Surrey Nature Partnership
Healthy Environment | Healthy People | Healthy Economy

Tree planting for climate change mitigation in Surrey:
*a Surrey Nature Partnership Position Statement**

Summary:

- The Surrey Nature Partnership supports tree planting, subject to some important considerations as listed below.
- Trees provide a range of ecosystem services beyond CO_2 sequestration so planting is, on a general level, to be encouraged.
- Tree planting in the South-East of England is not a particularly effective approach to mitigating climate change; it would be impossible to plant enough trees quickly enough to make an impact on just Surrey's carbon footprint alone. Other, more effective strategies should not be ignored and tree planting should not be regarded as an alternative to more direct actions.
- Surrey is England's most wooded county (with around 25% cover). From a biodiversity conservation perspective, protecting Surrey's open, unwooded habitats (chalk grassland and heathland in particular) is of far higher priority than increasing our native tree cover.
- A biodiversity priority in Surrey is for planting native hedgerows as well as more street and urban trees, which can provide connectivity between wildlife habitats.
- Tree planting on low-grade arable and pasture land could be supported, but never on open land of any importance for its associated biodiversity.
- There will always be a need for careful consideration of which tree species are appropriate for planting in any given site or area.
- There is justified concern for the supply of trees for planting schemes. UK nurseries will not have time to respond to the elevated demand for climate change mitigation. Native tree species must no longer be imported from abroad, for reasons of bio-security. Ash dieback, and the Oak processionary and Box tree moths were all introduced accidentally by commercial importers and are now well-established in the UK, with devastating impacts on native wildlife.
- Large-scale and street tree planting schemes have a poor record of success due to neglected aftercare, perhaps due to under-funding. Drought in particular is unpredictable and often difficult to counter at scale.
- Allowing natural regeneration is usually far more successful at establishing resilient, native woodland than managed and costlier tree planting schemes.
- Responsible tree planting can be summarised as the "**Right Tree** in the **Right Place**, for the **Right Reasons**".

Note: This statement will be accompanied by a separate Annex presenting case-studies of best practice approaches to tree planting for various purposes, including climate change mitigation[1].

[1] See; *Tree planting for climate change mitigation in Surrey: Case-studies* (Surrey Nature Partnership, in prep.)

* **Note this is the position of the SNP local government partners at an officer level only**.

1. Background & need for a position

The realisation that a climate crisis is truly upon us has finally hit home. In 2019 Surrey County Council and most of our local authorities declared 'climate emergencies'. These followed the UK Parliamentary declaration of an environment and climate emergency in response to various unfolding global urgencies, culminating with a revision of our national policy commitment to achieve carbon neutrality by 2050. **Mitigation** seeks to ameliorate the inevitability of human-accelerated climate change through measures to lower the rate of greenhouse gases (primarily carbon dioxide/CO_2 from fuel combustion) entering and accumulating in the atmosphere. **Adaptation** on the other hand is making ready for the future consequences of rapid climate change, from infrastructure planning to biodiversity conservation approaches.

Most plants 'feed' through photosynthesis and of course trees as the largest and oldest perform this on a vast scale over their long lifetimes. Photosynthesis absorbs CO_2 from the air to manufacture sugars, which fuel plant growth and are stored as carbon in vegetable matter; in trees notably as a component of wood. A critical product of photosynthesis is oxygen; the world's forests contributing around half the global supply to the atmosphere, on which all other life on earth depends - but that is a further, albeit related and worrisome matter.

Trees then, are natural storage vaults of carbon and growing more of them is therefore an important part of the possible mitigative strategy for addressing the growing CO_2 burden in the atmosphere. Unfortunately this can be taken out of all context by non-specialists, and seen as a panacea to the complete climate change problem. Proud new initiatives are regularly announced that will achieve the establishment of vast numbers of trees, liberally spread across the limits of various jurisdictive territories. The catch here is simply down to the mathematics involved. Planting trees is laudable for many reasons beyond carbon storage, but to make even a small dent in Surrey's annual carbon emission 'footprint' alone, the required number of trees couldn't be planted quickly enough[2] - even if the vast stock necessary was available, which is not the case. What must undoubtedly be our focus to make an urgent difference is the opposite side of the equation; drastic reduction of emissions at their source[3].

The Surrey Nature Partnership (SNP) is often asked to support such afforestation schemes, possibly on the assumption that 'trees are nature', so why wouldn't we? This position statement is necessary to articulate our caution and even occasional reticence on this matter, in order that the broader ecological issues, and hence our considered stance on tree planting for any purpose at scale in the county of Surrey, is clearly understood by everyone.

2. Tree planting, woodland creation & biodiversity in Surrey

Surrey is often quoted as the most wooded county in England. Estimates differ but the most reliable data[4] indicate that just below 21% of Surrey consists of the priority habitat types Mixed deciduous- and Beech & Yew woodland, with an additional 3% cover as coniferous plantation. So it would seem that at

[2] Estimated total UK net CO_2 emissions in 2018 were 364.1 Megatonnes (source: ONS), whereas the estimated CO_2 absorption by the UK's forests each year is only 3% of this at around 12 Mt pa (Forestry Commission 2012). Surrey's relatively high woodland cover could actually be absorbing around 10% of our county's yearly CO_2 emissions (ONS, 2017 figures).

[3] See; Cannell, R (1999). *Growing trees to sequester carbon in the UK: answers to some common questions*. In Forestry, Vol. 72, No. 3, pp.237-47.

[4] Source: Surrey Habitat Framework, Surrey Biodiversity Information Centre (in prep.)

least around a quarter of the county is wooded. For comparison, the national England coverage is around 10%. How much of this was originally planted for timber production is unknown, but a great deal will be of mixed origin or entirely self-sown (ie. naturally regenerated) woodland. Vast numbers of Surrey's trees are not within woodlands, such as those of hedgerows and 'street trees' in urban and suburban locations. There is no estimate of their number. An inventory of our oldest and most culturally valued 'veteran' trees is in process, but these are a mere fraction of the true total.

Arguably, Surrey's most threatened habitats and species are those of open, unwooded landscapes[5]. Chief amongst these are calcareous ('chalk') grasslands, as well as our heathlands with their associated bogs and wetlands. As 'semi-natural' habitats these represent an intended hiatus in their succession to woodland, which was originally established earlier in human social history. The management required to maintain this open state is considerable and today somewhat artificial, in terms of delivering a serious contribution to agriculture. Resource for this has inevitably been insufficient and these important habitats, so rich in rare wildlife, have seen significant areal losses. This diminution has left them largely as small, fragmented units, highly vulnerable to catastrophic events such as wildfires; hence their threatened status. Moreover their underlying soils have been undisturbed for centuries and can be very important carbon stores in their own right, especially the deep organic peats accumulating in wetter heaths, fens and mires[6].

In a county already blessed with so much woodland (where a long-term decline in regular management is the main problem for its constituent biodiversity) the urgency for preservation of our most deserving species is clearly focused on the remaining semi-natural open habitats. Our priority therefore is to reclaim some of the former extent of these habitats by realising appropriate opportunities (both practically and socially), wherever and whenever they arise. However, as these opportunistic factors seem to coincide all too infrequently, there will always exist sites that by default could also support native woodland creation. Where this can provide, consolidate or reinstate a physical connection between existing habitat patches (as with hedgerows for example) it will be all the more effective as a biodiversity conservation measure in a landscape scale context. But such is the premium on space to realise our aspirations for the recovery of Surrey's past natural losses, we must always be fundamentally assured that an opportunity for a more significant and beneficial alternative habitat restoration or creation outcome is not being compromised.

3. The right tree in the right place...

As mentioned previously, there are many other benefits to planting trees beyond carbon sequestration. Some of these also relate to climate change adaptation strategies, but the types of trees and where they are planted is always essential to their efficacy in these roles.

Individual trees, woods and hedgerows within the urban environment are and will become increasingly important, for;

- Remedial solar shading and passive cooling;
- Storm shelter, water absorption and surface flooding deflection;
- Filtration of particulate pollutants to offer locally improved air quality[7]; and

[5] See; Waite, M (2017). *The State of Surrey's Nature*. Surrey Nature Partnership.
[6] See; Alonso, I *et al.* (2012). *Carbon storage by habitat: Review of the evidence of the impacts of management decisions and condition on carbon stores and sources*. Natural England Research Report NERR043.
[7] See; Pollution Removal by Vegetation (online tool): https://shiny-apps.ceh.ac.uk/pollutionremoval/ & *The Local Air Pollutant Removal Value of Trees in the UK*: method note (Eftec/CEH, 2019)

- Enhancing community health and well-being, supporting an associated uplift in property values.

We are all aware that the planting of trees and woodlands anywhere can greatly enhance recreational assets, as well as biodiversity conservation. Back on climate change mitigation aspects, woodlands can be grown and harvested to supply a renewable biofuel resource, albeit with a carbon cost attached (but essentially less than the present scale of fossil hydrocarbon combustion). All such benefits are readily recognised as functions of well-planned Green Infrastructure, and may also be viewed as the tangible results of investing in the Natural Capital of a single site or wider area. In this context it is easy to understand why local planning authorities adopt strict requirements for tree and woodland protection, as well as the promotion of appropriate planting, through policies in local development plans.

Tree planting can also have downsides. There are increasing numbers of plant pathogens affecting native tree species in the UK. The most notorious at present must surely be ash dieback, such that no-one would dream of actively planting Ash *Fraxinus excelsior* at the current time unless in an experimental research context. But several other species also have problems, and the increasing likelihood of trees eventually dying or harbouring further issues has to be considered first in terms of the future costs to their managing agencies with liabilities for public health and safety (especially local authorities). Some of these pathogens are even climate change-related, in that the additional stresses caused to trees via prolonged drought (or equally flooding) can then depress their resistance to disease. All trees have a finely balanced relationship with a multitude of fungi active in their root zones and elsewhere, some essential to healthy growth but others presenting a potential threat. Milder, wetter climatic conditions could easily tip the fragile balance here to advance a tree's senescence. Often, it is the trees and shrubs that establish through natural regeneration that are the true local indicators to species survivability. It is also these individuals that are likely to be far more resilient in the race to maturity than grown-on nursery stock, and without any of the sourcing or aftercare costs.

Up to a point then, where a tree is planted has implications for its health and future longevity, and inevitably also for its management. In the very long term (important as trees are so long-lived), some native species will no longer be suited to the future climate scenarios now predicted to herald an eventual 'mediterranean-isation' of at least the more continental south-east of the UK. Afforestation schemes will need to anticipate this[8]. Beech *Fagus sylvatica*, although naturally a tree of the South-East is very likely to suffer; being shallow-rooted it cannot tolerate drought and is only found at altitude within the Mediterranean basin. Although certain oaks, such as Holm *Quercus ilex*, Cork *Q. suber* and Kermes *Q. coccifera* may offer a more resilient alternative, their potentially invasive habits could compound the climatic stress already heaped on struggling native vegetation. Some conifers cope well with drought but are inherently more flammable in wildfires, and as faster-growing softwoods are comparatively less effective at carbon sequestration than broadleaved trees.

4. Decision-making for tree & woodland planting

Here we present a **decision-making tool** to help would-be planters of trees and woodlands to choose sites suitable for habitat creation, especially those primarily motivated by carbon sequestration incentive schemes:

[8] See; *Managing England's woodlands in a climate emergency: A guide to help foresters and agents implement adaptation actions* (Forestry Commission, 2019)

(**1**). Has the site been assessed for its present biodiversity/ecological interest by a professional ecological advisor, to CIEEM standard guidelines? (eg. Ecological Impact Assessment[9] - EcIA): Yes (**3**)/No (**2**);

(**2**). Engage a qualified ecologist to undertake an ecological assessment of your site: (**3**);

(**3**). Does the ecological assessment conclude that a majority of the site is suitable for species-rich grassland or heathland **restoration**? (ie. it is clear & unequivocal that it supported these types of habitats until relatively recently in its history): Yes (**4**)/No (**5**);

(**4**). Record & register the site with the SNP as a potential open priority/Habitat of Principal Importance[10] (HPI) restoration site, and look for an alternative site for your tree planting scheme. (Note there may still be opportunity for significant perimeter/boundary planting, eg. hedgerow restoration/creation) - END.

(**5**). Consider your site's adjacent/peripheral habitats - are they HPI, or near to it in character/condition? Are you within a Biodiversity Opportunity Area[11] (BOA)? Thus, could your ecological advisor build a clear strategic/landscape ecology case for creating an open habitat HPI on this site?: Yes (**6**)/No (**7**);

(**6**). Consider the ecological practicalities of an open habitat HPI **creation** project, primarily feasibility of achieving the necessary site preparation, including soil pH/fertility correction. Then, would a project be affordable and what is the likelihood of funding (both now & under any future funding model)? If relevant, will it have wider community acceptance and future 'ownership' possibilities? Following this analysis; would the project remain a viable future proposition?: Yes (**4**)/No (**7**);

(**7**). Proceed with the further necessary feasibility planning for your tree planting or woodland creation scheme. This must of course first consider the site's ecological suitability (too wet/dry?); any implied public health and safety risks; any woodland/wood pasture HPI creation targets if within a BOA; the choice of trees and the planting design for the situation (both now & in a future climate - see above); and all management and aftercare cost commitments, in both currency and carbon emissions (see below) - END.

5. Conclusion

Tree and woodland planting is both admirable and to be applauded for many reasons. In European temperate latitudes however, a front-line solution to mitigating climate change it is not. Indeed, it should not be overlooked that planting trees and their aftercare also has a carbon footprint. The initial soil disturbance will release carbon to the atmosphere, while thinning and disposal of arisings, as well as use of growth supplements all involve the use of fossil fuels, potentially in significant volumes. There could therefore be a significant lead time before sequestration projects turn fully carbon-negative.

There is a multitude of worthwhile reasons to undertake afforestation projects in Surrey when fully demonstrated to be an appropriate change of land-use, and where no conflicts exist with more deserving biodiversity recovery outcomes. The declared emergency is equally climatic *and* environmental, so all possible solutions must clearly be of benefit to both.

6. Further references

Blakesley, D & Buckley P (2010). *Woodland Creation for Wildlife and People in a Changing Climate* (Pisces).

Morison, J *et al.* (2012). *Understanding the carbon and greenhouse gas balance of forests in Britain*. Forestry Commission Research Report.

[9] *Guidelines for Ecological Impact Assessment in the UK & Ireland* (Chartered Institute of Ecology & Environmental Management, September 2019).

[10] Listed under Section 41 of the Natural Environment & Rural Communities Act 2006 as Habitats of principal importance for the conservation of biological diversity in England (for which public bodies are obliged to have regard under Section 40).

[11] See; *Biodiversity Opportunity Areas: The basis for realising Surrey's ecological network* (SNP 2019)