

OXFORDSHIRE
TREESCAPE PROJECT



TREESCAPES GUIDE

How To Make Best Use Of
The Oxfordshire Treescape
Maps And Reports



Environmental Change Institute



ABOUT THIS GUIDE

This guide accompanies the Oxfordshire Treescape Opportunity Reports and Online Map. It offers a summary explanation of the treescapes included in the maps and the benefits they bring, together with some case studies of farmers and landowners who have put them into action. It also includes a brief explanation of the mapping rules we have adopted.

The Online Map can be accessed [here](#). If you would like us to produce an Opportunity Report for your land or parish, please visit [our website](#) for more information. These reports can be made available to you through one of our partner organisations on a not-for-profit basis and are intended to be used as a planning tool to support land use decisions. The partner organisations will be able to offer detailed advice about the suitability of the treescape options in each site and also the funding options available.

Please note that three treescapes described here are not yet included in our maps. These are street trees, trees in open spaces and trees in gardens. We are working on including these in future map releases.

The Maps have been produced by GrowGreenCarbon, with the support of the Environmental Change Institute (ECI). While the ECI has provided advice and support, the report and the methods we have used for the assessment are our own.

Welcome To The Oxfordshire Treescapes Project

The Oxfordshire Treescapes Project was initiated by the Lord Lieutenant of Oxfordshire with the support of a wide range of public and private organisations. It aims to support farmers, landowners, and managers and community groups by mapping opportunities for treescapes on their land and the benefits these would bring. By treescapes we mean trees in all their different forms and densities, each suited to a different land use.

The aim of the Oxfordshire Treescapes Project is to provide a simple picture of the full range of treescape opportunities available on every piece of land across the county. We have chosen to map woodlands, hedgerows, agroforestry, community orchards, street trees, garden trees and species-rich grassland. The maps show which of these treescapes can be placed where and which of seven benefits they would then bring.

The placements are not exact. Rather the maps are designed to present the broad range of opportunities available to a landowner or manager, from which a more detailed targeted land management plan can be created.

This guide is intended to make clear how to interpret these maps. It explains each of the six treescapes and what their benefits are, and how we have chosen to map them. A fuller explanation of precisely how the maps were derived is available in the technical manual, which is available on request.

PLEASE NOTE: As with all maps, the detail is not perfect. For this reason, decisions about land use changes should **NEVER** be made without first checking them out on the ground. We have had to make generalised assumptions about where treescapes might be placed that not all farmers and landowners will agree with. In this guide we are aiming to make these assumptions as clear as we can so that they can be taken account of in any land management plan.

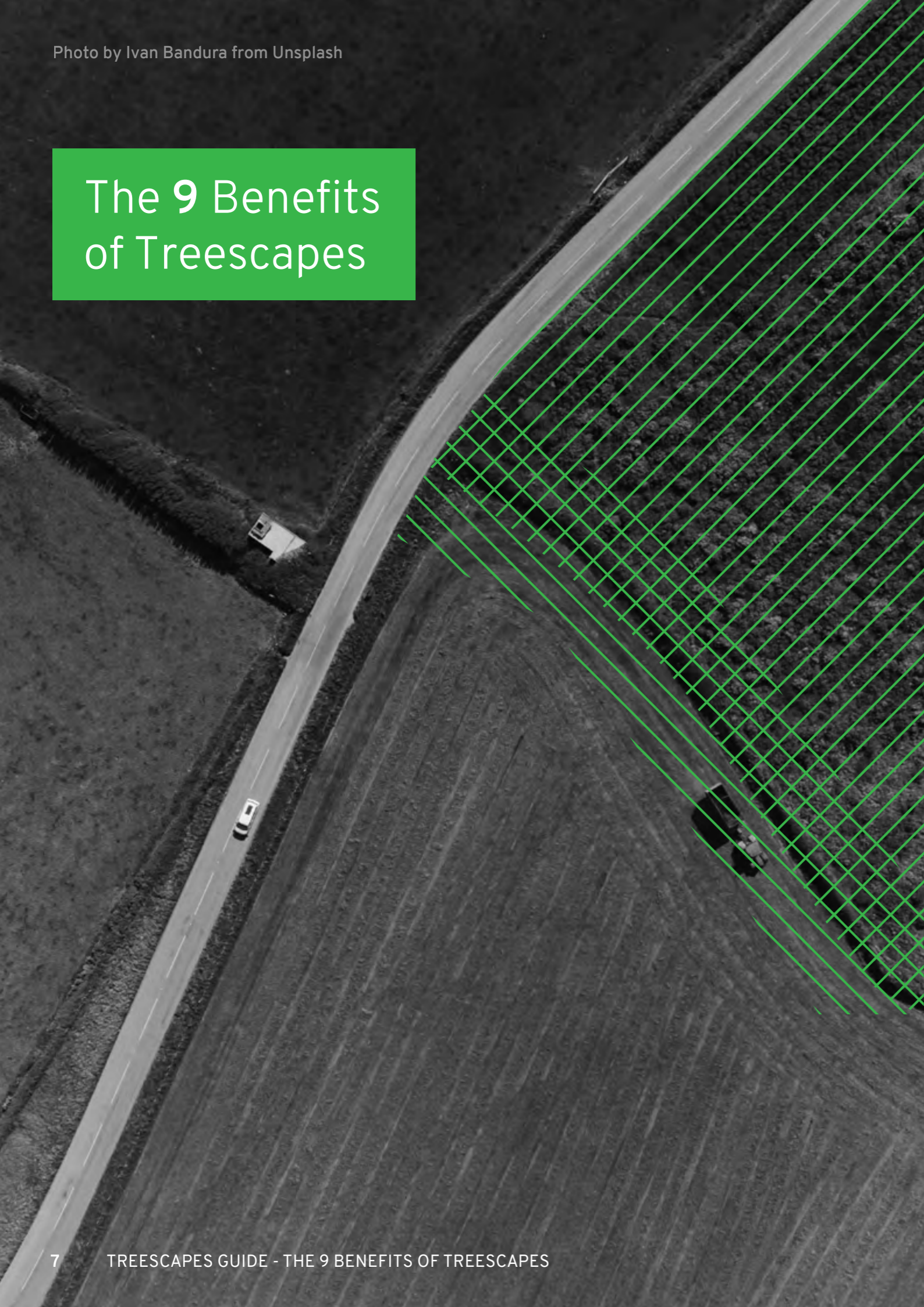
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Designed by [Noble Studio](#)

The 9 Benefits of Treescapes



BIODIVERSITY

Biodiversity describes the variety of life on earth. The variety and complexity of nature is essential to its health and resilience. All our treescapes add to biodiversity and will help to support its recovery to differing extents, so long as native species are used.

DEFRA has devised a metric for calculating the number of 'biodiversity units' that might be gained or lost through any land use change. We have applied a version of this metric to show the biodiversity net gain that every treescap placement offers. We have not recommended any placement that might result in a loss of biodiversity units.

As part of the Government's 25 Year Environment Plan, Oxfordshire County Council has mapped out a draft Nature Recovery Network (NRN) for the county made up of core and recovery areas. Our maps show whether or not a piece of land sits within this network. The land in the NRN's recovery zones has been given a higher biodiversity value, while core areas have been mapped as unsuitable for treescapes.

SCORING METHOD: Uplift in DEFRA biodiversity units per hectare.



CARBON CAPTURE AND STORAGE

All our treescapes capture and store carbon, each at a different rate. This offsets emissions from other activities. The National Farmers Union is aiming for agriculture to be carbon neutral by 2040. Our maps allow you to calculate the proportion of Oxfordshire's agricultural emissions that would be offset by the establishment of treescapes, averaged over 30 years, showing you the role that your land can play in taking your business and Oxfordshire's agriculture carbon neutral.

SCORING METHOD: Tonnes of carbon dioxide captured per hectare per year, averaged across 30 years. A further allowance of emissions of 5 tonnes per hectare of carbon dioxide from agricultural land has been allowed for, based on average UK farm emissions from intensive operations. This only applies if intensive food production is not displaced elsewhere.



FOOD PRODUCTION

Woodland offers limited food production potential. However other treescapes such as agroforestry offer food production alongside other natural benefits, while hedgerows can be added to agricultural fields with limited disruption.

Our maps show the extent of food production that would be gained or lost through the introduction of treescapes. Non-food producing treescapes have been restricted to lower grade land.

SCORING METHOD: Hectares of food producing land gained or lost.



TIMBER PRODUCTION

The UK imports £8.7 billion in timber each year. This is over 80% of our needs and makes us second only to China in world importers of timber. The potential for import substitution is then high.

Some treescapes have the potential to generate wood of economic value by producing sawlogs, paper, woody biofuel crops, coppice wood or wood fuel. We see sawlogs as preferable as these keep carbon locked up for the longest time.

To produce timber, woodlands need to be actively and sensitively managed. Clearing small areas, by allowing light to penetrate to the woodland floor can promote regeneration and support “edge” habitat. A balance can be found where some timber can be harvested, whilst the woodland still supports a variety of wildlife.

SCORING METHOD: Hectares of timber-producing land.



FLOOD MANAGEMENT, SOIL EROSION CONTROL AND WATER QUALITY

Treescapes sited in the right places can help prevent flooding by reducing surface water runoff, control soil erosion by stabilising the soil and trapping sediment, and improve water quality by breaking down pollutants and encouraging water to filter through the soil.

The Environment Agency has produced maps showing where interventions in the Thames catchment can be made to best control flooding. We have used these maps to show where our treescapes could be placed to deliver flood control in river catchments and alongside watercourses.

SCORING METHOD: Hectares of flood control land.



RECREATION AND WELFARE BENEFITS

Woodlands and other treescapes offer opportunities for leisure activities such as walking, cycling or bird watching. Research shows that these activities can play a valuable role in improving mental health and wellbeing, and accelerating convalescence.

We have mapped treescapes as offering this benefit if they contain a public path. This can help landowners interested in improving access to identify suitable sites.

SCORING METHOD: Hectares of recreational land gained.



Photo by JuergenPM from Pixabay

AIR QUALITY AND NOISE REDUCTION

Trees and other vegetation such as hedges can help to block or capture air pollution, the majority of which comes from road transport. The two major pollutants are Particulate Matter (PM2.5 or PM10 depending on the size of the particle) and Nitrogen Dioxide (NO²). A dense barrier of trees or hedges can cut noise, prevent pollution travelling and filter some of it out. Similarly, a vegetation barrier can prevent pollution drifting from a road to a school playground or park.

Our maps show where treescapes can be placed to control air pollution to best effect. We have chosen to focus on PM2.5s levels above 10 micrograms per cubic metre as nitrogen dioxide emissions from vehicles are set to drop dramatically across the next ten years, which is the time it takes trees to become well enough established to be effective.

SCORING METHOD: Hectares of air quality and noise reduction land.



Photo by achair from Pixabay

COOLING SHADE AND WINDBREAKS

Trees and hedgerows can provide cooling, shade and windbreaks in both rural and urban landscapes. This can help protect good quality farmland, reduce soil erosion and crop damage, provide shade to livestock and build resilience to climate change by creating micro-climates. In urban areas, trees can provide shade to people and help keep buildings cool.

SCORING METHOD: We have not mapped this benefit as we have been unable to determine why locating a treescape in one area rather than another would be advantageous.



LANDSCAPE CHARACTER AND A SENSE OF PLACE

Landscape character describes what makes a place distinctive. Most landscapes in England have trees in one form or another. They help to create more beautiful local surroundings, and the sights, sounds and smells of nature. These all contribute to personal wellbeing.

Landscape character should always be taken into consideration when choosing to add treescapes. If your land lies within an Area of Outstanding Natural Beauty, there will be restrictions on what you can do, so you should contact the AONB officers at the beginning of your planning process.

SCORING METHOD: We have not mapped this benefit as we have been unable to determine rules for why locating a treescape in one area rather than another would be advantageous, so we have left this as a decision to be made around individual plantings.

Woodlands



AREAS OF TREES
OF 0.25 HECTARES
OR MORE WITH
CANOPY COVER OF
20% OR GREATER

Overview

Woodland is well suited to areas that are less productive for agriculture. It can also help create micro-climates that protect good quality farmland.

This is a permanent land use change and there can be business implications. Funding options to cover the initial cost and ongoing maintenance of tree planting are improving. Maintenance such as watering, weeding and control of squirrels or deer may be needed. Alternatively, an area could be allowed to regenerate naturally, reverting initially to scrub. While trees will take longer to grow this may prove a more robust and diverse environment inhabited by the best suited native species.

DIFFERENT TYPES OF WOODLANDS

BROADLEAVED WOODLAND:



Composed of a variety of native species, this primarily deciduous environment is well suited to the UK climate.

WET WOODLAND:



Woodland on areas that flood, providing a damp environment for wildlife that is highly biodiverse.

CONIFEROUS WOODLAND:



Typically, this has been comprised of non-native monocultures. But Scots Pine is native and will succeed in infertile soils making it a valuable pioneer species.

NATURAL REGENERATION:



This not a type of woodland but an alternative to planting where the land is left idle and native species are allowed to grow over time

MAPPING CONSIDERATIONS

- In our mapping, we have assumed a standard new broadleaved woodland growing at Yield Class 6 (a measure of potential productivity) with low or no intervention, and that all plantings are protected against pests.
- We have also mapped new woodland strips of 20 metres around existing woodland sites as we see these as having a high biodiversity value as woodland adjacent to existing woodland colonises faster.
- Grassland restoration is an alternative to woodland in most areas and we have mapped it to the same opportunity areas as woodland. However, floodplains may be better restored as meadows with some wet woodland included. Some calcareous soils may also be better suited to calcareous grassland, especially if located near to existing grassland habitats.



PLANTING DENSITY

1,100 - 4,400 trees per hectare.



Minimum 0.25 hectares

LOCATION

Land of grade 3 - 4



Arable or Pasture

STRUCTURE



Canopy



Shrub



Ground layer

TIME TO MATURE

Broadleaf: 60+ years



Coniferous: 40+ years



FINANCIAL COST

£12.50-£20 per tree, including establishment and maintenance for 30 years.

FINANCIAL INCOME

Carbon credits (£30-90 per tonne), timber revenue, grants and scheme investments.

BENEFITS OF WOODLANDS



FOOD PRODUCTION

Woodlands do not produce food directly but can provide a habitat for game and species that control pests.



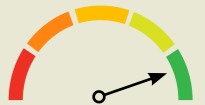
CARBON

Woodlands provide a carbon store and offset emissions of an estimated 300 tonnes of CO2 a hectare over 30 years.



FLOOD MANAGEMENT

During heavy rain, trees in catchments and along river courses can slow peak flows, and reduce soil erosion and surface run-off.



AIR QUALITY

Trees can act as natural air filters removing particulate matter, harmful gasses and noise from the atmosphere or blocking their transmission.



BIODIVERSITY

Woodland can improve biodiversity and attract predators provided it consists of a variety of native species.



RECREATION AND WELLBEING

Woodlands in areas accessible from a public path can provide opportunities for recreation and contribute to people's well being.



TIMBER PRODUCTION

Woodlands produce timber that can be harvested worth £20 - £90/tonne. Managing woodland for timber can mean that biodiversity and recreational benefits are not delivered.



Natural Flood Management on the Blenheim Estate



Photo by Nicholsons

The Queen Pool on the Blenheim Estate regularly becomes clogged and needs to be dredged. This is caused by sediment run off in the Glyme and Dorn River Valleys further upstream. To help address this, Blenheim plans to plant 141 hectares of catchment and riparian woodland in the Dorn Valley. The trees will be planted on land that is currently cultivated. Local construction firm Morgan Sindall will provide part of the funding.

Water quality in the area is poor due to high phosphate levels, soil erosion and sewage discharge. Some of the trees will reduce runoff, and in the longer-term, deeper root systems will enhance percolation into the soil, helping groundwater recharge in the winter. Wood fall features will be created in the river to slow the water flow during wetter periods, using species such as willow which will regrow.



Photo by Nicholsons

A central aim of the project is to provide **new publicly accessible woodlands**. The area is already criss-crossed by 6 footpaths and the proposals include a 7 kilometre circular path. There will also be a Woodland Visitor Centre providing outdoor learning and volunteering opportunities and birdwatching areas.

The new woodland is designed to **enhance biodiversity** by enriching ecosystems and protecting local flora. Wildlife rides seeded with meadow grassland will comprise 10% of the site. Species will be native and climate resilient based on 2080 climate predictions.

The project will **sequester 50,000 tonnes carbon** over 25 years both through removing land from cultivation and tree planting. There will also be rewilded areas.

The site will host **research** by Oxford University into carbon sequestration and soil carbon, trials of alternatives to plastic tree guards and squirrel control trials.

Jobs will be created by the planting, in maintaining the site and at the Woodland visitor centre.

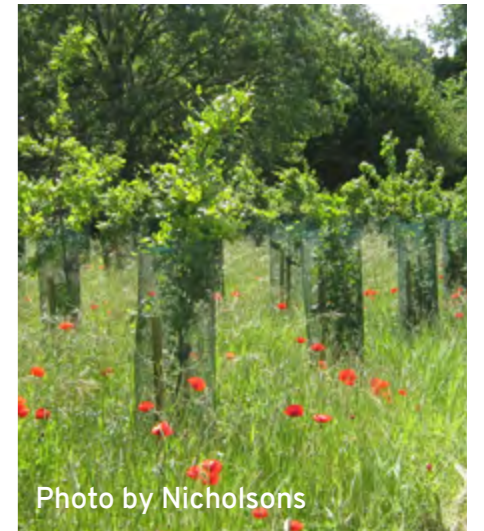


Photo by Nicholsons

Natural regeneration of a previously cultivated field in the Cherwell Valley



Some areas of land may lend themselves to natural regeneration rather than tree planting scheme as they are less productive or difficult to farm.

The owner of this 10-hectare, field decided to pause farming operations about 10 years ago. The three photos show how shrubs and trees have regenerated naturally and become well-established at the site over time.

The local geology means there are springs in the area which made the ground so wet farm machinery was getting stuck and soil was being washed away down the sloping land. As well as eroding the soil resource, soil erosion affects water quality and can cause harmful nutrient issues in streams and rivers. As this was unproductive land it was not much of a loss to food production and farm income.

When allowing a field to naturally regenerate, the exact speed and type of establishment is hard to predict as every location is different. Sites which are near existing deciduous woodland will have a ready source of seed and wildlife to distribute it and this has the added benefit of extending precious ancient and existing woodlands. Allowing trees to grow from the natural seed bank in the ground will encourage trees that are native to the local area, promoting biosecurity and variety making the woodland more resilient.

Today, trees and shrubs have become well established at the site:



This oak tree at the top of the site has many new oak saplings (6-8ft tall) growing immediately around it.



At the lower end of the site the large tree in the middle right was mature in 2009 and since then brambles and a mix of shrubs such as buddlia spindle and dogwood and trees such as hawthorn and birch have established.



TREESCAPE OPPORTUNITIES

Species-Rich Grassland

Photo by Alison Smith

Overview

Species-rich grassland is open, grassy habitat maintained as meadow by traditional grazing and cutting methods on a less intensive basis than typical pasture. It includes high numbers of wildflowers and sedges, but low levels of white clover, rye grass and injurious weeds. There may also be woody elements such as hawthorn.

It is a highly valuable habitat for biodiversity, carbon capture and other natural benefits.

Species-rich grassland can be grazed or cut for hay after plants have flowered and grass and flower seeds have set. It should not be ploughed or reseeded and no fertilisers or pesticides should be applied.

The type of species rich grasslands that can be established depends on geology. They can be upland or lowland hay meadows; and acid, calcareous or neutral. Grassland can include scattered small trees and shrubs.



Photo by Richard Barber

NATURALLY OCCURRING TYPES OF GRASSLAND IN OXFORDSHIRE

LOWLAND MEADOWS:

Moist, deep soils that are neither particularly acid nor lime-rich, supporting flower-rich swards in the early summer, followed later in the summer by taller species. Occasional moisture loving trees such as willow, may be present.



Photo by Roselle Chapman

LOWLAND CALCAREOUS GRASSLAND:

Famous for its floristic richness with up to 40 species per square metre and its rare and beautiful butterflies, this grassland includes lime-loving species and potentially shrubs such as guelder rose, dogwood and burnet rose, in addition to hawthorn and blackthorn.



Photo by Roselle Chapman

LOWLAND DRY ACID GRASSLAND:

Can be species-rich, with up to 25 plant species per square metre. These include fine grasses, lichens and mosses, small rosette-forming species, low-growing herbs, and tiny annuals.

MAPPING CONSIDERATIONS

- For our mapping purposes, we assume our treescape to be a grassland of medium distinctiveness with a score of 4 in the Biodiversity Metric, as with the woodland treescape.
- The grassland treescape is only suitable to be placed on arable or pastureland classed as grade 3 or 4 and currently being used for conventional crop or livestock production.
- We have assumed that modified grassland in intensive livestock use that is fertilised and sown with just a few productive species is not species-rich and not a treescape.



PLANTING DENSITY

N/A



LOCATION

Land of grade 3 - 4



STRUCTURE



Shrub



Ground layer

TIME TO MATURE

It can take as long as 100 years for grassland to achieve its full soil carbon and biodiversity potential.

FINANCIAL COST

Approximately £350-£700 per hectare.

FINANCIAL INCOME

Both government grants and biodiversity net gain payments may be available.

BENEFITS OF SPECIES-RICH GRASSLAND



FOOD PRODUCTION

Periodic and extensive livestock grazing but at a lower intensity than typical pasture. Can also be managed for forage.



CARBON

Species-rich grassland provide a carbon store and offset emissions of an estimated 120 tonnes of CO2 a hectare over 30 years.



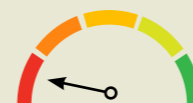
FLOOD MANAGEMENT

Adds texture and roughness which reduces soil erosion and surface run-off.



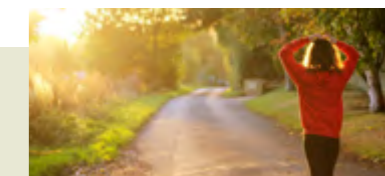
AIR QUALITY

Grasslands do not provide air quality benefits.



TIMBER PRODUCTION

Grasslands do not offer timber production opportunities.



RECREATION AND WELLBEING

Species-rich grassland can provide desirable areas for recreation and make a strong contribution to people's well being.



BIODIVERSITY

Of a higher value even than woodland in some locations, species-rich grassland supports a huge variety of wildlife.



Restoring species-rich calcareous grassland

Photo by Roselle Chapman



Species-rich grasslands are not only biodiverse but are also an intrinsic part of our natural and cultural heritage. Oxfordshire has some of the rarest and finest grasslands in the country. Calcareous grassland dominated the chalk hills of Southern England for many centuries, and was widespread until the 1940s, covering many of the steeper slopes in the Chilterns, the North and South Downs, Salisbury Plain and the Lincolnshire and Yorkshire Wolds. Little now remains.

Oxfordshire's calcareous grasslands support nationally important rare plants, including the bulk of the UK populations of downy woundwort, meadow clary, early and Chiltern gentian as well as three of Oxfordshire's rarest butterfly species, the Adonis blue, the silver-spotted skipper and the Duke of Burgundy.

Swyncombe Downs SSSI (46.4 ha) is an exquisite part of the Oxfordshire Chilterns, renowned for its chalk grassland and beech woodland at the eastern end of the site, and its scrub and bird communities. It is outstanding for its butterflies and moths. During the 1980s the site suffered from a lack of grazing which resulted in significant habitat degradation, but over the last 20 years the current landowner has worked tirelessly to restore it.

SSSIs are intended to protect small islands of remaining high-quality habitat and landowners are legally obliged to manage them appropriately. But where real gains start to be made is where landowners stop cultivating adjacent parcels of land and bring them into conservation management. The Swyncombe Estate has done just this with 32.5ha of arable land. With careful grazing management and natural regeneration, this has developed over time into good quality, species rich, semi-improved grassland with herb-dominated swards. Additionally, during the last 10 years neighbouring landowners in near-by Greenfield and Christmas Common have won awards for reverting 14.8ha of arable land to meadow through flower meadow creation.

Photo by Roselle Chapman

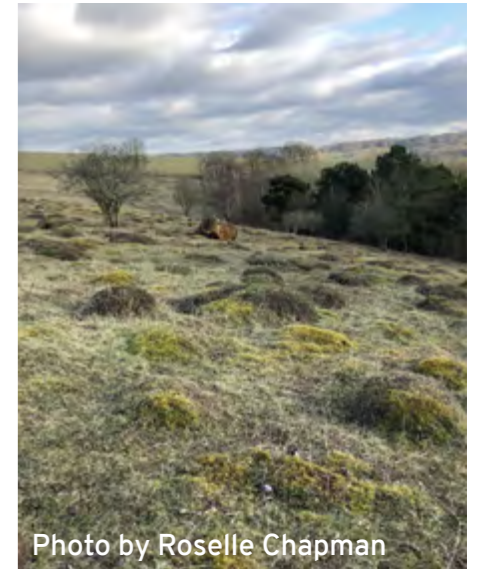


Photo by Roselle Chapman

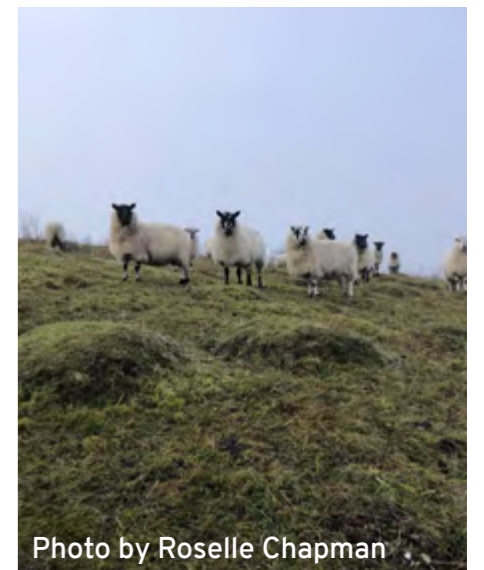


Photo by Roselle Chapman

Hedgerows



CLOSELY SPACED SHRUBS OR TREES PLANTED TO FORM A LINE THAT CAN ACT AS A BARRIER OR BOUNDARY OF FROM 2 TO 5 METERS WIDE

Overview

Hedges have high natural capital value and are relatively easy to introduce and maintain. They can be designed not to interfere with farming operations, provide windbreaks and shade and reduce soil erosion. They can also encourage predators that are good for pest control. To support biodiversity hedges should only be cut back at the right time of year and not too hard.

New hedges can join to existing hedges and woodlands to form an unbroken network. This speeds up natural colonisation of new woodland and allows wild and plant life to move across the landscape more easily, supporting biodiversity. Hedges can be introduced in areas not suited to woodland, such as floodplain grazing marsh, good quality semi-improved grassland and lowland meadows.

New hedges may initially require fencing to protect them from livestock.

DIFFERENT TYPES OF HEDGEROWS




Hedgerows can consist of a wide variety of native species, such as hazel, hawthorn, blackthorn, field maple, hornbeam and even brambles or wild roses. They may also contain trees.

Hedges may be set on banks and can have ditches along one or both sides. The best hedges have wide margins, often referred to as buffer strips. These might be sown with flowers for pollinating insects.

The greater the diversity of plants in a hedge, and the wider and thicker the shrub layer, the more wildlife it will support and the longer the flowering and fruiting season.



MAPPING CONSIDERATIONS

-  We have mapped every field boundary as being an opportunity for a hedge, if there is not one there already. Currently, over 50% of Oxfordshire's field boundaries have no hedges.
-  Some field boundaries have stone walls. These have strong landscape character and should be preserved and maintained.
-  We have also mapped hedge opportunities that divide arable fields larger than 20 hectares, as we think these will have little impact on impact farming operations.





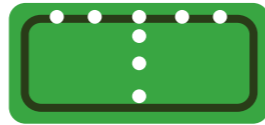
PLANTING DENSITY

2-year-old transplants.
1.5m width.



LOCATION

On field boundaries and across fields over 20ha



STRUCTURE



Tree Shrub Bank Ditch Margin

TIME TO MATURE

5 Years



FINANCIAL COST

£8,000 per kilometre including establishment and **£2,000** a year maintenance for 30 years.

FINANCIAL INCOME

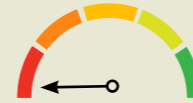
Mid and high tier grant funding is available at £11.60 a metre.

BENEFITS OF HEDGEROWS



FOOD PRODUCTION

Hedges protect livestock from extreme weather. They also provide habitats for insects that improve agricultural productivity.



CARBON

Hedgerows provide a carbon store and offset emissions of an estimated 360 tonnes of CO2 a kilometre over 30 years.



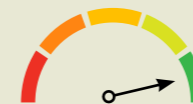
FLOOD MANAGEMENT

Hedgerows slow water flows especially if introduced across sloping fields.



AIR QUALITY

Hedges are highly effective at blocking particulate matter and harmful gasses and removing them from the atmosphere.



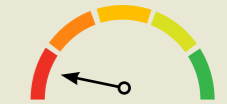
TIMBER PRODUCTION

Is limited, but hedgerows can be harvested for wood fuels and management by coppicing can bring some benefits.



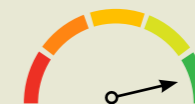
RECREATION AND WELLBEING

Hedgerows can strengthen landscape character and shelter fields and paths from winds.



BIODIVERSITY

Hedgerows are important habitats for mammals, birds and insects and can act as wildlife corridors



How a Cumbrian Farm Saved £18 a Ewe



FARMER:	Paul and Nic Renison, Cannerheugh farm, Cumbria
FARM SIZE:	165 hectares
FARMING SYSTEM:	Livestock
AGRICULTURAL LAND GRADE:	Class 4
CONSTRAINTS:	Low soil fertility, strong winds
TENURE:	Owned with a mortgage
GRANTS:	Higher Level and Countryside Stewardship + The Woodland Trust
SNAPSHOT:	How a Cumbrian farmer saved £18 a ewe
MORE DETAILED RESOURCES:	Mob Grazing and creating new hedgerows for livestock



“Adding hedgerows to a livestock farm can increase its productivity.”

Paul and Nic Renison moved to Cannerheugh farm in 2012. The farm has rough grazing, improved pasture and a small area of established woodland. It is home to between 900 and 1000 ewes, 30 suckler cows and 70 dairy heifers.

Paul and Nic decided to change to a ‘mob grazing’ system with a view to improving farm profitability. Small fields of just over 1 hectare were created using hedgerows. These are grazed intensively over short periods of a day or so, and then left to recover. The sheep are forced to eat all the plants on offer reducing their ability to be selective. The animal waste from grazing increases soil fertility. Feed and fertiliser costs were reduced by £18 a ewe within five years.

Combining mob grazing with new hedges and trees also led to better grass growth over a longer season as the provision of shelter increases the soil temperature in early spring and late autumn. And by providing new shelter for livestock on the farm, Paul and Nic have reduced lamb mortality.

The mob grazing system has improved the farm’s productivity by concentrating on soil health, sward diversity and shelter, but has also increased biodiversity across the farm. The trees and hedges are part of a productive farm system which also works sustainably with nature.



Mapping and Managing Hedgerows



COMMUNITY GROUP:	Watlington Climate Action Group
PARISH SIZE:	1,372 hectares
FARMING SYSTEM:	Arable and livestock
AGRICULTURAL LAND GRADE:	Class 2 and 3
CONSTRAINTS:	Area of Outstanding Natural Beauty
TENURE:	Farms and estates
SNAPSHOT:	Top tips for managing hedgerows
MORE DETAILED RESOURCES:	Mapping and managing Watlington's hedgerows



Watlington Climate Action Group have teamed up with national hedge expert Nigel Adams to survey the hedgerows in their parish. They want to discover the condition and length of local hedges and, if asked, to provide management advice. They are also looking for opportunities to plant new hedges and hedgerow trees. The majority of local landowners have allowed the group access to their land to survey the hedges.

The parish of Watlington straddles the western edge of the Chilterns Area of Outstanding Natural Beauty. The Chilterns has many well-established tall, wide hedges with wide field margins. These provide one of the best farmland habitats for wildlife that it is possible to achieve. Some of the hedgerows contain up to 15 woody species including hawthorn, hazel, spindle, wayfaring tree and elder, and are up to 10 metres wide reflecting their great age. They are rich in bird life, especially songbirds such as yellowhammers and corn buntings, as well as the more familiar robins, blackcaps, greenfinches and goldfinches.

Hedge management is often seen as an annual tidying exercise using mechanical strimmers. But hedges are often too heavily cut. Light trimming is preferable, ideally to an 'A' shape. This better supports fruits, birds, small mammals and insects. Gaps in established hedges can also be filled with a range of native hedge or tree species: the more variety the greater the number of habitats and food sources supporting wildlife. Leaving trimming until January or February allows birds and small mammals to feed during the coldest months when other food sources are scarce.

Agroforestry



Photo by Jason Ingram

TREES WITH CROPS OR LIVESTOCK ON THE SAME PIECE OF LAND

Overview

Agroforestry farming systems combine trees with agricultural crops or livestock. They enhance farm productivity, increase wildlife, improve soil health, protect crops and animals from extreme weather, manage water flow and contribute to climate change mitigation.

Using Agroforestry systems can avoid the trade-offs between food production and other public goods that occur in many modern farming systems. While this is a new approach there is increasing interest in the potential benefits for both food production and nature. There is now more funding available, and advice should be sought to find the best options for your farming business.

THE TWO TYPES OF AGROFORESTRY

SILVOARABLE:



Photo by Chris Wright Leeds University

Trees are grown in rows with wide alleys in-between for cultivating crops, with sufficient spacing for agricultural machinery. Tree and arable crops can be taken from the same field, improving productivity.

SILVOPASTURAL:



Photo by Jo Smith

Trees are introduced into a forage production system for cattle, sheep, pigs, horses or chickens. This is usually permanent pasture, grazed rotationally, but could be pasture cut for hay or silage.

In both cases the tree component may be timber or fuelwood trees, or a fruit or nut crop. Nitrogen-fixing trees can also be used to supply nitrogen for the forage crop. Trees are grown as standards or as pollards.

MAPPING CONSIDERATIONS

- We have mapped silvoarable on grade 1, 2 or 3 land. We have allowed for a 26-metre gap between rows of trees and a gap at either end of 14m, for agricultural machinery. The minimum economic field size is around 4 ha, although for horticulture, smaller sites can be viable.
- We have mapped silvopasture on grade 3 and 4 land with a minimum field size of 0.5 ha.



Photo by Jo Smith



Walnut and potatoes at Wakelyns July 2011 (photo taken by Paul Burgess, Cranfield University).

Photo by Jo Smith



PLANTING DENSITY



Silvoarable:
70 – 170 trees
per hectare



Silvopasture:
100 – 200 trees
per hectare

LOCATION



Silvoarable



Silvopasture

STRUCTURE



Trees interspersed with crops or livestock

TIME TO MATURE

Trees 5 - 60+ years
depending on species.
Income Immediately



FINANCIAL COST

Around **£12.50-£20** per tree including
establishment and maintenance for 30
years.

FINANCIAL INCOME

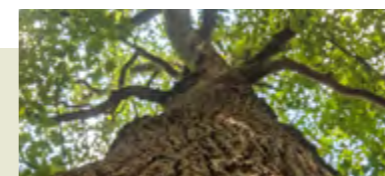
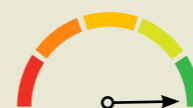
Eligible for **grant support** under the
Basic Payment Scheme and may
also be eligible under ELMS. Income
sources are more diversified than under
conventional farming systems.

BENEFITS OF AGROFORESTRY



FOOD PRODUCTION

Fruit or nut trees act as
an extra income crop.
Strips of trees can boost
productivity and improve
soil health across the
whole field.



CARBON

Silvopastural systems
can store an estimated
150 tonnes of CO2 a
hectare over 30 years and
silvoarable 45 tonnes.



FLOOD MANAGEMENT

During heavy rain,
agroforestry will help
reduce soil erosion and
surface run-off and can
also protect crops from
winds.



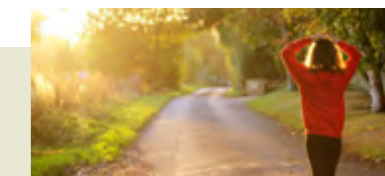
BIODIVERSITY

Providing a more
productive, sustainable
alternative to traditional
agricultural systems



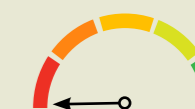
TIMBER PRODUCTION

Will only provide limited
amounts of timber or
fuelwood



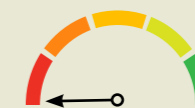
RECREATION AND WELLBEING

May be more visually
appealing than traditional
agricultural systems but
unlikely to be publicly
accessible.



AIR QUALITY

Food producing systems
should ideally not be
placed close to pollution
sources.



Agroforestry: Farming in Three Dimensions



Photo from Stephen Briggs

FARMERS:	Stephen Briggs, Whitehall Farm, Cambridgeshire
FARM SIZE:	105 hectares
FARMING SYSTEM:	Silvoarable
AGRICULTURAL LAND GRADE:	Class 1
CONSTRAINTS:	Flat land with erodible soils
TENURE:	15-year tenancy
GRANTS:	Basic Payments Scheme , Higher Level Stewardship
SNAPSHOT:	Agroforestry: Farming for the Future
MORE DETAILED RESOURCES:	The Agroforestry Handbook



Photo from Stephen Briggs

Stephen’s farm is the UK’s largest agroforestry system. It consists of 4,500 apples trees in rows with spring wheat, barley and oats and winter wheat grown in between. The trees are planted in a North-South orientation at a density of 85 trees a hectare with 24m arable alleys between them, wide enough for a combine harvester. The 3m wide strips of trees are under-sown with pollen and nectar mixes.

Stephen had to work within a 15-year tenancy and provide a reasonably quick income stream. He chose apples rather than a hardwood or nut crop such as walnut, as the trees mature more quickly. Productivity from the fruit crops is roughly the same as from the field crops, on a per unit area basis.

The trees have helped boost conventional crop performance by reducing soil erosion from wind, creating better drainage in winter and creating microclimates which support moisture levels in dry periods. With two crops a year taken off the same land at different times, he points out he is harvesting more sunlight for longer.

Looking at a future with warmer UK climates, Stephen calls this “climate-smart” farming. Combining annual and perennial crops have helped to mitigate the increasing risks associated with extreme weather events. Meanwhile he is making better use of his soil, fixing more carbon and reducing nitrogen leaching. Adding new woody elements to his cropping system has also improved levels of beneficial fungi in his soil and biodiversity has flourished on his farm with recorded increased populations of beneficial insects and bird species.

“We’re using the space above the ground and below the soil in a more imaginative way” Says Stephen. “We’re farming in three dimensions.”



Photo from Stephen Briggs

Integrating Bioenergy and Livestock Production



Photo by Organic Research Centre

FARMERS:	Ben Raskin, Elm Farm, West Berkshire
FARM SIZE:	85 hectares
FARMING SYSTEM:	Livestock - sheep
AGRICULTURAL LAND GRADE:	Class 3
CONSTRAINTS:	Poorly drained clay soils
TENURE:	Share farming arrangement
GRANTS:	Basic Payment Scheme
SNAPSHOT:	Tree shelter for Livestock
MORE DETAILED RESOURCES:	Elm Farm briefing

The trees grown in an agroforestry system can also be used for energy production. Elm Farm was the base for the Organic Research Centre from 1980 to 2019 and is now privately-owned. The farm sits within a wooded landscape in the North Wessex Downs Area of Outstanding Natural Beauty. It has approximately 9.5 kilometres of large traditional mixed species field boundary hedges. The soils are mainly Wickham Series poorly drained clay loams, susceptible to structural damage which limits the range of agricultural activities.

An innovative alley cropping system integrating short rotation coppice for bioenergy with livestock production was established in April 2011. This used an alley-cropping design with tree rows running north/south, planted in twin rows 0.7m apart with 1m between trees, with an initial density of 1,000 trees per ha. Willow was chosen as it has a dual value as both a bioenergy source and a livestock fodder. The second species was common alder which fixes nitrogen and coppices well.

The system allowed the farmhouse and buildings to be entirely self-sufficient in fuel, while also providing potential sources of tree fodder, woodchip for animal bedding and increased shade and shelter for livestock therefore increasing the resilience of the farm business. The environmental benefits include increased biodiversity on the farm, increased carbon capture and storage and soil protection.



Photo by Organic Research Centre



Photo by Organic Research Centre

Community Orchards and Forest Gardens



Photo by Capri23auto, Pixabay

Overview

Community orchards are small areas managed by the local community to produce fruit, most typically apples, and encourage wildflowers. Local people are encouraged to become involved with the orchard, and regular management events are held, alongside wider community events such as celebrating Apple Day each October.

Forest gardens are community spaces modelled on the structure of a young natural woodland, utilising plants of direct and indirect benefit to people – often edible plants.

Both need community and possibly also local government support to succeed. Agreements with landowners as to site lease or sale would need to be sought.

A WIDE VARIETY OF APPLES

The Orchard Project recommends apple varieties that taste good and are more resistant to disease:

GREENSLEEVES:

Can be eaten fresh from the tree for at least a month.

EGREMONT RUSSET:

A classic English apple from the Victorian era.

SATURN:

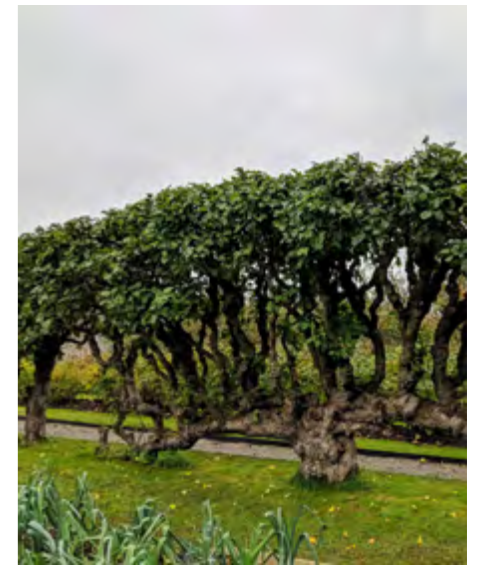
Disease resistant but with good flavour.

CHIVERS DELIGHT:

A medium-sized crisp apple developed in the 1920s.

THE CORE BLIMEY:

Crisp and juicy yet strong and resilient.



MAPPING CONSIDERATIONS

- Community orchards and forest gardens are assumed to be from 0.1 hectares to 0.5 hectares in size.
- We have mapped community orchards on suitable agricultural land on the fringes of built-up areas, up to a distance of 0.5km from those areas. This is to make sure that they are sited near the largest number of people.
- Community orchards have also been mapped in parks, larger school college and university grounds and allotments.

Langford Community Orchard



Photo by Langford Community Orchard

COMMUNITY GROUP:	Langford Community Orchards Group
SITE:	Langford Community Orchard, Bicester.
PARISH SIZE:	0.4 hectares
SITE ACCESS:	Open to all members of the public
AGRICULTURAL LAND GRADE:	Class 4
CONSTRAINTS:	Limited volunteer time
TENURE:	Tenancy, subject to review
GRANTS:	Planning gain from a private developer
SNAPSHOT:	Langford Community Orchard
PRINT RESOURCES:	The Orchard Project Guides and Advice



Photo by Jane Griffin

In August 2012 Bicester Town Council gave permission to establish a community orchard on a one-acre site. This was originally farmland with still visible ridges and furrows formed by ploughing with horses. It had been planted up with fruit trees and bushes by a landscape architect when Langford Village was first built, but then became neglected for many years.

The members of the Langford Community Orchard Group worked together with Grassroots Bicester and Bicester Green Gym. The first task was to rescue the fruit trees from a massive overgrowth of brambles and elderberries which smothered everything. More fruit trees were uncovered as well as redcurrants, blackcurrants, raspberries, and even mulberries!

The next stage over two winters was to prune the neglected fruit trees to remove dead branches and to let light and air into their middles and finally to mulch them with compost and grass mowings.

As yet, there is not enough variety of wildflowers in the orchard to attract bees, butterflies, moths and insects important for pollinating the fruit trees. A wildflower patch has been established including rare yellow rattle donated by BBOWT's Meadow Farm project. Together with more plant variety in the hedges, this will encourage wildlife.

But a rich variety of plants makes an attractive place for humans too! Apple Day is celebrated every October. Activities include, scything classes apple pressing, face painting, a scarecrow competition and bug hunting with the local wildlife trust.

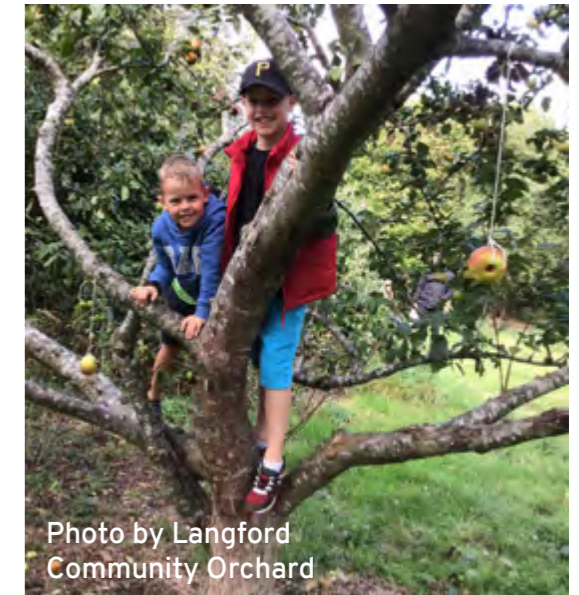


Photo by Langford Community Orchard



Photo by Langford Community Orchard



Photo by Langford Community Orchard



TREESCAPE OPPORTUNITIES

Street Trees

**TREES PLANTED
IN URBAN AREAS
TO BRING HEALTH,
WELFARE AND
ENVIRONMENTAL
BENEFITS**

Overview

Street trees provide cooling and shade, reducing heat stress in urban areas. They can form an effective barrier between polluted streets and parks and schools, although care must be taken not to trap pollutants beneath the tree's canopy.

Street trees can be placed in urban areas where the pavement is wide enough, where interference with building foundations and underground services such as drainage and cabling is minimal, and where there is not pressure for other uses such as cycle lanes.

Street trees are expensive to install and can be complex to maintain. Your local council tree officer or parish council may have a plan of street tree opportunities.



DIFFERENT TYPES OF STREET TREES

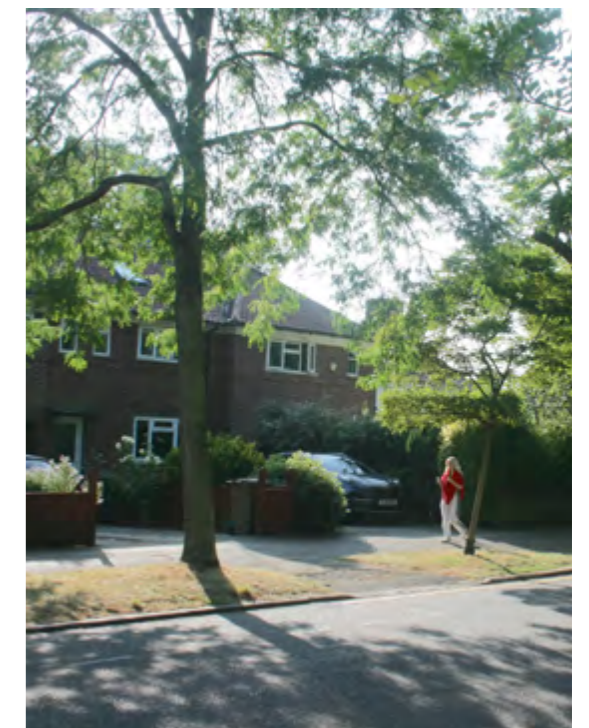
The species of trees most commonly found in our streets are: The London Plane, Common Lime, Horse Chestnut, Silver Birch, Cherry, Rowan, Holly, Ash, Beech and Oak.

The London Plane is particularly good at coping with high levels of air pollution, which is trapped in its bark and breaks away in large flakes.

Local conservation societies may have a view on the most suitable tree species for a neighbourhood.

MAPPING CONSIDERATIONS

- We have mapped street tree opportunities along the edges of arterial roads and neighbourhood streets, as well as around Park and Ride sites.
- Council maps of existing street trees can be poor making it harder to map new opportunities.
- The Bluesky National Tree Map provides the best picture of current street tree provision. Contact us if you are interested to access this.





PLANTING DENSITY



Planting at 14m spacing

LOCATION

Pavements wider than 2.5 metres with trees spaced 14 metres apart



STRUCTURE

Single Trees



TIME TO MATURE

Dependent on Species



FINANCIAL COST

At least **£12.50** per tree including establishment and maintenance for 30 years but can be much higher.

FINANCIAL INCOME

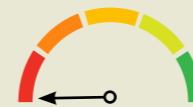
Grants may be available through the Urban Tree Challenge Fund and Trees for Cities.

BENEFITS OF STREET TREES



FOOD PRODUCTION

Street trees do not offer food production opportunities.



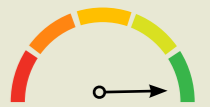
CARBON

Every street tree provides a carbon store of an estimated 1 tonne of CO2 over 30 years.



FLOOD MANAGEMENT

During heavy rain, street trees can help to reduce stormwater flow which can be particularly problematic in urban areas.



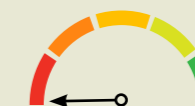
BIODIVERSITY

Urban trees have considerable potential to sustain and enhance urban biodiversity in our towns and cities.



TIMBER PRODUCTION

Street trees do not offer timber production opportunities.



RECREATION AND WELLBEING

Street add character, are visually appealing and provide shade, which all contribute to recreation, health and wellbeing.



AIR QUALITY

Trees can act as natural air filter, removing particulate matter and harmful gasses from the atmosphere.



Manchester – City of Trees



Photo by Tasfoto from www.depositphotos.com



GROWING MORE TREES
FOR GREATER MANCHESTER



Photo by Manchester City of Trees

City of Trees is an innovative and exciting movement instigated by The Oglesby Charitable Trust and Community Forest Trust and set to re-invigorate Greater Manchester’s landscape by restoring underused, unloved woodland by planting 3 million trees within a generation. That’s one for every person that lives in the City Region.

Residents in Trafford were keen to improve the look and feel of their streets with urban greenery. They set up the Old Trafford Tree Group to help secure funds for the initiative. City of Trees helped them plant 100 new trees in eight residential streets. Residents chose the type of tree with mountain ash and whitebeam taking root, brightening up the area.

City of Trees is researching into the value of street trees too. Howard Street in Salford was hit by severe floods on Boxing Day 2015, the worst in 70 years. Three London Plane trees were planted in a specially designed pavement, where rainwater running off the road was diverted before going back into the sewer system at the other end. This has achieved impressive results, with stormwater volumes reduced by 78% and slowed by 68 minutes.

“These results demonstrate that retrofit tree planting schemes in towns and cities can be used as a nature-based solution to tackle urban flooding” said Dr James Rothwell from the University of Manchester.

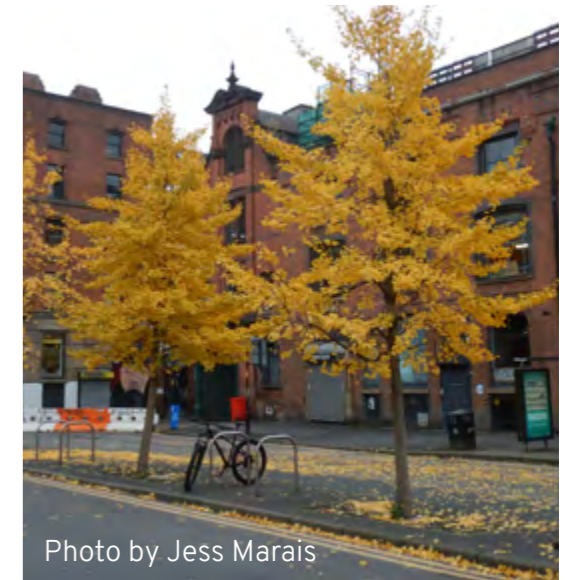


Photo by Jess Marais

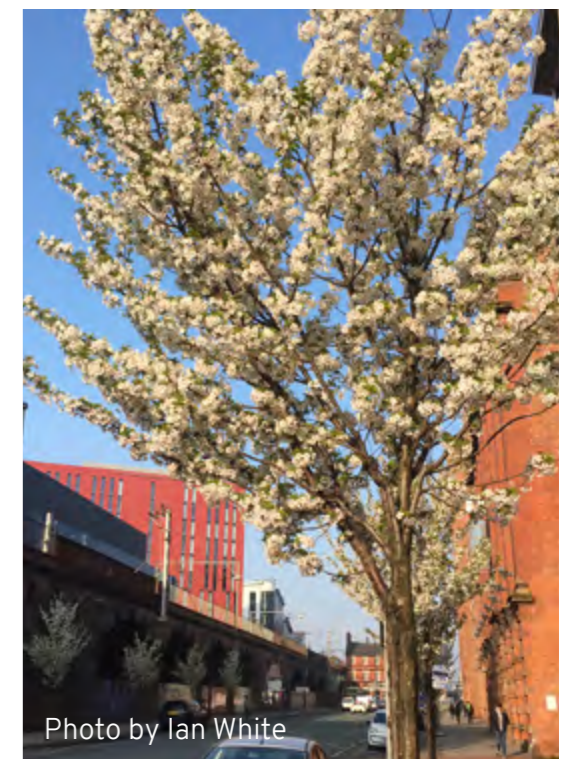


Photo by Ian White

Trees in open spaces



Overview

Trees can be added to spaces with full or limited public access. Trees need not cover the whole site but could be added in discrete areas on a case-by-case basis.

Trees in open spaces play an important role in providing recreation, controlling air pollution, and reducing the temperature of urban heat islands as our summers become hotter.

Local Council Tree Officers should be consulted. Collaborative projects are more likely to succeed.



DIFFERENT TYPES OF TREES

The trees species chosen would need to be suitable for urban conditions and match well with any trees already established in the area.

These could be scattered trees or lines of trees designed around the site and Local needs.

MAPPING CONSIDERATIONS

We have identified opportunities for trees in open spaces in public parks and recreation areas, larger school grounds, colleges and university grounds, golf courses, alongside playing field areas and other sports facilities, allotments and cemeteries and religious grounds. However, we have not yet been able to map existing tree cover in these spaces or to determine if further trees could be introduced. In practice, each of these spaces would need to be individually assessed as it is likely that only a limited number of trees can be introduced on each site.





PLANTING DENSITY

Up to 250 trees per hectare

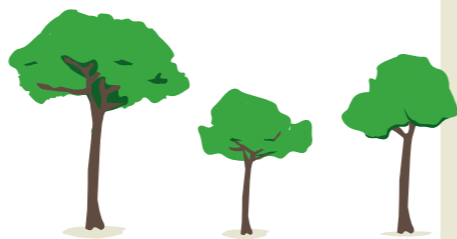


LOCATION



Suitable public and open spaces

STRUCTURE



Any

TIME TO MATURE

Dependent on Species



FINANCIAL COST

At least £12.50 - £20 per tree including establishment and maintenance for 30 years but can be higher.

FINANCIAL INCOME

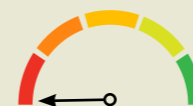
Grants may be available through the Urban Tree Challenge Fund and Trees for Cities.

BENEFITS OF TREES IN OPEN SPACES



FOOD PRODUCTION

Trees in open spaces do not offer food production opportunities.



CARBON

Every tree provides a carbon store of an estimated 1 tonne of CO2 over 30 years.



FLOOD MANAGEMENT

During heavy rain, trees help reduce stormwater flow which can be particularly problematic in urban areas



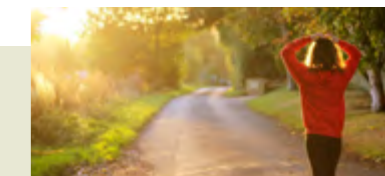
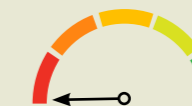
BIODIVERSITY

Trees in open spaces have considerable potential to sustain and enhance urban biodiversity.



TIMBER PRODUCTION

Trees in open spaces do not offer timber production opportunities.



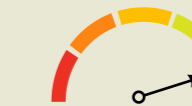
RECREATION AND WELLBEING

Trees add character, visual appeal and provide shade which increases the quality of green spaces.



AIR QUALITY

Trees can act as natural air filters removing or blocking airborne particulate matter and harmful gasses



Taking Climate Action to the Streets



Photo by Hackney Council



Photo by Hackney Council



Photo by Hackney Council

Since declaring a Climate Emergency, Hackney Council has been working hard to meet its commitment to net zero emissions by 2040. They plan to establish around 30,000 trees in parks and green spaces and 5,000 new street trees. This is the single largest investment in trees in the history of the borough. Not only will this help Hackney Council tackle global warming by locking-in thousands of tonnes of carbon, but it will also contribute to limiting air pollution, providing shade and cooling and supporting insect and animal life.

The Council plans to plant a new 'edible woodland' in Hackney Marshes. Around 6,500 fruit and nut trees, broadleaf specimens, and shrubs will be planted on East Marsh, capturing planet-warming carbon dioxide, promoting biodiversity, and encouraging the local community to learn more about foraging. The trees and shrubs are being funded by Honest Drinks through the charity Trees for Cities, which works with volunteers, schools and local communities to enhance green spaces in urban neighbourhoods. The land is being provided by Hackney Council. Local community group Tree Musketeers is inviting people to come and help plant the woodland.

If every local authority in the UK were to match Hackney's level of ambition, we would see close to 15 million trees planted in urban areas.



Photo by Hackney Council



Photo by Hackney Council

Garden Trees



Overview

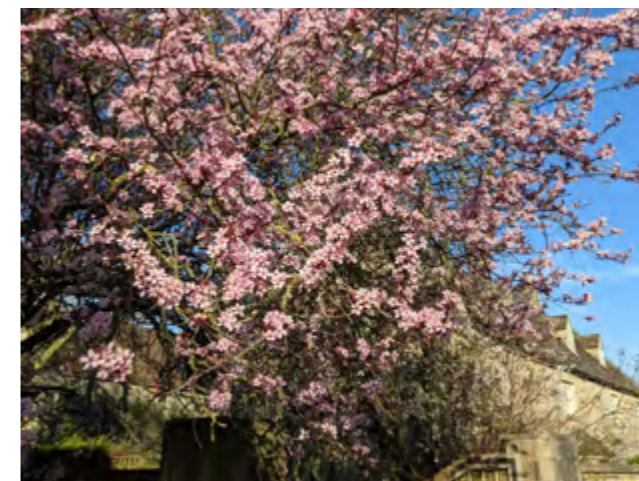
Gardens make up a high proportion of land in urban areas and provide great opportunities for trees. We consider that most gardens could have tree canopy cover of 40% or higher. To avoid damaging buildings, smaller trees and shrubs may be most appropriate.

Trees planted in gardens offer great benefits to wildlife and other plant species and collectively can form wildlife corridors through urban areas. If groups of connected gardens worked together, perhaps through residents' associations, this would help to maximise wildlife benefits.

Housing built after World War Two tends to have less trees in gardens than earlier housing.



TREES SUITABLE FOR GARDENS



Compact fruit or ornamental flowering trees are best.



MAPPING CONSIDERATIONS

We have identified all gardens in Oxfordshire but have not yet been able to map existing tree cover in these spaces or to determine if further trees could be introduced. The Bluesky National Tree Map provides the best picture of trees in gardens. Contact us if you are interested to access this.



PLANTING DENSITY



LOCATION



Any garden with less than 40% canopy cover.

STRUCTURE



Low Canopy Shrub Ground Layer

TIME TO MATURE

Dependent on Species



FINANCIAL COST

£10-£50 per tree depending on age and size.

FINANCIAL INCOME

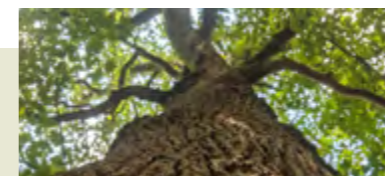
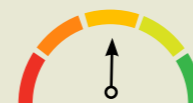
Support may be available from your local council.

BENEFITS OF GARDEN TREES



FOOD PRODUCTION

Domestic production of fruits from certain species.



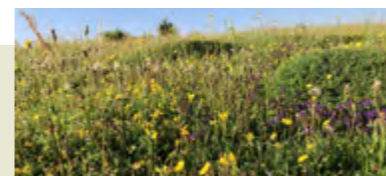
CARBON

Trees capture and store significant amounts of atmospheric carbon in both biomass and soil on which they grow.



FLOOD MANAGEMENT

Garden trees offer limited flood management benefits.



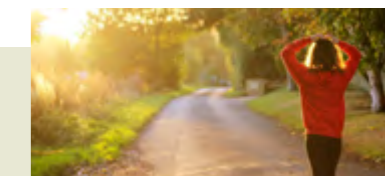
BIODIVERSITY

Gardens make up a significant proportion of urban areas and can provide vital habitat and corridors for wildlife.



TIMBER PRODUCTION

Garden trees do not offer timber production opportunities.



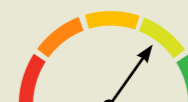
RECREATION AND WELLBEING

Trees can add considerable value to gardens and improve the quality of the environment and shade provision.



AIR QUALITY

Trees can act as natural air filters removing particulate matter and harmful gasses from the atmosphere.



Garden Tree Canopy

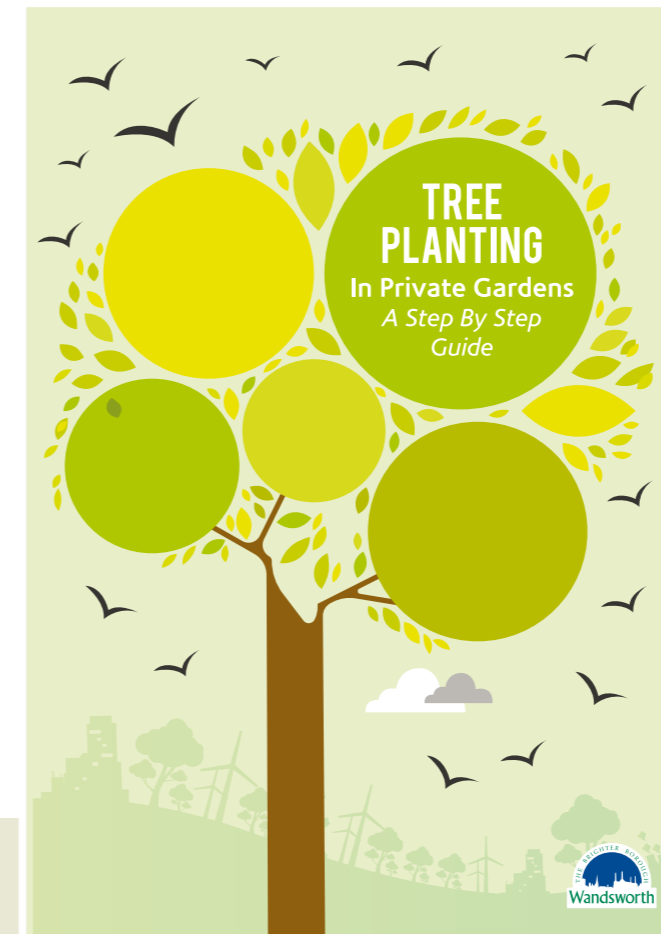
As part of wider tree planting projects to increase canopy cover across the urban landscape, two councils, Bradford and Wandsworth, have schemes to plant small trees in schools and private gardens. The aim of the schemes is to provide healthier environments, cooling and shade and improve wellbeing.



The Bradford Better Place Initiative is planting 55,000 trees in public places over the next 2 years, one for every child in school. But land is in short supply, so community engagement officers have been working with the residents of the Canterbury Estate to plant trees in residents' gardens. They are offering families a choice of 15 tree species for free. Apple, pear and cherry blossom have proved the favourites. Smaller trees and shrubs are often easier to incorporate into restricted spaces.

[More information about Trees for Cities in Bradford](#)

[More information about their schools Program here](#)



In Wandsworth, the Council has planted trees in parks and streets across the borough, including a scheme where local residents can request that street trees be planted in their neighbourhood, or replaced when they reach the end of their natural life. And to encourage residents to plant trees in their gardens, they have produced an easy to use [step-by-step guide](#).



DO YOU WANT TO PLANT TREES?

Then do think about taking advantage of our free private report service.

We can produce for you a map showing the opportunities for introducing treescapes to your land or parish and the benefits these would bring. These maps are broadly indicative of all the options open to you on your land and make a good basis for creating a more detailed land management plan.

The maps are provided by our partners who are specialists that can guide and support you through the tree planting process. For example, our partners can advise you on sources of funding and other important considerations such as the need to involve AONB officers or, for larger schemes, undertaking an Environmental Impact Assessment.

OXFORDSHIRE TREESCAPE PROJECT

SOURCES OF FUNDING

Woodlands, hedgerows and agroforestry can be funded by central government, biodiversity net gain, businesses wanting to mitigate for their environmental impact or the voluntary sector. Funding opportunities are continually changing and a guide can be found on our project website.

FOR MORE INFORMATION

More information on funding and our free private reporting service can be found at our website:

www.oxtrees.uk

Please contact us on
info@growgreencarbon.org