The Royal Society of Edinburgh KNOWLEDGE MADE USEFUL	Consultation closing date Monday 5 December 2022, 23:59

RSE inquiry into public support for tree planting and forestry

Respondent form

Respondents wishing to submit evidence should use this respondent form. It is essential that submissions are properly evidenced and concise, highlighting the key issues as they pertain to the consultation questions. Peer reviewed science is important, but other forms of evidence will be considered, including (but not limited to) internal reports, grey literature or photos (georeferenced and dated). Respondents should refrain from submitting full-scale reports in their entirety but include relevant conclusions in their written response with references to the full report.

We do not expect that all respondents will submit answers to all questions, and you may wish to confine your response to a single section. Each answer should be no longer than **500 words,** and some may be very short. Please send any additional evidence as an email attachment.

Please return your completed respondent form to tree@therse.org.uk by 23:59 on Monday, 5 December 2022.

Definitions

There are several different terms used for tree planting. Thus, within the context of this Inquiry and subsequent report, we will use ***Commercial Forestry*** to cover tree planting that is wholly or in part intended for harvesting (some refer to this as productive forestry), and ***Woodland*** to cover tree planting that is intended to remain as such for the long term. For consistency, we should be grateful if you would retain this same terminology in your submission.

Personal details:

Are you responding on behalf of:

☐ An individual

☒ An organisation

Full name or organisation's name:

The James Hutton Institute

Email address:

Phone number:

Address:

I consent to my or my organisation's response being published or referenced:

☒ Yes

☐ Yes, with no direct attribution (i.e. anonymously)

☐ No

Please note the RSE will handle and store your personal information in accordance with our organisational Privacy Policy: https://rse.org.uk/about-us/our-policies-and-corporate information/privacy-policy/

Evidence request

Please see end of document for full list of references cited.

We consider that the desired public benefits from tree planting comprise timber production, carbon sequestration, biodiversity enhancement, recreation, water management and reduction in air pollution, together with economic and social community benefits.

1. If you consider there to be other benefits, please provide evidence for them. [500 words]

Response:

We agree that the benefits listed above cover many of the key benefits from tree planting, however there are others, including oxygen production. The UK National Ecosystem Assessment (2011) lists the

following ecosystem services provided by woodlands which includes services not covered by the above

list. The degree of benefit will depend on the nature of planting and management and indeed accessibility to some extent e.g. access for recreation will provide for natural health benefits.

Provisioning services: Non-timber products such as meat (culled deer), berries, fungi, medicinal derivatives and drugs. Trees for timber, paper, building materials and as an alternative for building materials to reduce the use of fossil fuels. Trees for bio/wood fuel. Water supply.

Regulating services: Avoidance of climate stress - trees can help dampen the climatic effects of extremes of temperature, strong winds and UV light. Carbon sequestration. Soil protection (reducing erosion). Flood and water protection. Regulation of pests and disease. Detoxification and purification. Pollination.

Cultural services: Wild species diversity, recreation, education value, personal enlightenment and social activity and cohesion.

Supporting services: Soil formation, nutrient cycling, water cycling, oxygen production.

We seek to establish the extent to which current practices are delivering these benefits, how far they represent good public value in the short and long term, and what more, if anything, could be done to improve public benefits in tackling the climate-nature crisis and the economic and social well-being of resident communities by tree planting, woodland and commercial forest management.

Carbon sequestration

2. Scottish Government has set targets for reductions in greenhouse gas emissions of 75% by 2030 and 100% by 2045 and placed commitments for woodland and commercial forestry expansion in this context. What evidence is there that current practices will ensure that all newly planted woodland will be a net sink over this period, taking account of both above- and below-ground carbon? What impact will the time lag for carbon capture of new plantings and the harvesting of previously planted commercial forestry have on meeting the targets? [500 words]

Response:

Planting trees will in many cases increase biomass and soil carbon if planting occurs on mineral soils especially. However, there is increasing evidence (Friggens et al., 2020; Matthews et al., 2020; Warner et al., 2021; Baggio-Compagnucci et al., 2022) that especially on organic and organo-mineral in Scotland, in the timescale relevant to 2045, there is either no net gain or a net loss in ecosystem carbon. Current calculations of carbon gains through tree planting often assume a fairly homogenous landscape, uniformly suitable soil types and idealised 'average' tree timber yields, while carbon emissions caused by soil disturbance during planting, and changes in climate are rarely considered (Baggio-Compagnucci et al., 2022).

Two modelling studies for Scotland (Matthews et al., 2020; Baggio-Compagnucci et al., 2022) that take account of differences between objectives for afforestation, timber yields, climate, soil and planting practices show similar results. Tree planting is likely to result in net carbon losses in Scottish upland ecosystems, where the soils are rich in carbon, particularly if there was intensive ground preparation. These net carbon losses are likely to persist for many decades (Matthews et al., 2020) and see Online

Mapping). In the Scottish lowlands, where there is a prevalence of mineral soils, net carbon gains are more likely but these areas are where tree planting is argued to conflict with food production. There is some evidence that substantial areas of forestry could be included in improved grassland areas without displacing faming use (Matthews et al., 2020).

Even with minimal soil disturbance there maybe soil carbon losses due to changes in the soil microbial community breaking down the stored soil carbon. In a replicated experiment, Friggens et al., (2020) showed that slot planting (minimal soil disturbance) birch and Scots Pine on Scottish moorland with podzolic and peaty podzolic soils did not lead to a net increase in ecosystem carbon stock after 12 or 39 years. Friggens et al., (2020) hypothesize that altered mycorrhizal communities and autotrophic carbon inputs have led to positive 'priming' of soil organic matter, resulting in soil organic carbon loss. Warner et al., (2021) also found soil carbon losses in a large-scale reforestation project in the Scottish Highlands were not off-set by above-ground gains in carbon. Soil carbon losses have also been reported in the Arctic where tree colonisation is occurring through natural regeneration (Clemmensen et al., 2021; Parker et al., 2021).

The potential for natural regeneration of trees to cause soil carbon losses in Scotland is unclear, but is currently being studied. The potential limitation for natural regeneration is the rate at which it is likely to occur (ha/per annum) and the lower density of trees, meaning larger areas would be required to deliver the equivalent carbon storage.

Consideration also needs to be given to the proportional contribution afforestation targets can make to national net zero targets. Baggio-Compagnucci et al., (2022) calculated that the magnitude of the offset obtained in 30 years if Scottish afforestation goals were fully reached would be approximately 10% of the Scottish carbon footprint.

3. Are the current carbon sequestration requirements specified by the Woodland Carbon Code and UK Forestry Standard delivering their objectives?[1] [500 words]

Response:

No response submitted.

4. Are these requirements consistently applied? [500 words]

Response:

No response submitted.

5. Is independent inspection to verify initial and continuing fulfilment of the Code and Standard satisfactory? [500 words]

Response:

No response submitted.

6. Do you have evidence that offsetting payments are delivering carbon capture and other benefits in practice? [500 words]

Response:

[1] We recognise that the Woodland Forestry Standard is currently under revision, with an updated version due to be introduced by the end of 2022/2023. Practice indicates the existing Standard (published in 2017) should be followed until that time.

There is little data on whether offsetting payments are delivering carbon capture and other benefits in practice, and it is probably too early to say in many cases.

Biodiversity and environmental benefits

7. Do you have evidence on the role tree species choice and composition have in influencing biodiversity, timber production, flood management, and other outcomes? Do the species of trees and the mix of species help, hinder or change the balance of the benefits being sought? [500 words]

Response:

The choice of tree species will influence the biodiversity supported, and the ecosystem services delivered. In this regard, not all tree species are equal. In studies assessing the suitability of a range of tree species to support the biodiversity currently supported by ash trees or oak trees Mitchell et al., (2014) and Mitchell et al., (2019) showed that different tree species supported different biodiversity. Both studies showed that there was a lack of information about the biodiversity supported by non-native tree species and if the aim was to support biodiversity then there was greater confidence this could be achieved if native tree species were used. The Woodland Creation guide (Herbert et al., 2022) shows the different species different woodland types will support. Currently, the DiversiTree project (also see associated video), funded through the UKRI Treescapes call, is assessing the biodiversity supported in non-native Sitka spruce forests and Scotland's native pine forests, and how diversification of these forests with other tree species may increase the biodiversity supported and the resilience of the forests.

Age structure and woodland/forest structure is also important when considering the biodiversity supported. Woods and forest with a greater range of tree ages and structure (shrubs, understorey) will support a greater range of biodiversity. Generally older trees support more biodiversity (Mitchell et al., 2014; Mitchell et al., 2019).

Reviews of the literature (Mitchell et al., 2014; Mitchell et al., 2019) and field studies (Mitchell et al., 2021) have shown that different tree species will provide different levels of ecosystem services with differences in shade, soil temperature, soil chemistry, carbon storage, decomposition rates. These differences will also influence the biodiversity found both above- and below-ground.

Early results from the newLEAF Treescapes project suggest that there are differences in the invertebrates found on trees depending on whether they were planted or established via natural regeneration (pers. comm. Jenni Stockan, The James Hutton Institute).

Woodlands created via natural regeneration are likely to have greater biodiversity benefits as they will contain a mixture of ages, tree species and woodland structure, as well as more open ground and glades. However, a substantial reduction in wild herbivore numbers would be required to achieve a large increase in woodland expansion via natural regeneration, and woodland establishment would be slower. The lower density of trees established via natural regeneration would mean larger areas would be required to deliver the equivalent carbon storage tonnage by 2045, which might also imply the need for a change in the way afforestation is supported with public funds, with a focus on ongoing

management (revenue based) rather than conventional establishment (capital based).

8. Do you have evidence that planted woodland and commercial forestry impedes the balance between itself and the biodiversity value of other landscapes, habitats or other biodiversity interests? [500 words]

Response:

A change from open habitats to woodlands or commercial forestry will result in a loss of open habitat specialists. The change in "biodiversity value" will depend on the biodiversity present on the open habitat

prior to planting and the type of woodland/forestry created. Of particular concern in Scotland is the impact of woodland/forests on breeding waders, most of which are Red or Amber listed as Birds of Conservation Concern. Of particular priority is the Curlew, a Red-listed species, of which the UK is home to approximately 25% of the worlds remaining breeding population, the majority in Scotland (Brown et al., 2015). There is evidence from both the UK and abroad that woodland establishment has a direct impact on the curlews and other important wader species due to loss of habitat (Franks et al., 2017; Palsdottir et al., 2022), and an indirect impact through edge effects (Wilson et al., 2014; Hancock et al., 2020; Palsdottir et al., 2022). Predators (such as foxes and crows) move out from the woodlands predating the waders. This edge effect is thought to be between 0.75km to 1km (Wilson et al., 2014; Hancock et al., 2020; Palsdottir et al., 2022) and can have a significant impact on their breeding success. Thus, in some situations efforts to meet tree planting targets can be in direct conflict with the requirement to halt biodiversity loss by 2030.

9. Do you have evidence that woodland and commercial forest design and creation practices support or hinder biodiversity benefits? [500 words]

Response: Whether woodland and commercial forestry supports or hinders biodiversity benefits depends on a range of factors as documented in our responses to Questions 7 and 8. The benefits or disbenefits to biodiversity depend upon the habitat which the woodland/forestry is replacing. In some instances it can have negative impacts on open ground species, for example if woodland/forestry is established on areas where there are breeding waders (see response to Question 8 for details) or on species rich grassland or other rare habitats in Scotland. In other instances it can have positive benefits for biodiversity e.g. for Black grouse, but the species that benefit will depend on the tree species planted (Mitchell et al., 2014; Mitchell et al., 2019) , the structure of the woodland (understorey and shrubs), the layout of the woodland (glades, rides), the density of the trees (shading effects) and the age structure of the wood and how the wood is managed (Herbert et al., 2022).

In addition, strategically placed (new) woodland patches can enhance connectivity at the landscape level and therefore facilitate demographic processes for some species living in this habitat. However, the effect of climate change needs to be accounted for: in the absence of substantial woodland expansion, climate change could be detrimental for woodland species that need to shift distribution but have a dispersal distance < 2km (Gimona et al., 2015).

10. To what extent are Environmental Impact Assessments[2] carried out prior to design and planting? [500 words]

Response:

Our understanding is that Environmental Impact Assessments are always carried out prior to planting, in line with relevant regulations and best practices, and subject to enforcement notices (https://forestry.gov.scot/support-regulations/environmental-impact-assessment).

11. Do you have evidence that woodland and commercial forestry management practices support or hinder biodiversity? [500 words]

Response:

[2] An Environmental Impact Assessment (EIAs) is intended to identify and mitigate the potential impacts of a proposed development and is required for planning consent. Within the context of forestry, EIAs can apply to afforestation, deforestation, forest roads and forestry quarries. More information on forestry EIAs can be found here: https://forestry.govscot/support-regulations/environmental-impact-assessment

No response submitted.

12. Are the sources of seed and new trees sufficient to meet national tree planting targets? [500 words] **Response:**

No response submitted.

13. Do you have evidence that large-scale planting on a regional level leads to negative impacts on biodiversity? [500 words]

Response:

The wide scale planting of trees in the Flow Country in the 1970s and 1980s is a widely recognised example of large-scale regional planting having negative impacts on biodiversity (and carbon), breeding waders and other upland and open ground species. Considerable sums of public money have been spent on restoring the Flow Country. We need to ensure that the current policy pressure for more tree planting does not result in a similar negative impact for biodiversity (and carbon) that might have to be mitigated at the expense of the public purse at a future date.

14. Do you have evidence of any practices, good or bad, that you wish to highlight? [500 words]

Response:

No response submitted.

Community benefits:

15. Are there potential improvements that could be made to regulations and/or practice that could improve the recreational, employment or other community benefits of tree planting or commercial forestry schemes? [500 words]

Response:

Research shows that managing for conservation alone may cause challenges in the social acceptability of a site (Hague et al., 2022a). Woodland management approaches that encourage public engagement are perceived as increasing a sense of attachment to a site (MacLean et al., 2022),

Providing information and appropriate access to sites are important factors in encouraging greater use of woodlands for recreation. In addition, having information such as the history of a woodland contributes to people's sense of place (Hague et al., 2022b).

16. Are local communities sufficiently involved in the development of tree planting or commercial forestry schemes? [500 words]

Response:

Prior research on public participation in planning (Kirk & Blackstock 2011) shows that communities tend to get involved in planning processes once work on the ground has started, rather than when it is possible to influence the plans and budgets. Communities may be most interested in non-timber provisioning and cultural services provided by forests and woodlands (see Q1) and these may be difficult to discern from tree planting schemes.

Infrastructure to allow access and use of the forests and woodlands are also important topics for local communities, as these infrastructure along with safety concerns, affect ability to use and enjoy forested places, as highlighted in reports on urban green space (Campbell-Arvai & Lindquist 2021) (Dare et al., 2011).

Research by James Hutton Institute into social innovations shows that community-led initiatives can be highly effective means of addressing challenges such as climate change, reversing the loss of biodiversity, and the provision of rural services (e.g. Slee & Mosdale 2020). Social innovations contribute to building new practices, networks and governance arrangements, some formal (e.g. Development Trusts, e.g. Lochcarron Community Development Company), others informal (e.g. volunteer groups), and several linked in networks (e.g. Scottish Communities Climate Action Network). Support for such approaches to innovation such as through Rural Development Programmes (e.g. human capital; enabling funding) shows how communities can become the enabler of woodland change with aims of biodiversity, climate change, economic and amenity benefits (Barlagne et al., 2021) (Nijnik et al., 2019).

17. If not, what are the barriers and how might they be overcome; if they are, what works well? [500 words]

Response:

As per Scottish Planning Policy, community engagement needs to be meaningful and occur from the earliest stages of the planning process. As noted above, it is important to ensure that consultations are presented in ways that are meaningful to local people and the need to engage at the right stage of the planning or project cycle is clearly communicated, ideally through existing community structures (Dare et al., 2011). As with any environmental planning process, ensuring that the technical data are interpreted in ways that make sense to community concerns is important; and that individuals feel their concerns or interests are heard and acted upon. Innovations such as storymaps e.g. the Strathard project https://forestry.maps.arcgis.com/apps/MapSeries/index.html?appid=503d41e2c582457bab6fc9d1dce72584 can be useful for communicating the aims, process and expected outcomes of woodland planting.

Research in Scotland shows the benefits that can accrue in engaging communities in the dialogue and development of land use changes such as renewable energy, such as through place-based ownership community entities, cooperative or community benefit societies and shared ownership models. To engage a community and facilitate it through land use change requires actors with the necessary skills.

Slee (2020) notes that "where skilled third sector actors have mastered the complexities of the social innovation ecosystem and its supporting information flows and support systems, there is a high likelihood that an engaged community will replicate its successes and use their social capital in other arenas." The presence of successful institutional arrangements in several places in Scotland should provide a basis on which to build to tackle barriers relating to woodland planting.

Finally, research on green infrastructure found that often communities were most interested in the maintenance of urban nature (including woodland and forests) yet this was the least well resourced or planned for (Fisher et al., 2021).

Some communities of interest (particularly farmers and sporting estates) may resist afforestation. This may be due to trade-offs or conflicts with how land is used and wider issues of identity, culture and politics (Barnaud et al., 2021).

18. Do you have evidence of tree planting leading to quantifiable economic and social benefits, short and long term, for communities local to the planting? [500 words]

Response:

There is strong qualitative evidence that existing forests provide such benefits (Nijnik et al., 2019; Barlagne et al., 2021), and research within the James Hutton Institute has explored how potential forest management regimes contribute a range of benefits from employment, timber and social outcomes (Byg et al., 2019). However, we have not undertaken quantitative analysis of benefits from tree planting. There may be merit in further exploring different pathways to planting that lead to livelihoods and wellbeing (Erbaugh & Oldekop 2018).

19. Do woodland and commercial forestry planting result in any disadvantages to communities local to the planting? [500 words]

Response:

There may be concerns about increased traffic and road safety during the planting regimes; and also any issues that restrict access to recreational walking and running routes; or impacts on the visual and rural landscape of nearby green spaces that provide the cultural ecosystem services highlighted above. Furthermore, there is increasing focus on issues of equity and social justice and how the positive and negative impacts of environmental interventions are shared (Garrison 2018) with concerns that amenity woodland planting could unwittingly increase the social divisions through increasing nearby house prices once the planting has been established. On this topic, attention should be paid to ensuring that woodlands and forestry designed for recreational use has public transport and amenities that allow disadvantaged groups to access and enjoy them, as often access to nature remains a privilege restricted to the more affluent (Waite et al., 2021).

However, there is also evidence emerging of communities reacting negatively to afforestation in areas where there is already a high proportion of woodland land use (e.g. Dumfries and Galloway). In such areas, local feedback is suggesting that the drive for carbon credits is leading to a significant decrease in biodiversity (Miller et al., 2022).

20. To what extent does current financial support for tree planting enable planting in urban areas, including in streets/roadsides and other urban settings? [500 words]

Response:

No response submitted.

21. Does Scotland have sufficiently skilled people to deliver/continue to deliver the desired benefits from woodland and commercial forestry? If not, what changes are needed? [500 words]

Response:

No response submitted.

22. Do you have evidence of any conflicts between public financial support for tree planting and other land uses? [500 words]

Response:

No response submitted.

23. Are there evidenced wider societal community benefits that arise from woodland and commercial forestry creation? If there are, should these benefits be formally required or financially supported? [500 words]

Response:

Community owned woodlands and forests are an important aspect of the right to buy movement and contribute to the Scottish Government's Land Reform objectives; and it would be important to ensure that the community right to buy and the strong public participation obligations associated with the land reform agenda are considered within the forestry and woodland planning processes (Logan et al., 2021).

As noted above, community benefits of greater social and human capital can arise from the processes of setting-up, planning and managing the process of revitalising woodlands and their subsequent uses by local communities (Barlagne et al., 2021).

Finance

24. Do you have evidence that the following forms of public financial support for tree planting provide good value for money:

    I. Grants for tree planting? [500 words]
    II. Carbon offset and investment payments by government, charities or the private sector? [500 words]
    III. Tax allowances for land used for tree planting and commercial forests? [500 words] IV. Farm payments applicable to land planted with woodland or commercial forest, e.g. Basic Payment Scheme? [500 words]

Response:

No response submitted.

25. Do you have evidence that any of these payments have unintended results? [500 words]

Response:

No response submitted.

26. Do you have evidence that the interaction of these payments has any public benefits or disbenefits? [500 words]

Response:

No response submitted.

27. Do you have evidence that the structure of payments or allowances supports or hinders the public benefits? [500 words]

Response:

No response submitted.

28. Do you have evidence of any impact on land values as a result of payments/allowances? [500 words] **Response:**

No response submitted.

29. Are the anticipated changes in farming support likely to have any impact upon woodland or commercial forestry creation?[3] [500 words]

Response:

No response submitted.

This is a complex field and the questions above are not prescriptive. We should be pleased to learn of any other benefits, or disbenefits, you consider are brought about by public financial support for tree planting and commercial forestry in Scotland and if you consider that public financial support could be redesigned to provide greater benefits.

Thank you for taking the time to work through these questions.

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[3]It is relevant to mention that Scottish Government is currently consulting on proposals for a new Agriculture Bill which will have implications for farm payments in practice. More information on the Agriculture Bill can be found here: https://www.gov.scot/publications/delivering-vision-scottish-agriculture-proposals-new-agriculture-bill/

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