Office for National Statistics

Statistical bulletin

UK natural capital accounts: 2021

Estimates of the finanical and societal value of natural resources to people in the UK.

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1 . Main points

- In 2019, the stock of the aspects of UK natural capital we can currently value was estimated to be worth £1.2 trillion.
- The number of outdoor recreation and tourism visits in the UK increased by 46% between 2011 and 2019.
- Renewable power generation is 21 times larger in 2020 than it was in 2003.
- UK land-use emits more greenhouse gases than it removes.
- The number of days in cities classed as "hot" has risen year-on-year, leading to the economic value of urban cooling doubling in the last four years.

2 . Understanding natural capital

Natural wealth is reflected in things like the productivity of soils and access to clean water. Any natural resource or process that supports human life, society and the economy forms an important part of our natural capital. We are estimating both the current value and what it could provide for future generations. Natural capital is an important part of a wider move to better understand "inclusive wealth".

This year we have added data on nature tourism to estimates of recreation benefits. This has improved estimation of the asset value of our stocks taking them from a little under £1 trillion to £1.2 trillion.

There are two important caveats to our work.

Natural capital estimates do not cover all services. We continue to work to encompass as much of the economic value of the natural world as possible, which is challenging given its scale and complexity.

Our asset values are not an absolute "value" of the price we would accept to sell the entire natural world. The natural world supports all life on earth, and its collapse would precipitate our own, implying infinite value.

3 . Provisioning services

Provisioning services are products from nature such as food, water, energy, and materials. These provisioning services include:

- agricultural biomass: the value of crops, fodder and grazing (farmed animals are not included as they are considered produced rather than natural assets, however the food they eat, such as grass and feed, is included)
- water abstraction: water removal for public water supply only
- fossil fuels extraction: production of crude oil, gas and coal
- renewable energy generation: electricity generated from renewable sources, wind, hydroelectric, solar, wave and tidal
- timber removals: wood production (also referred to as removals) is the harvesting of roundwood (trunk and branch wood) from coniferous (softwood) and broadleaved (hardwood) trees
- mineral extraction: mineral extraction largely consisting of construction mineral aggregates
- fish capture: the value of marine fish taken from mainland UK waters (aquaculture of farmed fish are excluded as farmed fish are viewed as a produced asset and not a natural asset)

Table 1: UK provisioning services included in UK natural capital accounts and their annual and asset values, 2019

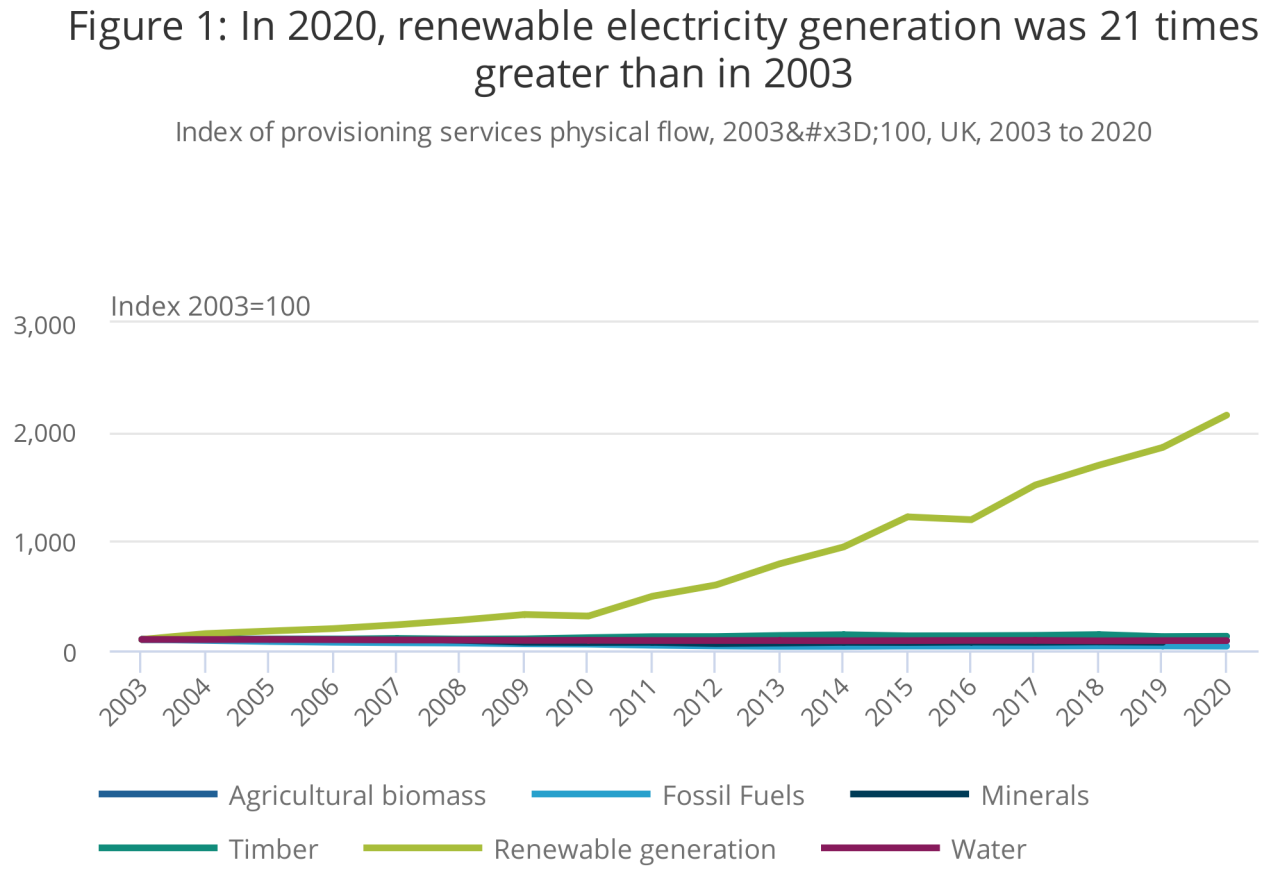
Service	Annual value (flow) 2019	Asset value (stock) 2019
	£ million, 2020 prices	£ million, 2020 prices
Agricultural biomass	5,695	147,149
Water abstraction	4,057	109,868
Fossil fuels extraction	8,607	57,084
Renewable generation	1,355	13,044
Timber removals	434	12,333
Mineral extraction	697	10,281
Fish capture	273	7,015
Total	21,117	356,773

Source: Office for National Statistics – UK Natural Capital Accounts

Fossil fuels has seen the largest reduction, with coal declining by 93% since 2003. Renewable energy generation is approximately 21 times larger in 2020 than it was in 2003.

Figure 1: In 2020, renewable electricity generation was 21 times greater than in 2003

Index of provisioning services physical flow, 2003=100, UK, 2003 to 2020



Source: Office for National Statistics – UK Natural Capital Accounts

Notes:

1. Data for 2020 are not available for minerals.

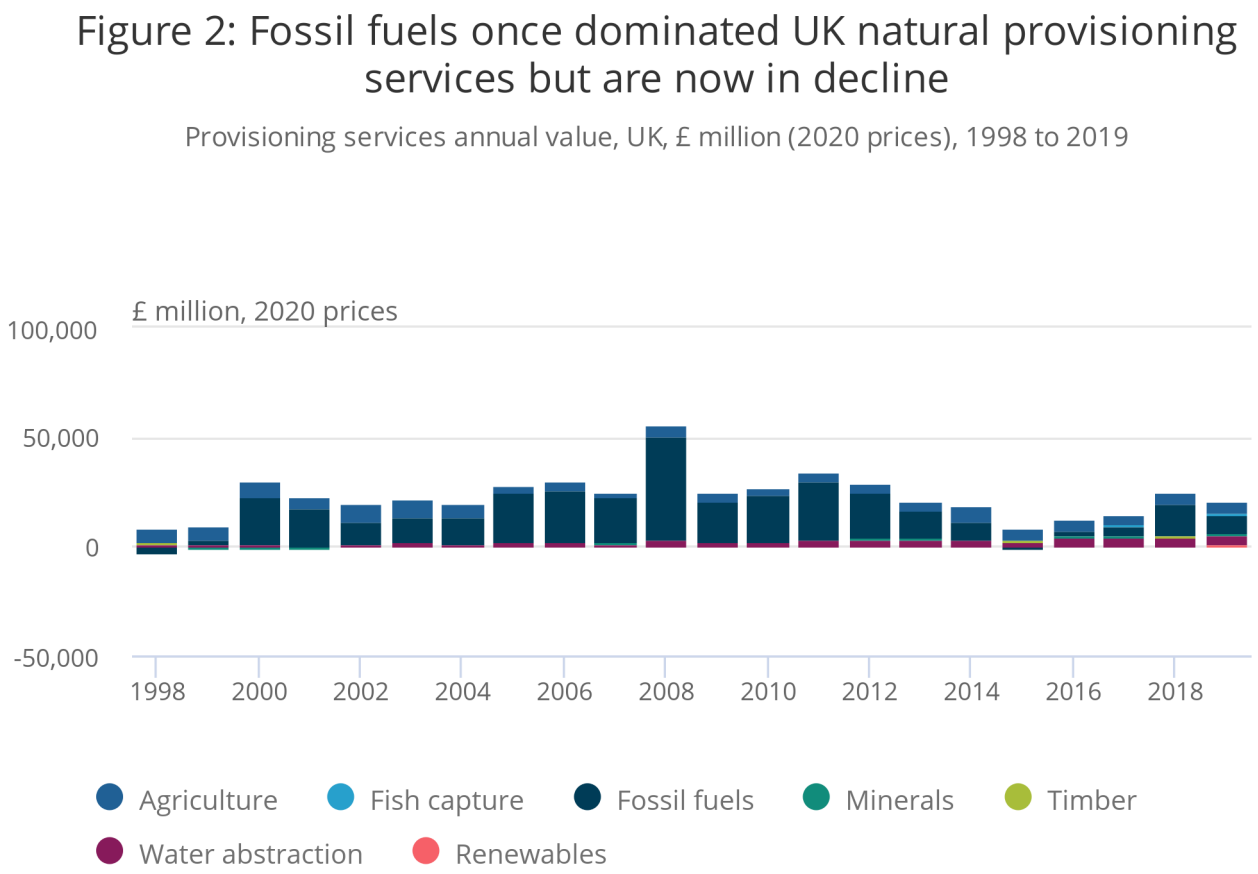
2. Fish capture is excluded as data are unavailable prior to 2015.

There was a 15% reduction in the annual value of provisioning services between 2018 and 2019, driven by fossil fuels, which fell by 37%. This can be partly attributed to decreases in oil and gas prices by 7% and 45% respectively.

Fossil fuels still account for 41% of the total provisioning services valuation.

Figure 2: Fossil fuels once dominated UK natural provisioning services but are now in decline

Provisioning services annual value, UK, £ million (2020 prices), 1998 to 2019



Source: Office for National Statistics – UK Natural Capital Accounts

Notes:

1. Annual valuations for renewables is available for 2008 to 2019 and fish capture is available between 2015 to 2019.

4 . Regulating services

Regulating services help to maintain the quality of the environment we rely upon. These include reducing noise, providing cooling on hot days, cleaning the air and sequestering carbon.

These regulating services include:

- carbon sequestration: the removal of climate change gases from the atmosphere is provided by a range of habitats, with woodland habitats being the primary supplier. The capacity for vegetation to remove carbon or pollutants from the air depends upon its amount and type.

- air pollutant removal: the removal of air pollutants by vegetation, which is measured in terms of the avoided healthcare costs associated with exposing the public to the pollutants removed
- urban cooling: green (parks) and blue spaces (rivers, lakes, canals) can cool urban environments on hot days, which benefits the economy by limiting loss of labour productivity and reducing use of air conditioning
- noise mitigation: vegetation acts as a buffer against noise pollution, in particular road traffic noise

Table 2: UK regulating services included in UK natural capital accounts and their annual and asset values, 2019

Service	Annual value (flow) 2019	Asset value (stock) 2019
	£ million, 2020 prices	£ million, 2020 prices
Carbon sequestration	2,110	105,997
Air pollutant removal	1,382	45,899
Urban cooling	453	22,876
Noise mitigation	17	902
Total	3,962	175,674

Source: Office for National Statistics – UK Natural Capital Accounts

Valuation methods of these regulating services differs:

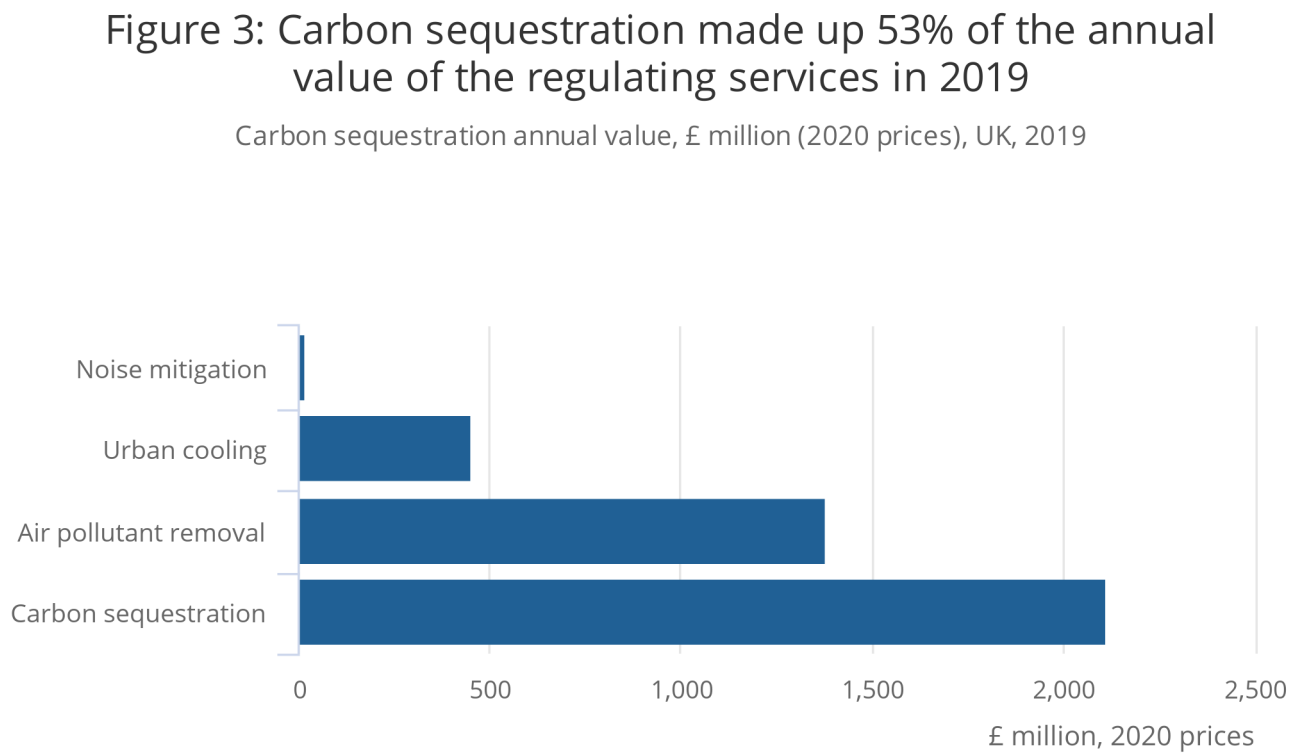
- carbon sequestration uses a removal cost, using the estimated cost of carbon removal by other means and BEIS recently increased its carbon prices

- air pollutant removal uses the cost of treating ill health in humans caused by the pollutant if it were not removed

Over the last decade, each tonne of air pollution removed was valued at £1,200 - more than five times the £220 value of a tonne of carbon sequestered. This is because pollutants, predominately PM2.5, have significant immediate effects on health, with even small removals providing large benefits to society.

Figure 3: Carbon sequestration made up 53% of the annual value of the regulating services in 2019

Carbon sequestration annual value, £ million (2020 prices), UK, 2019

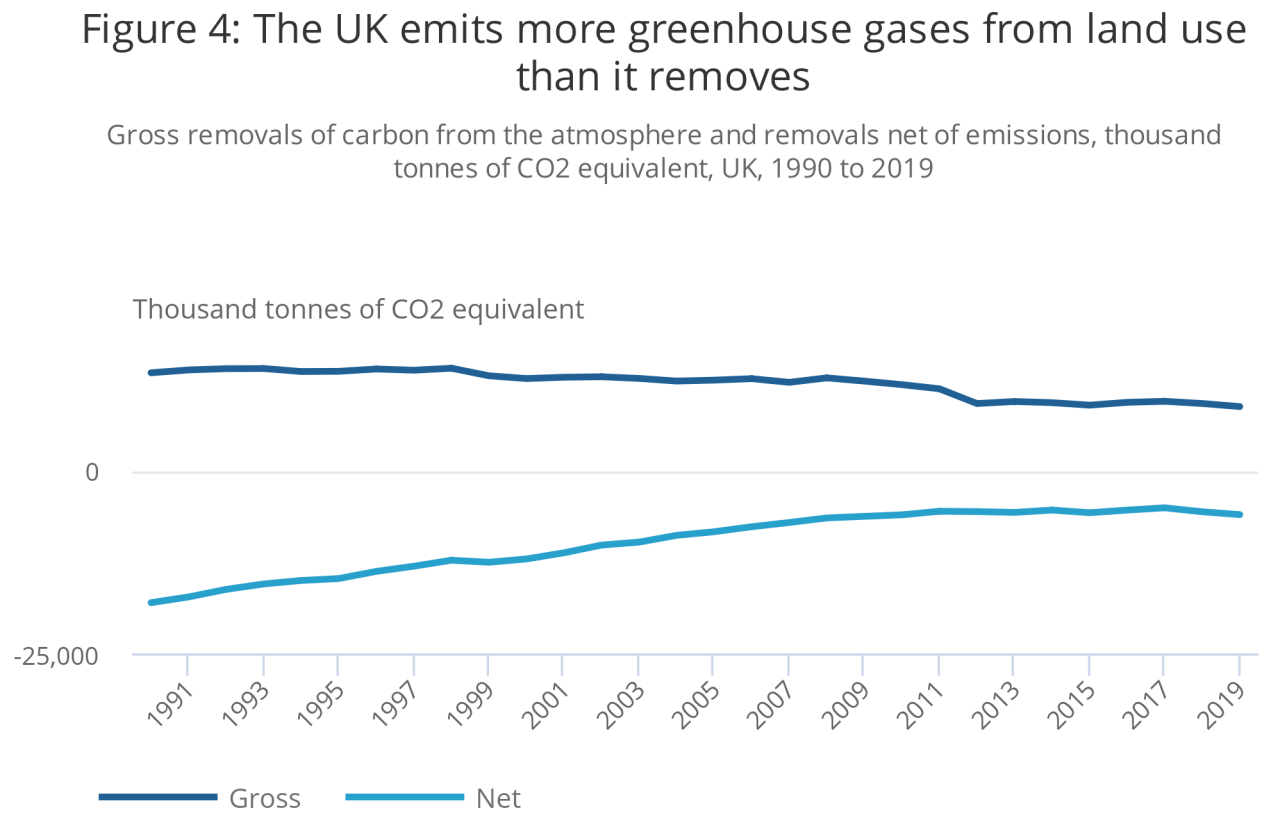


Source: Office for National StatisticsOffice for National Statistics – UK Natural Capital Accounts

Changes in how the UK models carbon sequestration by nature, primarily how peatlands are accounted for, indicate that the UK emits more greenhouse gases than it removes from land use, land use change and forestry (LULUCF). Following current guidance, the UK Natural Capital Accounts present 'gross' removals.

Figure 4: The UK emits more greenhouse gases from land use than it removes

Gross removals of carbon from the atmosphere and removals net of emissions, thousand tonnes of CO2 equivalent, UK, 1990 to 2019



Source: Office for National Statistics, Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland – National Atmospheric Emissions Inventory, Department for Business, Energy and Industrial Strategy

5 . Cultural services

Cultural services are non-material benefits people obtain from natural capital, such as tourism, recreation, and aesthetic experience. Changes have been made to the way we estimate the recreational benefit of nature. These are discussed within the UK natural capital accounts: Tourism and recreation methods changes. These cultural services include:

- tourism and recreation: the spend incurred to travel to the natural environment and some expenditure incurred during the visit (parking fees, transport costs, vehicle running costs and admissions)

- house prices (recreation and aesthetic): recreation house prices include the additional expenditure on houses that are near to green (land) and blue (water) spaces, enabling people to make "free trips" to the natural environment, while aesthetic house prices include how much value is added to a house that has a view of a green and/or blue space

Table 3: UK cultural services included in UK natural capital accounts and their annual and asset values, 2019

Service	Annual value (flow) 2019	Asset value (stock) 2019
	£ million, 2020 prices	£ million, 2020 prices
Tourism and recreation	14,788	613,782
House prices (recreation and aesthetic)	2,883	84,253
Total	17,670	698,035

Source: Office for National Statistics – UK Natural Capital Accounts

Since 2011, tourism and recreation has contributed an average of 83% of the annual value of cultural services.

Figure 5: The annual value of cultural services in 2019 was similar to the 2011 level

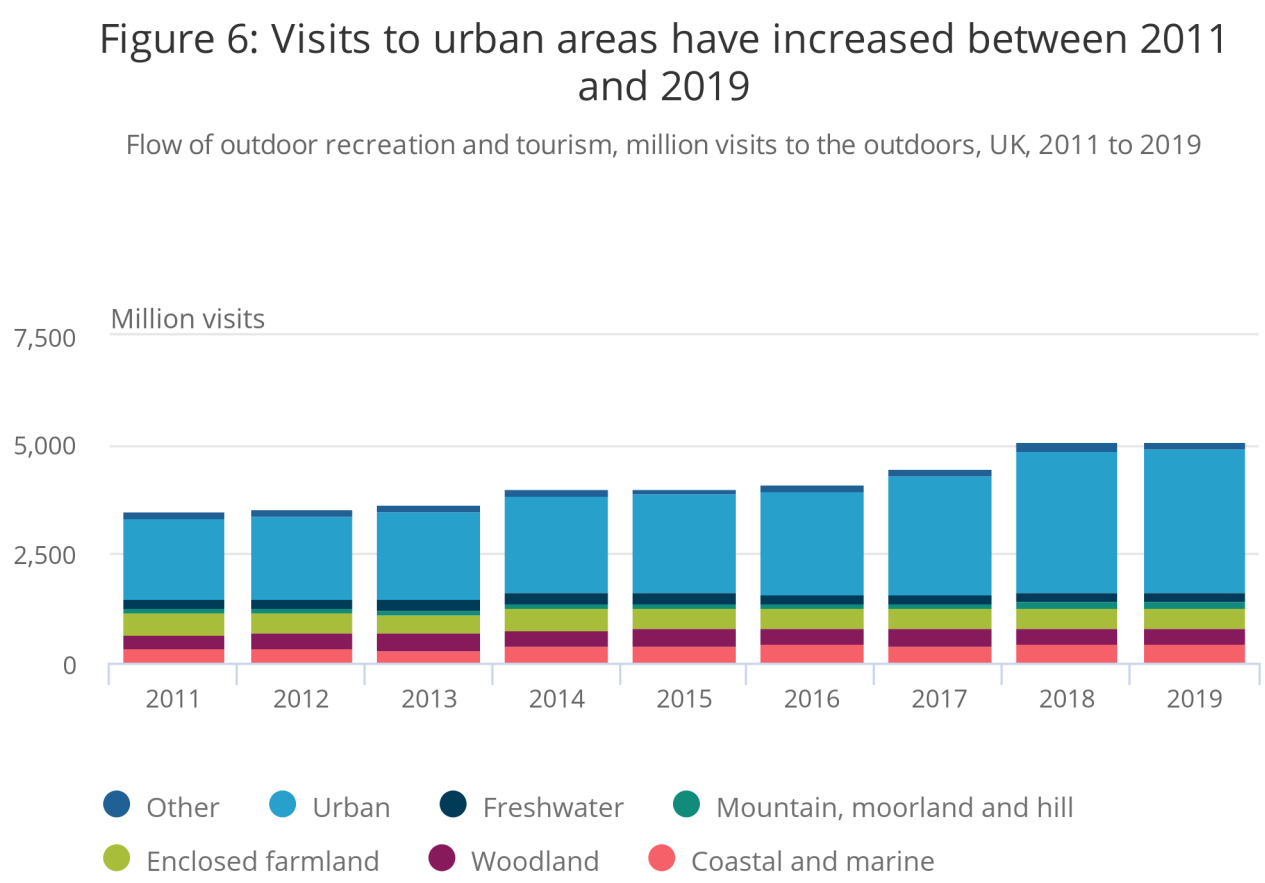
Cultural service annual value, £ million (2020 prices), UK, 2011 to 2019

Source: Office for National Statistics, Monitor of Engagement with the Natural Environment (MENE) Survey, Great Britain Day Visits Survey and Great Britain Tourism Survey

The number of recreation and tourism visits to the outdoors has been increasing over time. Visits have increased by 1.6 billion between 2011 and 2019, with 90% of this rise seen within urban areas. The number of visits to the outdoors was also more than 5 billion for the first time in 2018.

Figure 6: Visits to urban areas have increased between 2011 and 2019

Flow of outdoor recreation and tourism, million visits to the outdoors, UK, 2011 to 2019



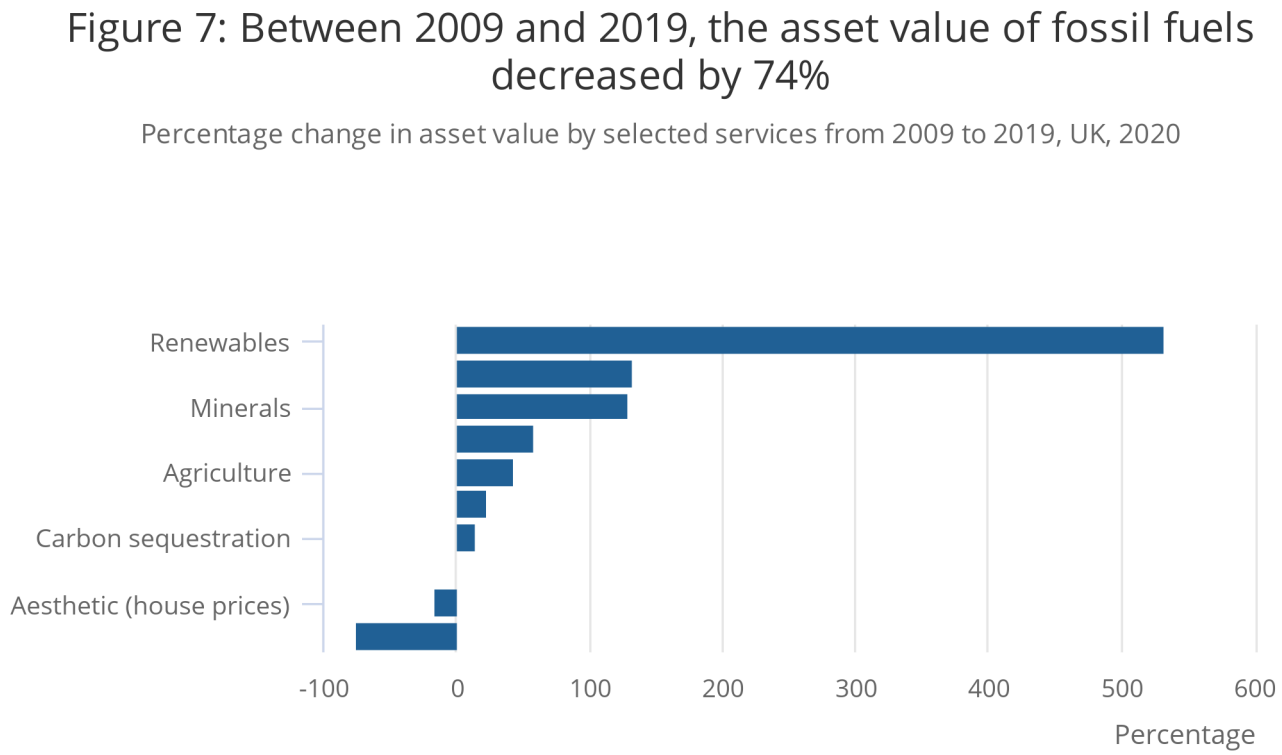
Source: Office for National Statistics, Monitor of Engagement with the Natural Environment (MENE) Survey, Great Britain Day Visits Survey and Great Britain Tourism Survey

6 . Asset valuation

Asset values of natural resources refer to the long-term potential (stock) of that resource to provide goods and services to humans. This contrasts with annual valuations (flows).

Figure 7: Between 2009 and 2019, the asset value of fossil fuels decreased by 74%

Percentage change in asset value by selected services from 2009 to 2019, UK, 2020



Source: Office for National Statistics – UK Natural Capital Accounts

Notes:

1. Excludes comparison of asset values for fish capture, urban cooling, and noise mitigation because of data limitations.

7 . UK natural capital accounts data

UK natural capital accounts: 2021
Dataset | Released 12 November 2021
Physical (non-monetary) and monetary estimates of services provided by natural assets in the UK between 1998 and 2020.

8 . Glossary

Asset

A natural asset is a resource that can generate goods or services to humans into the future. Asset valuation estimates the stream of services that are expected to be produced by the natural resource over a reasonably predictable time horizon see method for details.

Ecosystem services

Ecosystem services are the living (biotic) components of the Earth that provide services to humans, such as woodland.

Physical flow

The physical flow of a natural asset is the measure of its output in units appropriate to the good or service. This differs from the annual value and asset value, which measure the monetary value of a natural resource.

9 . Measuring the data

We have used a wide variety of sources for estimates of UK natural capital.

The Office for National Statistics (ONS) and the Department for Environment, Food and Rural Affairs (Defra) have published a summary of the principles underlying the accounts.

These accounts been compiled in line with the guidelines recommended by the United Nations (UN) System of Environmental-Economic Accounting Central Framework and System of Environmental-Economic Accounting Experimental Ecosystem Accounting principles, which are in turn part of the wider framework of the system of national accounts. UN guidance is currently under development.

We welcome feedback on any of the approaches and this output by email to natural.capital.team@ons.gov.uk.

More detailed quality and methodology information on strengths, limitations, appropriate uses, and how the data were created is available in the accompanying UK natural capital accounts methodology guide: 2021.

10 . Strengths and limitations

These experimental accounts are being continually revised to produce the best statistics with the available data and methods. We have identified any limitations of the data as well as ideas for future development. More detailed quality and methodology information on strengths, limitations, appropriate uses, and how the data were created is available in the accompanying UK natural capital accounts methodology guide: 2021.

11 . Related links

Woodland natural capital accounts: ecosystem services for England, Scotland, Wales and Northern Ireland, 2020
Bulletin | Released 11 May 2021
Additional information splitting down UK data in the Woodland natural capital accounts, UK: 2020 publication for England, Scotland, Wales and Northern Ireland. Extra data on summary ecosystem services and asset value.

UK natural capital: urban accounts
Bulletin | Released 8 August 2019
Natural capital accounts containing information about green space in urban areas.

UK natural capital: peatlands
Bulletin | Released 22 July 2019
Natural capital accounts for peatlands measures the ecosystem services which nature provides from this dramatic landscape, including water, carbon sequestration, food and recreation.