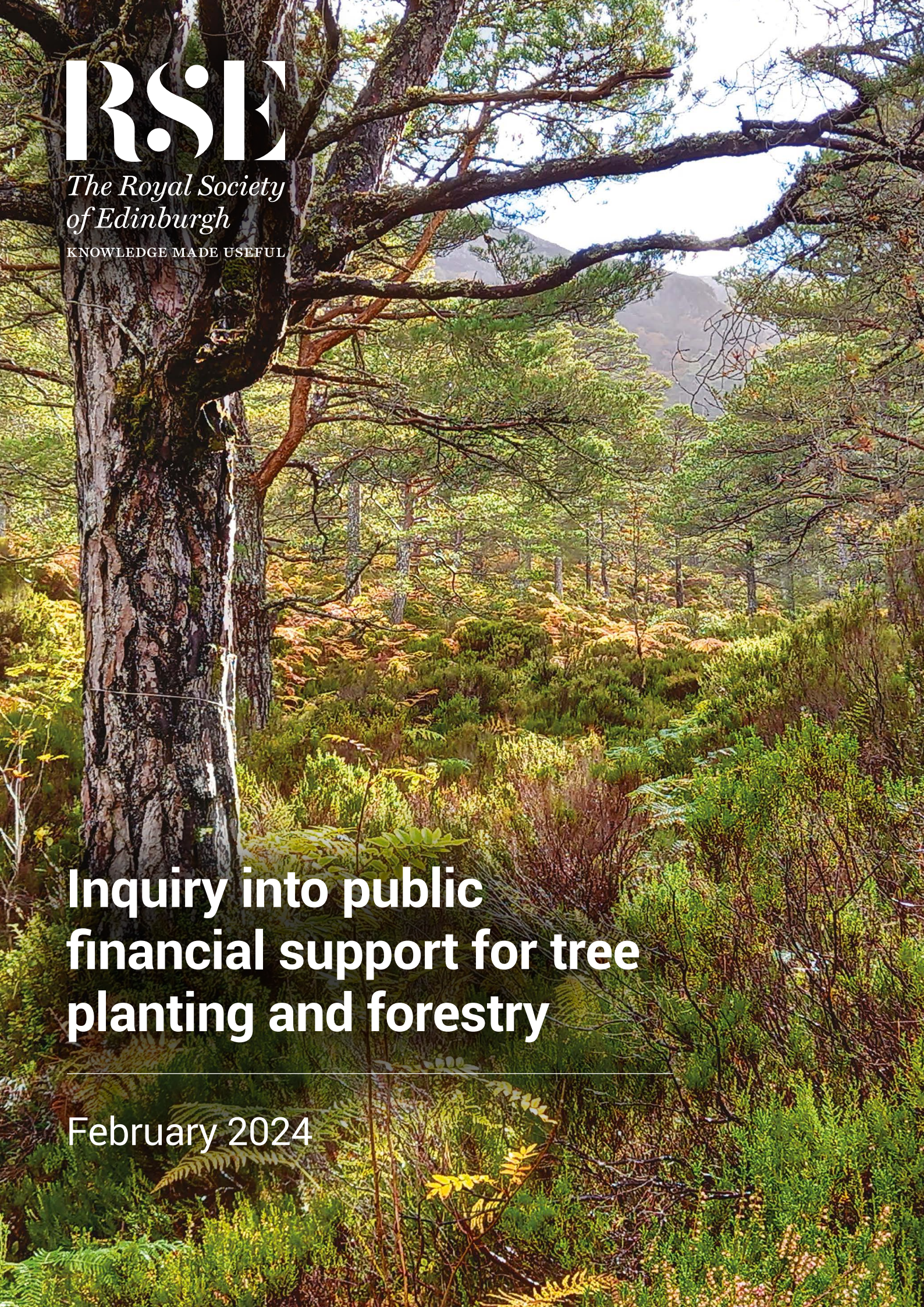

The Royal Society of Edinburgh

KNOWLEDGE MADE USEFUL

Inquiry into public financial support for tree planting and forestry

February 2024

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The Royal Society of Edinburgh (RSE), Scotland's National Academy, was established in 1783 for 'the advancement of learning and useful knowledge'. Our contemporary mission remains the same – the deployment of knowledge for public good. We recognise, support and mobilise expertise from across academia, business and public service for the benefit of Scotland and the wider world. Our Fellows from academia, industry and public service are among the most distinguished in their fields. This collective knowledge contributes to Scotland's social and economic wellbeing, its people, the care of its natural environment and the nation's wider contribution to the global community. We deliver on this mission through our strategic objectives and impacts to inspire, engage, provide expertise and promote Scotland internationally.

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Contents

1. Executive summary

Executive summary

1. The Scottish and UK Governments spend a significant amount of public money to incentivise tree planting and woodland expansion in the form of grants and tax reliefs. The policy basis for this is extensive, as reflected by Scotland having some of the world's most ambitious net zero targets and prioritising national outcomes such as nature restoration, economic prosperity, and societal wellbeing.

2. The utility of trees extends well beyond their commercial value and these wider benefits - such as carbon sequestration, biodiversity improvement and recreation - have come increasingly to the fore. In the present context of constrained public finances and the continuing impact of the climate and biodiversity crises, it is sensible to consider how best to allocate limited resources to fulfil critical policy objectives.

3. Despite the importance of forests and woodlands, to date there has been no analysis of the considerable public monies that are given to landowners to plant trees and the public benefits received. In response to this knowledge gap, the Royal Society of Edinburgh (RSE) undertook a review of public financial support for tree planting and forestry. A public call for views garnered 45 responses from a range of academics, community interest groups, members of industry, public sector agencies, non-profits, sector representatives, and members of the public. A committee of RSE Fellows, supplemented by external expertise, then analysed the responses and research evidence, developing a set of recommendations for policy-makers to consider.

4. Based on the evidence, the report concludes that subsidising commercial conifer planting is not justified and the potential for the forestry sector to deliver multiple benefits has not been fully realised. This is true across many areas including carbon sequestration, biodiversity, urban environments and rural communities.

5. Employment generated by forestry activity (including planting, harvesting and processing) is important, as is the employment generated by visitors and tourists to woodlands. In support of the former, Scotland's timber processing industry could be supported to improve the added value of its products.

6. Although trees are often seen as important in the fight against climate change, their ability to capture and store carbon dioxide over the longer term is contingent on a number of factors, many of which were found to be missing in the large-scale commercial operations that dominate Scotland's forestry sector.

To date there has been no analysis of the considerable public monies that are given to landowners to plant trees and the public benefits received.

7. The impacts of large-scale forestry operations on biodiversity are multi-faceted. It is clear that planting large, dense stands of non-native conifers has adverse effects on biodiversity. Commercial operations can, in part, grow to support rich assemblages of plant and animal life when best practice is fully implemented.

8. The effectiveness of the present Environmental Impact Assessment (EIA) regime is examined. EIAs are intended to identify and mitigate potential risks to the environment and people at an early stage in order to avoid adverse impacts.

Executive summary (continued)

However, rather than serving as a valuable tool for community consultation and environmental protection and enhancement, EIAs are rare in practice, as the evidence from respondents showed.

9. It is well-established that human beings benefit from regular interactions with the natural environment, whether in forests or in urban settings. More could be done to enhance and protect access to trees and to nature in general, particularly in the built environments where such benefits are disproportionately significant.

10. It is becoming increasingly urgent for Scotland to consider whether its approach to funding tree planting and forestry remains fit for purpose and that available funds are being applied to best effect to meet a range of objectives. Based on the evidence received, the report contends that the continued subsidy of commercial coniferous forestry cannot be justified.

11. The report makes several recommendations aimed primarily at Scottish Government, its agencies and local government to make best use of scarce resources and promote multifunctional forests and woodlands. This is best achieved through targeted investments supporting discrete interventions. The report's recommendations are presented below, according to topic:

Chapter 7: Current schemes and potential reform of financial support

1. Scottish Government should discontinue subsidies for coniferous commercial tree planting.

2. In discontinuing these subsidies, Scottish Government should redirect the money that is saved towards tree planting that is designed to provide long term carbon sequestration, biodiversity and public benefits.

3. The UK Government should calculate and report on the total cost of tax reliefs for woodlands, stating the purpose of the reliefs and evaluating them in respect of their cost effectiveness in meeting those objectives.

Chapter 8: Timber industry

4. Scottish Government should require and empower the Enterprise Agencies to use their resources – both skills and financial – to assist the Scottish timber industry in adding value to raw timber by supporting firms to develop and expand mass timber products.

Chapter 9: Carbon capture by trees

5. Scottish Forestry should ensure that Environmental Impact Assessments (EIAs) pay careful attention to soil composition by ensuring that sampling is done on a sufficient scale across the whole site.

6. In order to implement the UK Forestry Standard statement on techniques "that create the minimum amount of soil disturbance" (e.g. screefing), Scottish Forestry should prohibit planting with mechanical disturbance on carbon-rich soils.

Executive summary (continued)

Chapter 10: Biodiversity

7. As outlined by the UKFS, Scottish Forestry should require mixed native broadleaf planting, shrub cover and open land to be interspersed throughout commercial monoculture planting.

8. Scottish Forestry should encourage and support natural regeneration for proposed establishment of mixed native woodland and include this in its grant support criteria within the Woodland Creation category.

9. Scottish Forestry should require that planting schemes include native planting and regeneration along watercourses.

10. Scottish Forestry should require schemes to consider how the spread of invasive tree seed to adjoining land (especially peatland) will be prevented. It should also require appropriate steps to be taken to reduce such spread and, where necessary, impose conditions to remove seedlings when it does occur.

Chapter 11: Environmental Impact Assessment

11. Scottish Forestry should require that all planting proposals of 40 ha and above, or smaller applications adjoining existing woodland, submit an EIA.

12. Scottish Government should increase capacity in Scottish Forestry for independent scrutiny of planting applications, including an increased number of EIAs, and carry out compliance monitoring during and after planting to confirm adherence to the UKFS and specific conditions.

13. Scottish Forestry should consider providing guidance on the form and content of EIA submissions.

Chapter 12: Urban trees

14. Scottish Forestry should provide targeted grants to Local Authorities to plant trees in existing urban locations.

15. Local Authorities should require all new built developments with road frontages to incorporate trees in the road or on their frontages.

Chapter 13: Rural communities

16. Scottish Forestry should mandate adherence to the community engagement guidelines produced by the Scottish Land Commission for all proposed planting schemes.

2. Acknowledgements

Acknowledgements

13. The RSE gratefully acknowledges the many individuals without whom this report would not have been possible.

14. The RSE thanks the inquiry committee, chaired by Prof Ian Wall FRSE and comprising Jeanette Hall, Prof Pat Monaghan FRSE, Prof Marian Scott FRSE, Prof Pete Smith FRS FRSE, Prof Des Thompson FRSE, and Daria Tuhtar. We also extend our gratitude to other RSE staff in the Policy and Communications teams for their contributions.

15. The RSE thanks the expert advisers for their guidance and advice. We would like to thank particularly the peer reviewers for their careful consideration and very valuable commentary.

16. The RSE especially thanks the many individuals and organisations who took the time to respond to the inquiry. Their submissions were all helpful and often reflected their passion for the causes they represent. The RSE hopes the final report does justice to all the issues raised and will be regarded as a useful resource by all who continue to work for the interests of Scotland's people and natural environment, in whatever capacity that may be.

Our work is possible because of the continued support from the Scottish Funding Council.

3. Introduction

Introduction

17. The public purse has been financing woodlands for more than 100 years, beginning just after the First World War with the establishment of the Forestry Commission. Following this, grants of public money have been given to private landowners to incentivise a range of activities, supplemented by a wide variety of government tax reliefs.

18. At present, public financial support for woodlands comprises a range of grants as well as 100% tax relief on both profits and capital gains. Recently, landowners have been able to generate additional income by selling carbon credits for buyers to offset their own carbon production.

> *Public financial support for woodlands comprises a range of grants as well as 100% tax relief on both profits and capital gains*

19. This latter element reflects the justified concern that unchecked carbon production is intensifying climate change, leading to severe impacts on the Earth and its inhabitants. More recently, it has become clear that continued biodiversity loss poses another profound threat. What is more, these issues are interacting, as expressed in *The Scottish Biodiversity Strategy to 2045: Tackling the Nature Emergency in Scotland*: "*We face twin reinforcing crises: a decline in biodiversity will exacerbate the climate crisis – and a changing climate will accelerate the rate of biodiversity loss*". (Scottish Government, 2022b).

20. Woodland planting, maintenance, harvesting and use are activities that take place predominantly in rural Scotland, with implications for the local economy and communities. Within this context of socioeconomic benefit, woodlands also perform a more multi-functional role as sites of leisure and tourism.

21. Given that woodland creation is relevant to so many national objectives, it becomes important to determine whether the public money that is invested in it – a not insignificant sum – is indeed producing the outcomes that are necessary for both our present and our future. These include sustainable development, carbon sequestration, improvements in biodiversity, and the wellbeing of rural communities and broader society.

22. This report considers all types of tree planting (including scrub, montane and urban) supported by public finances. It also considers the public value resulting from natural regeneration and smaller-scale tree planting, especially in urban areas and along rivers. However, these activities only comprise a small percentage of the overall planting that takes place.

4. Methodology

Methodology

23. As Scotland's National Academy, the Royal Society of Edinburgh (RSE) regularly investigates emerging, underexplored or contentious policy challenges for the benefit of decision-makers. Given its political independence, multidisciplinary Fellowship and evidence-based approach, the RSE can provide objective and informed insights to shape national policy-making and discussions about future resourcing. This can take the form of major inquiries as well as shorter-term outputs such as preparing advice papers and briefings and convening roundtables and workshops to facilitate dialogue. A full description of the RSE's mission and activities can be found on its website.

24. In 2022, the RSE approved a Fellow-led proposal for an inquiry into public support for tree planting and forestry, recognising that a comprehensive analysis of public spend in this sector has been lacking to date.

25. An inquiry committee was formed in the summer of 2022.[1] Members were selected based on relevant expertise and an interest in forestry matters, with a view to capturing a broad range of specialisms and professional experience. Although Fellows often hold numerous positions concurrently, the inquiry committee members served solely in their capacity as Fellows of the RSE and did not represent any other professional or personal interests. Secretariat duties were fulfilled by RSE staff and external support. A collection of expert advisers was also recruited to provide supplementary advice on a voluntary basis. These spanned various disciplines including environmental conservation, law, land rights, public finance, and soil.

26. In framing the inquiry's terms of reference, the committee considered the range of objectives that tree planting is intended to fulfil, as described in existing Scottish and UK policy commitments and within the scientific literature. These objectives predominantly fell into one of three categories: carbon sequestration, biodiversity and other environmental benefits, and community benefits. These categories then formed the basis for the consultation questions. The questions were co-developed by committee members with expert advisers providing additional input in relation to their area of expertise. The questions were then tested to ensure neutrality and accessibility to a range of respondents.

27. In order to establish the financial context, the committee gathered evidence for 11 years' worth of public spend on tree planting in the form of grants, spanning the financial years 2012–13 to 2022–23. Grant figures are readily available in the public domain and were taken from the annual Forestry Statistics publications prepared by Forest Research. The committee did try to obtain a breakdown of grant money paid by activity but this information was not forthcoming.

28. Tax relief figures proved much more difficult to obtain as these do not appear to be collated by HMRC or any other agency. Requests for assistance were issued to HMRC, the UK Treasury, the House of Commons Library, Scottish Forestry, and Forestry and Land Scotland. In all cases, the committee was either directed to another agency or told that such figures do not exist. The committee considers the paucity of data on tax reliefs to be disappointing and calls for this to be improved, as described in the recommendations of this report.

[1] These were: Prof Ian Wall FRSE (Chair), Jeanette Hall, Prof Pat Monaghan FRSE, Prof Marian Scott FRSE, Prof Pete Smith FRSE, Prof Des Thompson FRSE, and Daria Tuhtar.

Methodology (continued)

29. As public investment in carbon markets tends to be limited, these were not analysed but are described in section 7 for completeness.

30. A public call for evidence was launched in October 2022 and ran for six weeks. Respondents were reached through a combination of targeted invitations and general promotion via newsletters, social media, and other communication channels. In total, the inquiry received 45 submissions from a range of academics, community interest groups, members of industry, public sector agencies, non-profits, sector representatives, and members of the public.

Respondents were asked to indicate whether they were responding in an independent capacity or whether they were representing the views of an organisation. In a few instances, submissions were made on behalf of an individual and an organisation. Respondents were also asked whether they wished to be named or to remain anonymous. Those respondents that consented to being named are presented in the below table (names, titles and post-nominals as they appear in the respondent form).

Table 1: Inquiry respondents (non-anonymous).

Individuals[2]
Prof Jane Bower FRSE
Dr Andrew Cameron
Roger Crofts
Dr James Fenton
Prof Julie Fitzpatrick
Luke Gaskell
Jon Hollingdale
Ted Leeming
Megan Parker
Prof David Raey[3]
Daniel Ridley-Ellis
Sarah Reece[4]
Philippa Swann and Dr Malcolm Appleby MBE FRSE (joint submission)
Stuart Wilkie BSC Ecological Science (Hons Forestry) F.I.C.For. C.Env.

Organisations
Botanical Society of Britain and Ireland Scotland Committee
Butterfly Conservation
Confor
Continuous Cover Forestry Group
ECCI
Friends of the Ochils
James Hutton Institute
Plantlife Scotland
RSPB Scotland
Scottish Land Commission
Southern Uplands Partnership
Sustainable West Linton and District
University of Edinburgh Centre for Sustainable Forests and Landscapes
University of St Andrews - St Andrews Forest Programme

[2] One individual consented to being referenced but did not explicitly state their full name. As such, they have been treated as an anonymous submission.

[3] Response was also submitted on behalf of Edinburgh Centre for Carbon Innovation (ECCI).

[4] Response was also submitted on behalf of Sustainable West Linton.

Methodology (continued)

31. The individuals noted above indicated they were responding in a personal capacity, regardless of any professional affiliations. Exceptions are given in the footnotes.

32. Respondents' submissions are published in full on the inquiry webpage (RSE, n.d.). Some submissions have been published anonymously at the request of the respondent. Two respondents did not want their response shared or referenced in any form, even anonymously. Three email submissions were sent via the inquiry webpage contact portal and were not accompanied by a formal respondent form; as a result, these responses have not been published as these individuals did not explicitly give their consent to have their responses shared.

33. Respondents were asked to answer a set of standardised consultation questions. They were encouraged to supplement their answers with additional sources of evidence such as reports, journal articles, and photographs where possible.

34. Using their professional judgement and the published literature, the responses were analysed in detail by the inquiry committee. All responses were given equal consideration. Requests for additional information were issued directly to respondents by the inquiry secretariat in instances where answers were found to be unclear or unverified by external sources. Anecdotal evidence was corroborated by external sources as far as possible; in instances where this was not possible, it was excluded from the analysis. Where required, the committee solicited the view of expert advisers in determining the credibility of certain statements. Some statements lay outwith the remit of this inquiry and so were excluded.

35. The committee then co-developed a set of recommendations as presented in the report. Given the potential breadth of recommendations, the report focused on those actions that are deemed most critical and that could be feasibly implemented by Scottish Government.

36. The draft report underwent peer review by two Fellows of the RSE who were not involved in compiling the report. It was also sent to expert advisers for additional comment.

5. Policy context

Policy context

Introduction

37. The following sections outline applicable Scottish and UK policy as it relates to the inquiry's main areas of focus: forestry, climate change and land use, biodiversity and environmental benefits, and community benefits. They are not intended to be exhaustive but rather serve as a description of the main policy commitments that influence how Scottish forestry and tree planting are undertaken. In instances where the UK as a whole is a signatory to an international agreement, Scotland is still responsible for progressing these commitments when they apply to devolved policy areas.

38. Although the UK has now left the European Union, the **UK Withdrawal from the European Union (Continuity) (Scotland) Act (2021)** provides for Scotland to keep pace with future EU policy developments where appropriate. This includes policy areas such as the environment. As such, the below sections contain reference to corresponding EU legislation if relevant.

Forestry

Legislation

39. Forestry became a fully devolved policy area in 2019 through the provisions laid out by the **Forestry and Land Management (Scotland) Act (2018)**. Although forestry was included in the **Scotland Act (1998)** which transferred certain powers to the Scottish Government, the Forestry Commission's status as a cross-border body was retained and it continued to exert authority across the UK as a whole. In 2003, the Forestry Commission set up two subsidiary bodies, **Forestry Commission Scotland (FCS)** and **Forest Enterprise Scotland (FES)**, to manage the Scottish National Forest Estate.

40. With full devolution, the role of the Forestry Commission was replaced by two new government agencies: **Scottish Forestry (SF)** and **Forestry and Land Scotland (FLS)**, both of which report to Scottish Ministers. Scottish Forestry oversees forestry policy, regulation, grants incentives, technical forestry advice and cross-border arrangements. It also hosts the Chief Forester who advises Scottish Ministers on forestry matters. **Forestry and Land Scotland** manages Scotland's public forests and woodlands for the purposes of producing timber, enhancing biodiversity, and promoting tourism and recreation.

Strategic policy

41. **Scotland's Forestry Strategy 2019-2029** (Scottish Government, 2019a) is the main policy document guiding forest and woodland management. The **Forestry and Land Management (Scotland) Act 2018** mandates the regular development of a forestry strategy setting out Scottish Ministers' objectives, priorities, and policies with respect to the promotion of sustainable forest management. According to the legislation, the Forestry Strategy must align with related policies and commitments including the **Kyoto Protocol** (UNFCCC, 1998), the Land Use Strategy (Scottish Government, 2021a), the Land Rights and Responsibilities Statement (Scottish Government, 2022a), the Code of Practice on Deer Management (Scottish Natural Heritage, 2011), and the Scottish Biodiversity Strategy (Scottish Government, 2022b). The Act also introduced a three-year reporting cycle.

42. The Forestry Strategy is built upon a **50-year vision** for the sector which seeks to expand and enhance forest and woodland cover in support of 'a strong economy, a thriving environment, and healthy and flourishing communities.' These objectives are to be met in the **context of sustainable management and better integration with other land uses**, as well as alignment with

Policy context (continued)

the National Performance Framework outcomes and the **United Nations Sustainable Development Goals (SDGs)** (United Nations, 2023). Each iteration of the Strategy is underlain by successive **implementation plans** which describe how the Strategy's ambitions will be achieved in practice and monitored effectively. The implementation plans are jointly prepared by the National Forestry Stakeholder group and key partners. The latest, spanning 2022–25 (Scottish Government, 2022c), acknowledges the now widely accepted dual climate–biodiversity crisis and the changes that have taken place since the original Strategy was published, including the Covid-19 pandemic and the priorities laid out in the **Bute House Agreement** (Scottish Government, 2021b). As a result, the plan advocates for nature-based solutions based on five strategic drivers: resilience, reversing biodiversity loss, net zero, just transition, and green recovery.

43. **Woodland creation targets** are a key element of the Strategy and reflect Scotland's pledges under the Bonn Challenge (IUCN, 2020).[5] In particular, the Strategy aspires to increase forest and woodland cover to 21% of the total land area by 2032. It is intended that the rate should increase every year, beginning with 10,000 ha in 2018 and rising to a rate of 15,000 ha per year from 2024–25. Of the total annual amount, the majority will comprise productive, non-native woodland while another 3000–5000 ha will be new native woodland. The targets also aim to increase native woodland restoration and improve conservation management, as well as stimulating increased use of Scottish wood products in construction. The woodland creation target was increased in the 2021–22 Programme for Government to 18,000 ha by 2024–25.

44. The **UKFS (2023): Fifth edition** is the technical standard for sustainable forest management in the UK. It is based on internationally agreed sustainable forest management criteria implemented in a way that is appropriate to the UK. It sets out the approach of the four governments of the UK, defines the requirements and provides guidance for foresters on how to practise sustainable forest management in the UK. In this way, it provides a basis for operating grant schemes and official controls and support for regulatory processes.

45. In the above context, sustainable forest management refers to the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity and vitality. It also refers to their potential to fulfil, now and in the future, relevant ecological, economic and social functions at local, national and global levels, without causing damage to other ecosystems.

46. Scottish Forestry is responsible for determining how the UKFS is implemented and monitored in Scotland. It is monitored via compliance with existing grant and regulatory approvals. Where non-compliance is identified and breaches have occurred, corrective actions are identified via a Compliance Procedure. If corrective actions are not undertaken, the offence is escalated through regulatory mechanisms where funding can be reclaimed or permissions can be suspended or revoked.

Planning

47. Scotland's fourth **National Planning Framework (NPF4)** (Scottish Government, 2023a) was published in February 2023 and sets out how land in Scotland should be used and developed in accordance with long-term public interest. It identifies six strategic spatial principles to create 'sustainable', 'liveable' and 'productive' places.

[5] The Bonn Challenge commits pledgees to restoring 350 million hectares of degraded and deforested landscapes by 2030, with an interim target of 150 million hectares restored by 2020.

Policy context (continued)

The principles themselves are derived from the UN Sustainable Development Goals and National Performance Framework outcomes (Scottish Government 2023b). Planning authorities then prepare **Local Development Plans (LDPs)** in accordance with the principles laid out by the NPF as well as any existing Local Place Plans.

48. In terms of woodlands and forests, NPF4 instructs LDPs to "identify and protect existing woodland and the potential for its enhancement or expansion to avoid habitat fragmentation and improve ecological connectivity" and "identify and set out proposals for forestry, woodlands and trees, including the expansion of a range of types to provide multiple benefits" (Scottish Government, 2023a, p 44).[6] LDPs must also be complemented by **local forestry and woodland strategies**, as required by the **Town and Country Planning (Scotland) Act (1997)**. Specific guidance for these strategies can be found in *The right tree in the right place* (FCS, 2010), which classifies sites as 'preferred', 'potential' or 'sensitive' with respect to their suitability for tree planting.

49. Scottish Government also has a **policy on the control of woodland removal** (FCS, 2009), which sets out the conditions that must be met in order to remove woodland. It includes a strong presumption against the removal of ancient woodlands owing to their often irreplaceable ecological and cultural value.

50. Under the **Forestry (Environmental Impact Assessment) (Scotland) Regulations (2017)**, unless otherwise exempt, forestry proposals must undergo an EIA in cases where significant environmental impact may arise as a result of the proposed activities.[7]

Climate change and land use

51. At the global level, the **United Nations Framework Convention on Climate Change** (United Nations, 1992) requires industrialised countries to reduce their greenhouse gas emissions in line with set targets. In 2015, the **UN Paris Agreement** (UNFCCC, 2015) mandated that signatories must collectively limit global warming to "well below" 2°C and "pursue efforts" to further minimise warming below 1.5°C above pre-industrial levels. Scotland is bound to the Paris Agreement by extension through the UK serving as a signatory. Forestry figured prominently at COP26, the 26th UN climate summit, which saw the **Glasgow Leaders' Declaration on Forest and Land Use** (UKCOP26, 2021) committing 137 countries to halting forest loss and land degradation by 2030.

52. Climate change mitigation and adaptation is a devolved policy area, and Scotland has been determined to position itself as a world leader in achieving net zero. This ambition was first reflected in the **Climate Change (Scotland) Act (2009)**, which set a target of reducing greenhouse gas emissions by 80% below 1990 baseline levels by 2050. It also required that **Climate Change Plans** be prepared every five years to identify the policies and proposals through which reductions will be achieved; the current iteration covers the timespan 2018–2032. An update was published in 2020 to reflect the need for a 'green recovery' in response to the Covid-19 pandemic. The Plan is the main driver behind current woodland creation targets, recognising the critical role of forests and woodlands in achieving net zero. Specifically, the Plan reiterates a target of 18,000 ha of new woodland creation per year by 2024–25, as announced in the 2021–22 Programme for Government.

[6] Policy 6 of NPF4 provides specific guidance for woodland and trees and supersedes the provisions found in Scottish Planning Policy.

[7] Exemptions apply to projects where compliance with the Regulations would have an adverse effect on the purpose of the project, where a project is in response to a civil emergency, or where the project is adopted pursuant to an Enactment, provided that the conditions of the EU Environmental Impact Assessment Directive are met.

Policy context (continued)

53. Reflecting advice received by the UK Committee on Climate Change and the mounting urgency of the climate crisis, the 2009 Act was amended by the **Climate Change (Emissions Reduction Targets) (Scotland) Act (2019)**, which introduced a more stringent deadline of 2045 for decarbonisation, five years earlier than the rest of the UK, together with targets for annual reductions. Statistics published in June 2023 indicated that Scotland's progress has fallen short of its targets in eight out of the past 12 years, with domestic transport making up the single largest source of emissions as of 2021, followed by agriculture and business (Scottish Government, 2023c).

54. The 2009 Act also required that every Climate Change Plan is complemented by an adaptation strategy that responds to the risks identified by the UK Climate Change Risk Assessment. **The Second Scottish Climate Change Adaptation Programme** (Scottish Government, 2019b) spans 2019–2024 and takes an outcomes-based approach to adaptation, one of which specifies "a natural environment [that] is valued, enjoyed, protected, and enhanced and has increased resilience to climate change."

55. Scottish Government confirmed its intention to introduce a **Land Reform Bill** (Scottish Government, 2022d) in the 2023/24 Programme for Government, which will likely introduce important changes to how land is governed, managed and used.

Biodiversity and environmental benefits

56. Scotland has an overarching **Environment Strategy** (Scottish Government, 2020) which integrates existing plans and policies under a shared vision and purpose and reiterates Scotland's commitment to continued alignment with (or, where relevant, surpassing of) EU environmental standards.

57. The **UN Convention on Biological Diversity (CBD)** (UNEP, 2023) – one of the outcomes of the 1992 Rio 'Earth Summit' – was ratified by the UK in 1994. The CBD was the first example of a global and legally binding framework to halt the destruction of biodiversity. As a signatory, the UK is committed to creating and enforcing national strategies and action plans to protect and enhance biological diversity. The provisions of the CBD were later supplemented by more specific targets for biodiversity protection, including the 2010 Biodiversity Target (UNEP, 2010) and the Aichi targets for 2020 (UNEP, 2020). In its final progress report, NatureScot (2021) concluded that Scotland had met nine of the 20 Aichi targets and fallen short of the remaining 11 by the 2020 deadline.

58. The **15th Conference of the Parties to the UN Convention on Biological Diversity ('COP15')** (UNEP, 2022), held in Montreal, Canada in December 2022, placed further pressure on countries to respond effectively to the joint climate–nature crisis through the landmark '30 by 30' goal of protecting 30% of global land, inland waters, coastal areas and oceans by 2030.

59. The **Scottish Biodiversity Strategy** outlines a vision whereby Scottish terrestrial and marine biodiversity is restored and regenerated by 2045. A more immediate target states that Scotland will become 'Nature Positive' by 2030 through the work of 26 Priority Actions, including supporting nature-friendly farming, fishing and forestry. The vision is embodied within a set of high-level outcomes covering terrestrial, freshwater and marine and coastal environments. In terms of forestry, the Strategy describes the following outcome:

"Forest and woodland management will have led to sustainable natural regeneration; a greater diversity of woodland species; increased woodland cover with a healthy understorey, enhanced woodland connectivity; and improved integration of trees into other land uses". (Scottish Government, 2022b, p. 35)

Policy context (continued)

60. In January 2024, Scottish Government consulted on a **Strategic Framework for Biodiversity** (Scottish Government, 2023d), that will include the first five-year action plan for the most recent Scottish Biodiversity Strategy.

61. As detailed in the **Bute House Agreement** (Scottish Government, 2021b), a **Natural Environment Bill** is expected to be introduced in the third year of this parliamentary session. It will lay out statutory targets for nature restoration, helping to enforce progress against the measures of the Scottish Biodiversity Strategy and mirroring those applying to emissions reductions.

62. Scotland manages a series of **protected areas** under different schemes that contribute to the protection and restoration of species and ecosystems of significance. These include Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation and Special Protection Areas (part of the Natura 2000 European network (European Commission, n.d.)), nature reserves and other national designations (e.g. National Scenic Areas).

63. Specific policies exist for the **control of deer populations** which can present a risk to forest and woodland habitat and wildlife conditions.

Community benefits

64. **Forestry and Land Scotland** is the main government body with a responsibility for liaising with communities regarding the use and development of the national forest estate.

65. The issue of landownership has often been raised in relation to community benefits. The **Land Reform (Scotland) Act (2003**) introduced a pre-emptive community right to buy, by which community bodies register their interest in rural land or buildings (usually privately owned) and are given right of first refusal should these assets go up for sale. This right is granted on the basis of a connection to said land and proposals for its sustainable development. The Act can apply to any type of eligible land, including woodlands. Specific policies relate to the ability of crofting communities to buy land. The **Land Reform (Scotland) Act (2016)** expanded the features of the original Act by allowing the community purchase of land in the absence of a willing seller for the purposes of sustainable development, subject to ministerial approval. This complements the provisions of the **Community Empowerment (Scotland) Act (2015)** which enables community bodies to purchase abandoned, neglected or detrimental land (ANDL) for the purposes of sustainable development even if it is not for sale. The Act also states that community bodies should be involved in forestry leasing. Communities can access funding for land acquisition through sources such as the **Scottish Land Fund** (TNLCF, 2023) and the **Empowering Communities Programme** (Scottish Government, n.d.).

66. The 2016 Act also introduced the **Scottish Land Rights and Responsibilities Statement**, which was revised in 2022 (Scottish Government, 2022a). The Statement takes a human rights-based approach to land rights, advocating more diverse landownership and extensive collaboration with communities in decisions about land.

67. There was a recent consultation on a **Proposed Land Ownership and Public Interest (Scotland) Bill** (Scottish Parliament, 2023). The Bill would require any land transfers of more than 500 ha to be subject to a public interest test in an effort to address the long-standing issue of inordinately concentrated land ownership in Scotland.

68. There is a proposed Members' Bill for a **Wellbeing and Sustainable Development (Scotland) Bill** which would require public authorities to ensure that wellbeing and sustainability are appropriately considered across all decision- making, policy development and implementation, similar to the existing public sector equality duty.

6.

History and nature of tree planting in Scotland

History and nature of tree planting in Scotland

Introduction

69. Much mythology surrounds the idea of an ancient 'Great Wood' having covered the bulk of Scotland in prehistoric times, only to have been destroyed by human activity. In fact, with the possible exception of juniper, no trees survived the last glaciation in Scotland, which ended about 8300BC. As the climate then warmed, trees gradually returned, with juniper, willow, rowan, birch, elm, oak and Scots pine all being present by around 7000BC. Total tree cover increased, possibly to more than 50% of the land area, though the extent to which this was continuous or more open woodland is uncertain. The maximal cover appears to have been reached by about 5000BC, followed by steady loss resulting from a mixture of climatic factors and human-induced effects (see Smout et al., 2007, for a detailed discussion).

70. By the early twentieth century, tree cover in Scotland was reduced to just 5% of the total land area, mirroring the pattern of decline seen elsewhere in the UK. Modern afforestation programmes in Britain began after the First World War. Warfare relied on large amounts of timber and the UK's dependence on foreign imports was seen as a serious weakness. A significant programme of afforestation began and the Forestry Commission was created, backed by the 1919 Forestry Act. Its primary aim was to establish strategic wood reserves in case of another war. It was hoped that this would also bring socioeconomic benefits, especially in the form of increased employment in rural Britain. Extensive planting began, initially dominated by Scots pine (Scotland's only native conifer suitable for timber), but increasingly overtaken by Sitka spruce and lodgepole pine (Oosthoek, 2013). These efforts were increased in the wake of the extensive felling that took place during the Second World War. In the drive to expand forest cover, private forestry was increasingly promoted as an attractive business investment. A scheme was also introduced whereby landowners could 'dedicate' land in return for forestry subsidies. The related public benefits of amenity provision and nature conservation were also highlighted, although they remained by-products in the pursuit of securing a national timber reserve.

71. This changed in 1957, when the Zuckerman (1957) Report concluded that there was no longer a strategic need for national self-sufficiency in timber. A further report in 1958 (Cabinet Working Party on Forest Policy, 1958) advised limiting subsidies, citing both a reduced national need for timber as well as the increased liberalisation of trade. At the same time, there was an increasing focus on enhancing the social aspects of forestry, which once again included amenity and conservation. By the 1960s, social benefits had become one of the major justifications for public expenditure on forestry. At the same time, despite proposals to abolish the land dedication scheme, pressure from landowners resulted in increased grants for dedicated woodlands. Over the following decades, proponents of free trade continued to advocate the removal of forestry subsidies.

72. Despite a highly critical report from the National Audit Office in 1986 (NAO, 1986), nothing immediately changed. The report found that the majority of new planting (88%) was concentrated in Scotland, and criticised the extent to which this was carried out on unsuitable land with poor rates of return. It noted that "...the provision of incentives to private planting is in effect a subsidy which could only be justified in national economic terms if there were social benefits from the expansion of forestry not reflected in the commercial returns...these benefits appear if anything to be less in the private than in the public sector." At the same time, there was increasing concern about the ecological impacts of post-war afforestation, including in the Flow Country where internationally important peat bogs were

History and nature of tree planting in Scotland (continued)

destroyed because of planting in the 1970s and 1980s. Despite the strong opposition of the Nature Conservancy Council from 1980 onwards (Stroud et al., 1987; Ratcliffe, 1980, cited in Stroud et al. 2015), planting continued. However, increasing concern resulting from the publication of Birds, Bogs and Forestry (Stroud et al., 1987) by the Nature Conservancy Council, combined with public opposition to tax breaks for the rich, led to the withdrawal of tax incentives for private investment in forestry in 1988 and the introduction of a Woodland Grant Scheme (WGS). Although timber production remained the primary objective, grants were also provided for community and ecological benefits with an increasing emphasis on improving those benefits. There have since been several changes to grant schemes in Scotland, with the Forestry Grant Scheme being the latest iteration (Scottish Forestry, n.d.f).

The present position

73. In marked contrast to other European countries where the majority (60%) of forest holdings are less than 1 ha, only 6% of holdings in Scotland fall into this category. Woodlands previously managed by the Forestry Commission are now managed by Forestry and Land Scotland. Tree cover in Scotland is now at ca 19% of the land area, higher than the rest of the UK (10% England, 15% Wales, 9% N. Ireland) (Forest Research, 2023a) but still well below European levels (examples include Finland: 74%, Sweden: 69%, Spain: 37%, Italy: 33%, Germany: 33%, France: 32% (Forest Research, 2023b)). In Scotland, approximately 38% of wooded area is on public land (National Forest Inventory, 2020).

74. Across the UK, 97% of new trees planted in 2019 were on privately owned land. In Scotland, only 2% of new trees planted in 2019 were on publicly owned or managed land; the comparable figures for the rest of the UK are 25% in N. Ireland, 4% in England and 0% in Wales (Ares et al., 2021). Thus, the overwhelming majority of public money invested in tree planting is given to private landowners.

75. As described in the Policy section, Scotland aims to create 18 000 ha of new woodland per year by 2024–25. With this, the Scottish Government intends to increase tree cover to 21% of the total area of Scotland by 2032, with a concomitant objective of increasing community ownership (Scottish Government, 2019a). However, no clear targets for community ownership levels have been provided. The vast majority of new tree planting in the UK takes place in Scotland and most new trees planted in Scotland are non-native conifers. By contrast, England and N. Ireland plant more broadleaf trees (Ares et al., 2021). Figures from March 2023 show that 71% of Scotland's woodland area is made up of conifers compared with 23% in England (NB: Scottish figures include native Scots pine as well as non-native species). Of all coniferous woodland in Scotland, 61% (of 848,000 ha) comprises Sitka spruce and another 18% of Scots pine (in 2021). The principal species in broadleaved woodland (in 2012) are birch (43% of 297,000 ha), oak (9%) and sycamore (7%) (Forest Research, 2023a).

76. Some 94% of timber production in Scotland is softwood (Scotland's Forestry Strategy 2019-2029, Scottish Government, 2019a), used for the supply of wood and wood fibre.

77. Increasingly, trees are being planted for carbon sequestration. However, the carbon sequestration value depends on the tree species, the time scale, growing conditions, the area where the trees are planted, the soil type, the means of site preparation, when the trees are cut down, as well as the final use of the timber (see section 8, Carbon capture by trees). The wrong tree in the wrong place can result in net carbon loss. For example, recent

History and nature of tree planting in Scotland (continued)

work has shown that planting of two native species (downy birch (Betula pubescens) and Scots pine) in areas of heather moorland with peaty/podzolic soil did not lead to an increase in net ecosystem carbon on a decadal scale and in fact resulted in a loss in one of the studied areas (Friggens et al., 2020). Matthews et al. (2020) discussed the potential for net carbon losses from planting on organo-mineral soils (i.e. not on deep peat) and highlighted the risks of undesirable outcomes (e.g. net emissions) associated with area-based targets. Furthermore, there is very considerable uncertainty around the quantification of forest carbon outcomes and associated carbon markets (Wells et al., 2023).

7. Current schemes and potential reform of financial support

Current schemes and potential reform of financial support

Background to public financial support for forestry

Planting and maintenance grants

78. Gross government expenditure on grants is provided by the annual Forestry Statistics 2023 (Forest Research, 2023c) and is summarised below for Scotland over a ten-year period. This includes grants paid under the Forestry Grant Scheme and legacy schemes (including Rural Development Contracts). The drop in grants paid between 2019–20 and 2020–21 predominantly reflects a change to accruals resulting from an improvement in accounting procedures. Figures include funding for planting, restocking and management activities.

Tax reliefs

79. Whilst forestry-specific tax incentives were withdrawn in 1988, commercial forestry income and inheritance are exempt from a range of taxes.

Income and corporation tax

- No income or corporation tax is levied on the occupation of, or the income from, commercial woodlands;
- Profits from the sale of timber are tax free; rents and other revenue receipts from woodlands are liable to income tax;
- No relief from income tax is given for expenditure incurred in commercial woodlands.

Capital Gains Tax (CGT)

- Special provision is made for commercial woodlands under CGT legislation:
- CGT is not payable on the gain in value attributable to the trees; only the increase in value of the underlying land is assessable;
- Roll-over relief is available when qualifying business assets are replaced (i.e. no tax is paid until the assets are sold), but this relief only applies to the land and capital works;

Table 2: Grant money paid, 2013-14 to 2022-23.

Year ending 31 March	£ million
2013-14	35.5
2014-15	39.2
2015-16	27.5
2016-17	30.5
2017-18	37.9
2018-19	50.2
2019-20	52.2
2020-21	31.7
2021-22	45.8
2022-23	41.2

Source: Forest Research, 2023c.

Current schemes and potential reform of financial support (continued)

- Non-commercial woodlands are subject to normal CGT rules.

Inheritance tax (IHT)

- Commercial woodlands currently attract 100% business property relief, provided the transferor has owned the 'relevant business property' for a minimum of two years immediately before the transfer;
- Under heritage relief, woodlands may qualify for the conditional exemption from IHT which is available for assets of national heritage quality, e.g. land of outstanding scenic, historic or scientific interest.

80. For all of these reliefs, the HMRC publishes no associated figures of the cost to the public purse.

81. In 2011, the Office of Tax Simplification published a survey of tax exemptions including that for income and corporation tax for woodlands. It noted that HMRC justified the reliefs on the grounds that, if tax were applied, it would provide greater scope for tax avoidance (OTS, 2011).

82. These exemptions were criticised in 2014 by the Land Reform Review Group (Scottish Government, 2014) for their cost to public funds in terms of income foregone, as well as their lack of clarity. They proposed a review of exemptions, with a clear and transparent explanation of the public interest justification for each of them. No such review has so far taken place.

Carbon payments

83. The Scottish and UK Governments do not make direct payments for carbon credits; these are traded between growers and companies seeking to compensate for their carbon emissions. Public investment is limited to Scottish Forestry's management of the Woodland Carbon Code (2022).

Other public subsidies

84. In addition to grants and tax reliefs, the Scottish Government established a Strategic Timber Transport Fund in 2005. Its purpose is to "facilitate the sustainable transport of timber in rural areas of Scotland and deliver benefits for local communities and the environment". (Scottish Forestry, n.d.a). It was intended to be in place for a period of three years but has been extended every year since its introduction, with the annual budget from 2016 being £3 m pa; that was increased to £7 m for 2023.[8]

Justification for current schemes of financial support

85. Since Adam Smith, many economists have considered that state subsidies create market distortion and are counter-productive to the wellbeing of the economy. Exceptions include:

- **Market failure** – It is possible that when financial payments or tax benefits for private forestry were introduced in the 1930s, they could have been justified in terms of providing support to nascent private enterprise. However, even if that were originally the case, it has not been true for a long time, as commercial forestry and timber industries have grown into a mature and successful enterprises, with both UK and foreign owners.

[8] This is in contrast to other commercial firms' schemes that require planning permission. Such permission is made conditional upon road works being carried out by the company to ensure that others are not unduly inconvenienced by the company's activities.

Current schemes and potential reform of financial support (continued)

- **State necessity** – Just as the government maintains an army, it was previously believed that a strategic reserve of wood was required to resource future wars. As described above, this policy was abandoned in 1957 (Zuckerman, 1957). In modern times, government priorities have shifted towards carbon sequestration and biodiversity restoration. (Scottish Government, 2023d). However, as this report will go on to explain, the current model of commercial forestry offers only incidental support for these objectives.
- **Import substitution** – This point was made by several submissions, not on economic grounds but on the premise that "it is in the public interest both here and abroad that our reliance on imports is reduced to help limit our contribution to damage and loss of the world's natural forests" (Confor). At present, the UK imports ~ 80% of its timber (approximately 30% of that is wood-based bio-fuel), with 58% arriving from the EU/Norway, 29% from USA/ Canada and the remaining 13% from the rest of the world, with no other country exceeding 1% (Forest Research, 2023d). As these figures illustrate, the large majority of timber imports are derived from countries with good environmental standards. Although poor forestry and environmental practices are indeed prevalent in some countries (UNEP, 2012), the solution lies in the proper control of supply chains by importers and timber industries. This is essential as there is currently no mechanism by which subsidised UK timber can be guaranteed to replace unsustainably harvested timber. Indeed, the main timber product imported from 'high-risk' countries (Friends of the Earth, 2022) is plywood, which is not produced in the UK. In 2022, two-thirds of plywood imports were from Brazil and China (Forest Research, 2023d), with half of the rest coming from 'other non-EU' sources. The last UK domestic manufacturer of plywood closed in 2007.
- **The public good** – Although commercial tree planting can contribute to the public good, this is often a secondary rather than a primary outcome under the current support structure. If subsidies are to be given in the interests of the public good (for example, to sequester carbon, to increase biodiversity, or to improve rural life), these are more cost effective and transparent if directed specifically at the public good.

The outcome of subsidies and tax reliefs

86. The Royal Institution of Chartered Surveyors' (RICS) Valuation of woodlands and forests – UK and Ireland (RICS, 2023) notes that:

10.2 non-afforested land that has scope to be planted with trees.

"In the UK and Ireland, there are a number of grant schemes available for establishing new woodlands. In addition, there are increasing opportunities to derive additional income streams from the various non-timber benefits that woodlands can provide.

In some jurisdictions, it is already possible to sell the carbon predicted to be sequestered by a new woodland creation scheme. The sale of carbon can make a significant contribution to the future income achievable from a new woodland creation project. The importance of carbon may also be an issue for recently established woodlands.

If the above sources of income amount to a greater sum than competing uses for that land (such as agriculture), then this may increase the value of this land."

87. Inevitably, one consequence of the subsidies and tax reliefs is an increase in land value and prices. This is demonstrated

Current schemes and potential reform of financial support (continued)

by recent sales of agricultural land for forestry. The 2022 UK Forest Market Report (Tilhill & Goldcrest, 2022) revealed that the average cost of plantable land in Scotland rose by 73% in just a single year (2021–22), jumping from £9,900 to £17,200 per hectare. The majority of UK sales of planting land were in Scotland (85% by value), as were all deals over 100 ha. Prices paid per hectare were substantially higher for larger purchases, at an average of £18,100 per plantable hectare, compared with £10,700 per hectare for smaller deals. Given that the early state afforestation programme was expected to bring socioeconomic benefits, especially increased employment in rural Britain, it is perhaps concerning that increased competition for planting land is reported to have priced some farmers out of the market (Merrell et al., 2023).

88. Land prices vary across the country, and a report by Savills (2023) showed that the average price per net productive hectare in 2022 was £17,400 for North Scotland, £28,900 for Central Scotland, and £33,600 for South Scotland.

89. Strutt and Parker's Scottish Farmland Market Review for 2022 shows the volatility of prices, which vary considerably throughout the year:

"...prices paid by forestry purchasers peaked at the beginning of the year, reaching in excess of £8,000/acre [£19,768/ha] in some cases. This was not seen during the second half of the year, yet prices remained well above traditional agricultural values. Upland values in Q3 and Q4 came back to approximately £5,000/acre - £5,500/acre [£12,355 - £13,591 / ha]". (Strutt & Parker, 2023, p. 6).

90. It is clear that the availability of carbon payments, grants and tax benefits leads to increased land prices, with the ultimate beneficiary being the landowner.
As the Institute for Fiscal Studies stated in evidence to the Scottish Affairs Committee in 2014 regarding agricultural subsidies:

"You would want to ask what precisely the reason is that you want to subsidise it. What precisely is the activity you would want to encourage, and then let's subsidise that... whatever it is that you want to achieve, identify that carefully, define it and target that". (Scottish Affairs Committee, 2014, p. 45).

91. The above evidence leads the inquiry to conclude that there is no reason for the public to continue to subsidise commercial timber production. This practice represents a misuse of capital and results in increased land values that distort the market. As an alternative, this report recommends that this money be reallocated to increased staffing for Scottish Forestry and otherwise to native and non-commercial woodlands that will lead to greater carbon capture, greater biodiversity and, if properly directed, could sustain increased benefits for rural communities by attracting more tourists and visitors (Sing et al., 2018).The latter points are considered in subsequent chapters.

92. Recommendations - current schemes and potential reform of financial support
1. Scottish Government should discontinue subsidies for coniferous commercial tree planting.
2. In discontinuing these subsidies, Scottish Government should redirect the money that is saved towards tree planting that is designed to provide long term carbon sequestration, biodiversity and public benefits.
3. The UK Government should calculate and report on the total cost of tax reliefs for woodlands, stating the purpose of the reliefs and evaluating them in respect of their cost effectiveness in meeting those objectives.

8. Timber industry

Timber industry

93. Timber processing provides an important source of employment for Scotland. In 2013–14, raw timber production directly employed 7119 FTEs (full time equivalent) – of which 1224 were employed by the Forestry Commission – with an additional 5050 FTEs estimated to be generated by associated recreation and tourism opportunities, although it is noted that this figure is likely to be conservative (CJC Consulting, 2015). Workforce figures for industries that use timber for creating products are as follows:

Table 3: Employment figures.

Activity	FTEs
Saw milling, production of pallet slats, fencing posts	2,227 FTEs
Production of wood panels, board and pulp and paper	1,126 FTEs
Production of chips, pellets	472 FTEs

Source: CJC Consulting, 2015; Scottish Forestry, n.d.b.

94. Timber processing in Scotland is largely restricted to short-life and low-value products that in turn produce limited added value (Construction Leadership Forum, 2023). This in turn leads to the early release of the sequestered carbon back into the atmosphere.

95. The situation is similar elsewhere in the UK. However, as Scotland produces the majority of timber across the four nations, it represents a particularly significant missed opportunity to capitalise on local manufacturing capacity to make better use of timber's potential as a raw material. Pursuing more complex added value manufacturing such as Glue Laminated Timber (Glulam), Nail Laminated Timber (NLT) and Cross Laminated Timber (CLT) would not only be more lucrative but would also lead to the long-term sequestration of carbon compared with lower grade wood products. This was highlighted by the construction of two homes, one of CLT and one of NLT, as demonstration projects at COP26 in Glasgow (BE-ST, 2021).

96. Scotland also benefits from centres of excellence in timber research, particularly through the Centre for Wood Science and Technology at Edinburgh Napier University, and Built Environment – Smarter Transformation (BE-ST, formerly Construction Scotland Innovation Centre). The latter recently contributed to a report titled *Low Carbon Energy Supply Chain – Detailed Analysis* (Construction Leadership Forum, 2023), which provides a valuable overview of the opportunities and constraints facing the growth of the mass timber industry. It identifies several actions that need to be brought about to facilitate this expansion – most critically, developing a coordinated programme of implementation.

Timber industry (continued)

This further requires an agent to lead, coordinate and drive the programme as well as helping to obtain appropriate financial and capital investment to stimulate further growth. The obvious candidates for this are the Enterprise Agencies[9], either in partnership or with one taking the lead, who should be requested and empowered by the Scottish Government to use their skills and financial resources to support increased investment in high value-added timber production.

The success of such a programme would benefit the timber industry as well as contributing to carbon sequestration (Mass Timber Institute, n.d.). It is noted that Highlands and Islands Enterprise (HIE) is already supporting high value-added manufacture in partnership with BE-ST.

97. Recommendations - timber industry

4. Scottish Government should require and empower the Enterprise Agencies to use their resources – both skills and financial – to assist the Scottish timber industry in adding value to raw timber by supporting firms to develop and expand mass timber products.

[9] Scottish Enterprise is Scotland's national economic agency. It works to transform the Scottish economy by helping businesses to innovate and scale.

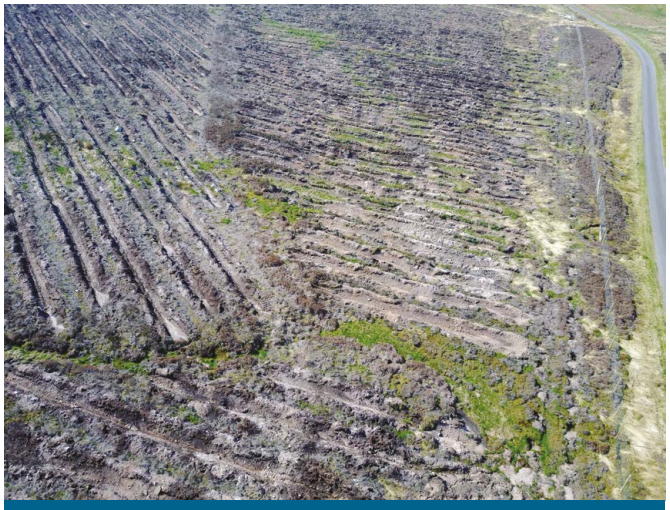
9. Carbon capture by trees

Carbon capture by trees

98. While trees capture appreciable quantities of carbon from the atmosphere (~5->10 $tCO_2e/ha/yr$; Matthews et al., 2022), species vary in their rate of carbon uptake. Production forestry species such as Sitka spruce grow quickly and take up carbon more rapidly than native broadleaved species (Matthews et al., 2022), although natural forests ultimately store more carbon than plantations (Waring et al., 2020) and they also provide more co-benefits for water provisioning, soil erosion control and biodiversity (Hua et al., 2022; see also section 8, Biodiversity). However, it is acknowledged that rates of carbon capture by trees can be uncertain. An undue focus on carbon as a metric of success for tree planting, at the expense of the many non-carbon co-benefits of different types of woodland, was raised as a concern by several respondents to the inquiry (excerpts below).

99. Globally, soils contain three times more carbon than does vegetation (Smith, 2004). On long-established woodlands, the soil can contain as much carbon as the trees, and on peaty soils the carbon in the soils can far exceed the amount of carbon in the trees (Matthews et al., 2020). This means that soils need to be carefully considered when planting trees, requiring a pre-planting survey at a fine enough grain across the whole site to understand the soil types and their locations.

100. With minimal disturbance, freshly planted woodlands can very quickly become carbon sinks, but with significant disturbance soil carbon can be lost at planting, and it may take some years before a net carbon sink is established. This is particularly true on soils high in organic carbon, such as those with a shallow peaty layer which are found throughout Scotland (Matthews et al., 2020).



Ground prepared for planting on Sherrifmuir, deep drains on humus-iron podzol. 2019 © Patricia Bruneau

Ground prepared for planting on Sherrifmuir, deep drains on humus-iron podzol. 2019 © Patricia Bruneau

Carbon capture by trees

In extreme cases, the net carbon sink could take decades to realise. For this reason, the soil type on which the trees are planted is critical (with low carbon soils, such as those previously under arable production, being the most beneficial), as well as the method of planting (with direct planting being less destructive than deep ploughing and/or mounding). It is notable that in England, planting is not allowed on peat soils deeper than 30 cm even although the new UKFS (and Scottish policy) allows planting up to 50cm depth. The lack of consideration for planting on appropriate soil types, and/or with appropriate cultivation methods, was raised by respondents.

101. The long-term carbon balance of a woodland depends not only on the soil type, but on whether the timber is harvested and on the ultimate fate of the harvested wood products (Matthews et al., 2022). Harvested woodlands can constitute a greater long-term carbon sink than unharvested woodlands if the harvested trees are replaced by planting and the majority of the harvested wood products are long-lived (such as timber used in construction). If the harvested trees are not replaced by replanting, or if the harvested wood products are short-lived (e.g. pulp and paper, or burnt for energy), the long-term carbon balance can be as low as zero.

102. Recommendations - carbon capture by trees
5. Scottish Forestry should ensure that Environmental Impact Assessments pay careful attention to soil composition by ensuring that sampling is done on a sufficient scale across the whole site.
6. In order to implement the UKFS statement on techniques "that create the minimum amount of soil disturbance" (e.g. screefing), Scottish Forestry should prohibit planting with mechanical disturbance on carbon-rich soils.

10. Biodiversity

Biodiversity

Historical context

103. The historical loss of native woodland cover (notably Caledonian pinewood, Atlantic woodlands and juniper) has contributed to the biodiversity crisis in Scotland, and indeed across other parts of western Europe.

104. The biodiversity profile varies considerably across native broadleaved woodland and production forestry, with the former being greater in structural and biological diversity (e.g. Humphrey et al., 2015; Newton, 2020; Newton & Moss, 1981; Sing et al., 2018; Summers, 2018;). Biodiversity within the forest tends to be greater in stands that are structurally diverse in terms of their age, species, patch edge, understorey and deadwood component (e.g. Humphrey et al., 2015; and see references in Sing et al., 2018). In addition to the submissions provided by respondents, this section draws on several specialist and recent reviews to assess the biodiversity characteristics of common forestry practices and approaches (e.g. Di Sacco et al., 2021; Martin et al., 2021; Newton, 2020; Ratcliffe, 2007; Sing et al., 2018; Summers, 2018; Tew et al., 2023; Wilson et al., 2014).

Clear fell for new timber extraction route, Loch Striven, Argyll 2023 © Ted Leeming

105. Historically, with the advent of the Forestry Commission, the emphasis was on planting for fast establishment and growth. As a result, non-native species were preferred – from continental Europe, larch on drier ground, and Norway spruce on wetter ground. This later switched to Sitka spruce and lodgepole pine (a North American species), which thrive in damp, oceanic conditions. Scots pine remains the only native plantation conifer, although it is relatively slow growing and performs poorly on wet soils.

106. Commercial forests tend to be planted as monocultures, often following ground preparation, with trees spaced roughly 2m apart and in blocks. Dense planting excludes an understorey, and ensures that trees grow tall and straight, forming a thicket stage with virtually no ground vegetation. In the past, stands were thinned periodically during a rotation, with up to 90% of the trees removed before the final crop. Following felling, the second rotation of planting now offers the opportunity to increase open space, species and age diversity, thus improving overall value for biodiversity (e.g. Sing et al., 2018; Newton 2020), but this opportunity is seldom taken (e.g. Newton 2020). Old-growth, open-grown trees with full crowns have their own ecology and specific biodiversity associations, both as live trees and as 'snags' (standing, dead or dying trees).

Upper Scaur valley, near Penpont, Dumfries and Galloway, grant aided commercial planting with downhill hill ground preparation 1996 © Roger Crofts

Biodiversity (continued)

These, and so-called 'granny pines' in Caledonian pinewoods, do not feature in plantation systems. Indeed, in previous decades, many such trees were killed by close planting of non-natives conifer around them, as is visible in Glenmore, Cairngorms (Summers, 2018).

107. The 5th edition of the UKFS, which comes into force in October 2024, requires that planting schemes should have a maximum of 65% of one species, with the remainder comprising a minimum of 10% of another tree species and at least 10% open land or ground, managed for biodiversity as the primary objective, and 5% broadleaved tree or shrub cover (UKFS, 2023). This is a welcome improvement on previous guidance, which allowed up to 75% of the area to be a single species. To maximise resilience, it is important that non-coniferous species are spread throughout the scheme, as recommended in the UKFS (2023), *"a long-term forest structure of linked permanent habitats, such as riparian woodland, open space and mature broadleaves."*

108. In recent decades, several tree pathogens have become established in Scotland. This presents a growing threat to timber production, not least because monocultures are more susceptible to the rapid spread of species-specific diseases and pests (Bellamy et al., 2018). For example, *Phytophthora ramorum* kills larch to the extent that large areas are now felled to limit disease spread, and *Dothistroma septosporum* kills large areas of lodgepole and Corsican pines. As well as these known threats, others are likely to emerge (e.g. Mitchell et al., 2022). One potential concern is *Ips typographus*, the larger eight-toothed European spruce bark beetle that has formed breeding populations in Kent and East Sussex in the last five years and is regularly trapped across south-east England. This beetle was recently recorded in Scotland for the first time, although so far it has been found only once (Haugh, 2023). Native trees have also succumbed to disease, notably ash dieback (*Hymenoscyphus fraxineus*) and Dutch elm disease (*Ophiostoma novo-ulmi*). The former was initially recorded in UK in 2012, although evidence has since confirmed its presence from before 2006 (Wylder et al., 2018). Disease harboured by a non-native tree species is more likely to transfer to a native species if the two tree species are closely related (e.g. both *Pinus* species; Piotrowska et al., 2018).

Range of impacts on land

109. Both the literature and evidence from respondents point to concerns about several aspects of tree planting adversely affecting biodiversity (see especially references in Section 88, and others cited below).

The major concerns relating wholly or largely to planting of non-native conifers are:

- a lack of understorey (and old growth) resulting in greatly reduced biodiversity value compared with woodland with a more diverse structure. This is generally the case for young plantations, whatever the species, but can persist throughout the entire rotation under the heavy shade of species such as Sitka spruce, especially when not thinned;
- substantial areas of open upland and associated biodiversity have been, and continue to be, lost to commercial forestry;
- the acidification of soils and water, particularly affecting invertebrate fauna with additional adverse impacts on fish, birds, and other wildlife across the catchment, including non-forested areas (e.g. Nisbet and Evans, 2014); and

Biodiversity (continued)

- ground preparation involving ploughing (less common) and mounding (trench, hinge and invert), both of which lead to destruction of the soil profile, a loss of soil carbon if the soil is peaty, and altered soil hydrology. This affects both native and non-native planting (screefing is the least damaging method of ground preparation).

Concerns relating to both native and non-native planting are:

- expensive fencing around planted areas resulting in red deer being displaced to adjoining areas where browsing and grazing pressures then increase, together with capercaillie and black grouse mortality caused by collisions with fences;
- tree species seed 'rain' beyond the planted area, resulting in trees regenerating far beyond the fence and potentially onto blanket bog, wet heath and other habitats rich in carbon and biodiversity. Where such species are non-native, this can lead to biodiversity loss in all habitats, including native woodland. Colonisation by native tree species can also be a problem for open habitats, where it can lead to drying out, or loss of less competitive species. In many areas, tree seedlings are not removed by those responsible, which are then restored at considerable public expense;
- restrictions on natural regeneration and recovery of ancient native woodlands. In the case of non-native plantations, ancient woodland can be 'boxed in' and unable to expand. Native planting adjacent to existing ancient woodland can represent a lost opportunity for natural regeneration, which is usually more beneficial for biodiversity (see Summers & Cavers, 2021);
- predation effects around the edge of plantings, which provide cover for mammalian and bird predators. Their impact on ground-nesting birds can extend for many hundred metres out from the forest edge, affecting settlement density, nesting success or both (e.g., Douglas et al., 2014; Pálsdóttir et al., 2022; Wilson et al., 2014); and
- lack of monitoring evidence after planting to address concerns about forest-edge effects (e.g. from greater predation pressure, herbivore impacts, and seedling invasion), wider forest maintenance, and impacts on watercourses, soil health and wildlife.

110. The release of invasive species is prohibited under the **Wildlife and Natural Environment (Scotland) Act 2011**, although Sitka spruce (together with a range of other commercial tree species) is: "exempt because they are important to the Scottish economy and their maturation patterns and invasive potential are understood well enough to allow the risk of their spreading to be managed and lowered. However, these species must still be managed according to the UK Forestry Standard". (Forestry Commission Scotland, 2015). The UKFS (2023) Guideline states: "*Where species are invasive and pose problems, manage, control or remove them where this is feasible; take action early while populations are still small*." Summers and Cavers (2021) give a clear example of the adverse effects of non-native conifers on the expansion and integrity of Caledonian pinewoods. Additional recent reviews show global impacts of invasive Pinaceae (Nuñez et al., 2017; Policelli et al., 2022).

Biodiversity (continued)

111. NatureScot is developing tools to predict the impact and potential extent of tree seed rain on blanket bog in Scotland. Initial results, based on proximity of peatland to plantations, estimate that 267k ha of peatland are at higher risk of colonisation (within 200m of the forest edge), and 579k ha are at lower risk (200m – 1km). To date, it is not known what impact such seed rain may have on carbon sequestration or biodiversity, and any effects may not become evident until 10+ years after tree planting, by which time resources to support subsequent management may become unavailable. At present, seed rain may extend to 200m, but in time the forest will spread progressively further over the open landscape (some tree species produce seeds at around 10 years old).

Initial results from the DiversiTree project (James Hutton Institute, n.d.) show that around 1100 species use Scots pine and around 390 species use Sitka (data still being finalised). Of these, approximately 217 are found only on Scots pine and six non-native species are found only on Sitka. In addition, there are a further 469 lichens found on pine species, 12 of which are obligate at the genera level (i.e. only found on pine species), and 243 lichens found on spruce, one of which is only recorded on spruce (but there are few records for this lichen in the UK and this may be due to under-recording; elsewhere in Europe, it is recorded on soil and humus). Data for lichens are only available at the tree genera level (R. Mitchell, personal communication, November 27 2023). Clearly, this is emerging and highly important scientific work.

112. The Terrestrial Breeding Birds Indicator for Scotland (NatureScot, 2022) shows a steady rise in woodland bird abundance since 1994, contrasting with declines in farmland, urban, and especially upland populations.

Conifer encroachment on deep peat at Forsinard Flows National Nature Reserve. © Lorne Gill/NatureScot - 2017

Biodiversity (continued)

Harris (2020) provides examples of how productive forest management can benefit biodiversity. For example, the edge of commercial forests, planted with broadleaved trees, can sustain a rich invertebrate and bird fauna (e.g. Scridel et al., 2017). Well-managed productive forests also support mammals such as red squirrel and pine marten.

113. Natural regeneration of woodland, as opposed to tree planting, supports a greater range of species through its growth, from early establishment through successional stages (e.g., Newton, 2020; Watts & Jump, 2022). Natural regeneration also avoids some of the adverse effects arising from soil disturbance (including disturbance of peat) and erosion, and arguably offers a more attractive landscape effect (Friggens et al., 2020; Summers & Cavers 2021). The biodiversity of these regenerating woods can complement that of adjoining open landscapes, especially where natural treelines are forming (e.g., Martin et al., 2021).

At present, Scottish Forestry has only one scheme to support natural regeneration - 'Woodland Improvement Grant – of Habitats and Species' (Scottish Forestry, n.d.f), but this is within the Woodland Management section, not in the Woodland Creation options.

114. The limited funding for woodland management in relation to deer impacts is a concern. Management of mixed native woodland for timber can be important for biodiversity (e.g., several SACs in the Cairngorms are managed for timber). Removal of deer fencing and reduced deer densities are key to sustainably managed forests with restored biodiversity (e.g., capercaillie; forest floor botanical and invertebrate richness). As outlined in the *Strategic Framework for Biodiversity in Scotland* (Scottish Government, 2023d), the sustainable management of deer – requiring marked reductions in densities –- is essential both to productive and native forest sustainability. Gullett et al. (2023) showed that in recent years 164ha of new woodland has been established annually within the Cairngorms Connect area as a result of deer control, illustrating the wider potential of this approach.

115. The prediction that forests of mixed tree species provide greater resilience to disease and climate change is largely supported by the scientific literature (e.g. Sturrock et al., 2011; Thompson et al., 2009;), reinforcing widespread concerns about the low diversity of many plantations. Gamfeldt et al. (2013) found that production of tree biomass, soil carbon storage, berry production and game production potential were all positively related to tree species richness. However, there are some exceptions such as drought resilience, which varies according to tree species (e.g., Ovenden et al., 2022). Higher diversity of native and regionally appropriate species in a forest should convey greater resilience to disease. This relates to species that naturally occur together in ecosystems developed over many centuries, but not to new forests or novel pathogens (e.g., Bellamy et al., 2018). As well as species diversity, genetic diversity of individual tree species is crucial to resilience, as observed in the response to ash dieback (Semizer-Cuming et al., 2019).

116. The principal ways of promoting biodiversity in productive forestry include: a) increasing the mixture and extent of native broadleaved species (including scrub); b) diversifying the age structure across mosaics, with some extensive areas of long-rotation trees; c) pursuing sensitive management around water bodies to avoid acidification and support natural broadleaved species (such as alder) regeneration at the water's edge (to mitigate the effects of climate warming); d) careful consideration given to avoiding seed rain effects on surrounding open habitats, especially blanket bog; e) greater tolerance of dead timber; and e) creation of open spaces within the forest, and bog restoration, to benefit biodiversity (see examples of some of these benefits in Harris, 2020).

Biodiversity (continued)

Wood of Cree, Cree valley Wigtownshire, Dumfries and Galloway. 2019 © Roger Crofts

Riverine wood planting

117. In recent years, the importance of riverine woodland has gained prominence, and funding is now available for its establishment (Scottish Forestry 2023). Woodland regeneration associated with rivers and wetlands – most recently benefiting from beaver reintroduction (provided deer do not prevent regeneration after felling) and supported by 'riverwood' restoration – has the potential to help control water temperature, hydrological processes, nutrient loads, floods and droughts and bank erosion.

118. The climate crisis is increasing water temperatures in river systems (Caissie, 2006; Hannah and Garner, 2015; Webb et al., 2008;). River temperatures are particularly important for fish species adapted to cold water, such as salmonids; significant deviations in water temperature can adversely affect their growth, survival and demography (Elliott & Elliott, 2010; Gurney et al., 2008; Jonsson & Jonsson, 2009; McCullough et al., 2001). Measurements taken during the summer of 2018 showed that 69% of Scottish rivers experienced temperatures that are known to cause thermal stress for young salmon on one or more days (Marine Scotland, 2019). This is especially concerning as the Atlantic salmon in the UK was recently reclassified by the IUCN as 'Endangered', as announced at COP28 in December 2023. Temperatures above this threshold have been shown to reduce the density and biomass of juvenile salmon in upland streams in Scotland (Bernthal et al., 2022). Under continued climatic change, it is estimated that summers as hot as 2018 may occur in around half of all years by 2050 (McCarthy et al., 2019).

Biodiversity (continued)

119. Riparian tree cover – especially in headwater streams – helps to mitigate these concerns by shading the water surface (Marine Scotland, 2018) and stabilising bank structure (e.g. Broadmeadow et al., 2011).

However, an unpublished analysis by NatureScot shows that only 19% of all riverbanks in Scotland are wooded, with some areas having no riparian trees at all. In Highland Scotland, the figure is only 15%. A lack of riparian woodlands can have adverse impacts on freshwater biodiversity and river channel morphology, even under stable circumstances, and increased riparian cover is important in helping to achieve Good Ecological Status as required under the Water Framework Directive (European Commission, 2023).

120. Deciduous, native, riparian vegetation alongside streams is important in supplying nutrients for fish and aquatic invertebrates when leaves, wood or terrestrial invertebrates fall into the water (Addy et al., 2016). However, conifer needles entering streams throughout the year (Inoue et al., 2012) are not easily processed by stream biota (Collen et al., 2004; Márquez et al., 2017; Principe et al., 2015). Their low nutrient concentrations and palatability compared with that of many broadleaf deciduous species (Casas et al., 2014; Graça & Cressa, 2010; Martínez et al., 2013; Martínez-Vilalta et al., 2016) can hinder processing efficiency in stream ecosystems and contribute to higher acidity.

121. Stream-scale investigations show that macroinvertebrate biomass in deciduous woodland streams is around double that in moorland streams, and lowest in streams draining areas of non-native conifers (Thomas et al., 2016). Forest planting surrounding a river may also have a positive effect on aquatic communities when large pieces of wood fall into a stream. These can increase habitat heterogeneity by modifying flow patterns, as well as providing new habitats themselves.

122. Tree regeneration or planting (requiring tree guards for each tree to avoid herbivore browsing) along the edges of watercourses can thus bring benefits to freshwater communities.

Scottish Forestry (2023) identified a target area of ~175,000 ha of riparian land across Scotland that has the potential to provide many benefits through woodland planting. These woodlands will help to improve water quality, reduce river temperatures, contribute to flood management, and enhance biodiversity and the wider environment. They will also be eligible for a higher grant rate under the Forestry Grant Scheme.

123. Recommendations - biodiversity
7. As outlined by the UKFS, Scottish Forestry should require mixed native broadleaf planting, shrub cover and open land to be interspersed throughout commercial monoculture planting.
8. Scottish Forestry should encourage and support natural regeneration for proposed establishment of mixed native woodland and include this in its grant support criteria within the Woodland Creation category.
9. Scottish Forestry should require that planting schemes include native planting and regeneration along watercourses.
10. Scottish Forestry should require schemes to consider how the spread of invasive tree seed to adjoining land (especially peatland) will be prevented. It should also require appropriate steps to be taken to reduce such spread and, where necessary, impose conditions to remove seedlings when it does occur.

11. Environmental Impact Assessment (EIA)

Environmental Impact Assessment (EIA)

124. An Environmental Impact Assessment (EIA) is used to determine whether consent should be given for forestry work to go ahead (Scottish Forestry, n.d.e). The four types of forestry activity to which an EIA may apply are:

- **afforestation** – planting new woods and forests, including direct seeding or natural regeneration, planting Christmas trees or short rotation coppice;
- **deforestation** – felling woodland to use the land for a different purpose;
- **forest roads** – the formation, alteration or maintenance of private ways on land used, or to be used, for forestry purposes, including roads within a forest or leading to one; and
- **forest quarries** – quarrying to get materials needed for forest road works on land used, or to be used, for forestry purposes, or on land held or occupied with that land.

125. Several respondents raised concerns about the de facto approach to EIAs. In particular, they believed that EIAs lacked rigour in practice (especially in relation to the actual or potential impacts of plantations, including on adjoining areas), that they largely overlook cumulative impacts, and are undermined by insufficient monitoring. In relation to EIAs, the inquiry received the following comments:

- "*EIAs are rarely carried out prior to design and planting. For example, a current check (30/11/22) of the Scottish Forestry EIA register lists 22 schemes, comprising 3690.85 hectares, none of which were required to submit an EIA (note this also includes a small number of Long-Term Forest Plans, although these will involve (re)planting)*". (Anonymous 2)."*Insufficient attention is paid to cumulative effects of afforestation of particular types, such that in areas of rapid commercial forest expansion like the south of Scotland there are negative impacts on regional biodiversity developing. Detailed examples given for south Scotland*". (Anonymous 2).

Borrow Pit, north of Clatteringshaws Loch, 2023
© Ted Leeming

Environmental Impact Assessment (EIA) (continued)

- "*Forest plans are meant to follow the UKFS but there is limited monitoring or verification once the forest plan has been approved. Furthermore, whilst mixed forestry is a UKFS requirement, it is also unclear if forest plans adopt the most suitable planting for local site conditions and the wider landscape context (Yang, 2020)*". (The University of Edinburgh Centre for Sustainable Forests and Landscapes).
- "*Unpublished evidence from focus groups with community groups in and around the northern Great Glen area (Drumnadrochit and Glen Urquhart) and in the Galloway and South Ayrshire UNESCO Biosphere suggests that consultation processes on new woodland/forestry are insufficient and tokenistic*". (The University of Edinburgh Centre for Sustainable Forests and Landscapes).
- "*A site in the Borders was planted up within the agreed forest plan and advertised through the Woodland Carbon Code website as a biodiversity positive site having left species rich grassland areas for Northern Brown Argus (Aricia artaxerxes). At a later date an application was submitted under planning conditions for the construction of a forest track, the forest track went through many of the open habitat areas which had been specifically left for Northern Brown Argus destroying the habitat*". (Butterfly Conservation).
- "*The available data on which EIAs are based are limited. There is a lack of information about important habitats and species within Scotland with little or no mapped data available to search on several important habitats such as species-rich grassland. Butterfly Conservation has attempted to tackle this problem by trialling providing data to local Scottish Forestry offices, the local records centre and by publicising the fate of specific high-risk species such as Northern Brown Argus in the Scottish Borders*". (Butterfly Conservation).

126. Other concerns raised by respondents to the inquiry were: a) the lack of, or inadequate, EIAs of new tree planting projects; b) a lack of independent post-planting oversight to check that the trees are growing well and that all of the intended outcomes (in terms of carbon, biodiversity and other metrics) are being met; and c) the potential for tree planting schemes to be used by companies and project developers to 'greenwash' their operations, e.g. by planting trees while doing little to reduce the emissions from their business.

127. The EIA process is therefore clearly perceived as inadequate. There appears to be a passive approach to considering direct impacts, when in fact the impacts on areas adjoining plantations need to be appropriately considered. The cumulative impacts of forestry establishment appear under-assessed, even if the ways in which several, independently planned forestry schemes might radically transform landscape character and biodiversity value are readily apparent. Furthermore, there appears to be a detachment in the EIA process between the community and environmental benefits of planting schemes.

128. Confor recently suggested that planting projects take too long to be approved. In a supplement to The Herald (2023) Confor stated "*When you have keen investors putting in proposals for good projects, and in some cases the consultation just drags on and on, you are basically driving away investment in the sector. All too often, investors are faced with more and more requests for information and changes late on in the application process which delay approval still further. We are in a climate emergency but applicants bemoan a lack of urgency and want to see more decisiveness on the part of the regulators.*" Unfortunately, The RSE received no figures on this, nor were any found, so it is difficult to judge if applications do indeed take longer than would reasonably be expected. It is inevitable that planting applications, particularly large ones with potentially

Environmental Impact Assessment (EIA) (continued)

significant consequences for the natural environment and built infrastructure, will not be a quick process, especially as biological rhythms do not necessarily coincide with commercial objectives. In addition, the speed of response is, in part, a condition of the quality and thoroughness of the submission.

129. Improving the EIA process will require an attendant increase in capacity across the relevant public agencies. As recommended in section 7 (**Current schemes and potential reform to financial support**), some public finance could reasonably be redirected from subsidies for commercial tree planting into employing additional staff at Scottish Forestry to allow more efficient and effective assessment of proposals. This could further be facilitated by Scottish Forestry adopting a standard public platform for submissions and issuing appropriate guidance on the approach and content of an EIA.

130. Recommendations - Environmental Impact Assessment
11. Scottish Forestry should require that all planting proposals of 40 ha and above, or smaller applications adjoining existing woodland, submit an EIA.
12. Scottish Government should increase capacity in Scottish Forestry for independent scrutiny of planting applications, including an increased number of EIAs, and carry out compliance monitoring during and after planting to confirm adherence to the UKFS and specific conditions.
13. Scottish Forestry should consider providing guidance on the form and content of EIA submissions.

12.

Urban trees

Urban trees

131. Although the assets provided by forests and woodlands are well understood, there are increasing moves to recognise, encourage and produce benefits from urban tree planting. The benefits of urban trees include climate change mitigation (through shade and cooling), improvements in air quality and biodiversity, reductions in noise, and wider health and wellbeing benefits (e.g. Liu & Slik, 2022; Pataki et al., 2021).

132. This growing appreciation was clearly affirmed in 2022, with funding dedicated to creating urban 'wee forests' (Scottish Government, 2022e). The Wee Forest demonstration projects consist of tennis court-sized, densely planted, fast-growing native species, creating rich woodland in an urban setting. As of 2022, 27 Wee Forests had been created, with more than16,000 trees planted "for nature and climate" (NatureScot, n.d.a).

133. There are several different urban tree-planting schemes already in place within the UK and Scotland, managed predominantly by Local Authorities. A number of Scottish cities have announced strategies for this while also recognising that, in response to climate change, trees different from our native species may be needed. As an example, the initiative One million tree city (The City of Edinburgh Council, 2023) has created an action plan that includes:

- preserving and maintaining trees
- working with land and property owners to plant more trees
- involving business in tree planting through activities such as volunteer schemes
- running community planting projects
- working with residents to raise awareness of which trees to plant and where
- putting in place appropriate development controls.

134. In Glasgow, there is an equivalent strategy to increase the city's canopy cover from the 2020 figure of 16.1% to 17.1% over a 10-year period by planting trees across the city's land holdings (TGCVNP, 2019). Sixteen neighbourhoods have so far been identified as priority areas (Clyde Climate Forest, n.d.).

135. Scottish Forestry's *Woods in and Around Town* (WIAT) (Scottish Forestry, n.d.d) programme tackles the barriers people face in regularly visiting and benefiting from woodlands. The programme focuses on the location, accessibility and management of urban woodlands to encourage more use by local people. WIAT woodlands are located within 1km of a population settlement of ≥2000 people, and the Forestry Grant Scheme (Scottish Forestry, n.d.f) offers financial support for managing these and other urban woodlands in Scotland.

136. As the above paragraphs describe, much of the emphasis is on planting large numbers of trees whether in Wee Forests, parks or peri-urban areas. Although these are undoubtedly valuable, they are not located in the hard urban environments where a significant number of people would directly benefit from them.

137. Trees in streets, especially when planted in a line, are effective at pollution reduction (Nowak et al., 2006) and in providing shade and cooling where it is most needed (Vaz Monteiro et al., 2019). A key component of visual amenity, they signal the changing of the seasons and their ever-changing beauty is accessible to all, even the house bound. This latter point is very important as research has shown that both mental (Marselle et al., 2020) and physical well-being is strengthened by street trees (Donovan et al., 2022).

Urban trees (continued)

138. It is difficult to understate the social value of trees within our streets but, as a very poor proxy, there is a substantial body of evidence showing that proximity to trees increases the value of property (e.g., Pandit et al., 2013). More recently, Konijnendijk (2022) has provided a valuable review of the health benefits of urban trees and proposed a useful measure and aim of 3:30:300; that is, three trees seen from every house, 30% tree cover in every neighbourhood, and no more than 300 m from the nearest park or green space.

139. In England, there are a number of schemes, including the Local Authority Treescapes Fund (LATF), for restoring trees, and the Urban Tree Challenge Fund (UTCF) (UK Government, 2023b) which provides financial support for new planting in socially deprived urban areas with low canopy cover and in proximity to healthcare and educational facilities. Both of these initiatives support the planting of individual trees or lines of trees ,with the UTCF supporting the "planting of large 'standard' trees and street trees."

140. Increasing the number of street trees can be achieved if, when granting planning permission for new larger schemes (whether commercial or residential), Councils require the frontages of streets to be planted with trees. Tree planting can also be combined with traffic calming and road improvement measures. In densely developed locations, additional mitigating measures may be required. Enacting these changes requires a strategic commitment and policy, the adoption of special planting techniques, and an ability to respond to opportunities – particularly underground service renewals and road changes and improvements (UK Government, 2023b).

141. Recommendations - urban trees
14. Scottish Forestry should provide targeted grants to Local Authorities to plant trees in existing urban locations.
15. Local Authorities should require all new built developments with road frontages to incorporate trees in the road or on their frontages.

13. Rural communities

Rural communities

142. Rural communities in Scotland face major issues affecting their viability and way of life. These include housing, the availability of long-term jobs, and connectivity, especially public transport and telecommunications (RSE, 2023; SCDI, 2019; Scottish Government, 2021c, 2021d).

143. Although the previous Forestry Commission built many homes for forest workers across rural Scotland, including new villages such as Ae (Dumfries and Galloway) and Achnamara (Argyll and Bute), it currently makes no contribution to housing provision in rural areas. Increases in productivity brought about by capital investment mean that employment numbers for forestry workers are proportionately lower than they were, and part-time working has increased.

144. The forestry workforce was last surveyed in 2012–13 (CJC Consulting, 2015), the results of which showed that 7119 FTEs worked directly in the establishment, management and delivery of timber to the process industries. Overall, employment is likely to have grown since then.

145. Prior to the implementation of post Brexit labour regulations, a large proportion of the workforce originated from outside the UK (Farquhar, 2022).

146. The same CJC Consulting report showed that the use of forests and woodlands for recreation and leisure generated 5050 FTEs (although it notes that this is likely to be a conservative estimate), placing this sector not far behind the number of direct forestry workers.

147. Forestry operations can place significant pressure on an already fragile rural road network. The Scottish Government-funded Strategic Timber Transport Scheme (Scottish Forestry, n.d.a) recognises this and provides awards mostly to address improvements to minor roads. It was established in 2005 for a duration of three years but has been consistently extended, with the budget in 2021–22 of £3 m increased to £7 m for 2022–23. Nevertheless, concerns were expressed regarding the impact that timber lorries have on roads, often leading to rapid deterioration (R. Crofts; Anon 5; T Leeming).

148. A recurring concern across several submissions (e.g. RSPB, BSBI, Prof David Raey/ECCI, Friends of the Ochils, James Hutton Institute, Scottish Land Commission, Sustainable West Linton and District) was the absence or poor nature of community consultation. The criteria for undertaking consultations are published online by Forestry Commission Scotland (FCS, n.d.). It is notable that Community Councils are not considered statutory consultees. FCS does note that "for large or sensitively located proposals" (FCS, n.d., p. 7), it may consult with Community Councils. Unfortunately, the term "large or sensitively located" is subjective and could lead to different interpretations.

149. A recent report by the Forestry Policy Group (FPG, 2022) provides specific examples of reluctant and poor consultation. Although it also presents more positive examples – demonstrating that effective engagement can be achieved if the intention is there – these are unfortunately in the minority. A report by the James Hutton Institute (2022) cites similarly disappointing examples of community engagement taken from the south of Scotland.

150. In this context, the Scottish Land Commission (SLC, 2023, p. 1) has produced community engagement guidelines in the Land Rights and Responsibilities Statement that are "additional to any statutory process or sector specific requirements, such as consultation for planning applications or forestry developments or in relation to funding applications.". The guidelines articulate expectations for good practice that can be used for early engagement before more formal processes are initiated.

Rural communities (continued)

151. In its Forestry Implementation Plan 2022–25, the Scottish Government states a commitment to "*work with the forestry sector and communities to promote the principles set out in the Land Rights and Responsibilities Statement and improve the opportunities for communities to be involved with the development of forestry proposals and plans*". (Scottish Government, 2022c).

152. As previously described in section 11, Environmental Impact Assessment (EIA), respondents frequently cited failure by government authorities to consider the cumulative effects of many planting applications. If looked at in isolation, a new proposal may not appear to be problematic but could raise issues when viewed in the context of previous, adjacent or nearby schemes. This refers not only to the appearance of the landscape but the cumulative effect upon water quality and regional biodiversity. This latter point was raised in respect of plantings in Dumfries and Galloway; a particular community in the south of Scotland has had more than 900 ha of conifer approved through five separate applications (Carsphairn Community, n.d.; Scottish Forestry, n.d.c).

Encircled sheep fold amongst multiple adjacent private forestry complexes - North of Carsphairn, Glenkens, Dumfries & Galloway, 2020

153. As described in Section 11 (**Environmental Impact Assessment (EIA)**), where Scottish Forestry (SF) determines that a proposal is "likely to pose a significant impact on the environment" (Scottish Forestry, n.d.e), an EIA is then required. This process expands the scope of the consultation to allow Community Councils and others to contribute.

154. On the basis of the evidence, it appears that EIAs of forestry applications are rare in practice (e.g. Friends of the Ochils). Scottish Forestry, in carrying out its due diligence in partnership with the applicant, identifies potential issues in the screening phase. If these are then resolved to the agency's satisfaction, then the proposal is deemed not to require an EIA. (Friends of the Ochills (FOTO) submission; FPG, 2022). However, the proposed mitigation measures will not necessarily address all the potential risks. In their submission, Butterfly Conservation described a case study in the Scottish Borders where it was only after afforestation was approved that sites of the northern brown argus, a UK Biodiversity Action Plan (BAP) priority species, were identified.

155. The screening of proposals is not transparent and further hinders effective engagement or public oversight (e.g. Anonymous 4, Anonymous 5, Anonymous 10). It does not provide the type of meaningful and expert consultation that would allow the beneficial input of others in the process, with Scottish Forestry itself acknowledging that "developing a proactive dialogue can help improve decisions, implement forestry proposals more effectively, and lead to a culture of co-operation and support."

Rural communities (continued)

156. In Section 11, this report recommends that all proposals in excess of 40 ha, or smaller applications adjoining existing woodlands, should be required to have an EIA. Apart from the increased protection and enhancement of biodiversity that would result, the implementation of this proposal would ensure that public consultation is widespread, structured and transparent. Tree planting, for whatever purpose, needs to consider the wellbeing of Scotland and all its living inhabitants. Formal consultation allows all interests to be considered and helps to legitimise the outcomes of the application process.

157. More generally, Scottish Forestry should make the full implementation of the SLC guidelines a mandatory condition for all applications and carry out regular post-planting inspections.

158. Recommendations - rural communities

16. Scottish Forestry should mandate adherence to the community engagement guidelines produced by the Scottish Land Commission for all proposed planting schemes.

14. Summary and recommendations

Summary and recommendations

159. This report has considered some of the benefits that society receives in return for the public subsidies given to landowners to support tree planting. Those considered are economic, carbon sequestration, biodiversity and impact upon rural society.

160. The Royal Society of Edinburgh concurs with the principle that public money should be spent in ways that produce the greatest public benefits. The proposed reductions in public expenditure, combined with the increasingly damaging environmental, commercial and social effects of the twin climate and biodiversity crises, lead the RSE to conclude that it is essential that public money is spent in a more carefully directed manner than at present in order to maximise the benefits that society needs.

161. The evidence we have examined demonstrates that there is no current economic need for public money to facilitate commercial tree planting. Commercial conifer is poorer at sequestering carbon and weaker at providing biodiversity benefits compared with mixed native species planting (the latter also being more attractive to tourists and visitors).

162. The twin global crises are also likely to have impacts on commercial timber growing. The recent horizon scanning exercise by Tew et al. (2023) identified 15 key threats to UK forests. The researchers identified "*catastrophic forest ecosystem collapse*" as the most pressing outcome, commenting that "*there is clear evidence of increasing natural disturbance to European forests...often exacerbated by past management strategies that have simplified forest ecosystems*."

163. At the heart of public policy in respect of tree planting is a conflict between the drive to increase the gross number of trees planted and the need to plant "the right tree in the right place". Maximising the number of trees planted generally takes precedence, with adverse consequences for carbon sequestration and biodiversity.

164. It is essential that the Scottish Government and its agencies put their knowledge and skills to the service of much better designed planting schemes, informed by EIAs and public consultations carried out under the Scottish Land Commission Protocol.

165. Public monies for tree planting should be reserved for schemes designed to provide clear public benefits, such as truly intermixed mixed native woodland planting, riverine planting and the introduction of more and carefully chosen trees into the urban environment.

166. The RSE concludes that this report's recommendations, if implemented, will maximise societal and environmental benefits while providing society and tree planters with better services that help to future-proof all forests.

15. Addendum

Addendum

167. As this report was being finalised, the Scottish Government published its budget for 2024–25, which saw the allocation for tree planting reduced from £77.2 m (2023–24) to £45.4 m (Scottish Government, 2023e). This reinforces the necessity of carefully targeting these limited resources to maximise public benefit.

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