Land Cover Map and the Land Cover *plus* data sets

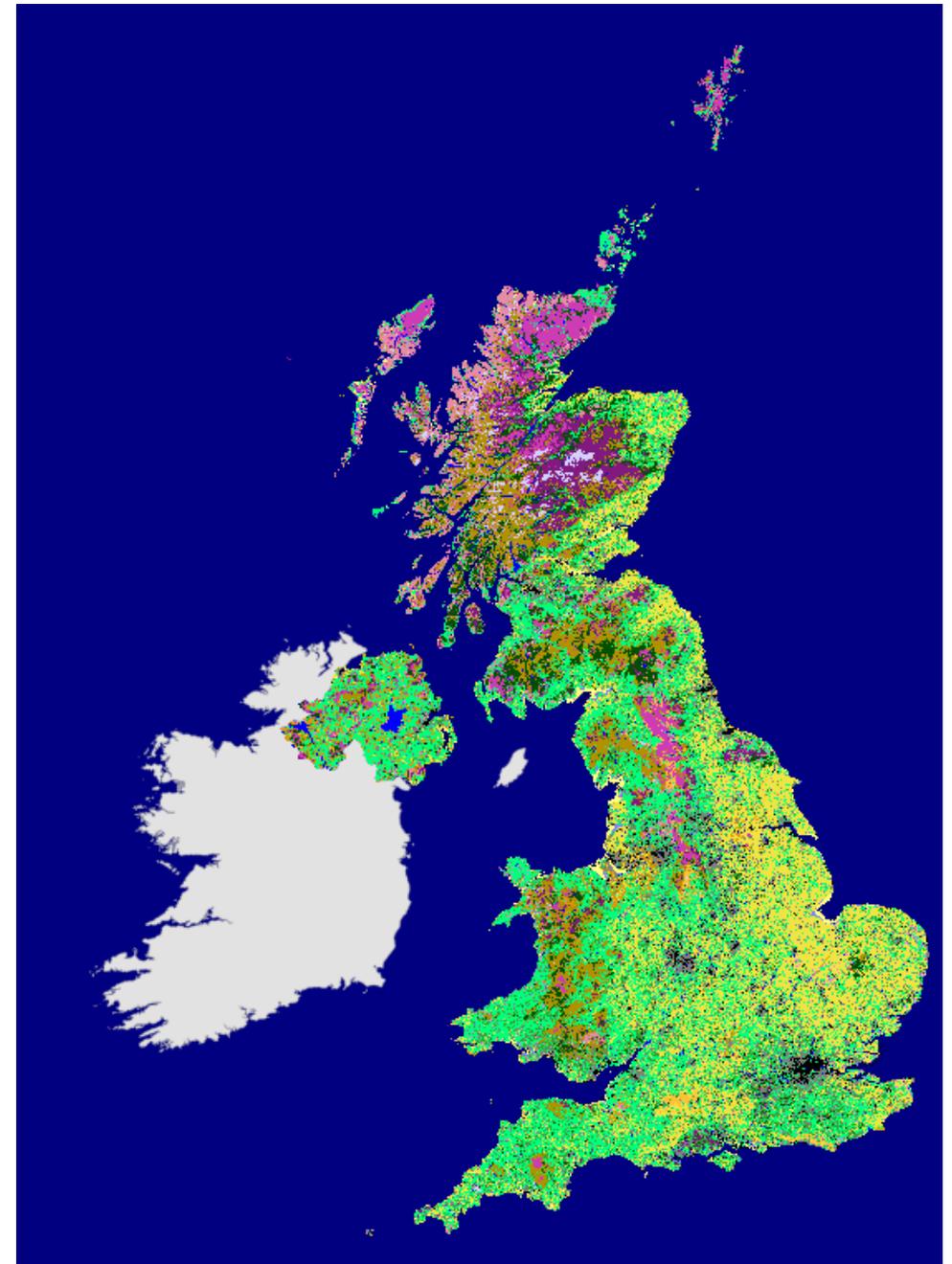Clare Rowland and Emily Upcott

UKCEH

Our planet.
Decoded.

Contents

1. What is a Land Cover Map?

2. How is a Land Cover map created?

3. How can we use a Land Cover Map?

4. What land cover data sets are there?

5. Land Cover Change results
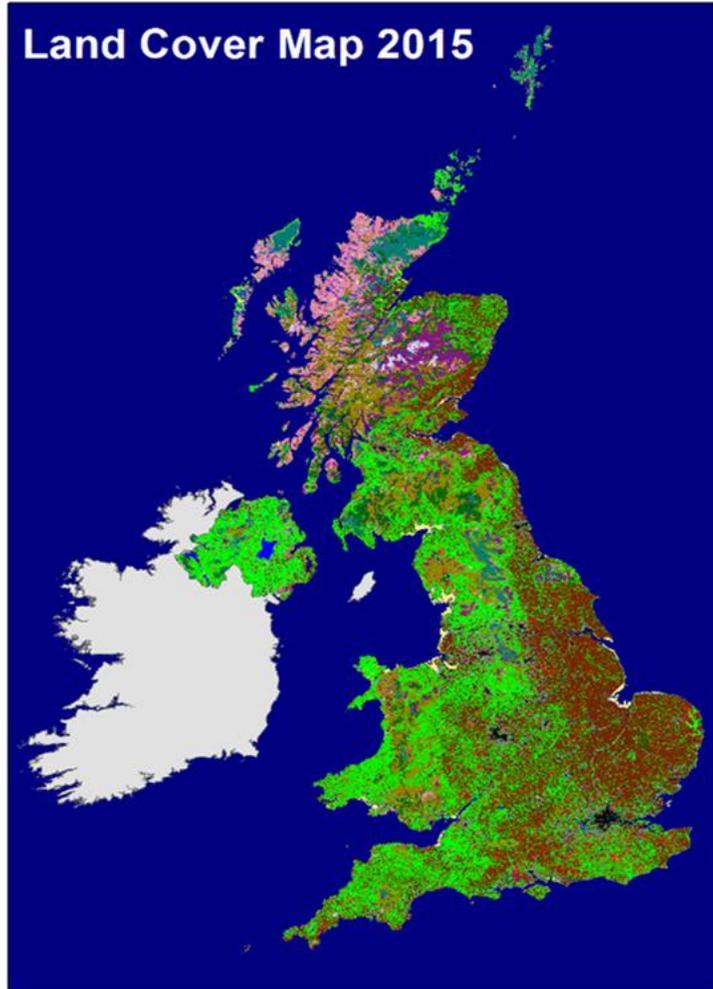
6. Accessing the data set

7. Data formats

What is a Land Cover Map?

Broadleaved woodland

Coniferous woodland

Arable

Improved grassland

Neutral grassland

Calcareous grassland

Acid grassland

Fen, Marsh and Swamp

Heather and shrub

Heather grassland

Bog

Inland rock

Saltwater

Freshwater

Supralittoral rock

Supralittoral sediment

Littoral rock

Littoral sediment

Saltmarsh

Urban

Suburban

UKCEH NATIONAL CAPABILITY FOR UK CHALLENGES

What is a Land Cover Map? Also a project output

Land Cover Map 2015

Land cover map priorities:
- Improve the data

- Expand the LCM offer

- Increase accessibility

LCM team:
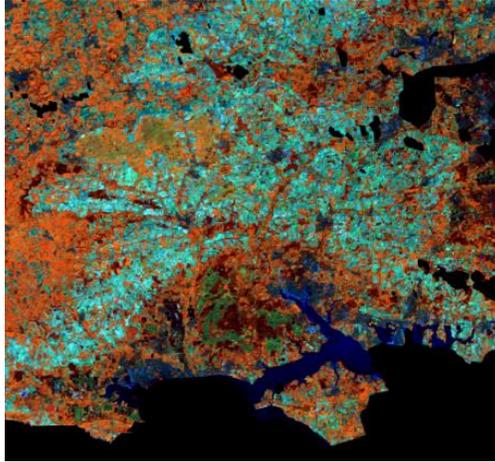Clare Rowland, Chris Marston, Nye O'Neil, Merryn Hunt

UKCEH NATIONAL CAPABILITY FOR UK CHALLENGES

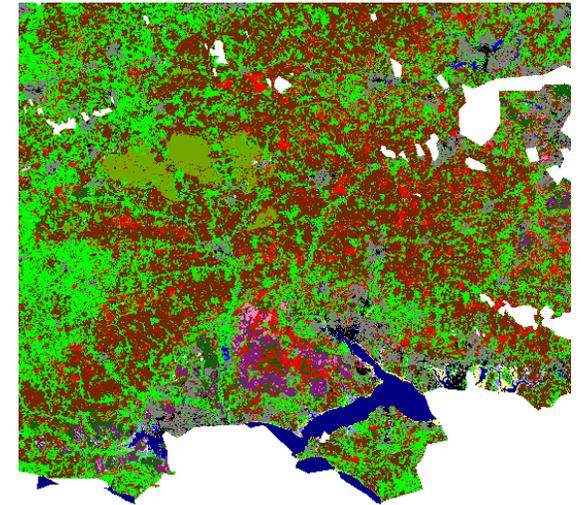# How to make a Land Cover Map
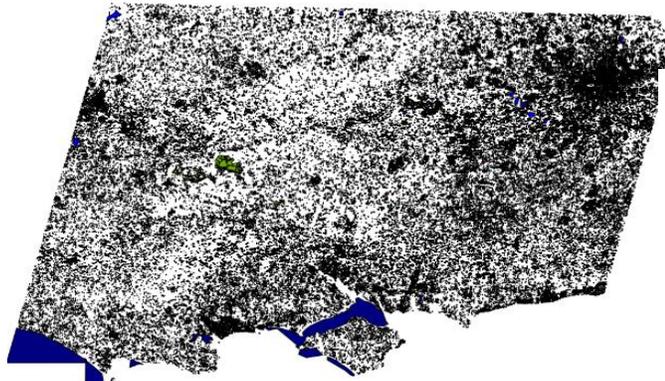
Get the data

Prepare satellite data

Run classification algorithm

Classification

+

Prepare the training data

Carrasco, L., O'Neil, A.W., Morton, R.D. and Rowland, C.S., 2019. Evaluating combinations of temporally aggregated Sentinel-1, Sentinel-2 and Landsat 8 for land cover mapping with Google Earth Engine. Remote Sensing, 11(3), p.288.

Why is LCM important?

Supports a wide range of applications:

Atmosphere & climate

Agriculture

Water & catchments

Landscape planning

Marine & coastal

Telecommunications

Ecology & conservation

Urban studies

Impact assessment
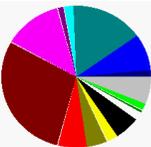
Statistics, information

Health & hazards

Education & publicity

LCM uses....

Nine tenths of England's floodplains not fit for purpose, study finds

Intensive farming cited as main reason for destroying natural barriers to deluge and making low lying areas more vulnerable to floods

Floodplains of river Eden in Cumbria, 2016. Photograph: Dr Neil Entwistle/University of Salford

Only a tenth of England's extensive floodplains are now fit for purpose – 90% no longer function properly – with the shortfall putting an increasing number of homes and businesses at risk of flooding, according to a new report.

Floods are more likely due to climate change and will claim higher economic costs unless action is taken to halt the damage to floodplains and restore some of their functions, warned the authors of the 12-month study – the first to paint a comprehensive view of England's floodplains and their capabilities.

"We have ignored our floodplains," said George Heritage of Salford University, co-author of the study the Changing Face of Floodplains, published by Co-Op Insurance on Thursday. "The changes to them mean water [from heavy rainfall] can flow much faster downstream, and can flow at the same speed as the water in the rivers."

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Science & Environment

Urbanisation's varying impacts on ecosystem services

By Mark Kinver
Environment reporter, BBC News, Sheffield

🕐 13 September 2011 | Science & Environment

Different urbanisation policies have varying impacts on a region's ecosystem services, researchers report.

Dense housing leads to an increase in concrete and asphalt, reducing areas' flood mitigation services, they say.

And low density housing does not affect flood mitigation services but does reduce land availability for food and carbon storage, the UK team adds.

The study was presented at the British Ecological Society's (BES) annual meeting at the University of Sheffield.

Loss of green spaces can exacerbate extreme flooding events, the study shows

"Predicting exactly how cities are going to grow was extremely difficult because every city does it a little bit differently," said co-presenter Felix Eigenbrod from the University of Southampton, who was part of a University of Sheffield
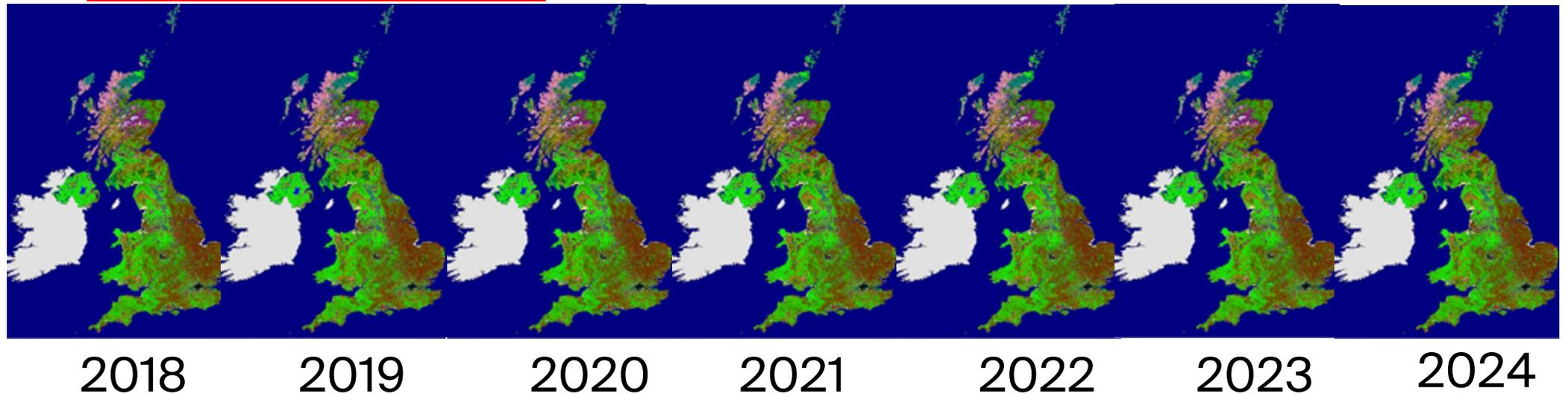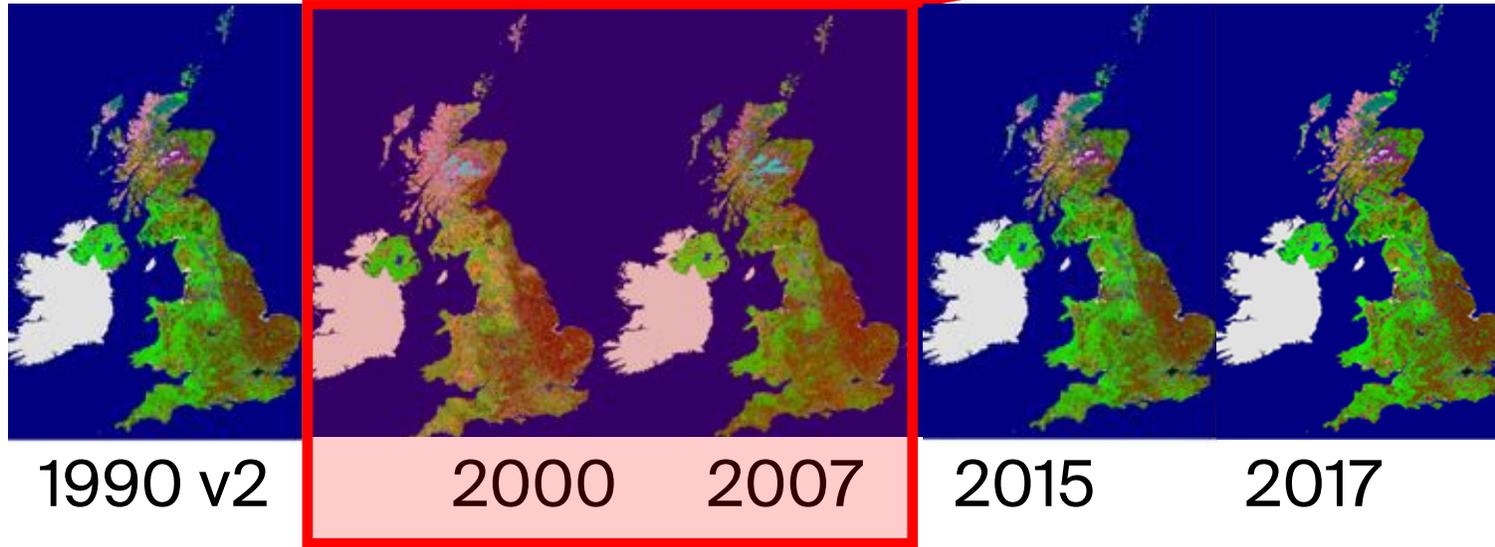
How to use a Land Cover Map

1. Get Land Cover stats to characterise an area

2. Combine with other data to produce maps or new products

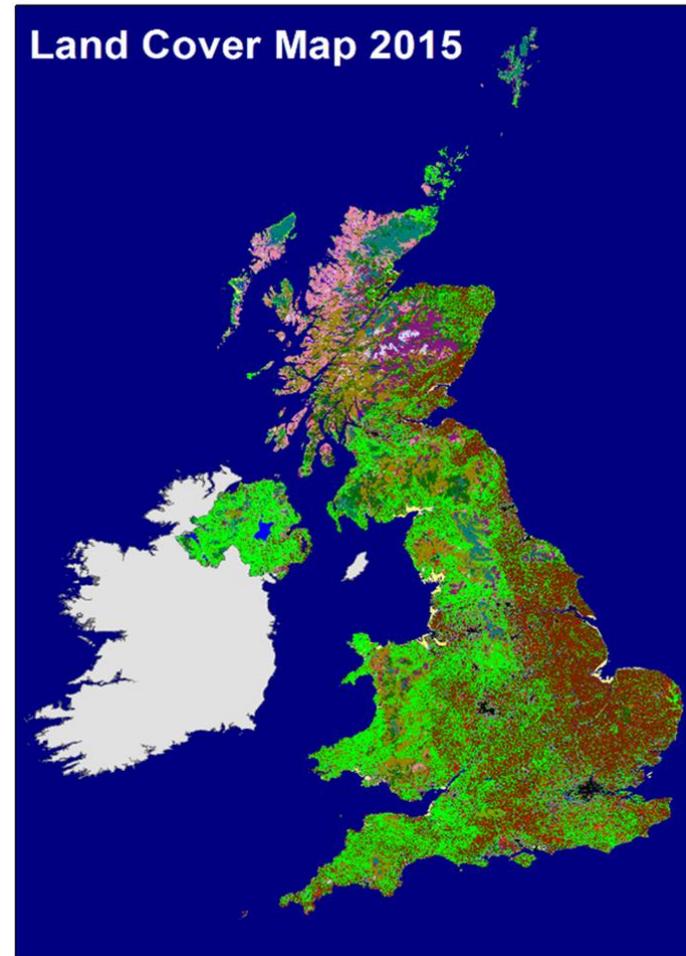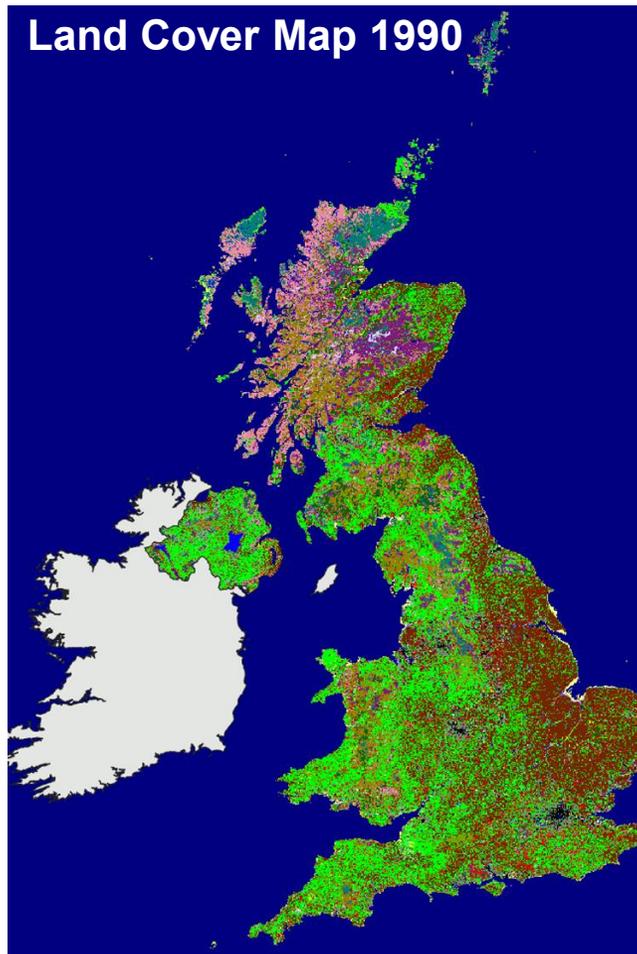3. Model input (e.g. impact of land cover on run-off quantity/quality)
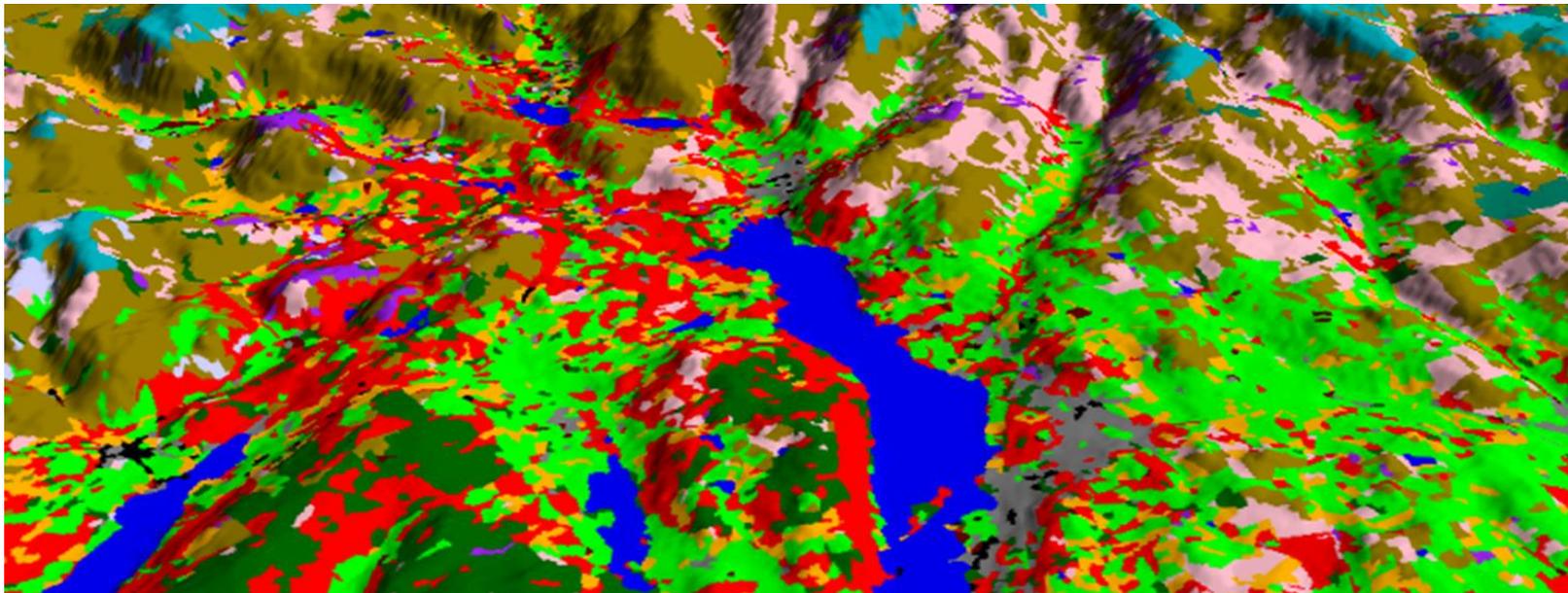
Land Cover Map series

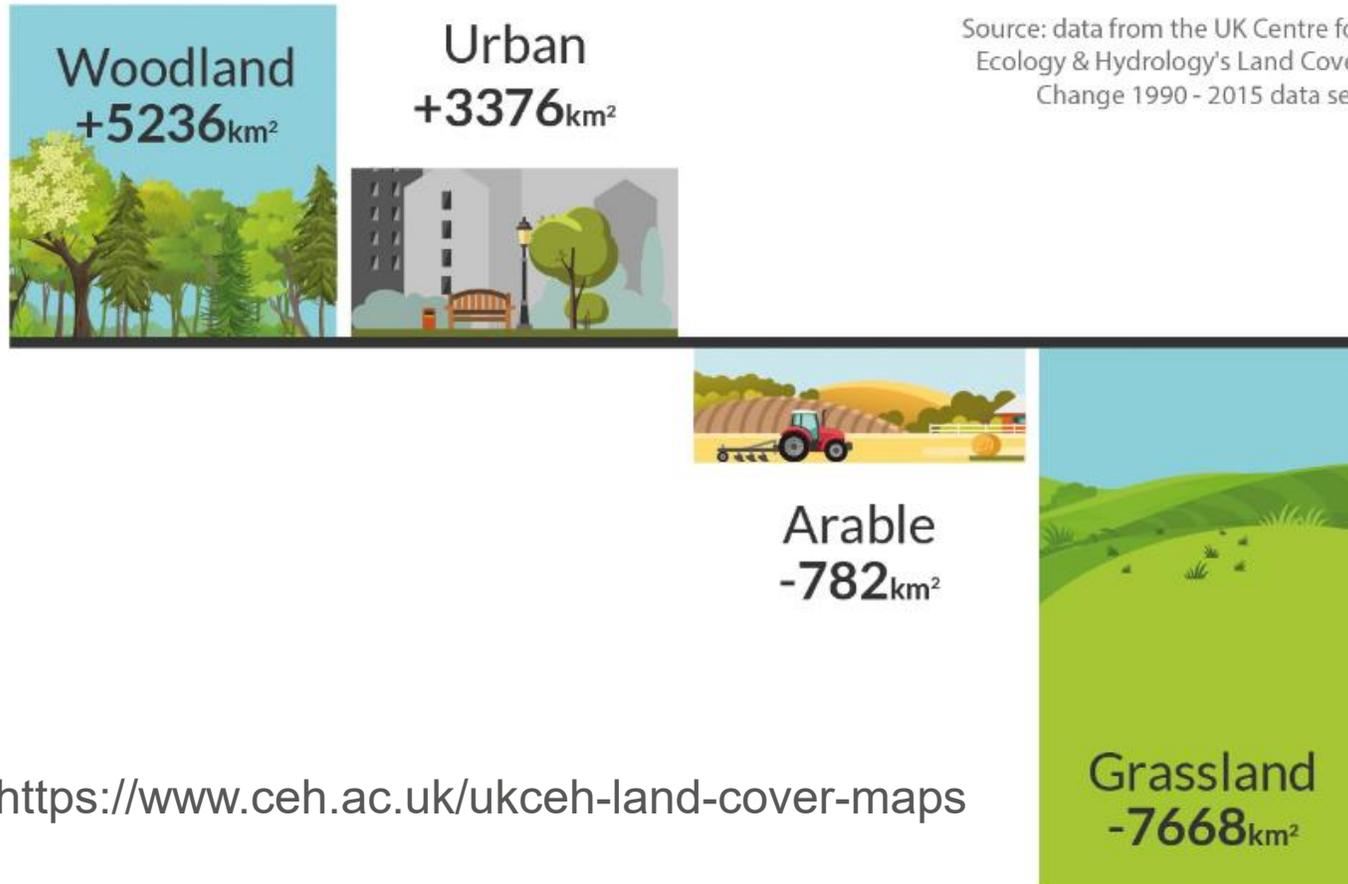Different land cover classes &/or different spatial structure

1990 v2   2000   2007   2015   2017

2018   2019   2020   2021   2022   2023   2024

Land Cover Change 1990 - 2015

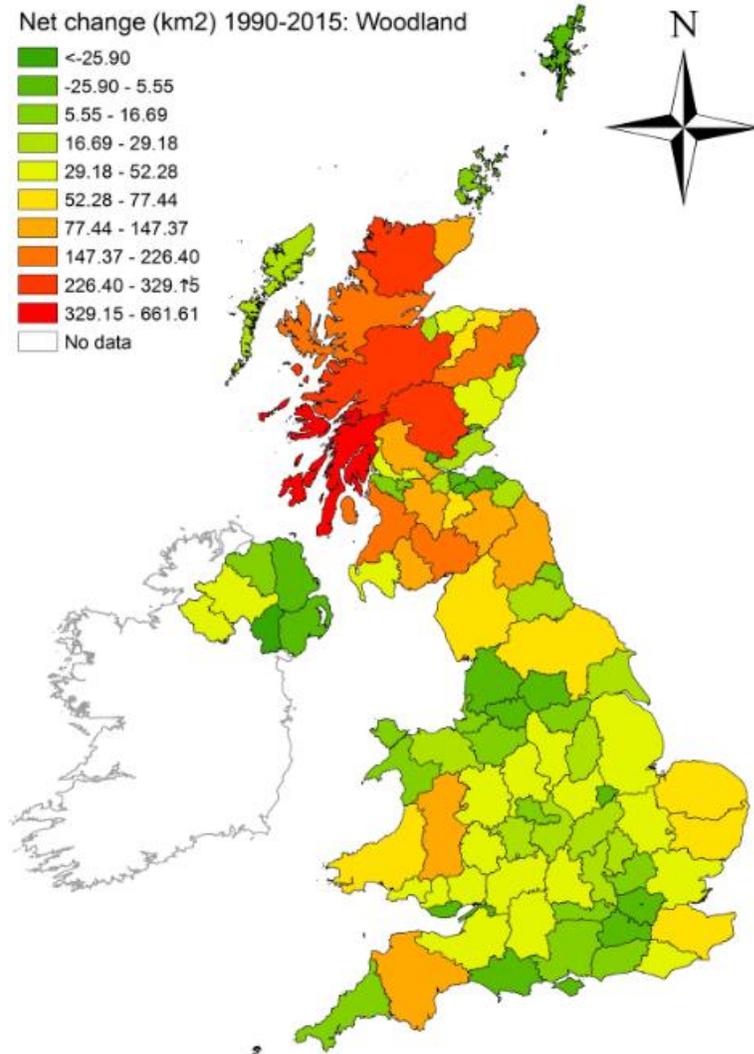Land Cover Map 1990

Land Cover Map 2015

GB Net Land Cover Change 1990-2015

GB land cover change
1990-2015

Source: data from the UK Centre for
Ecology & Hydrology's Land Cover
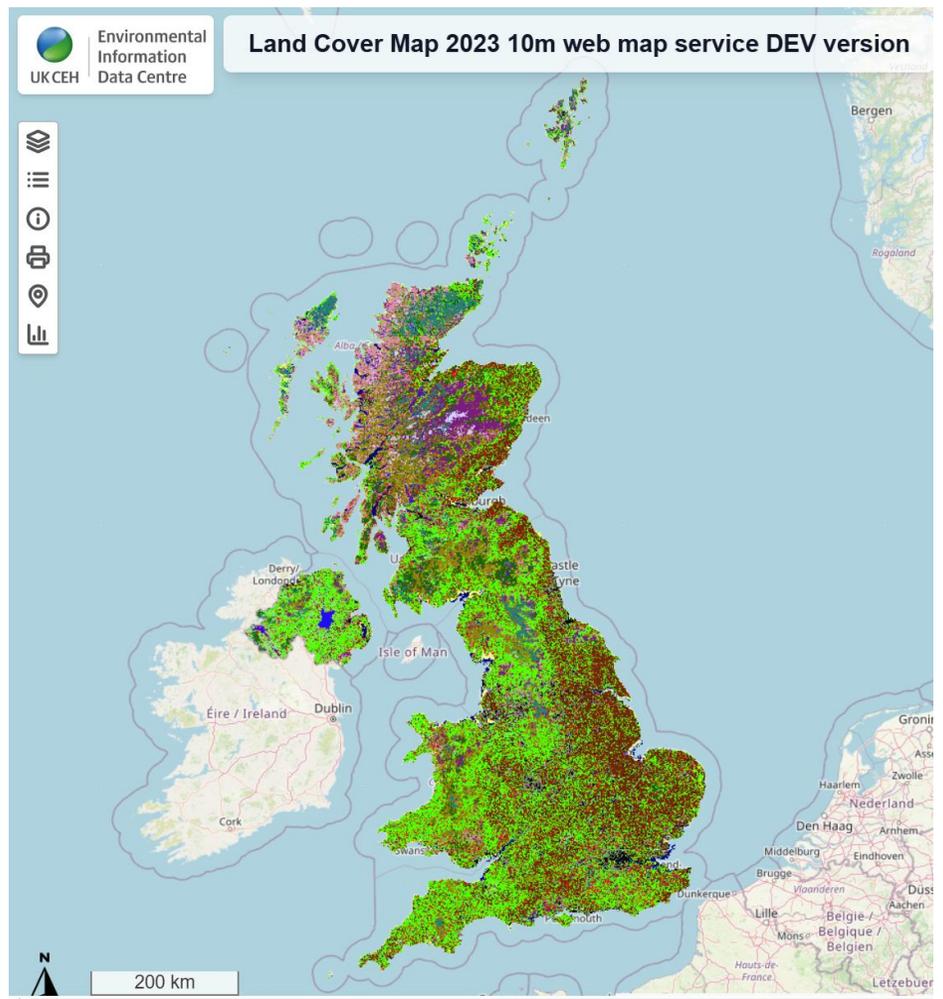Change 1990 - 2015 data set.

Woodland
+5236km²

Urban
+3376km²

Arable
-782km²

Grassland
-7668km²

https://www.ceh.ac.uk/ukceh-land-cover-maps

Spatial trends: Woodland

Net change (km2) 1990-2015: Woodland

- <-25.90
- -25.90 - 5.55
- 5.55 - 16.69
- 16.69 - 29.18
- 29.18 - 52.28
- 52.28 - 77.44
- 77.44 - 147.37
- 147.37 - 226.40
- 226.40 - 329.15
- 329.15 - 661.61
- No data

N

Key points:

- Net increase of 5,236km^2 (almost the size of Norfolk)

- Largest increases in Scotland
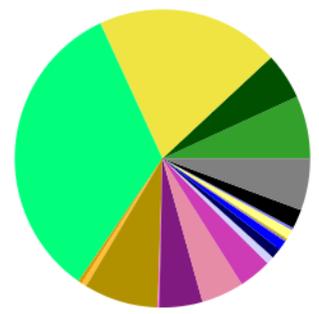
- Biggest increase in Argyll and Bute (662km^2)

New in 2025 – spatial explorer

Google: LCM2024 spatial explorer, or: https://catalogue.ceh.ac.uk/explore/spatial/

New in 2025 – LCM statistics

Land cover area
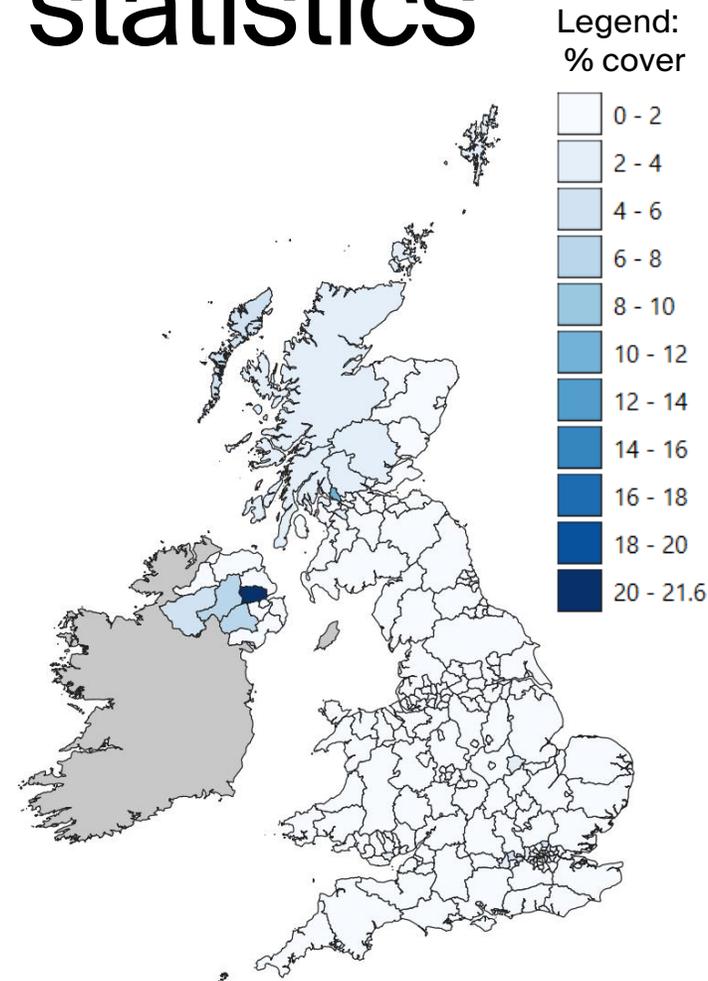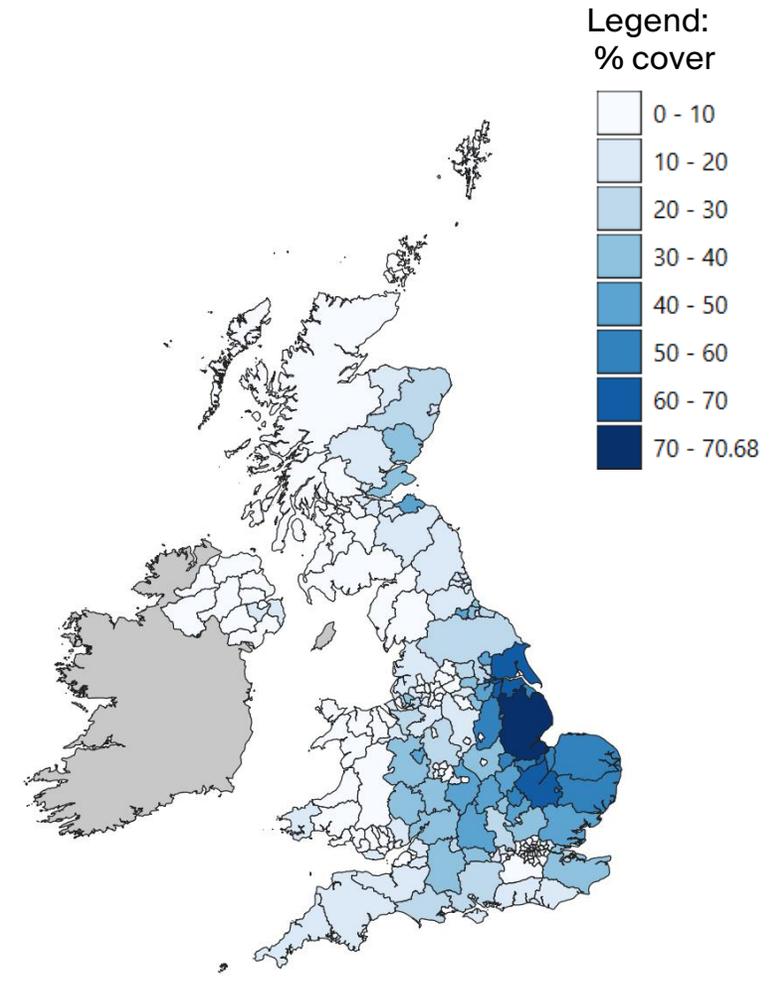
- m ^{2}, km ^{2}, hectares, percentage cover

Data formats

- Text files & spatial

Geographical units

(use ONS boundary areas)

- Countries
- Counties and unitary authorities
- English regions

Legend:
% cover

0 - 2
2 - 4
4 - 6
6 - 8
8 - 10
10 - 12
12 - 14
14 - 16
16 - 18
18 - 20
20 - 21.6

Legend:
% cover

0 - 10
10 - 20
20 - 30
30 - 40
40 - 50
50 - 60
60 - 70
70 - 70.68

LCM stats:
Mystery map 1

LCM stats:
Mystery map 2

New in 2025 – LCM statistics

Land cover area

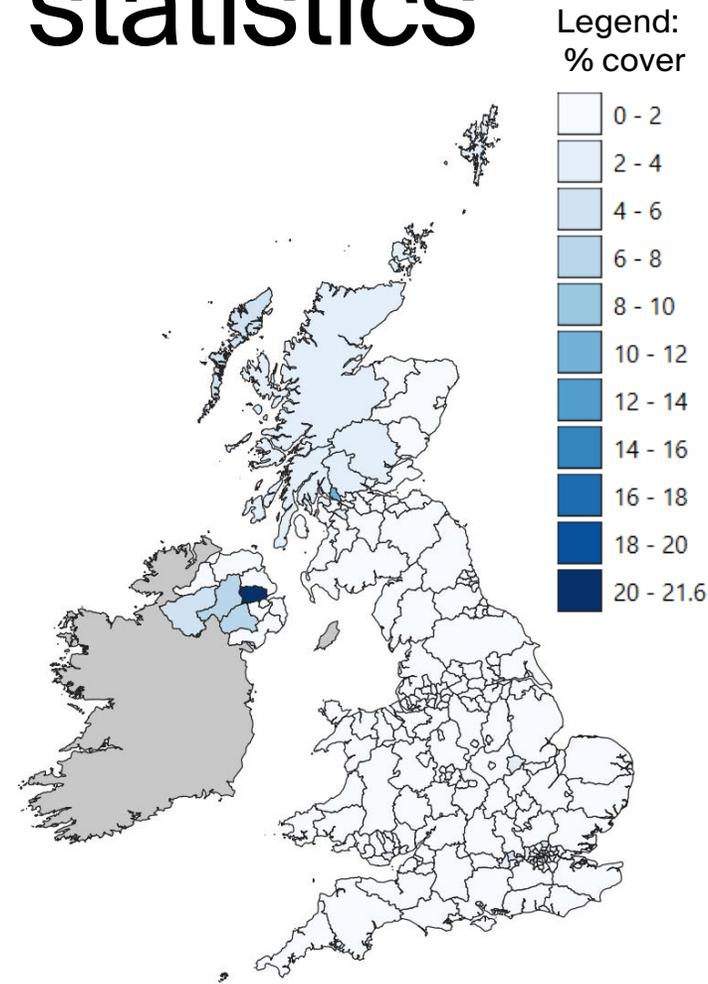- m ^{2}, km ^{2}, hectares, percentage cover
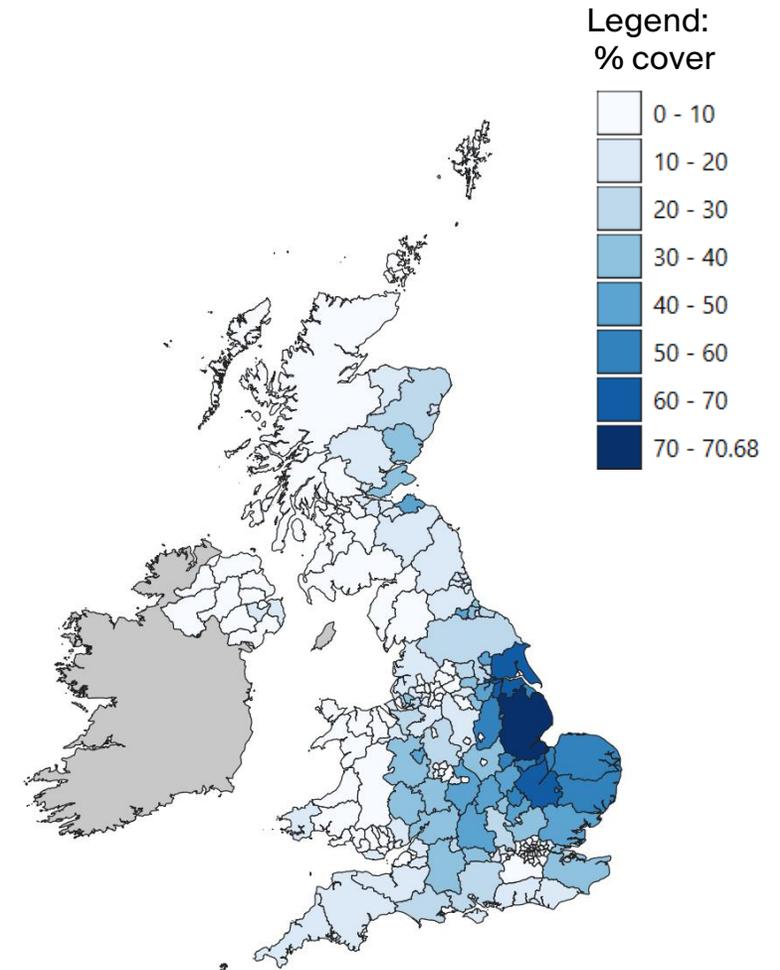
Data formats

- Text files & spatial

Geographical units

(use ONS boundary areas)

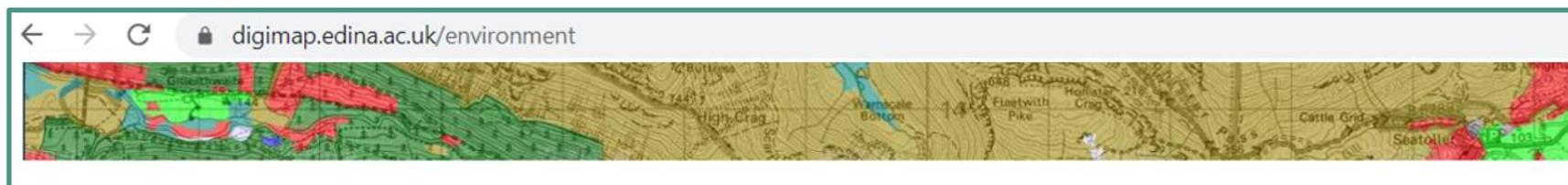- Countries
- Counties and unitary authorities
- English regions

Legend: % cover

- 0 - 2
- 2 - 4
- 4 - 6
- 6 - 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- 16 - 18
- 18 - 20
- 20 - 21.6

Legend: % cover

- 0 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 70.68

Freshwater

Arable

Accessing the data

Available from: https://www.ceh.ac.uk/ukceh-land-cover-maps and
EDINA Digimap https://digimap.edina.ac.uk/environment

Data formats

Land Cover Map 2023

Land Cover Map 2023 (LCM2023) is a suite of geospatial land cover datasets (raster and polygon) describing the UK land surface in 2023. These were produced at the UK Centre for Ecology & Hydrology by classifying satellite images from 2023.

LCM2023 includes four geospatial datasets each for Great Britain and Northern Ireland:
- 10 m Classified Pixel dataset, classified to create a single mosaic of national cover
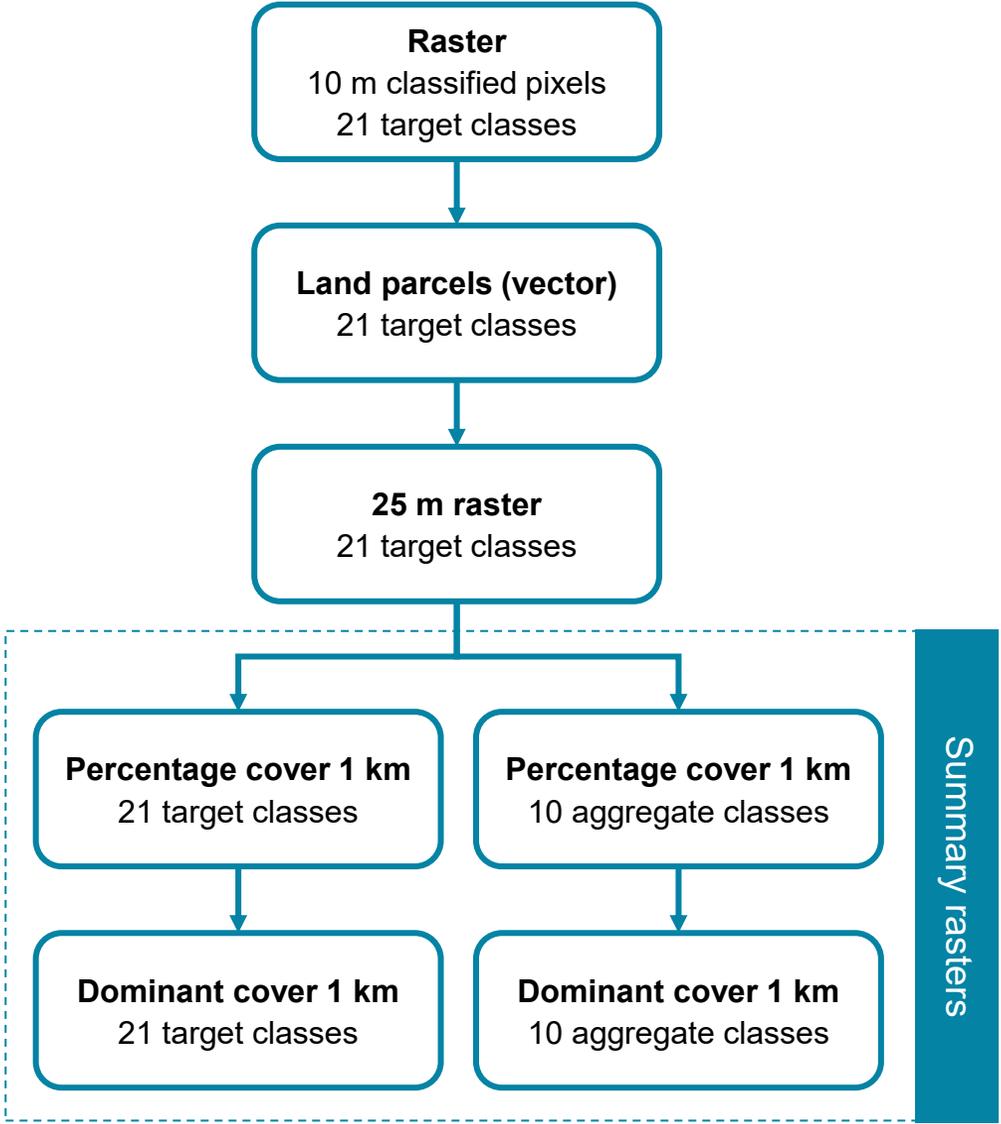- Land Parcel datasets which are the result of intersecting the 10 m Classified Pixel dataset with the UKCEH Land Parcel Spatial Framework to generate land parcel attributes
- 25 m Pixel Rasterised Land Parcel datasets: the result of rasterising the Land Parcel dataset into 25 m pixels
- 1 km summary raster products, summarising dominant land cover class and percentage coverage of each land cover class

LCM2023 is the eleventh UK land cover map produced by UKCEH. Previous versions are LCM1990, 2000, 2007, 2015, 2017, 2018, 2019, 2020, 2021, and 2022.

This data collection contains these resources

Web service **Land Cover Map 2023** 10m web map service	Dataset **Land Cover Map 2023** (10m classified pixels, N. Ireland)	Dataset **Land Cover Map 2023** (1km summary rasters, GB and N. Ireland)
Dataset **Land Cover Map 2023** (land parcels, GB)	Dataset **Land Cover Map 2023** (land parcels, N. Ireland)	Dataset **Land Cover Map 2023** (10m classified pixels, GB)
Dataset **Land Cover Map 2023** (25m rasterised land parcels, GB)	Dataset **Land Cover Map 2023** (25m rasterised land parcels, N. Ireland)	

Raster
10 m classified pixels
21 target classes

↓

Land parcels (vector)
21 target classes

↓

25 m raster
21 target classes

Percentage cover 1 km
21 target classes

↓

Dominant cover 1 km
21 target classes

Percentage cover 1 km
10 aggregate classes

↓

Dominant cover 1 km
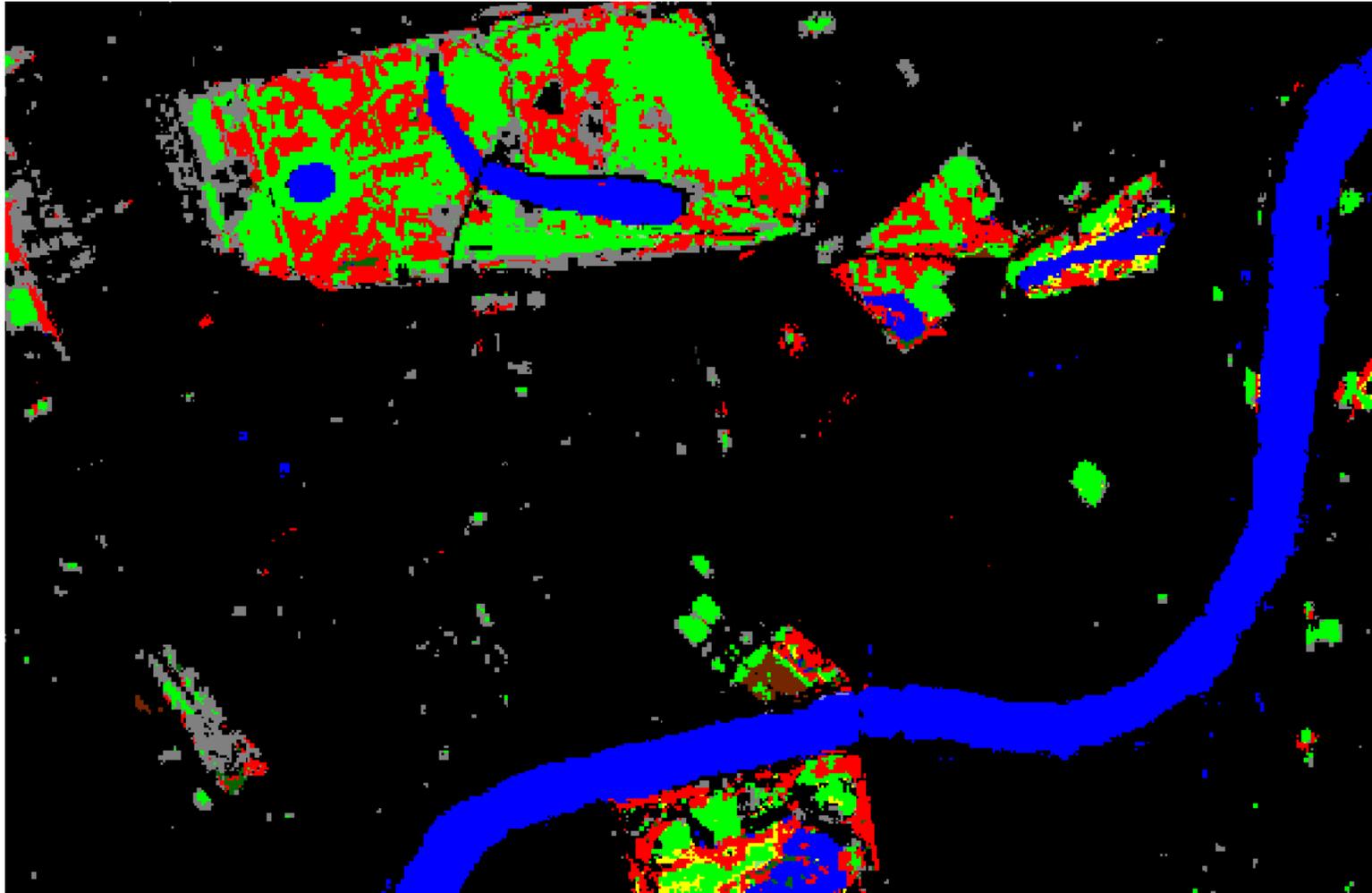10 aggregate classes

Summary rasters

Examples

- 🟥 Broadleaved woodland
- 🟩 Coniferous Woodland
- 🟫 Arable and Horticulture
- 🟩 Improved Grassland
- 🟦 Freshwater
- ⬛ Urban
- ⬜ Suburban

Example: 10m data

Legend:
- Broadleaved woodland (red)
- Coniferous Woodland (dark green)
- Arable and Horticulture (brown)
- Improved Grassland (green)
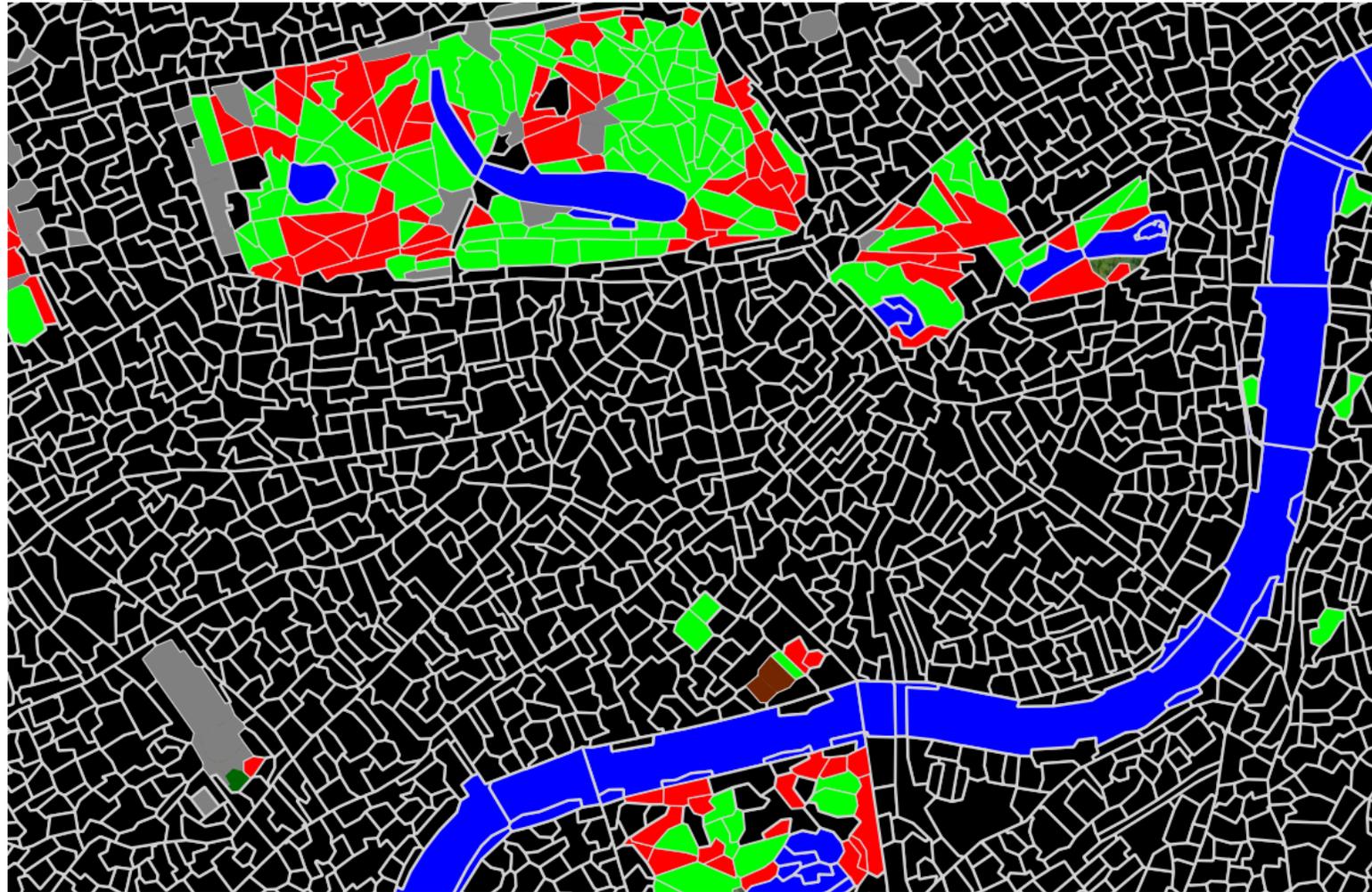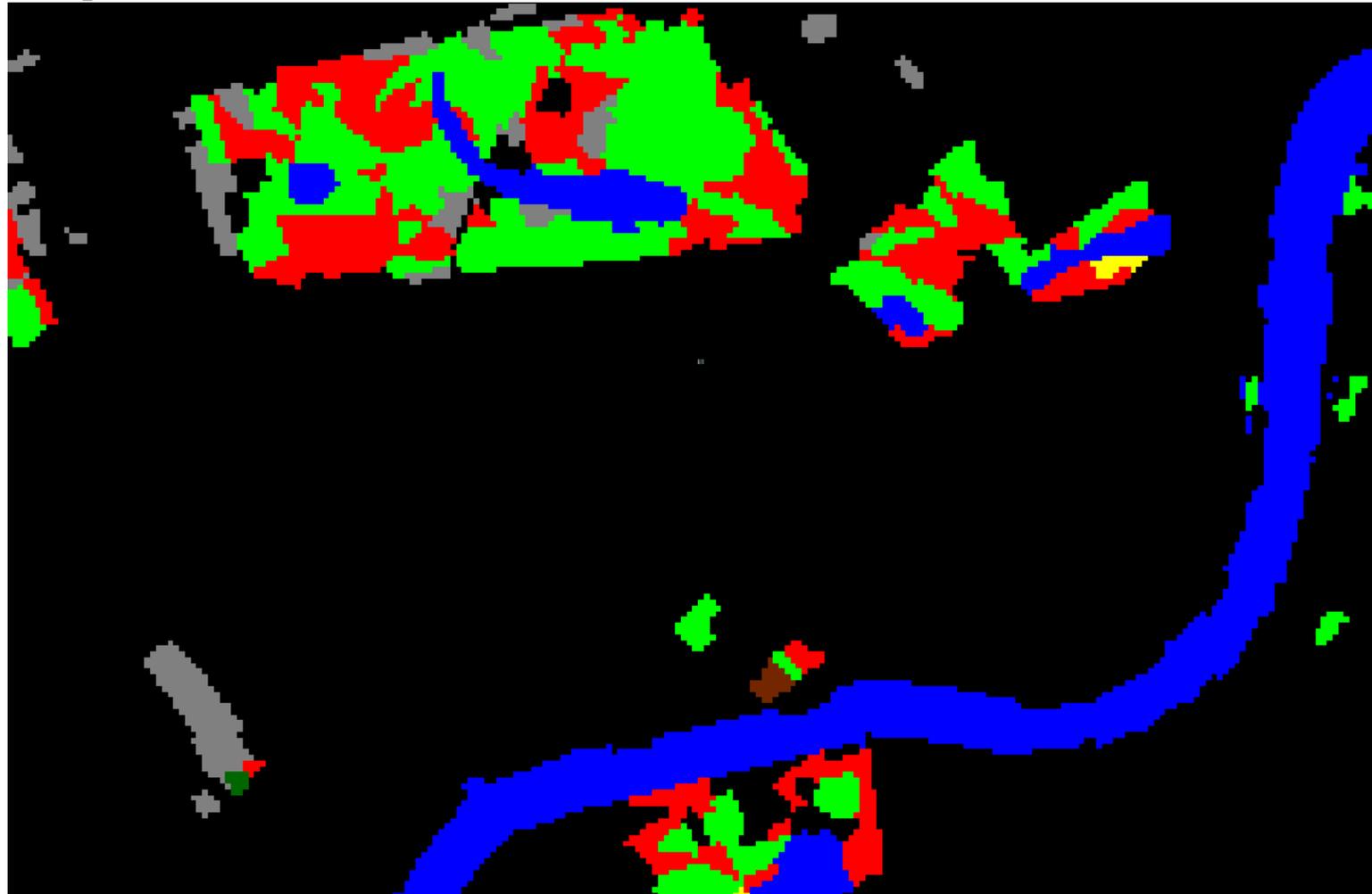- Freshwater (blue)
- Urban (black)
- Suburban (grey)

Example: Vector data


Broadleaved woodland
Coniferous Woodland
Arable and Horticulture
Improved Grassland
Freshwater
Urban
Suburban

Example: 25m data

Legend:
- **Broadleaved woodland** (red)
- **Coniferous Woodland** (dark green)
- **Arable and Horticulture** (brown)
- **Improved Grassland** (green)
- **Freshwater** (blue)
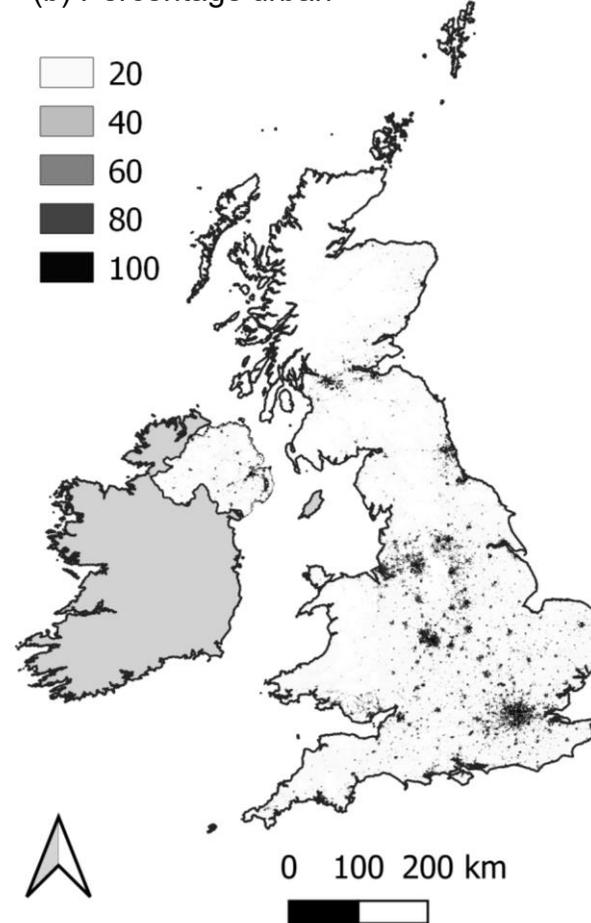- **Urban** (black)
- **Suburban** (grey)

Examples of the 1km percentage data
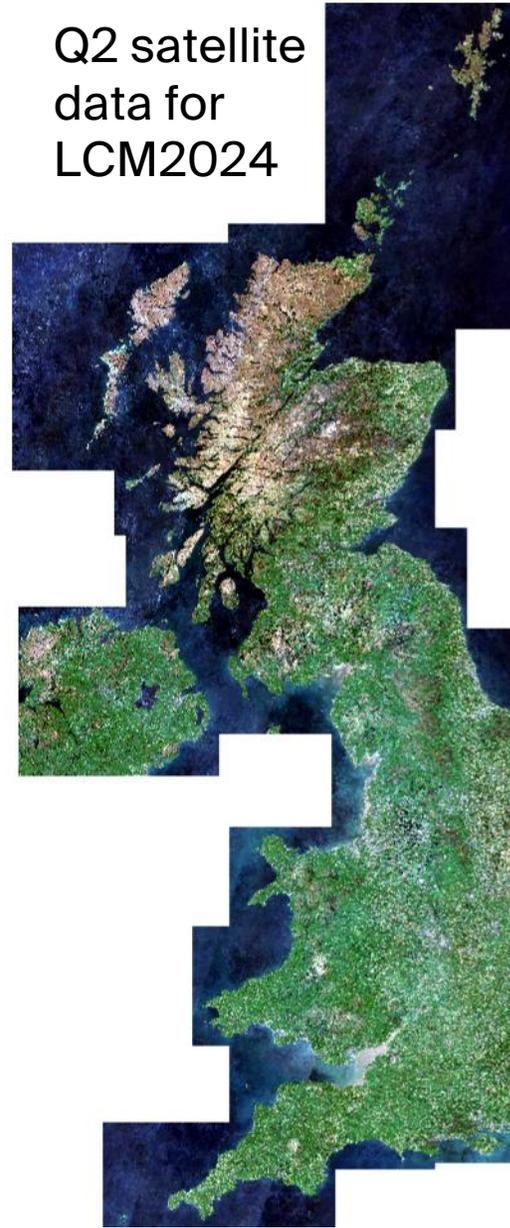

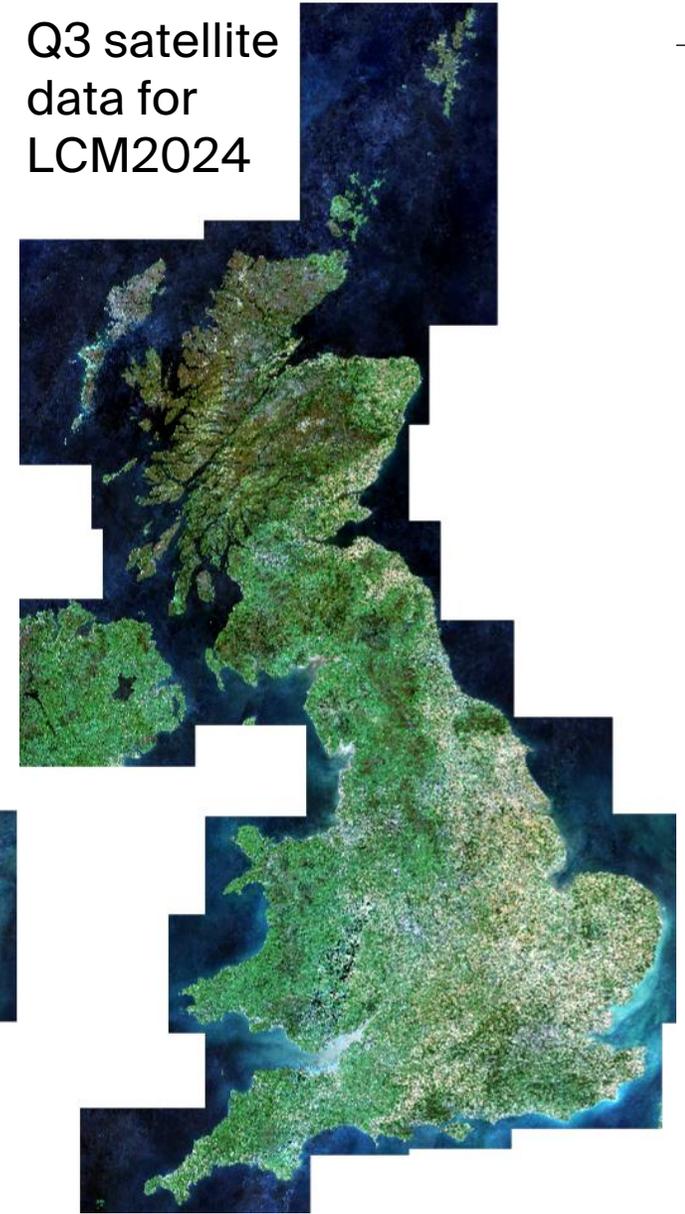(a) Percentage broadleaf woodland
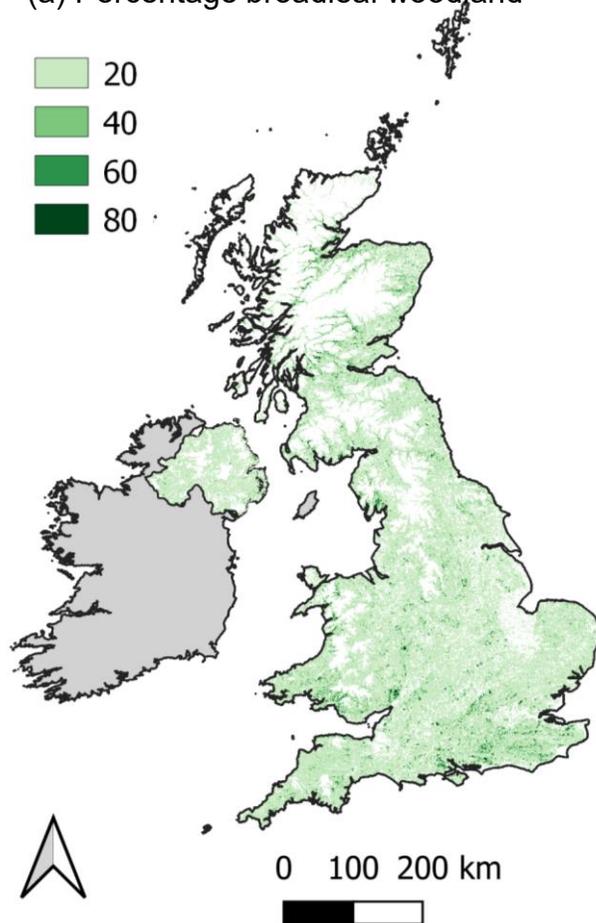
(b) Percentage urban

Coming in 2026...

- LCM2025

- Updated LCM stats, with additional geographies

- LCM occasional report

Q2 satellite data for LCM2024

Q3 satellite data for LCM2024

Further information

Websites:
- EDINA
- UKCEH Land Cover Map page

LCM data set document (bundled with the data)

Journal papers:
Marston, C. G., O'Neil, A. W., Morton, R. D., Wood, C. M., & Rowland, C. S. (2023). LCM2021–the UK land cover map 2021. *Earth System Science Data Discussions*, 2023, 1-35.

Carrasco, L., O'Neil, A.W., Morton, R.D. and Rowland, C.S., 2019. Evaluating combinations of temporally aggregated Sentinel-1, Sentinel-2 and Landsat 8 for land cover mapping with Google Earth Engine. *Remote Sensing*, 11(3), p.288.

OEP report – google 'oep report recent land cover change'