbon in above-ground biomass	376	482	586	630	643	649
Carbon in below-ground biomass	135	173	211	227	231	234
Carbon in dead wood	132	141	146	150	153	154
Carbon in litter	163	173	179	185	189	194
Soil carbon [note 2]	2,366	2,533	2,629	2,726	2,761	2,819
Total forest carbon	3,173	3,503	3,751	3,918	3,977	4,050

Source: Forestry Statistics: chapter 4 - carbon, Forest Research, 2025.
[note 1] To convert tonnes carbon dioxide equivalent to tonnes carbon, multiply by 12/44.
[note 2] Carbon in soil depth 0 to 100cm.

Table 4: forest carbon stock Wales, 2020 and 2025

Unit: million tonnes of carbon dioxide equivalent [note 1]

Carbon Stock	2020	2025
Carbon in above-ground biomass	64	62
Carbon in below-ground biomass	23	22
Carbon in dead wood	14	15
Carbon in litter	18	18
Soil carbon [note 2]	217	271
Total forest carbon	337	389

Source: Forestry Statistics: chapter 4 - carbon, Forest Research, 2025.

[note 1] To convert tonnes carbon dioxide equivalent to tonnes carbon, multiply by 12/44.

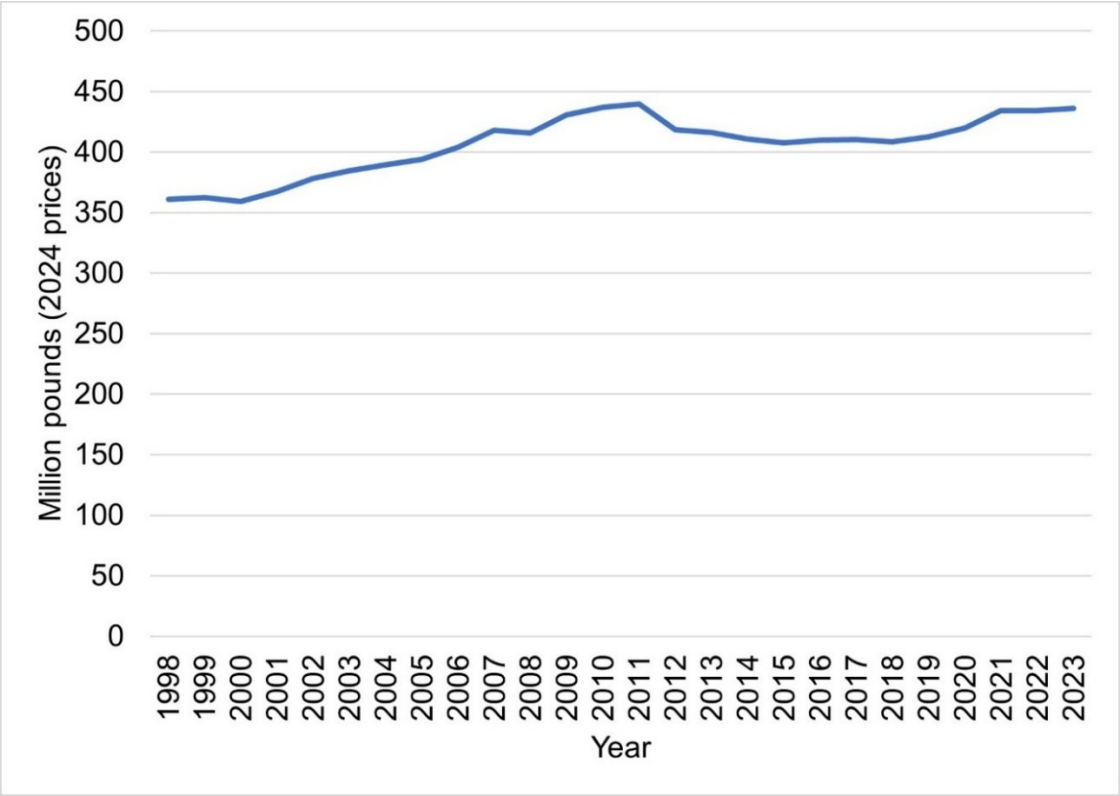
[note 2] Carbon in soil depth 0 to 100cm.

Indicator 7b: value of greenhouse gas regulation

Indicator	Trend since the last WfW indicators report
7b: Value of Greenhouse Gas Regulation by woodlands	↑

The ONS woodland natural capital accounts, 2026, give estimates of the monetary valuations of the contribution of woodlands to greenhouse gas regulation. Figure 2 shows the annual estimated value in £ millions for greenhouse gas regulation from Welsh woodland. This has increased between 1998 and 2023, from £361 million to £436 million. Since the last WfW indicators report, the trend in the estimated value of GHG regulation from woodlands has increased.

Figure 2: estimated value of greenhouse gas regulation by woodlands, Wales, 1998-2023 (£ millions, 2024 prices)



Description of figure 2: a line chart showing an increase in the estimated value of greenhouse gas regulation by woodlands in Wales.

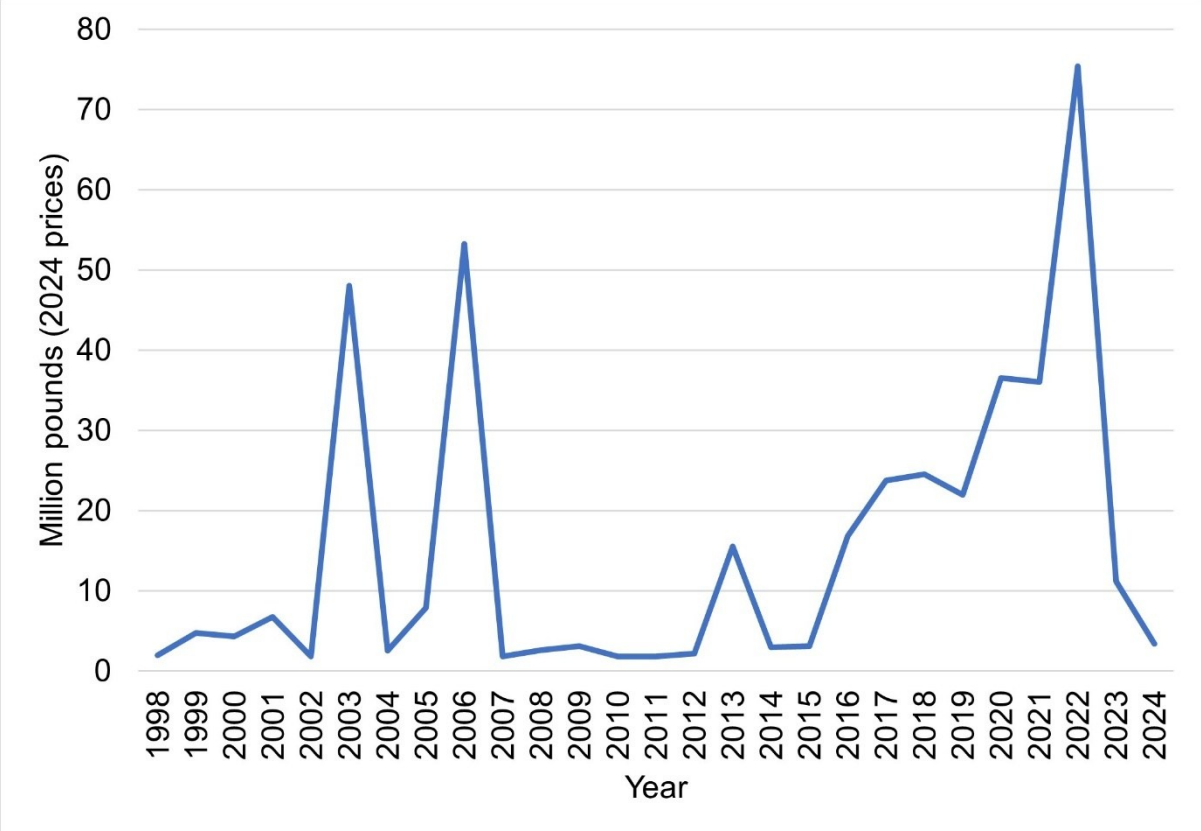
Source: Woodland natural capital accounts, UK: 2026 - Office for National Statistics

Additional data and context

Value of climate regulation provided by woodlands

Woodlands and trees contribute to Wales' climate resilience. Although not explicitly set out as an outcome of the WfW strategy, the contribution of woodlands to climate regulatory ecosystem services is increasingly recognised. We have included data on the estimated value which woodland contribute through urban heat regulation and flood regulation here as an indication of the contribution that trees and woodlands make to reducing the impact of climate change. We will consider further developing indicators for the role of trees in reducing the impact of climate change in future. Figure 3 shows the value of urban heat regulation between 1998 and 2024.

Figure 3: estimated value of urban heat regulation by woodlands, Wales,1998-2024 (£ millions, 2024 prices)



Description of figure 3: a line chart showing the estimated value of urban heat regulation by woodlands in Wales. There are spikes in value in 2003 and 2006. Value increases between 2015 and 2022, but there is a steep drop in 2023.

Source: Woodland natural capital accounts, UK: 2026 - Office for National Statistics

The value of flood regulation in 2021 to 2024 was estimated at £97 million (2024 prices) annually. This is the first time this value has been estimated by ONS. Further details about flood regulation are included under outcome 20 in chapter 5. There are many ecosystem services provided by carbon regulation, however the impact of woodland specifically on these is often hard to estimate. The Woodland Natural Capital accounts currently only provide values for a subset of ecosystem services.