Woodland Creation in Wales

Report for the Wales Land Management Forum

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1 Executive Summary

This report was commissioned by the Wales Land Management Forum to review the current available evidence on the potential, drivers, barriers and solutions for woodland creation in Wales, and provide a list of recommendations to support woodland creation by enabling more land managers to plant more trees more often.

The key points presented in the recommendations include:

1. Streamline the application process, prioritising applicant experience, and removing bureaucracy. Explore and challenge the presumption against woodland creation within administrative agencies and amongst stakeholders.
2. Incentives should support a broad range of tree species, to align with landowner objectives and to increase the diversity and resilience of the woodland resource.
3. New schemes must be compatible with existing payment schemes, allowing landowners to release areas of land for woodland creation without losing all payments.
4. Grants need to be attractive for landowners who would lose essential income, and overcome objections to long-term land use change, missed opportunity costs and a reduction in land value. They must support the use of high-quality UK grown plants to ensure biosecurity and cover establishment and long-term management costs.
5. Funding sources beyond public sector grants must be explored, including co-funding from the private sector and payments for public goods. Options which support landowners to create woodland on their land are preferred over land sale and remote investment by some stakeholders.
6. Woodland creation can present a valuable investment; however, the application and EIA process are problematic for investors wishing to purchase land before grant application.
7. [88]Farmers present the greatest opportunity by area to create woodland. There is a need for integration and communication between forestry and farming sectors at community and administrative levels, to integrate objectives and to provide consistent responses.
8. Schemes should be co-developed with forestry and farming sector representatives across their supply chains to increase confidence and support forward planning. Tenant farmers must be supported and protected under new schemes.
9. To prevent constraints in plant availability, to attract investment, and to reduce risk co-ordination with forest nurseries and support to modernise are both necessary.
10. The potential for woodland creation by landowner group beyond agriculture is a current knowledge gap, as is the impact of woodland creation on ecosystem service provision.
11. Accessible, consistent, in-person advice, through trusted channels and from trained advisors is necessary, including information on the benefits of woodland creation, modern forestry regulations and standards, and mitigating potential risks.
12. There is need to implement a comprehensive, accessible, consistent, tailored and timely communications strategy through trusted organisations and existing channels.

2 Background

There is a longstanding and shared ambition to increase woodland cover in Wales, which is incorporated in Welsh Government policy[1]. Current targets are to increase tree planting to at least 2,000 hectares per year, increasing to 4,000 hectares as rapidly as possible. Despite this ambition and financial support available through Glastir, planting rates remain low[2]. This picture is mirrored elsewhere in the UK, where except for in Scotland woodland creation targets have not been met.

There is an urgent need to understand why woodland creation is not taking place and identify solutions to achieve it. We need to understand the barriers preventing landowners and land managers who want to create new woodlands from doing so, as well as understand why some landowners don't wish to plant trees and what can be done to support or incentivise them. It is widely accepted that many barriers and potential solutions will vary between landowner groups.[3] There is also a recognised need to understand the potential for woodland creation in Wales and how this varies by region, landowner group and with time, to ensure targets are realistic.

The authors of this report were commissioned by the Wales Land Management Forum to provide a list of potential recommendations based on the available evidence, to support woodland creation in Wales by enabling more land managers to plant more trees more often. Underpinning these is a review of the available evidence for the current extent of woodland and tree cover in Wales, and the potential for woodland creation, supplemented by expert and stakeholder opinion. We discuss the drivers motivating current and aspiring landowners to plant woodlands, the barriers which constrain delivery, and potential solutions. These are summarised in Key Findings.

This report was produced based on evidence available and in the public domain at the time of writing (October 2020). The authors anticipate that additional evidence may be in preparation by NRW and other stakeholders, and that this may form the basis of a subsequent response and future policy development.

3 Recommendations

Based on the available evidence presented in this review, supplemented by stakeholder and expert opinion, we provide the following recommendations to enable and encourage more landowners to plant more trees in Wales:

1. Application process

a. Streamline the whole application process and reduce administrative bureaucracy.[4,5] Align the application and approval process with annual forest planting and management cycles,[7] allowing sufficient time between approval and planting deadlines to order plant stock and arrange contractors. Simplify the re-submission

process where revisions are needed. Feedback suggests a review of the application process is underway and that greater flexibility in timing is being incorporated.

b. Explore and challenge the perceived presumptions against woodland creation within administrative agencies and stakeholders[7]. See Recommendations 2,6, & 8 for raising awareness of the benefits of woodlands, UK Forestry Standard, and integration between sectors.

c. Simplify the Environmental Impact Assessment (EIA) process and create a single administrative point of contact[6]. This is particularly important for inward investors who often wish to acquire land before verification. In these cases, the EIA is undertaken in advance of submitting a Glastir expression of interest (EoI).

d. Review and clearly communicate area thresholds and ensure consistency and a "level playing field" between agriculture and forestry. EIA thresholds have recently been increased in England although the effect of this change is not yet known.

e. Reduce the perception of "professional imbalance" where an NRW decision overrides independent professional opinion. Where professional opinion is discounted, a full written justification for this must be given. Consider the use of "Earned Recognition" as a way of reducing the administrative burden for the assessment of submitted woodland creation plans.

2. Information & Advice

a. Information and advice to encourage woodland creation needs to be consistent and provided in preferred and accessible formats, in particular in-person advice and site visits from trusted organisations or individuals.4[,5,9]

b. Information and education should include the benefits of woodland creation to the landowner and beyond from planting through maturity, including potential benefits to the green economy, air and water quality, climate mitigation and health, along with the assurances provided by woodlands managed to UK Forestry Standards.

c. Support is necessary for land managers to understand and mitigate potential risks from woodland creation, including establishment failure, tree health, adaptation to climate change, health and safety, and financial planning[7].

d. Training and mentoring for advisors is essential to provide this information and to communicate it sensitively, effectively and consistently.

3. Scheme Design

a. Incentive schemes need to be simple for applicants[3,7] whilst remaining flexible[8], ideally developed with user consultation.

b. Incentives need to be consistent with landowner management objectives and include a broad range of categories, as landowners are unlikely to change their approach to management for financial reasons alone.[11,12]

c. Integration with existing and new agricultural schemes is essential. Landowners need to be able to release areas of land from existing schemes for woodland creation without losing all payments.

d. Stability is necessary to provide confidence to forestry and agricultural sectors and to attract private sector investment.

e. A range of options for payment schedules could support different landowners, such as increasing the level of upfront payment[8]. Ongoing payments, such as for carbon and provision of public goods can support long-term management.

4. Grant levels

a. Grant levels need to continue to be sufficient to encourage woodland creation[3,4,7,11.] Payments will vary by forest type, species and management objective. Schemes will need to cover necessary establishment costs, including the use of high quality UK sourced plants, and long-term management costs, and may need to include a premium in order to compete with alternative land uses and missed opportunity costs, or long term funding to overcome objections to long term land use change, and to address risk and uncertainty. Fundamentally woodland creation needs to be an attractive option for landowners; existing forest can provide a high return for investors, but woodland creation is often unattractive to landowners due to a reduction in land value, permanency, and loss of productive land and revenue.

b. Funding sources and options beyond public sector grants must be explored. Meeting planting targets of 2000 hectares per year to 2030 through Glastir funding at current rates would cost up to £120 million, including 8 million in up-front costs, with the remainder in maintenance payments, according to an estimate provided by CONFOR. Co-funding with the private sector, including investors, insurers and businesses, and public sector payments for public goods, including carbon offsetting, green credentials, flood mitigation, increased water and air quality and health should be considered. Options which support landowners to create woodland on their land would be beneficial in areas where land sale and remote investment are undesirable.

c. Additional top-up payments or premiums can be considered for regions where woodland creation is particularly desirable or exceptional benefits[8] could be provided (flood mitigation or air quality target zones, expanding native or ASNW woodlands), as identified in the Woodland Creation Opportunities Map on the Lle web portal.[14]

d. Payment levels for broadleaves and minor conifer species must be higher, where productivity and revenue are lower, rotations are longer, management and plant costs are higher, and additional protection is needed.[7] These stands deliver additional public benefits and support resilience by increasing the diversity of the woodland resource, therefore additional costs are justified by the benefits.[13]

5. Land Availability and Ecosystem Service Modelling
    a. Data on the potential for woodland creation by land ownership is a current knowledge gap, as is the impact of woodland creation on local and national ecosystem service provision. Spatial analysis of land ownership, exclusions, forest ecological suitability, combined with modelling of land use economics, exploration of incentive levels, and segmented social science models by land owner group can explore woodland creation opportunities, potential costs and likelihood of uptake.[22,23] The Welsh Government Woodland Opportunities Map contains much of this information and is currently being updated.[19,20] The Environment and Rural Affairs Monitoring and Modelling Programme (ERAMMP) Integrated Modelling Platform can provide information on the provision of ecosystem service benefits and natural capital values under woodland creation scenarios. [22]
    b. Ensure that the process of stakeholder consultation and engagement which underpins the construction of NRW Area Statements results in the creation of regionally appropriate plans for woodland creation which will all contribute to the national target for Wales.
6. Engagement with Farming and Forestry Sectors
    a. There is a need for integration and communication between forestry and farming at community and administrative levels, including representative bodies and farming unions, building on the work of Forestry and Farming Connect. [18] Land use change can be a contentious issue and there are significant socio-cultural differences between farmers and foresters which must be respected. [4,9,18] Dialogue between sectors can increase integration of land-use objectives.[19]
    b. Discuss change and co-develop plans for schemes and incentives with forestry and farming sector representatives across the supply chains, including forestry nurseries, management agents, operators, contractors8 and farming unions; in order to validate policy and research proposals, increase confidence and support forward planning.
    c. Review work force capacity[8], and where there may be constraints consider support for local communities, business expansion and training.
    d. [88]Farmers represent the largest landowner group in Wales[a] and the greatest opportunity by area, to create woodland[17]. If just 3.42% of Wales' existing agricultural land was to be used for the establishment of new woodlands (*i.e.* 1.73

[a] In Wales, 88% of the land area (1.753 million hectares) is agricultural land (2015 figures). There are approximately 34,800 Welsh farm holdings; the average size is 48 hectares (2015 figures). See Section 8.2 on page 30 for caveats which may need to be applied this estimate.

hectares on the average-sized Welsh farm holding), the Welsh Government's lower woodland creation target of 2,000 hectares per year (60,000 hectares in total by 2050; see Table 2.1) would be met.

e. Farmers are a heterogenous group and therefore a broad range of woodland creation options and approaches will be needed. [3,18] Agroforestry can help bridge the gap between farming and forestry, increasing tree cover in shelterbelts, hedgerows and the least productive land with minimal impact on production. The needs of tenant farmers must be supported and protected under new schemes.

7. Plant and Seed Supply

a. To prevent plant availability from becoming a constraint, pro-active engagement and co-ordination with forest nurseries is necessary to ensure and agree sufficient lead times to collect seed and grow plants, especially where a step change in planting rate or species is anticipated.

b. The use of UK grown certified planting stock (*e.g.* Woodland Trust UKISG) should be strongly incentivised in the interests of increased plant biosecurity. Afforestation through natural regeneration for appropriate woodland types, in suitable locations should be considered.

c. Stability in demand will allow investment and reduce risk. The public forest estate can help assume some risk, and NRW's current long-term tree supply tender could enable tree nurseries to invest with confidence.

d. Support for nursery businesses to modernise and for research to develop new propagation techniques would be beneficial, such as provided by the Welsh Government's Forestry Industry Recovery Scheme. Underwriting nursery production may be necessary in event of a change affecting species choice *e.g.* pest or disease.

8. Communication

a. Implement a comprehensive, accessible, consistent, and timely communications strategy to landowners and potential woodland creators through trusted organisations and existing channels.[9] Messages should be tailored to landowner groups and align with their drivers and values and include clear information on payment levels.[3,9,10] A broad approach, including demonstration sites, case studies, best practice examples, knowledge exchange and networking events is recommended[4,8,9,10] to foster engagement, along with online and printed material. Timing is key, and some barriers will need to be addressed first.

b. There is a need for increased internal communication by agencies and regulating bodies to provide an integrated and consistent response.

4 Key Findings

Current Extent & Condition

The total area of woodland and tree cover in Wales is 402,000 hectares, 19.4% of land area.[24] There are 309,000 hectares of woodland in Wales[b], covering 14.9% of Wales' total land area,[25,c] and an additional 92,700 hectares of tree cover found in small woodlands, groups of trees, lone trees, and tree cover in hedgerows[24,d] Most woodland and tree cover in Wales is in rural areas (90%) with the remainder in urban areas; almost all woodlands (97%) and two-thirds of tree cover outside woodlands are situated in rural areas and one third in urban.[24] Woodlands and trees occupy a higher proportion of urban land area (35.9%) than rural land area (18.4%)[24]. Appendix 1 includes a tree cover map for Wales.

Almost all woodland in Wales (99%) was in favourable or intermediate condition in 2013, according to the National Forest Inventory Woodland Ecological Condition Survey[26], although most was in intermediate condition. This may have decreased due to tree pest and pathogen outbreaks. Nearly half of woodlands in Wales (47%) are known to be managed according to the requirements of the UK Forestry Standard[25,27] (UKFS). This figure includes the 117,000 hectares of Welsh Government Woodland Estate (WGWE) and 29,000 hectares of certified private woodlands. This is certainly an underestimate of the area of woodland in Wales in active management[28], however there are no exact records.

Woodlands in Wales show a relatively diverse mix of species; 42% of woodlands are conifers and 44% are broadleaves[25,e]. The dominant species are Sitka spruce (25%), oak (8%), larch (7%) and ash (6%) (see Figure 1.2). Both larch and ash are experiencing significant disease outbreaks across the UK including Wales.[29,30]

Ambition

Meeting the Welsh Government's target of 2,000 hectares of woodland planting per year[1] would create an additional 60,000 hectares of woodland by 2050, increasing woodland cover to 369,000 hectares and 17.8% of landcover. The increased target of 4,000 hectares per year would create an additional 120,000 hectares of woodland by 2050, increasing the total woodland cover of Wales to 429,000 hectares and 20.7% of land area. Planting rates in Wales remain low with only 1,470 hectares planted between 2016 and 2020[25].

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[b] Figures include woodlands over 0.5 hectares & greater than 20 metres in width (NFI)
[c] UK woodland cover is 3.2 million hectares which represents 13% of total land area. Corresponding figures for woodland cover are 10% in England, 19% in Scotland and 9% in Northern Ireland.
[d] Small woods measure 0.1-0.5 hectares; groups include clusters & linear tree features.
[e] The remainder are being restocked and in private woodlands include small areas of open ground

Potential

The potential for woodland creation depends on land ownership, availability, and management; social, economic, environmental and regulatory drivers and constraints. There is limited knowledge of potential land availability by landowner type.

Farmers represent the largest landowner group in Wales and the greatest opportunity by area, to create woodland. In Wales, 88% of the land area of Wales (1.753 million hectares) is utilised as agricultural land (2015 figures)[17]. There are approximately 34,800 Welsh farm holdings; the average holding size is 48 ha (2015 figures). If 3.42% of Wales' existing agricultural land was to be used for the establishment of new woodlands (*i.e.* 1.73 ha on the average-sized Welsh farm holding), the Welsh Government's lower woodland creation target of 2,000 ha per year[1] (60,000 ha in total by 2050; see Table 2.1) would be met. Increasing this ambition to establish trees on 6.85% of Wales' existing agricultural land (*i.e.* 3.45 ha on the average-sized Welsh farm holding) would achieve 120,000 ha of new woodland in total, fulfilling the higher target of 4,000 ha per year[1].

However, the numbers reported above represent the best-case scenario and don't take account of the numbers of "active farmers", the number claiming the basic payment scheme (BPS), or the number of tenant farmers. The actual number of Welsh farm holdings on which it is realistically possible to create woodland may be closer to 11,000.

The additional barriers to woodland creation faced by tenant farmers need to be considered. Brownfield sites could be considered as areas for afforestation.

Drivers for woodland Creation

To achieve woodland creation targets we need to understand the benefits and forces that lead land managers to choose to create woodlands. We also need to understand the wider benefits we are seeking to achieve from our future woodland resource and identify where there may be conflict between these visions.

Driver and benefits considered in Section 3 can be split broadly into direct benefits to the landowner and indirect benefits to the public and wider society:

Direct Benefits (to the landowner)

- Economic gain, *e.g.* revenue, tax benefits, commercial timber production, wood fuel
- Carbon sequestration
- Domestic wood fuel or timber production
- Protection (wind break, noise reduction, visual screening, slope stability, flood mitigation, water quality, soil protection, shade for animals, people & buildings)
- Recreation (personal use or for financial gain)
- Biodiversity
- Cultural

Indirect Benefits (wider public)

- Air quality
- Public recreation
- Flood mitigation (remote to land holding)
- Community resilience and local employment
- Green economy, national timber resource support for forestry sector

A noted area of conflict is between remote investors purchasing land to plant trees for maximum profit but without local community benefit or engagement.

Barriers to Woodland Creation

General Barriers which apply to most or all current and aspiring landowners and managers are considered in detail in Section 9. These include:

- Application and approval process
- Grant scheme design.
- Incompatibility with other schemes, *i.e.* Basic Payment Scheme
- Environmental restrictions
- Presumption against tree planting
- Insufficient support and advice
- Poor communication
- Insufficient economic return, long-term management cost, delay receiving revenue
- Land devaluation
- Risk & uncertainty (financial risks, tree health, health & safety liability, establishment failure, failure to adapt to climate change, missed earnings)
- Public access requirements
- Competing land uses
- Woodland permanency
- Invasive species
- Land ownership, specifically for tenant farmers

Potential Solutions

In order to facilitate woodland creation, it is necessary to overcome the barriers identified above, and to provide incentives where needed. Factors observed to influence decisions about whether different types of woodland are created are:

- grants and other incentives;
- regulation and the approval process;

- communication, advice and knowledge exchange;
- policy support and leadership including the public sector leading by example.[4]

Incentive schemes need to align with landowner and potential woodland creator drivers and visions[3,4,33] and support delivery of wider public and economic benefits, and ensure woodlands meet high standards of design and management consistent with the UK Forestry standards (UKFS). Some solutions will apply to all or multiple landowner group and some to specific landowner groups. There is also likely to be regional variation due to social and cultural differences. Grant availability alone may not incentivise planting.[10,11]

Targeting incentive schemes towards those who want or are more likely to consider woodland creation, rather than those who are against woodland creation would be the best use of resources.12,[34] Some landowners are not interested in woodland creation and their views are not likely to change, some evidence suggests directing efforts to this group can be uneconomical[34] and the complex, multi-layered approach to decision making needs to be understood.

Additional incentives may be needed to deliver benefits which do not benefit landowners directly, *i.e.* through information and raising awareness of remote benefits

- Payments for Public goods could bridge the gap by providing a direct benefit to the landowner in the form of a financial incentive[15,16]
- Strong leadership including leading by example on national public estates can support change.
- Expansion of the WGWE could deliver public benefits from public land and resources. Some stakeholders disagree with this route and believe funding should support farmers and other landowners to plant on their own land, rather than changing land ownership, suggesting that public funding should be used in this way only if the private sector fails to do so. A cost-benefit review of this approach may be advisable.

Solutions are incorporated within the Recommendations above.

5 Current Tree Cover in Wales

5.1 Woodland Area

Wales currently has 309,000 hectares of woodland[f] which equates to 14.9% of Wales' total land area.[25] UK forest cover is currently 3.2 million hectares which represents 13% of UK total land area, corresponding figures are 10% in England, 19% in Scotland and 9% in Northern Ireland.[25]

5.2 Tree Cover

The total tree cover in Wales includes an additional 92,700 hectares of small woodlands, groups and lone trees[g] providing a combined total of 402,000 hectares of woodland and tree cover[24],which is 19.4% of the landcover of Wales (Table 1.1). The additional tree cover comprises 49,200 hectares of small woodlands, 33,400 hectares in groups of trees and 9,000 hectares of lone trees. Appendix A1 includes a map of woodland and tree cover.

Table 1.1 Woodland & tree cover area (thousand hectares), urban & rural[24]

Land category	Total Area of Woodland & Tree cover	Woodland area	Tree Cover*	Tree Cover: Small woods	Tree Cover: Groups	Tree Cover: Lone trees
Rural	360.1	300.2	59.9	(37.5)	(17.1)	(5.0)
Urban	41.9	9.1	32.8	(11.7)	(16.3)	(5.0)
Total	402.0	309.3	92.7	(49.2)	(33.4)	(10.1)

* values for Tree Cover include the area of small woods, groups and lone trees

5.3 Composition of Woodland & Tree Cover

Area of rural tree cover

The total area of rural woodland and tree cover in Wales is 360,100 hectares. This represents 90% of all woodland and tree cover in Wales and 18.4% of rural land area. 300,200 hectares (97%) of rural woodland and tree cover are classed as NFI woodlands, and a further 59,900 hectares as additional tree cover, comprising 37,500 hectares of small woods, 17,100 hectares in groups of trees and 5,000 hectares of lone trees.[24]

Area of urban tree cover

The total area of urban woodland and tree cover in Wales is 41,900 hectares, this covers 35.9% of urban land area and comprises: 9,100 hectares of NFI classified woodland and

[f] Figures include woodlands over 0.5 hectares & greater than 20 metres in width (NFI)
[g] Small woods between 0.1 & <0.5 hectares; groups include clusters & linear tree features <0.1ha

32,800 hectares of additional tree cover. The later comprises 11,700 hectares of small woodlands, 16,300 hectares in groups of trees, 5,000 hectares of lone trees.[24] (Table 1.1)

Area of hedgerow trees

The canopy area of hedgerow trees in Wales is 6000 hectares[24] which comprises 3,600 hectares within groups of trees and 2,400 hectares of lone trees. These areas include both urban and rural trees and are included within the values given in Table 1.1 for Wales for tree cover area outside of NFI woodlands. The area of all hedgerows in Wales (in the NFI) is 26,000 hectares with a length of 75,500km.[24] In NRW's 2014 State of Natural Resources Report (SoNaRR) the total length of hedgerows in Wales was estimated at 106,000 km with 78% in unfavourable condition.[35] These differences are due to measurement techniques.

Orchards

Traditional orchards in Wales cover 653 hectares at an average of only 0.14 hectares each. The modern orchard area has expanded in response to the growing cider market.[35]

5.4 Historic Tree Cover in Wales

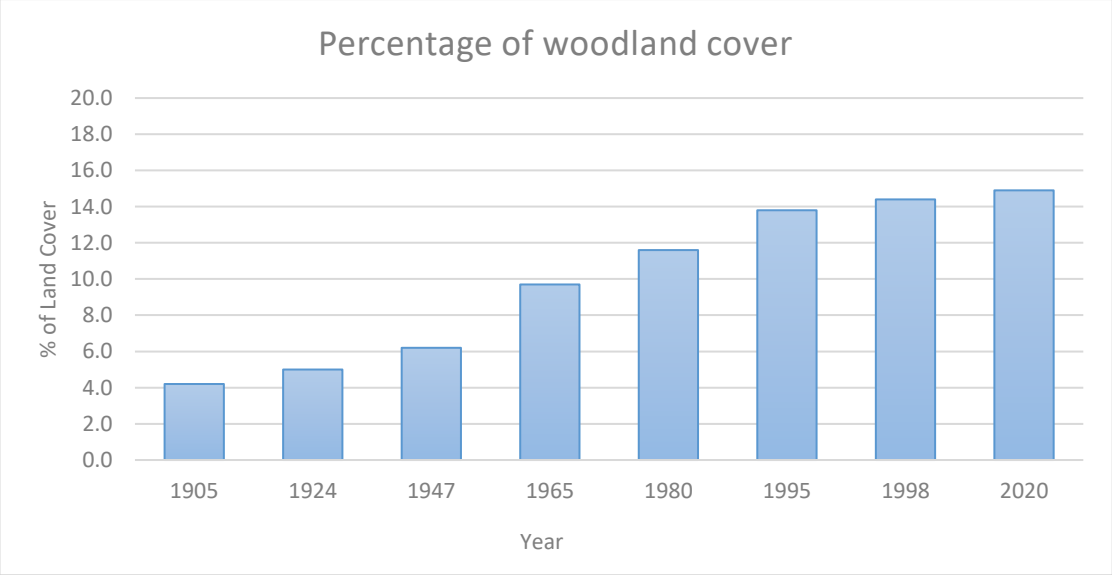

Figure 1.1 Historic tree cover (1905-2020) in Wales as percentage of land area [25]

Tree cover in Wales has increased from low pre- and post- war levels, with large areas of woodland planted mid- to end- of the last century to build a national timber reserve.

5.5 Woodland and Tree Cover by Landowner

Detailed information regarding land ownership and woodland ownership in Wales is key to deliver a targeted approach by landowner, however these data are not readily available. Table 1.2 includes data from the National Forest Inventory from 1997, therefore names and areas are only indicative. Updated official statistics on land and woodland ownership

will be available in December 2020. Current values include 117,000 hectares of Welsh Government Woodland Estate (WGWE)[25], 900 hectares of other woodland managed by NRW[25], 2,897 hectares Woodland Trust[36].

Table 1.2 Woodland ownership by area and percentage (31st March 1997)[64]

Ownership type	Area (hectares)	Percentage (%)
Personal	95,500	35.4
Business	26,089	9.7
Forestry or Timber business	6,006	2.2
Forestry Commission (*now WGWE)	119,979	44.4
other public (not FC/WGWE)	4,704	1.7
Local authority	7,925	2.9
Charity	7,784	2.9
Community ownership or common land	652	0.2
Unidentified	1,396	0.5
Total	270,035	100.0

5.6 Woodland area by species

Of the 309,000 hectares of woodland in Wales, 266,000 hectares (86%) are stocked and the remaining 14% are classed as felled and being restocked[25]. 42% of woodlands in Wales are conifers and 44% are broadleaves. The species composition is summarised in Figure 1.2 and Table 1.2.

Figure 1.2 Species Composition of Woodlands in Wales [25]

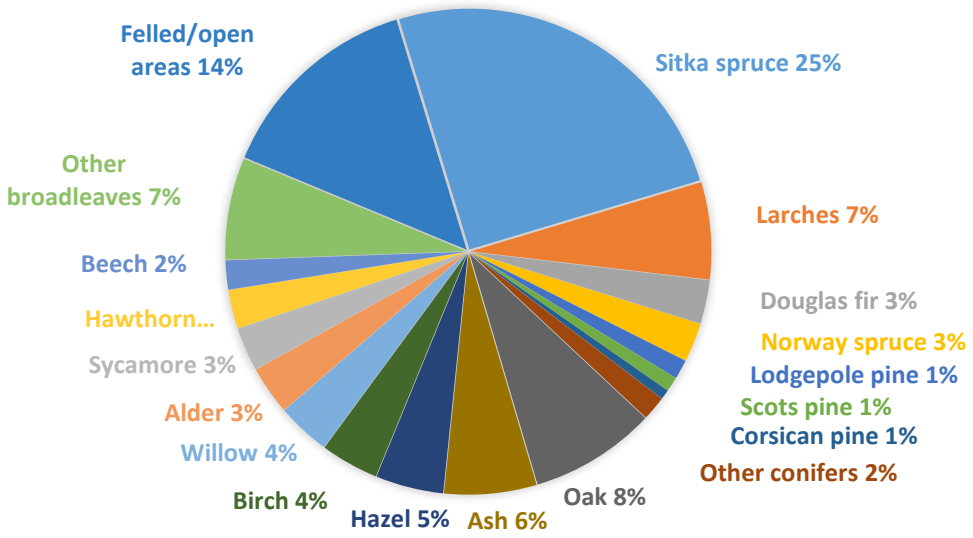

Table 1.2 Species Composition of Woodlands in Wales [25]

Tree species	Thousand hectares	Percent Forest Cover	Tree species	Thousand hectares	Percent Forest Cover
Sitka spruce	77	25%	Oak	26	8%
Larches	20	7%	Ash	19	6%
Douglas fir	9	3%	Hazel	14	5%
Norway spruce	8	3%	Birch	12	4%
Lodgepole pine	4	1%	Willow	11	4%
Scots pine	3	1%	Alder	10	3%
Corsican pine	2	1%	Sycamore	9	3%
Other conifers	5	2%	Hawthorn	8	3%
All conifers	129	42%	Beech	6	2%
			Other	21	7%
			All broadleaves	137	44%
Felled/open areas	43	14%			
Stocked area*	266	86%			
Woodland Area	309	100%			

*Stocked area only: excludes felled areas and for private sector land open space.

5.7 Woodland area by habitat type

There are a wide range of woodland habits in Wales, including Section 7 priority habitats as listed under the Environment (Wales) Act 2016.[37] Habitat areas are summarised in Table 1.3 along with conifer woodland and clearfelled areas.[25,26] Many of these priority habitats are small or fragmented, and expansion and restoration of these woodland habitats would provide significant ecological benefits.

Table 1.3 Woodland in Wales by Habitat Type [25,26]

Habitat type	Area (Thousand Hectares)
Non-native coniferous woodland	145
Lowland mixed deciduous	79
Wet woodland	28
Upland oakwoods	26
Broadleaf habitat not classified as	12
Upland mixed ashwoods	7
Lowland beech/yew woodland	6
Birch dominated upland	2
Clearfelled and transition	6
Total	313

5.8 Area of managed and undermanaged woodland in Wales

UK Forestry Standard (UKFS) Certification

146,000 hectares (47%) of woodlands in Wales are known to be managed according to the requirements of both the UK Forestry Standard (UKFS) and the UK Woodland Assurance Standard (UKWAS).[25,27] This figure includes 117,000 hectares of Welsh Government Woodland Estate (WGWE) and 29,000 hectares of private woodlands certified under the Forest Stewardship Council (FSC) and/or the Programme for the Endorsement of Forest Certification (PEFC) schemes.

It is likely that 146,000 hectares is an underestimate of the area of woodland in Wales in active management.[28] In 2015, 55,000 hectares of private woodland was known to be managed according to UKFS based on the area of woodland receiving grant funding and 24,000 hectares were certified under schemes.[38] However, as it is not possible to know whether areas within the grant schemes were also certified, the total area of woodland managed according to UKFS isn't known. Therefore, in 2015 between 141,000 and 172,000 hectares of woodland in Wales were estimated to be managed according to UKFS, although if there was no overlap between grant funded areas and certified areas this could have been as high as 196,000 hectares. In the Woodlands for Wales Strategy[2] and The State of Natural Resources Report[35] 203,000 hectares of Welsh woodland were reported to be managed to UKFS in 2014.

Non-certified woodland

Beyond the 146,000 hectares known to be managed to UKFS in 2020[25], the nature and extent of management of the remaining 163,000 hectares (53%) of woodland is less certain. Some will be actively managed for different benefits but not certified. Under-managed woodlands show a degree of management but there is the potential to deliver additional ecosystem services. In reality, many managers consider themselves to be managing their woodland in contrast to official perceptions and statistics[9].

Unmanaged woodlands have no active management taking place; this may be intentionally prescribed to support environmental objectives or may occur because management is seen as uneconomical because of size, because woodlands are inaccessible, or due to lack of incentive or knowledge.[28] These variables should be considered in relation to woodland creation as Welsh Government forestry policy includes the ambition to increase the area of woodlands in active management.[2]

NFI Woodland Ecological Condition

The National Forest Inventory Woodland Ecological Condition report for Wales[26] summarises the area and condition of native, near native and non-native NFI woodlands in Wales, and therefore provide valuable information about non-certified woodland in Wales; see Table 1.4 and Appendix A2. Relevant key findings are:

- 150,399 hectares of native and 154,822 hectares of non-native woodland in Wales
- 9% of native woodland is in favourable condition and 90% in intermediate condition
- 99% non-native woodland is in intermediate condition and 1% is in favourable condition
- 99% of woodland in Wales is in favourable or intermediate condition; however, as the majority is in intermediate condition this can be improved
- Conifer stands managed for timber are likely to score less favourably against the ecological condition criteria used (*e.g.* ground flora, regeneration, native species, veteran trees, age distribution), but they are likely to be actively managed.
- The condition of tree cover outside of NFI woodland area, including small woodlands, groups of trees and hedgerows is not included.
- More evidence and newer survey data are needed.

Table 1.4 Area of woodland in Wales classified as favourable, intermediate or unfavourable[26]							
Woodland Type	Total Area	Favourable		Intermediate		Unfavourable	
	Area (hectares)	Area (hectares)	%	Area (hectares)	%	Area (hectares)	%
Native	150,399	13,244	9%	135,128	90%	218	0%
Near native & fragments	7,004	111	2%	6,665	95%	150	2%
Non-native	154,822	1,019	1%	153,386	99%	2,303	1%
Not determinable	718						
Total	312,943	14,375	5%	295,179	94%	2,671	1%

5.9 Woodland size

Woodlands of different sizes provide different benefits, and therefore woodland size considerations are important alongside management objective.[20,39]

Small woodlands affording biodiversity gains to woodland edge species, and larger woodlands providing habitats to woodland specialists (but potentially displace other wildlife, therefore they must be carefully located to minimise trade-offs)[20]. Whilst new small woodlands deliver biodiversity gains, fragmentation is a significant pressure affecting native woodland condition, there are nearly 22,000 woodlands identified as being smaller than 2.0 hectares and half of native woodland stands in Wales are found in woods smaller than or equal to 20 hectares[35]. This identifies the need to create additional areas of native woodland adjacent to or in proximity of small native woodlands to increase their size and resilience and deliver significant environmental benefits.[20]

Commercial woodlands are economical to manage at larger scales, with an ideal minimum size of 20 hectares, or a cluster of moderate sized woodlands in close proximity.[15]

Woodland size has no significant impact on carbon sequestration and woodlands of all size deliver climate change mitigation benefits.[40]

Small on-farm and community woodlands deliver domestic and small-scale wood fuel benefits. Small woodlands and linear features also deliver significant health benefits to humans and livestock and provide indirect economic benefits.[39] There are potential disbenefits from the use of wood fuel on air quality in some areas.

Woodlands of all sizes deliver recreation benefits, with older and more natural habitats most valued. There is an evidence gap between the benefits provided by different habitat types (*e.g.* open space, woodland) with accessibility being the main determiner.[39]

6 The Ambition for Woodland Creation in Wales

To meet woodland creation targets we need to understand what we are aiming to achieve and by when. Here we review woodland creation targets and the impact they will have. Forestry is a devolved matter and the devolved administrations in Scotland, Wales England and Northern Ireland each have their own woodland creation targets. We present historic planting and restocking rates and potential tree health risks.

6.1 Woodland creation targets in Wales

The Welsh Government's current target is to "Increase tree planting to at least 2,000 hectares per year, aiming to increase this to 4,000 hectares as rapidly as possible" as outlined in Wales' first statutory climate mitigation plan, Prosperity for All: A Low Carbon Wales[1] in 2019. On 29th April 2019, shortly after the Climate Mitigation Plan was published, Environment Minister Lesley Griffiths declared a climate emergency in Wales[41]. This extends the previous target of 2000 hectares per year from 2020 to 2030 and beyond, as outlined in the Woodlands for Wales Strategy.[2]

Impact

Meeting the target of creating 2000 hectares of woodland per year would increase woodland cover in Wales by 20,000 hectares per decade and increase the landcover percentage of woodland by just under 1% per decade. By 2050, this would increase woodland cover to 366,000 hectares and 17.7% of landcover. The increased target of 4000 hectares per year would increase woodland cover by 1.9% per decade and increase the woodland cover of Wales to 426,000 hectares, 20.5% of landcover, by 2050. (Table 2.1).

Table 2.1 Impact of woodland planting targets on woodland area and woodland cover 2020-2050

Planting Target (ha/year)	Increase % landcover per decade	Woodland area (hectares)				Woodland Cover (%)		
		2030	2040	2050	Additional	2030	2040	2050
2,000	0.96%	329,000	349,000	369,000	60,000	15.87	16.83	17.8
4,000	1.93%	349,000	389,000	429,000	120,000	16.83	18.76	20.69

6.2 UK Woodland creation targets

England

The UK Government committed to increase woodland cover in England to 12% of land area by 2060 in the 25 Year Environment Plan[42]; implying planting rates of at least 5,000 hectares per year. The subsequent manifesto commitment to meet Net Zero by 2050 is likely to result in an increase to this target. A consultation on England's Tree Strategy ran from June to September 2020 with results to be published this year.[43]

The UK Government manifesto commitment to increase tree planting across the UK to 30,000 hectares per year by 2025 and to maintain this to 2050[31] reflects recommendations

made by the Committee on Climate Change (CCC) in the Net Zero report to reach net zero emissions by 2050[32]. This would increase woodland cover in the UK from 13-17%.

Scotland

The Scottish Government's Climate Change Plan: Third Report on Proposals and Policies[44] and Scotland's Forestry Strategy 2019-2029[45] outline targets to create 10,000 hectares a year in 2019/2020, rising to 12,000 hectares per year from 2020/2021, 14,000 hectares per year from 2022/2023, 15,000 hectares per year from 2024/2025; including 3000–5000 hectares of new native woodland per year. The aim is to increase forest cover from 18.7% to 21% by 2032. Scotland is the only UK nation to meet planting targets (in 2019).

6.3 Previous woodland creation targets.

Ambitious woodland creation targets were set by all UK nations; however planting rates did not rise to meet them. The Climate Change Strategy for Wales[46] set the ambition to increase woodland area by 100,000 hectares before 2030 through a planting rate of 5,000 hectares per year over 20 years. However only 3,203 hectares of new woodland were created from 2010 – 2015.[47] A revised aim of 10,000 hectares of new planting by 2020 was set, however only 1,470 hectares were planted between 2016 and 2020.[25]

6.4 Planting rates

Average rates of woodland creation have reduced since the 1970's and 80's[25] Figure 2.1. This reduction was at least in part due to the Finance Act 1988 which introduced significant changes to the taxation of commercial woodlands in the UK[78] and due to a reduction in agricultural land sale due to an increase in support for farmers.

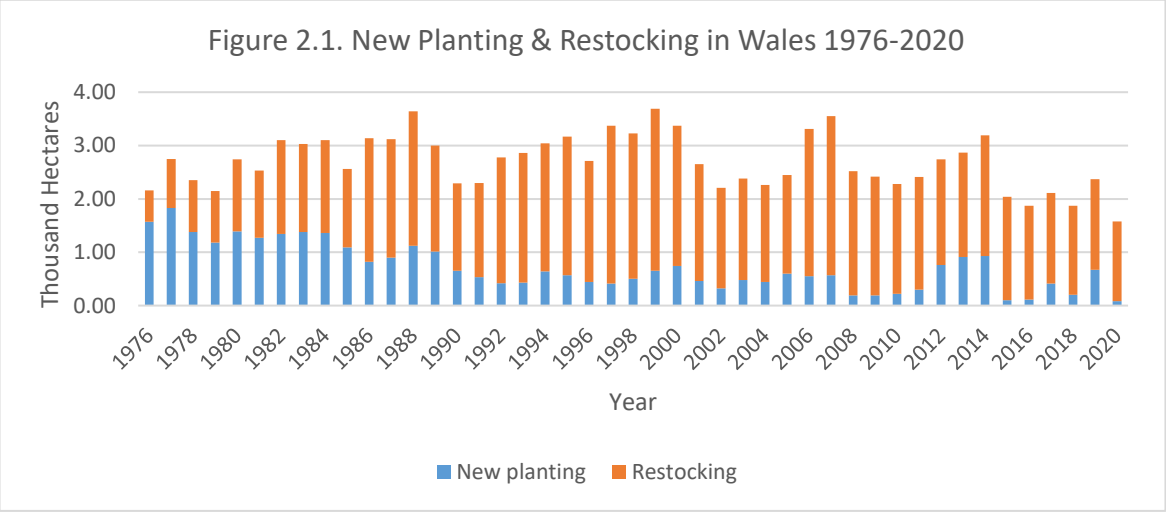

Figure 2.1 Planting & restocking in Wales 1976–2020, thousand hectares per year.[25]

6.5 Deforestation & Tree Health

Woodland cover in the UK is protected by law, and the area of woodland felled is regulated. It is assumed that clear-felled woodland, due to harvesting or pests or disease damage is replanted and planting targets exclude restocking. In a few authorised cases, tree cover is permanently cleared and a compensatory area of woodland should be planted. In the case of peatlands restoration woodland will be cleared to provide recognised benefits. There is a small risk of permanent tree cover loss due to pest or disease damage or unlicensed deforestation.

In 2017 there were 20,000 hectares of larch woodland recorded in Wales[25] (Table 1.2), all of which are at risk of *Phythophthora ramorum* and statutory felling[30]. Table 2.2 documents felling areas under statutory plant health notices.[25]

Hymenoscyphus fraxineus (*Chalara* ash dieback) is widespread across Wales, causing significant die back and decline, putting woodlands at risk of mortality or of felling[29]. There are 19,000 hectares of ash woodland[25] (Table 1.2) including 7,000 hectares of upland mixed ash woods[26] (Table 1.3), which is a Section 7 priority habitat of the Environment (Wales) Act 2016[37]. An additional 91,000 hectares of mixed deciduous woodlands and broadleaf habitat[26], also section 7 priority habitats, may contain ash in intimate mixtures with other species. To avoid deforestation and damage to priority habitats, support is necessary for management of sensitive upland ash woods and ash woodlands, and if supported by research, support for replanting ash with appropriate substitute species.

We note than updated figures will be available in SoNaRR 2020.

In addition to woodlands, hedgerows, groups and lone trees are also at risk from *Chalara*. SoNaRR[35] reports that "Chalara is a major threat to hedgerows. Welsh hedgerows contain a considerable quantity of ash, both in the shrub layer and as standard trees. As ash declines over the coming years, gaps will form in hedgerows and a significant proportion of the mature trees in our landscape will be lost. This is likely to have a major impact on other species dependent on both hedgerows and free-standing trees". Retaining trees should be encouraged to support dependent taxa including lichens and beetles. Support for replanting could be considered to retain tree cover, especially where removal is needed for health and safety. To avoid gaps in hedgerows, height could be reduced to hedgerow height or to leave as standing deadwood whilst other tree cover is established.

Table 2.2 Felling areas under Statutory Plant Health Notices [25]

Year	Area (000 hectares)	Year	Area (000 hectares)
2010-11	0.8	2015-16	1.5
2011-12	0.5	2016-17	0.2
2012-13	1.5	2017-18	1.3
2013-14	4.6	2018-19	1.9
2014-15	0.4		

7 The Forces Driving Woodland Creation

Woodlands provide a range of local and national environmental, financial and public health benefits, and market and non-market goods for landowners and tenants. In order to meet woodland creation targets we need to understand the benefits and forces that lead land managers to choose (or not to choose) to create woodlands. We also need to understand the policy goals we are seeking to achieve from new and future woodlands, where these align and where there are conflicts.[71]

7.1 Benefits as drivers for woodland creation

Land management decisions are underpinned by a range of social, cultural, historical attitudes and values, in addition to economic, and land-based variables. Woodlands deliver a wide range of benefits, including market and non-market goods and services.[15,39] Decisions about whether, when and where to create woodlands are influenced in part by the benefits which they provide, often multiple benefits. Here we explore the benefits which can motivate landowners to create woodland, and the benefits which act as policy drivers for woodland creation. This section is not intended to be a full review of forest Ecosystem Service provision[39]. We note that historic drivers of woodland creation may not be the same as current drivers.

Landowner Groups

Evidence suggests that landowners and land managers can be grouped by their motivators for land management, including woodland creation, into three groups which sit along a spectrum from revenue generation to public benefits, with a central multipurpose group managing for mixed objectives[3,10,12] (Figure 3.1).

Figure 3.1 Landowner woodland creation drivers

Income

The main drivers for many landowners are economical, whether generating an income, long term investment or tax relief. Commercial production is a key route to generating revenue, along with wood fuel, recreation income, payments for carbon sequestration, and grants.

Commercial Production

Productive forests, mainly coniferous, are managed to provide timber and wood products, pulp and paper products, and/or biomass for energy production, predominately to generate revenue. Commercial forests also present an investment opportunity and can provide tax benefits as they are free from income, capital gains and inheritance tax[21]. Owners include private individuals, businesses and commercial investors often using forest management

agents; also large private estates, the WGWE and some famers as part of their estates and holdings. New productive woodland could be created on larger estates and farms, or land may be purchased specifically for productive woodland creation, *i.e.* through farm sale. There are currently more investors looking to purchase land for woodland creation than there is land available.[77] However there is a potential conflict between remote landowners and investors purchasing land for afforestation without local community benefit or support.

Carbon sequestration & offsetting

Woodlands sequester carbon which contributes to mitigating climate change.[40] New woodlands can register for carbon credits that offset carbon emissions and provide an economic incentive to create woodland, they may also be managed for other benefits including timber production, biodiversity and recreation. The establishment of the woodland Carbon Code enables woodland to be created to offset carbon emissions.[49] Investors, businesses, farmers, and community woodlands can register for carbon credits as an alternative or additional environmental and economic motivator to create woodland. As such, woodlands created for carbon sequestration may also be managed for other benefits including timber production, conservation and recreation.

Wood fuel

Many small woodlands are managed for domestic wood fuel and small-scale local wood fuel markets, including those on farms. Some are managed alongside other benefits such as recreation and biodiversity. Recent increases in wood-fuel prices have supported an increase in the area and management of productive broadleaf woodlands in the UK.[38]

Short rotation forestry and coppice are grown for biomass for renewable energy and co-products from sawmills are used for heat and energy production.

Protection

Small woodlands or linear woodland features are created to provide shelter to people, crops or animals from wind, rain or heat; or to provide a visual or sound barrier. They can provide health, environmental and economic benefits, such as increased air quality. These woodland features are likely to be integrated into other land uses such as farming.[39]

Interest in woodland creation and management for natural flood management is increasing, as is riparian woodland for shading watercourses and planting deep rooting, slow growing, shrubby tree species for stabilising hillsides and reducing landslide risks.[39]

Personal recreation

Woodlands may be created specifically for personal recreational purposes or for profit as part of business diversification on farms and large estates, such as for mountain biking, ecotourism or shooting

Biodiversity

Broadleaf and native tree species may be planted to provide environmental benefits such as habitat creation for woodland edge species and woodland specialists, ecological connectivity, conservation, restoration of plantation on ancient woodland sites and riparian habitats, or buffer zones. They may be created on farms, private estates, charity owned/managed woodlands or community woodlands.

Cultural

There has been a resurgence of interest in traditional land and woodland management practices and traditional craft, such as coppice management, charcoal making, and green woodworking practices. These act as a motivation for woodland creation and especially for community woodlands and small-scale woodland ownership.

7.2 Indirect Benefits

Some ecosystem services provided by woodlands do not benefit the landowner or the immediate area and are therefore unlikely to motivate woodland creation directly. These economic and public benefits align with forestry strategies and policy targets. Raising awareness of these benefits through information and education and translating these benefits into payments for public goods may incentivise landowners to plant trees for indirect benefits.

Air quality

Vegetation, especially woodland, is efficient at removing particulate matter, which is one of the principal air pollutants that impacts on human health, from the air. Trees are five times as efficient at removing fine particulate matter (PM2.5) than other vegetation types and twice as efficient as other vegetation types in capturing other airborne pollutants such as ammonia, ozone and sulphur dioxide. Conifers are more efficient at removing pollution than deciduous trees. The location where benefits are experienced may not be the same as where the pollution removal happens, *i.e.* woodlands benefit locations downwind and rural woodland benefits urban areas. The location and direction of pollution sources, prevailing wind direction, and the location of the benefitting population need to be considered.[39]

Public recreation

A significant proportion of the population of Wales visit woodlands regularly for walking, dog walking and picnics. These visits deliver cultural ecosystem service benefits to many people. There is a need for increasing accessible woodland in areas with a low woodland cover. Visitor centres which provide recreation facilities can benefit local hospitality industries. The value of woodland-based recreation to the Welsh economy in 2014 was £85 million (at 2015 prices).[56]

Community resilience

Woodland creation and investment in wood-based industries can provide local community benefits and economic support to rural areas, including post-industrial regeneration.[57]

National timber supply & green economy

The forestry sector provides direct employment and contributions to the Welsh economy through forest nurseries, management and contractors, harvesting, transport and processing of timber and pulp products, as well as supporting local and national economies indirectly through the hospitality sector and wood-based supply chains including construction, housing, fencing, paper products, biomass for heat and energy, and Engineered Wood Products.[15] In 2017 the forestry sector contributed a total Gross Value Added (GVA) of £665 million to the Welsh economy.[48] The expansion of the Welsh timber resource can support the economy, reduce imports and meet increasing market demand.[58,59] Whilst timber production for revenue generation is one driver for productive woodland creation, these national benefits are unlikely to be local drivers of change.

7.3 Farmer Types

Farmers represent the landowner with the biggest opportunity for woodland creation.[17] It is a large group with a range of attitudes and values. Eves *et al.,* (2015) identified 5 different farmer types connected with woodland and tree planting,[3] and different strategies could be needed to incentivise planting in each subgroup:

- Business Oriented Farmers: interested in financial benefits, less interested in woodlands
- Pragmatic Planters: larger holdings, more likely to plant trees, were interested in economic and financial benefits, had some environmental motivations
- Willing Woodland Owners: held smaller holdings, were interested in tree planting for public benefits but not necessarily likely to respond to public schemes
- Casual Farmers were motivated by planting for public benefit
- Farmers First were the least likely to have any interest in trees and woodland planting. They saw public benefits in terms of agricultural production and perceived dis-benefits from trees. They represented a category that the researchers conclude may not be efficient to direct efforts at; however, it may not be possible to reach targets without considering interventions to reach this group.

Significantly this research does not account for tenant farmers, and in Wales 25-30% of land is under a tenancy agreement.

7.4 Farm and Farmer Characteristics

Several factors emerged as significant in influencing and understanding decision making:

Previous behaviour

- Existing woodland – farms with existing woodland are more than twice as likely to be interested in additional planting[3,10,21,51]
- Prior uptake of other agri-schemes means farmers are more likely to enrol in grant schemes to plant trees[3,10,50]
- Farmers with diversified holdings are more likely to plant trees[10,53]

Landowner characteristics

- Age – younger farmers are more interested in woodland creation[10,21,50]
- Education – higher levels of education correlate with increased interest [3,10,50]
- New owners (<5 years) are more interested in planting trees

Farm properties

- Farm size – those with larger holdings were more likely to create woodlands, up to 10-20% land area (although this threshold has not been verified)[3,10,21,50,54,55]
- Land type, farm type, and productivity – can integrate trees into pasture but not arable
- Freehold farmers were more likely to create woodland than Tenanted farmers[3]
- Neighbours with woodland were more likely to create woodland[10,21]
- Farm profit levels influence grant uptake and woodland creation

Social and cultural

The attitudes of farm owners and tenants are also influenced by managers and agents, regulators, family members, friends and neighbors[4,9,21,53]

The social and cultural barriers preventing farmers from creating woodland are explored in Section 9. As with most trends, there may be early adopters, mainstream uptake, and late uptake. If experiences of woodland creation are positive it may influence the rate of woodland creation by positively influencing social norms.

7.5 Aligning Drivers and Incentives

Landowners manage for a range of benefits and objectives and therefore different interventions may incentivise different groups to create woodland. Evidence suggests that incentives need to be consistent with management objectives – financial incentives alone won't change management if they don't align with landowner beliefs, values and ambitions for land management.[4,11] Private landowners have their own management objectives and respond to a wide range of policies and drivers and forestry is only one factor[4,9] Table 3.1 maps landowner types to drivers.

7.6 Land Use Visions: Land-sharing to land-sparing

In addition to the decision about whether to create woodland is the question about type of woodland - beyond conifer or broadleaf, to how the tree cover is integrated into the landscape and landholdings. Burton *et al.* (2018) explored these visions for woodland creation (in Scotland) and add an additional axis of land sharing (integrating conservation and production on the same land) to land sparing (separating conservation and production) to the production–public benefit axis in Figure 3.1, see Figure 3.2.[33]

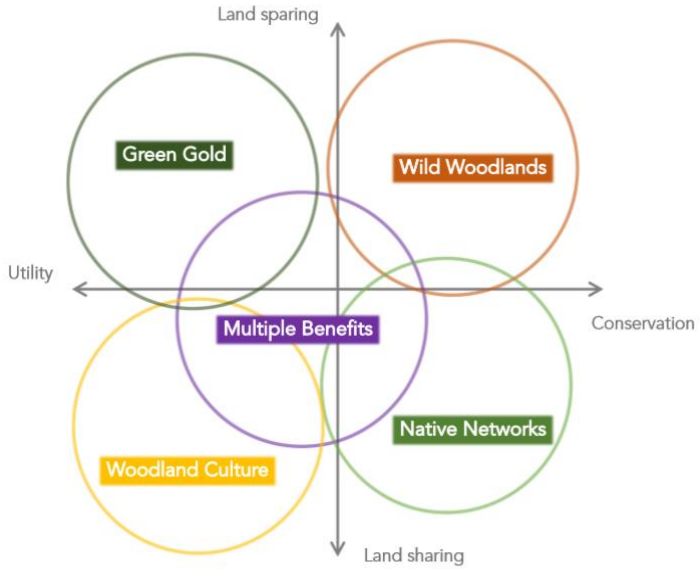

Figure 3.2 Five visions for woodland expansion in the landscape (Burton *et al.,* 2018)[33]

Some visions saw forests and farms separated in the landscape: 'Green gold' is productionist and largely receptive to grants & expansion of commercial plantations, others included (separate) woodlands on farms and 'Woodland culture' sees small areas of productive woodland in an intimate mix over land. Other visions integrated land uses, as in agroforestry or wood pasture. 'Wild wood' creating or regenerating close to nature woodland across the landscape in larger scales, 'Native Networks' semi-natural woodlands are restored & reconnected, integrated with other land uses, and avoiding fragmentation of open ground habitats, with transition zones between land uses.

'Multiple benefits' Sustainably managed trees and woodlands 'stitch-in' and complement a diverse mix of land uses at the landscape scale. Clarifying these visions with landowners in Wales and aligning communication and incentives with preferences and communicating shared visions for land use will be important components of achieving land use change.

Table 3.1 Key drivers for woodland creation by landowner

Landowner / Objective	Commercial Forestry	WGWE	Private Estates	Farmer	Community	Charity, NGO	Water companies	MOD
Timber	x	x	x	x				
Pulp & paper	x	x	x	x				
Wood fuel	x	x	x	x	x			
Carbon	x£	x	x	x	x	x		
Protection		x	X	x	x	x		x
Recreation		x	X	x	x	x		
Culture		x	X	x	x	x		
Biodiversity		x	x	x	x	x		
Water quality		x	x			x	x	
Flooding		x	X				x	
Air Quality		x		x				
Training								x
Key	Commercial	Multiple	Public	Water	Air			

8 Potential for Woodland Creation in Wales

The potential for woodland creation depends on land ownership, availability, ecological suitability for woodland, economic, social and cultural factors which influence decision making. Some land is excluded from woodland creation due to environmental sensitivities[60], unsuitability for forestry, competing use, historic or cultural conservation, or stakeholder objection. The Woodland Opportunities map includes areas where tree establishment could be optimal.[14]

There are a wide range of options for increasing woodland and tree cover, including expanding or creating additional agroforestry, farm woodlands, shelterbelts, hedgerows, orchards, food forests (fruits, nuts, berries), linear features (boundaries, road, rail and waterways), or woodlands, and a range of woodland types, from native broadleaves, productive broadleaves to productive conifers. Different types are suitable for different locations and are of interest to different landowner groups.

8.1 Woodland Creation Potential by Landowner

There is interest in understanding the potential for woodland creation by landowner group, however there is insufficient data on landownership in the public domain to provide this information. Analysis of land ownership, including ex-industrial brownfield sites could provide useful answers on potential land availability and support woodland creation policy.

Farmers represent the largest landowner group in Wales, and therefore analysis of the potential for woodland creation on agricultural land in Wales has been carried out, including in the Environment and Rural Affairs Monitoring and Modelling Programme (ERAMMP)**Error! Reference source not found.** Integrated Modelling Programme and The *Climate Smart Woodlands in Wales* report[61] which is presented in the following sections.

8.2 Farm Woodland

Farmers represent the largest landowner group in Wales and the greatest opportunity by area, to create woodland. 88% of Wales' land area (1.753 million hectares (ha)) is utilised as agricultural land (2015 figures). There are approximately 34,800 Welsh farm holdings; the average holding size is 48 hectares (2015 figures).17

If just 3.42% of Wales' existing agricultural land was to be used for the establishment of new woodlands (*i.e.* 1.73 ha on the average-sized Welsh farm holding), the Welsh Government's lower woodland creation target of 2,000 ha per year (60,000 ha in total by 2050; see Table 2.1) would be met. Increasing this ambition to establish trees on 6.85% of Wales' existing agricultural land (*i.e.* 3.45 ha on the average-sized Welsh farm holding) would achieve 120,000 ha of new woodland in total.

However, the numbers reported above represent the best-case scenario and don't take account of the numbers of "active farmers", the number claiming the basic payment scheme (BPS), or the number of tenant farmers. The actual number of Welsh farm holdings on which it is realistically possible to create woodland may be closer to 11,000.

The *Climate Smart Woodlands in Wales* report[61] produced in 2020 for Welsh Government, suggests there is an estimated 551,277 ha of agricultural land classified, on the basis of its productive potential, as ALC grade 3b in Wales. The area of ALC 3b grade land suitable for the commercial growing of Sitka spruce in Wales is estimated as 531,975 ha, which is 96.5% of the total land area in this ALC category. The authors also provide comparable figures for other tree species included in the same study, which are: Douglas fir 263,092 ha (47.7%); Scots pine 544,274 ha (98.7%); pedunculate oak 522,053 ha (94.7%); silver birch 524,851 ha (95.2%); and beech 344,971 ha (62.6%).

Climate Smart Woodlands in Wales also highlights that the viability of ALC 3b land for commercial investment in establishing woodlands for timber production is limited by key constraints including, for economic and operational reasons, distance to the nearest accessible road and (rarely) steep slope angles. Other constraints are applied for reasons of environmental protection, *e.g.* no woodland establishment on deep peat or designated conservation sites, and restrictions on woodland establishment in riparian zones adjacent to water courses. Under these constraints the area of ALC 3b land available for woodland creation decreases. However, only 40,139 ha is excluded from new conifer woodland because it lies within a designated riparian zone. If road access is factored-in, then the area available is potentially more constrained: 37.8% of ALC3b land is more than 2000 m from an A-road or motorway and 67.5% is more than 1000 m from an A-road or motorway. These areas of land are sufficient to meet woodland creation targets.

Most individual patches of ALC 3b grade are less than 1 hectare, which is much smaller than the majority of existing commercial woodlands in Wales, thus restricting new commercial woodlands to land of this grade would significantly constrain the potential for conventional commercial investment. The fragmentation of these patches will also constrain the potential to establish de novo a woodland habitat network of high biodiversity value. However, there is still scope for the establishment of productive small-scale on-farm shelter woodlands for increasing agricultural production and the provision of other local ecosystem services (such as providing fuelwood and intercepting runoff).

8.3 Modelling Land Availability

The Environment and Rural Affairs Monitoring and Modelling Programme (ERAMMP) Integrated Modelling Platform explores farm type, economics and ecosystem service provision and incorporates models of farm transition to woodland under climate, economic and trade scenarios. These models could provide information on the provision of ecosystem service benefits and natural capital values under woodland creation scenarios[22] to address

the current knowledge gap of the impacts of woodland creation on local and national ecosystem provision.

Additional spatial analysis of land ownership, exclusions, forest ecological suitability, combined with modelling of land use economics, exploration of incentive levels, and segmented social science models by land owner group could explore and provide information on woodland creation opportunities, potential costs and likelihood of uptake.[22,23] The Welsh Government Woodland Opportunities Map contains information on current woodland and areas where woodland creation is excluded and areas of sensitivities and is currently being updated.[19,20]

The process of stakeholder consultation and engagement which underpin the construction of NRW Area Statements results in the creation of regionally appropriate plans for woodland creation which will all contribute to the national target for Wales.

8.4 Changing Ownership

It is important to distinguish between woodland creation which occurs as a change in management by the current landowner such as estate owners or farmers choosing to plant trees or woodlands on their existing land, or as a result of change in land ownership.

There is a small amount of land ownership transfer each year, some through investors or community groups purchasing land with the intention of woodland creation, and also urban to rural migration which is creating a category of new landowners with their own culture and motivations. This latter category of new landowners tends to be financially independent and well-educated and are more likely to create woodland. The impacts of Brexit and changes to the Sustainable Farming Scheme are likely to further impact land use and land ownership, offering potential for reform.[62]

Large-scale productive schemes normally depend on whole-farm or part-farm sale and purchase, which can be a complicated process due to the EIA process and potential objections to productive planting from neighbours or local communities.[8] Planting by remote investors is not always well received by local communities, and many would prefer local landowners were able to keep their land, using public or private funding to support tree planting.

The Scottish Government recently announced the intention of purchasing land to create new areas of public forest estate to support woodland creation and Net-Zero targets.[63] Some stakeholders support an increase in the area of the public estate, whilst others would prefer to see money spent supporting and incentivising land owners, and increasing the public estate as a 'last resort'.

9 Barriers to Woodland Creation

9.1 Common barriers

Some barriers to woodland creation documented in the literature were relevant to multiple landowner categories. We note that some barriers listed in the literature are already under review by NRW and Welsh Government.

Application and approval

Grant schemes require too much paperwork and administration and often require external assistance.[3,4,6,7,8,9] The time between application and approval is slow, unreliable and the outcomes are inconsistent.[54,55] Planting deadlines are often too short and don't align with annual forest planting times, which are determined by environmental constraints such as ground nesting birds and ground condition. Short timeframes place high demand on practitioners,[7] can constrain species choice and place a high proportion of risk with nurseries.

Informal feedback suggests that some stakeholders perceive that there is "presumption against forestry" in application for schemes.[7] For uptake to increase, this perception must be addressed and an equal playing field created for all sectors.

The Environmental Impact Assessment process is documented as complicated, lengthy and administered by too many organisations,[9] however this is less of a barrier in Wales, where applications are pre-screened and an Environmental statement is not always necessary. The EIA process still places a barrier to investors who have to acquire land before verification. Opponents of new productive schemes can have a high level of influence during the consultation process; it is important to consider local views and decide fairly.[4,8]

Grant Scheme Design

Grant schemes are often considered too complex[6] and landowners may apply for grants with less administration even though they are less suitable for their land and deliver less public benefits.[4,21]

Grant schemes don't always support the desired woodland type or management approach. Landowners are not likely to be interested in grants where they differ from their intended management objectives and future vision and instead opt not to create woodland.

Woodland creation grants schemes can be incompatible with existing agricultural schemes, as landowners cannot release areas of land from existing schemes for woodland creation without losing all payments.

Inconsistency or uncertainty over continuity of schemes and policy support can undermine confidence in the forestry and agricultural sectors and deter investors.

Payment schedules do not support landowners who are dependent on regular income from their land [8], nor do they provide ongoing payments for future generations.

Ecological restrictions

Some environmental sensitivities which exclude woodland planting are considered too severe, even with the understanding that it is important to regulate woodland creation to avoid negative impacts.

Support Information and Advice

Insufficient support alongside grants, lack of in-person advice, lack of accessible information, lack of trust, unapproachable advisors. Inconsistent advice within and between organisations. It was felt that removing in-person support in favour of online information and application was the opposite of what was needed.[4,9,10]

Communication

Landowners may not be aware of grant schemes[6], especially if there is no interest in creating woodland. Landowners may not have knowledge about local woodland networks, markets, or contractors or may feel that advisors or agents are unapproachable.[4,9] Landowners may not be aware of the benefits of woodland to themselves or beyond.

Economics & Grant Levels

The level of grants may be insufficient for the intended management or to overcome other barriers, such as missed opportunity costs from a permanent change of land use, and lost future revenue from productive land. The long timescales of forestry are off putting to many landowners, with revenue from forestry coming after too long a timeframe. Land value also decreases once woodland is planted[4,9]

Risk & Uncertainty

Risks and risk assessment vary by landowner, for a farmer the risks are on land value, reversion, income stream, management reliance. For an investor risk are focused on the approval process after land acquisition and potential loss. There can be uncertainty over the ability to plant trees after purchase which can constrain planting for community groups, investors, businesses and individuals.[4]

There is a risk of pests or disease damage or mortality leading to financial loss, health and safety risks, unexpected costs, value and markets of end crop, establishment failure and requirement to repay grants. Uncertainty in future policy can be a disincentive to woodland creation, as landowners report various shifts in policy, grants and rural development programmes.[7,9] Incompatibility between existing payment schemes and woodland creation grants can create uncertainty.

Access

Provision of access is unpopular with some landowners[65], due to potential liability, loss of rights, vandalism, anti-social behaviour, lack of privacy, additional cost, and conflict with

other land uses.[9] The requirement for access in some grant schemes is reported as off putting and acts as a barrier to uptake.

Competing Land Uses

Estate owners and charities managing for historic conservation may wish to maintain a diverse portfolio of historic land uses which can constrain the proportion of woodland. Many farmers see agricultural land as too good for forestry and don't wish to reduce the area of land available for farming, or the loss of productive farmland would mean small farms cannot support their families.[9] Existing agri-environment grants may prevent farmers from creating woodland.[9]

Land managers can consider schemes too restrictive and inflexible or fear a loss of control over their property, meaning that subsidies are unattractive or the disbenefits outweigh the potential benefits[3,5]

Land availability may be limited, or land costs too high for purchase.[3,21]

Social Barriers

Woodland creation and land use change can be contentious, with diverse cultures and evident tensions, frustrations and divisions between farming and forestry; production vs conservation; international companies vs local communities; annual cash flow vs capital investment. Tensions may occur spatially, between upland and lowland regions, areas of high and low population such as urban and rural areas.[4]

Negative perceptions of forestry can prevent woodland creation. Some negative publicity is out of context and doesn't consider recent changes in regulations and the high level of the UK Forestry Standard.

Large-scale public, private and charitable land managers have long and complicated formal and professional decision-making processes, which can take time to change.[8]

Training

Many landowners are not trained foresters and don't have the skills to safely and sustainably establish and manage suitable woodlands, and would therefore benefit from training to help understand management outcomes and impacts of *e.g.* invasive species, pests and pathogens.

Invasive Species

Grey squirrel damage is seen as prohibitive to growing productive broadleaves for high quality timber; managing squirrel populations is unachievable unless at scale, and management costs are too high.[7]

Deer browsing can deter planting of broadleaf and novel conifer species due to high levels of damage and/or preventing natural regeneration, fencing and tree protection costs can be prohibitive unless funded and are necessary to control deer browsing.

9.2 Specific barriers

Other documented barriers apply specifically to one or more land-owner categories or management type

Woodland Permanency

The permanency of woodland creation acts as a barrier as it takes away opportunity for future land demands.[3] It is important for estate owners and farmers to ensure future financial viability of their land for future generations and to maintain family legacies.

Barriers for Farmers

As the biggest group of landowners, offering the biggest potential for woodland creation by land area[17], but with significant social, cultural and economic differences[3], the barriers and disbenefits of woodlands experienced by farmers, in addition to those above, namely economic constraints and competing land uses, require specific consideration:

Farmers report the aesthetics of trees can be off putting as woodlands look 'untidy'.[9,66]. They also value open fields and sheep grazing and see this as a significant to their culture. Farmers were unlikely to plant woodland on more than 10-20% of their holdings.[21] Farmers report Woodland habitats can harbour vermin and disease which threaten their livestock.

Farmers report a lack of trust in the advisory or administering organisations. They cite a lack of in person advice as a significant barrier.[4,5,9] They report a lack of forestry training and forest management skills.[7]

Land value of forests lower than that of agricultural land.[7] Many farm woodland owners report no income generation from their woodland.[9,65]

Modern farming practices have discouraged small woodland and hedgerow plantings, however there is significant interest in increasing on farm hedgerows and tree cover.

Tenant Farmers

A large proportion of farms in Wales are held under tenancy. This creates a barrier as the owner would need to agree with any proposal and the tenant would need to be able to benefit from any long-term investment. There may be a historical bias against woodland, where woodland reduced the area of available land and only benefited the 'rich' landowner. There is also a risk of tenant eviction if the landowner chooses to create woodland.

Social & Historical Barriers faced by Farmers

There are deeply embedded cultural factors influencing farmers reluctance to plant trees.[18] There is a wide cultural gap between agriculture and forestry.[9,12,18] Strongly held negative attitudes and emotions against trees and woodland are common amongst farmers. There remains a deep division between the forestry and agricultural sectors. Social norms and the community within which farmers and others are situated influences their land management choices.[21]

Farmers have strongly held beliefs that farmland should be used to support the production of food and ensure food security, so planting trees is seen as taking farmland out of productive use. There are strongly held cultural beliefs which see forestry as 'selling out' the family business and legacy.[18,21] Encouraging farmers to plant on less or unproductive areas of land has been successful, and also communicating the benefits that trees can provide to crops and animals through increased productivity. An integrated approach where farmers create small areas of woodland on their land may be more supported and successful.

The long timescales of forestry act as barriers for farmers achieving social status.[9,66] Social norms play an essential role in farmer decision making as evidenced in behaviours like roadside farming where farmers display their best livestock to display a positive image.[21]

In some cases, there is a lack of awareness about the potential environmental and recreation benefits of forestry, and of potential revenue, although awareness is increasing. The legacy effect of negative environmental and recreation impacts of conifer plantations *e.g.* clearfell, invasion of habitats, plantations on native woodland sites and acidification of water bodies remain and are still being experienced now. There is a need for education about how the regulation and standards of modern forestry (*i.e.* UKFS) have evolved, and the benefits of 'the right tree in the right place'. Past conditions, where trees and woods remained the property of landlords rather than tenant farmers, built perceptions that trees provide little benefit, but could lead to disbenefits *e.g.* by sheltering vermin.

10 Overcoming Barriers to Woodland Creation

In order to facilitate woodland creation, it is necessary to overcome the barriers identified in Section 9 and to provide incentives where needed. Some solutions will apply to all or multiple landowner groups, and some to specific landowner groups. There is also likely to be regional variation due to social and cultural differences.

As noted, some barriers listed are already under review by NRW and Welsh Government.

10.1 Overcoming Common barriers

Application and approval process

Streamline the application process and reduce administrative bureaucracy.

Align the application process deadlines and responses with the annual forest planting cycle. Allow sufficient time between approval and planting deadlines to order plant stock and arrange site preparation[8]

Explore and challenge the perceived presumptions against woodland creation within administrative agencies.

Create a single administrative point and simplify the process for EIA and Environmental Statement applications, particularly for investors who often need to acquire land before verification. Provide sufficient information about area thresholds and create a level playing field for all sectors. Simplify the re-submission process where revisions are needed.

Reduce the perception of "professional imbalance" where an NRW decision overrides independent professional opinion. Where professional opinion is discounted, a full written justification for this must be given. Consider the use of "Earned Recognition" as a way of reducing the administrative burden for the assessment of submitted woodland creation plans.

Scheme Design

Incentive schemes need to be simple for applicants[3,7] whilst remaining flexible[8], ideally developed with user consultation rather than to meet regulatory hurdles. In Scotland, stakeholders were critical either of the complexity and bureaucracy of schemes which tried to address many circumstances, or by the lack of complexity when attempting to develop a 'one size fits all' approach.[8]

Incentives need to be consistent with landowner management objectives and include a broad range of categories, as landowners are unlikely to change their approach to management for financial reasons alone.[11,12]

Schemes need to be integrated with existing and new agricultural schemes. Landowners need to be able to release areas of land from existing schemes for woodland creation without losing all payments.

Stability is necessary to provide confidence to forestry and agricultural sectors and to attract private sector investment.

A range of options for payment schedules could support different landowners, such as by increasing the level of upfront payment[8]. Ongoing payments, such as for carbon and provision of public goods can support long-term management.

Grant Levels

Welsh Government reports that Glastir calls are currently oversubscribed, suggesting that present grant levels are appropriate. However, other calls have historically been undersubscribed, and there is a shared consensus that increasing grant levels would increase the likelihood landowners to plant woodlands, although low certainty on the proportion of landowners this would encourage. There is also evidence that grant availability alone may not incentivise planting, and other barriers and incentives are required.

Grant levels will inevitably vary by forest type and species, and in many cases will need to cover at least 100% of costs *i.e.* sufficient to prepare, fence and protect the site, pay for high quality UK sourced plants, cover equipment, management or agent fees, and support long term management. Payments should reflect differences in establishment costs linked to different sizes of woodland[8].

For some landowner groups, including farmers, grants in excess of 100% costs may be needed to incentivise woodland creation, especially where landowners need to make an income from their land. This may help overcome objections to long term land use change, lost earnings, and barriers such as perceived risk. Up front versus long term payments may encourage some landowners.[8] Fundamentally woodland creation needs to be an attractive option for landowners; existing forest can provide a high return for investors, but woodland creation is often unattractive to landowners due to a reduction in land value, permanency, and loss of agriculturally-productive land and revenue.

Payments will need to be higher for broadleaf and for minor/novel conifer species where productivity and revenue will be lower or higher risk, where additional protection is needed, and plant costs are higher; pruning may be needed to produce high quality broadleaf timber. Broadleaf, native and diverse stands deliver additional public benefits and support overall resilience, by increasing the diversity of the woodland resource, and therefore the benefits to planting these woodland types typically justify the additional cost.

Consider additional top-up payments for regions where woodland creation is particularly desirable or exceptional benefits could be provided (*e.g.* flood mitigation or air quality zones, expanding native or ASNW woodlands). Maintain the emphasis on good forest design and planning across the board.

Funding Sources

Funding sources and options beyond public sector grants must be explored. Meeting planting targets of 2000 hectares per year to 2030 through Glastir funding at current rates would cost up to £120 million, including £8 million in up-front costs, with the remainder in maintenance payments, according to an estimate provided by CONFOR.

Payment for public goods[16] such as biodiversity, flood mitigation, carbon offsetting, increased water and air quality and health could provide an additional source of finance.

Co-funding with the private sector, including investors, insurers and businesses should be considered. Options which support landowners to create woodland on their land would be beneficial in areas where land sale and remote investment are undesirable.

Ecological restrictions

Review exclusions and environmental sensitivities which preclude woodland planting, whilst still ensuring any disbenefits from woodland creation are avoided, mitigated or are outweighed by benefits. See Recommendation 5 on Land Availability and Ecosystem Service Modelling.

Information & Advice

Provide information and advice in preferred and accessible formats, in particular in-person advice and site visits from trusted organisations or individuals.[4,5,9] Information and advice to encourage woodland creation needs to be consistent across organisations.

Information and education should include the benefits of woodland creation to the landowner and beyond from planting through maturity, including air and water quality, climate mitigation and health, and the benefits of home-grown timber to the green economy. Using a targeted approach for different audiences could encourage landowners with interest in woodland creation for public benefit (see Section 7: The Forces Driving Woodland Creation). The value and uses of woodland creation to the local economy must be clearly communicated.

The assurances provided by woodlands managed to UK Forestry Standards and regulation of modern forestry practices are critical in overcoming the legacy effects and negative views associated with large-scale "single species" plantations.

Training and mentoring essential to ensure that advisors provide the required advice and information in a sensitive, effective and consistent way.

Stakeholder engagement could develop a shared vision for what an expanded woodland and tree resource (outside of woodlands) could look like. Communicating this shared understanding and the benefits it provides could engage landowners and generate public support.

Reducing Risk

Provide information, support and training in risk management for climate change, tree health, health and safety, & financial planning. Review the EIA process to support land purchase for woodland creation. Provide stability and consistency for woodland creation grants, targets and policy.

Communication

Implement a comprehensive, accessible, tailored and timely communications strategy to landowners and potential woodland creators through trusted organisations and existing channels. Messages should be tailored to landowner groups and must align with their drivers and values.

A broad approach, including demonstration sites, case studies, best practice examples, knowledge exchange and networking events are recommended[4,8,9] along with online and print marketing, but only once barriers have been addressed and revised schemes are in place.

Demonstrate to land managers how well-designed woodland creation proposals and afforestation targets can be achieved while respecting the other requirements that we have for our land.[8]

Incorporating forestry-related learning into agriculture and land management courses, through the appropriate Qualifications Authority process.[8]

There is a need for increased internal communication by agencies and regulating bodies to provide an integrated and consistent response.

Plant and Seed Supply

To prevent plant availability from becoming a constraint, pro-active engagement and co-ordination with forest nurseries is necessary to ensure and agree sufficient lead times to collect seed and grow plants, especially where a step change in planting rate or species is anticipated. The use of UK grown certified planting stock (*e.g.* Woodland Trust UK and Ireland Sourced and Grown (UKISG)) should be strongly incentivised in the interests of increased plant biosecurity. Whilst nurseries don't need to be located in Wales, locally-sourced seed and appropriate provenance choice is important and support for local nurseries would benefit the Welsh economy. In future, with appropriate plant health measures in place, imported seed could be considered to support climate change adaptation. In suitable locations, afforestation through natural regeneration for appropriate woodland types should be considered.

Stability in demand will allow investment and reduce risk. The public forest estate can help assume some risk, and NRW's current long-term tree supply tender could enable tree nurseries to invest with confidence.

Support for nursery businesses to modernise and for research to develop new propagation techniques would be beneficial, such as provided by the Welsh Government's Forestry Industry Recovery Scheme. Underwriting nursery production may be necessary in event of a change affecting species choice *e.g.* caused by the emergence of a new pest or disease.

Engagement with Forestry and Farming Sectors

Schemes should be co-developed with forestry and farming sector representatives across the supply chains, including forestry nurseries, management agents, operators, contractors8 and farming unions; to increase confidence and support forward planning.

The availability and capacity of forestry workers, machine operators and forest management agents to respond to approved applications needs to be considered to ensure capacity for forest management plans, site preparation, fencing and planting. Where a lack of trained workers could become a constraint, support could be provided to train workers, including farmers, in local communities.

Investors may benefit from assurances of the future value and market demand for their end crop. Increasing awareness of the projected reduction in timber availability in the middle of the century could help ease concern[68]. Continued investment in the Welsh processing sector, along with training for forest workers and operators could increase confidence and encourage investment in the forestry sector and support a wood-based economy. Short supply chains and local economic benefits could foster community support.

10.2 Overcoming Specific Barriers

The following additional solutions may encourage some or all landowner groups and potential woodland owners to create woodland

Social, cultural, and historical legacy

Providing appropriate in-person advice and communication through trusted intermediaries networks and events. Focus on well-designed, diverse woodlands which provide public benefits, especially those to landowners and the local population. Positive experiences of woodland creation could lead to a shift change in perceptions of forestry.

Integration of Forestry and Farming

As the biggest group of landowners offering the biggest potential for woodland creation by land area, but with significant social, cultural and economic differences, the barriers and disbenefits of woodlands experienced by farmers require specific solutions:

- Farmers are a heterogenous group and therefore a broad range of woodland creation options and approaches will be needed. [3,18] Agroforestry can help bridge the gap between farming and forestry, increasing tree cover in shelter woodlands, hedgerows and the least productive land with minimal impact on production.

- There is a need for integration and communication between forestry and farming at community and administrative levels, including representative bodies and farming unions, building on the work of Forestry and Farming Connect. [18] There are significant socio-cultural differences between sectors which must be respected. [4,9,18]
- Include young farmers in efforts to encourage woodland expansion with a targeted approach. Include forestry skills and farm woodland management in training courses for young and current farmers, with examples of good practice.[4,52]
- Deliver information and education on the benefits of trees and woodlands, how these can be integrated into farming practices and the potential financial benefits of business diversification. Consider front-loaded grant schemes rather than delayed payments.[8]
- Provide training in forest management and forest operations to up-skill farmers[3]
- Review the land values of forest and agricultural land.[7]
- Develop a more integrated advisory system. The advisory and outreach system typically replicates the farming/forestry split and there is a demand for advisors that can bridge the gap between the two communities and professions. An improved advisory system needs to be proactive, free, innovative, issue-focused, provide direct personal contact and introduce woodland topics into mainstream farming.[8]
- Engaging with farmers through existing communicating routes and trusted organisations. It is recommended for advice and support to be offered to farmers from organisation and networks already known and trusted. Training Woodland Officers in this role can be considered in favour of forestry agents. Training opportunities for the advisory service could promote well-designed and sustainable productive woodland.[8]
- The use of exemplar demonstration farms may provide a strong basis for outreach. Owners can learn from organised events and networks that facilitate the exchange of ideas and experience and farmer-to-farmer communication.[8]
- Specific protections are needed for Tenant farmers to ensure they receive benefits from woodland creation and to prevent termination of their tenancy by landowners who wish to plant trees. Recommendations from the Tenant Farmers Association and the CLA will be published shortly.

10.3 Incentives

In addition to overcome barriers, incentives will be needed for some landowners. There is overlap between the solutions to barriers and incentives described, as four sets of factors are observed to influence decisions about woodland creation: 1) grants and other incentives; 2) regulation and the approval process; 3) communication, advice and

knowledge exchange; 4) policy support and leadership, including the public sector leading by example.[4] Grants alone may not incentivise planting and other drivers are necessary.[11]

10.4 Incentives for Indirect Benefits

Additional or different incentives may be needed for indirect benefits, where the benefits of woodland creation are not direct to the landowner.

Expansion of the Public Forest Estate

Productive forests were created by the Forestry Commission in the mid-19th century for a national timber reserve and now form part of the WGWE. Public sector land acquisition for woodland creation may form part of a woodland creation strategy, although some stakeholders would prefer other avenues are pursued first.

National Forest Projects

Large scale afforestation projects have achieved woodland expansion through community engagement, shared vision and additional funding. Recent examples include:

- The National Forest (England): The establishment of a new National Forest in the English Midlands begun in 1995 with the objective of restoring land with a history of coal mining and heavy industries into a green landscape. New, mainly broadleaf planting has created 200 square miles of mixed wooded landscape connecting two ancient forests. 80% of the forest has public access.[57]
- The Northern Forest (England): was announced in 2018 as a new forest in Northern England to encompass five community forests and include peri-urban, riparian and rural forests to be planted over 25 years to 2032. The aim is to provide leisure opportunities, environmental benefits, timber, and biomass for power stations along the M62.[67]
- National Forest for Wales: The first minister for Wales announced plans for a National Forest for Wales that 'extends the length and breadth of Wales' including funding for community woodland and additional funding through Glastir.[68]

Education & Information

Raising awareness of remote benefits through additional education and example sites might encourage woodland creation for public benefits by interested landowners.

Payments for Public goods

The concept of payments for ecosystem services (PES) and payments for public goods (PPG) can help to bridge this gap by providing a direct benefit to the landowner in the form of a financial incentive[16]; the Woodland Carbon Code is one successful example.[49]

The Environment and Rural Affairs Monitoring and Modelling Programme (ERAMMP) Integrated Modelling Platform can provide information on the provision of ecosystem service benefits and natural capital values under woodland creation scenarios.[22]

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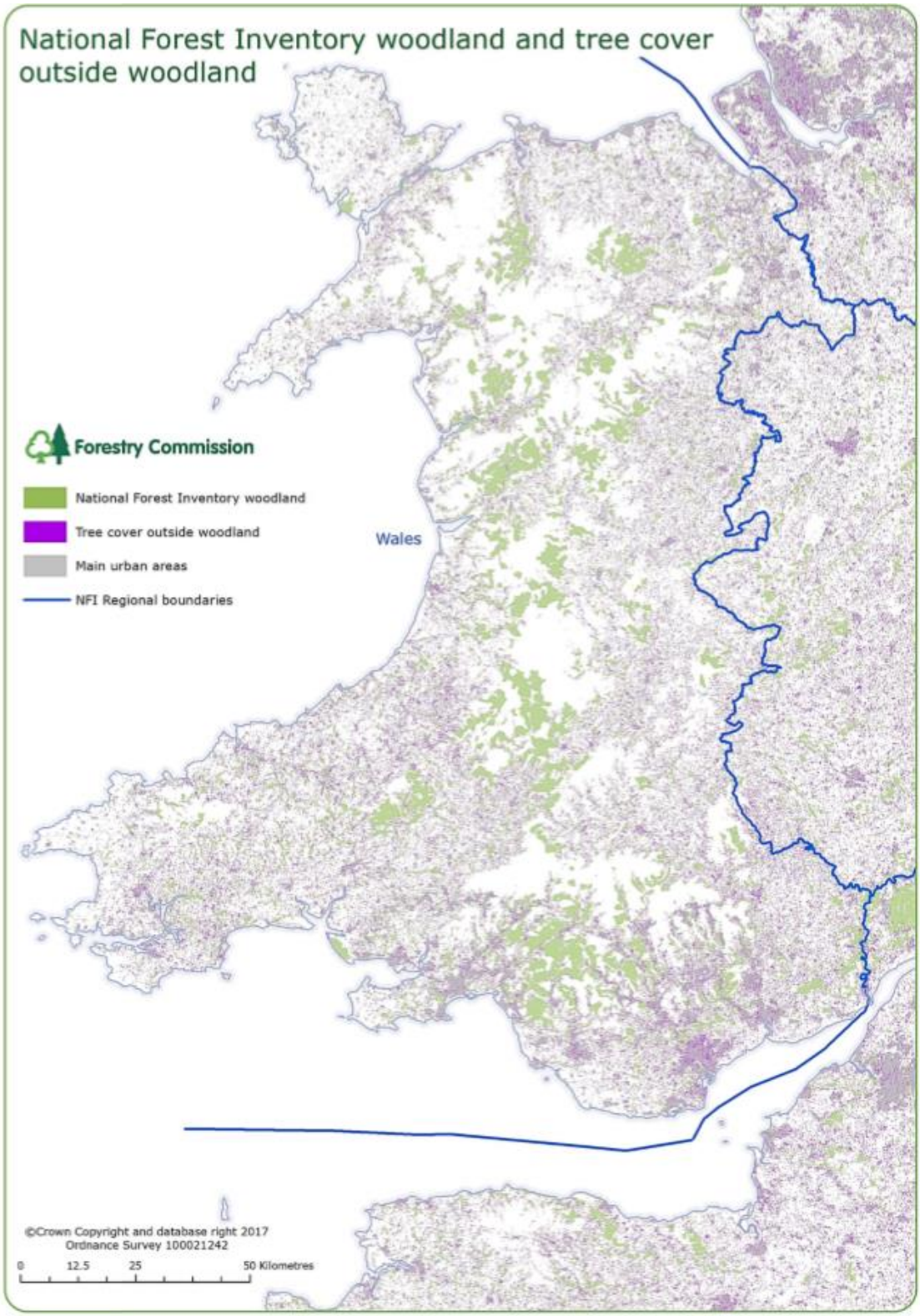
Appendix A1 NFI Tree Cover in Wales



www.forestresearch.gov.uk/documents/2709/FR_Map_of_tree_cover_in_Wales_A3.pdf

Appendix A2 Ecological Condition of Woodland in Wales

Table A2-1 Area of woodland in Wales classified as favourable, intermediate or unfavourable, by indicator

Native	Unfavourable		Intermediate		Favourable	
Ecological Indicator	Area (ha)	%	Area (ha)	%	Area (ha)	%
Ground flora	23,107	15%	120,376	80%	6,916	5%
Tree pests and diseases	4,487	3%	15,954	11%	129,958	86%
Invasive species	10,893	7%	4,438	3%	135,068	90%
Herbivores / grazing	36,903	25%	17,931	12%	95,564	64%
Regeneration at	0	0%	131,982	88%	18,417	12%
Number of native tree	17,859	12%	35,931	24%	96,609	64%
Deadwood volume (m3 per	123,185	82%	22,718	15%	4,496	3%
Vertical structure	9,661	6%	57,423	38%	83,314	55%
Veteran trees	147,882	98%	1,001	1%	1,516	1%
Age distribution of tree	24,879	17%	94,082	63%	31,437	21%
Nativeness of occupancy	0	0%	21,660	14%	128,739	86%
Proportion of open space	126,876	84%	21,504	14%	209	0%
Proportion of woodland /	887	1%	23,663	16%	125,849	84%
Size of woodland parcel	37,288	25%	36,918	25%	76,193	51%
Regeneration at population	6,964	5%	108,769	72%	34,665	23%
Overall ecological condition	218	0%	135,128	90%	13,244	9%
Near native & fragments	Unfavourable		Intermediate		Favourable	
Ground flora	567	8%	6,129	88%	308	4%
Tree pests and diseases	293	4%	514	7%	6,197	88%
Invasive species	883	13%	164	2%	5,957	85%
Herbivores / grazing	1,344	19%	933	13%	4,728	67%
Regeneration at	0	0%	6,313	90%	691	10%
Number of native tree	1,343	19%	3,337	48%	2,324	33%
Deadwood volume (m3 per	5,637	80%	1,154	16%	213	3%
Vertical structure	1,040	15%	2,735	39%	3,229	46%
Veteran trees	6,776	97%	179	3%	49	1%
Age distribution of tree	2,145	31%	3,831	55%	1,028	15%
Nativeness of occupancy	6,243	89%	165	2%	597	9%
Proportion of open space	5,978	85%	929	13%	19	0%
Proportion of woodland /	26	0%	1,145	16%	5,833	83%
Size of woodland parcel	1,338	19%	896	13%	4,770	68%
Regeneration at population	431	6%	5,306	76%	1,267	18%
Overall ecological condition	150	2%	6,665	95%	111	2%

Table A2-1 continued. Area of woodland in Wales classified as favourable, intermediate or unfavourable, by indicator

Ecological Indicator	Area (ha)	%	Area (ha)	%	Area (ha)	%
Non native	Unfavourable		Intermediate		Favourable	
Ground flora	21,310	14%	117,348	76%	16,164	10%
Tree pests and diseases	4,709	3%	23,642	15%	126,471	82%
Invasive species	8,306	5%	2,175	1%	144,340	93%
Herbivores / grazing	18,214	12%	11,279	7%	125,329	81%
Regeneration at	0	0%	145,733	94%	9,089	6%
Number of native tree	98,777	64%	38,185	25%	17,860	12%
Deadwood volume (m3 per	107,107	69%	32,034	21%	15,681	10%
Vertical structure	37,688	24%	76,212	49%	40,922	26%
Veteran trees	154,682	100%	113	0%	27	0%
Age distribution of tree	69,001	45%	83,130	54%	2,691	2%
Nativeness of occupancy	154,822	100%	0	0%	0	0%
Proportion of open space	128,716	83%	27,571	18%	422	0%
Proportion of woodland /	330	0%	7,398	5%	147,095	95%
Size of woodland parcel	7,376	5%	9,498	6%	137,948	89%
Regeneration at population	12,442	8%	117,746	76%	24,634	16%
Overall ecological condition	2,303	1%	153,386	99%	1,019	1%

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