



This green and pleasant land

Faith Clark explains how a new aerial survey is helping reveal the often hidden value of our woodlands and green urban spaces

‘Five trees for every human in Britain’ (*Express newspaper*). **‘Towns put rural areas in the shade’** (*The Times*). **‘Why Surrey really is leafy’** (*Mail Online*). These were just some of the headlines generated by publication of the first detailed digital map of the nation’s tree canopy cover.

Created by aerial mapping company Bluesky¹ the National Tree Map (NTM) details more than 280 million trees with a canopy cover in the region of 20,000 square kilometres – around 13.5 per cent of the nation’s land mass, or an area the size of Yorkshire, Lancashire and Cumbria – combined!

Why it matters

A report by the Woodland Trust² recently valued Britain’s woodlands at around £270 billion! Derived figures for timber, recreation, carbon sequestration, health benefits and aesthetics highlighted the importance of this national resource – all aimed at ensuring the benefits afforded by woodland are embedded in decision-making across Government.

Drawing on a range published resources, the report cited the average values per hectare of woodland depending on its use for commercial or non-commercial purposes. It concluded that peri-urban wood and lowland, broad-leaved woodland could be more than twice as valuable as commercial forests. So while commercial forests account for around 60 per cent of total UK woodland cover, their total

value (£99 billion) is estimated to fall short of lowland, broad-leaved woodland (£122 billion).

These estimates build on previous reports including a government white paper ‘The Natural Choice’³ that placed a more conservative estimate on the economic benefits of urban green spaces. This valued living with a view of a green space at £300 per person, per year, and reckoned its annual value to the economy as £2.3 billion. While maintaining the UK’s green spaces was predicted to deliver £30 billion in health and welfare benefits alone, failing to maintain them could cost an estimated £20 billion each year.

So while the numbers might differ, the importance of woodland and green spaces in economic, social and health terms is not disputed. This was perhaps the reasoning behind Bluesky’s decision to invest in the first ever detailed digital map of trees.

Seeing the wood from the trees

The NTM digital dataset⁴ was created, and is being continually updated, from up-to-date, high resolution aerial photography, colour infrared data and detailed height models. Using innovative algorithms and image-processing techniques, the creators were able to partially automate dataset production, making its creation possible in terms of costs and production schedules. A team of experienced professionals then conducted extensive checks to ensure its quality and accuracy.



Pictured from left to right: NTM's three vector map layers; tree cover aligned with mapping, and oblique aerial photography to aid the capture of height points

The NTM currently includes three vector map layers: polygons for crowns (the mass of foliage and branches growing outward from a tree trunk); idealised crowns, and height points, plus an attribute table that identifies each crown feature, height attribute and area calculation.

NTM data is already being utilised by a number of local authorities for the prioritisation of street cleansing, as well as proactive tree management and planting. The same is true of the academic and private sectors, with utility companies having a particular need for such data.

'Growing' information from data

In a perhaps less obvious application, the NTM is helping healthcare experts shed light on the way pollen travels through our atmosphere with a view to alleviating the misery of hay fever sufferers.

In this project, experts at the Met Office and University of Exeter Medical School are developing the most detailed, species-specific, maps of allergenic pollen ever produced. The maps will be combined with detailed models of how pollen is likely to move and behave in the atmosphere. The findings will help establish the links between pollen exposure and other allergic diseases such as asthma. They will also prove valuable in assessing other risks to health such as links to pre-term births, strokes and mental health issues.

Dr Rachel McInnes, Senior Climate Scientist at the Met Office Hadley Centre commented, "Different types of pollen are released from different plants and trees at different times of the year. These can trigger hay fever and other allergies that can have a serious impact on health and wellbeing. By understanding where and when allergens are produced and how they are affected by weather and climate we can gain a better understanding of their impact and provide more accurate and detailed forecasts."

"By providing detail of trees in urban environments, small wooded areas and hedgerows that our existing forest datasets do not cover this data will make the resulting pollen maps more accurate in these areas."

Using a tested methodology, scientists will use NTM data alongside



The NTM is helping health and weather experts tackle seasonal pollen-related allergies such as hay fever

other land use maps, vegetation and species datasets. The project will not only consider the actual location of where the pollen is produced, but also look at when it is produced and how and where it is likely travel, taking into account species characteristics and climatological impacts.

Resilient treescapes

The data is also helping the Woodland Trust undertake assessments of the scale of current tree cover, including in urban areas, to support its work in developing resilient treescapes.

"The data Government has used to date to calculate statistics about woodland cover only includes areas of woodland above a specific size," commented Dr Nick Atkinson, Senior Conservation Advisor at the Woodland Trust. "We already know from our initial assessment that this significantly underestimates total tree cover. In fact, something like a third of all cover is outside traditional woods; such as along rivers, field boundaries, roads and railways."

"These trees play an important but largely unsung role in providing habitat and linking woodland patches together, they also deliver important ecosystem services such as soil conservation, insect pollinator habitat and protection for crops and livestock."

The NTM data will be used to supplement existing datasets such as the Government's National Forest Inventory. Already used alongside existing mapping within the Trust's Geographical Information System (GIS) to evaluate the true extent of tree canopy in England and Wales, one striking revelation has been the extent to which tree cover in built up areas often exceeds that in nearby countryside. These trees provide an important refuge for wildlife, help ameliorate surface water flooding, soak up airborne pollution and provide shade for those living in urban heat islands.

Moving forward

This is not, however, the only the only green map created by Bluesky. Also derived from Colour Infrared sensors, the Normalised Difference Vegetation Index (NDVI) compares the 'green-ness' of vegetation, thereby providing an indicator of health, vitality and even maturity.

With vegetation under threat from pests, disease, pollution and adverse weather conditions the NDVI is a simple graphical indicator that can be used to assist with the detection of plant maturity, insect attack or water shortage. And in looking to the future, Bluesky is investigating the use of other wavelengths and data analysis techniques to yield additional intelligence for tree and vegetation management.

1. www.bluesky-world.com
2. The Economic Benefits of Woodland. A report for the Woodland Trust prepared by Europe Economics. 2015
3. The Natural Choice: securing the value of nature. Printed in the UK for The Stationery Office Limited on behalf of the Controller of Her Majesty's Stationery Office. 2011
4. <http://www.bluesky-world.com/#!national-tree-map/c1pqz>

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