

Diversifying conifers in productive forests: stakeholders' perspectives

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1 Executive summary

1.1 Aims

Commercial forestry has in recent decades become highly dependent on a small number of conifer species, particularly Sitka spruce. Adaptation and resilience of productive forestry is affected by risks from climate change and a number of high impact tree pests and diseases. These risks have prompted policy, practical and industrial concerns about over-reliance on a small number of tree species.

There is renewed interest in alternative conifer species including western red cedar, firs, western hemlock and Douglas fir, all of which can produce valuable timber if grown competently on well-selected sites. Most research about diversification focuses on the biological and economic aspects of these changes. However, change in practice will only come if the people who produce, manage, harvest and buy the trees are willing and able to work in different ways.

Based on 55 in-depth interviews designed to capture the views and experiences of stakeholders, this report considers the implications of a shift in forest management through the lens of species diversity. Analysis is based on interviews conducted in 2015-16, and updated to fit the evolving policy context. No particular stakeholder view is 'right' or 'wrong' but understanding the range of views helps to identify where conflict or congruence lie, between policy and practice. This helps to see (a) where the bottlenecks lie, and (b) wider contextual factors that impede change.

1.2 Key Findings

- Species choice is a social as well as an economic and technical choice, because different people involved in land use have different objectives and preferences.
- Tree nursery producers, forest managers and sawmill businesses all influence species choice through supply and demand relations, as well as through preferences and shared values.
- Almost all stakeholders are open to the idea of, and potential need for, greater species diversity in commercial forestry

- Stakeholders experience risk in different ways.
 - Nursery businesses are bearing the most tangible component of risk at the outset, and paying the cost of low confidence in policy direction.
 - Sawmills are adapting to a wide range of species, and more than they are usually credited with.
 - The private investment forestry sector is the least interested in change, because most of their clients are driven by the search for high returns on their investments.
 - Public forest managers are committed to diversification but are forced to take an experimental approach because of the scarcity of experience and site-specific information on cultivating alternative species.
- Both private and public forest managers identify deer populations, and their preference for browsing species other than spruce, as a particular constraint to commercial diversification.

1.3 Recommendations

To enhance the contribution of conifer diversity to resilient forestry, it would be worth considering:

- mitigation of financial risk taken by nurseries when they diversify seedling production;
- increased investment in silviculture skills, research and professional expertise (reversing recent trends of loss of this knowledge-base); and
- the relevance of current debates about the need for more deer management, to improve the prospects of tree species diversification.

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2 Introduction

2.1 Diversification as a policy goal

Forestry is one of the main land uses in Scotland, occupying 19% of the land area, and contributing nearly 1% of gross value added (GVA)¹. Commercial forestry has in recent decades become highly dependent on a small number of conifer species, particularly Sitka spruce. If the sector is to become more resilient, this dependence on a few species grown in monoculture may need to change.

2.2 Alternative conifers

In Scotland 75% of the forest cover is coniferous, of which 58% is now made up of Sitka spruce. Only 2.6% of the conifer resource is not spruce, pine or larch². Adaptation and resilience of productive forestry is affected by risks from climate change and a number of high impact tree pests and diseases. These risks have prompted policy, practical and industrial concerns about over-reliance on a small number of tree species. There is renewed interest in alternative conifer species including western red cedar, firs, western hemlock and Douglas fir, all of which can produce valuable timber if grown competently on well-selected sites³.

The diversification agenda has met with some concern among the commercial sector in recent years. Explanations for slow change are anecdotal and often identify 'others' as unwilling to change. This study therefore looks systematically at the range of perspectives affecting forest species choice, including preferences, motives and experience.

2.3 Method

To make sense of the diversity of people involved, the study grouped stakeholders according to the supply chain. They include tree nursery managers, private forest managers, public forest managers, sawmill managers, policy advisers and researchers.

The study is based on qualitative interviews with 57 stakeholders, conducted between 2014 and 2016, as follows:

Nursery managers	4	from 4 different businesses
Private forest managers	16	in 12 interviews
Public forest managers	18	in seven districts (five in Scotland, two in England)
Sawmills and chipboard manufacturers	10	from 10 different businesses
Policy and research	9	a mixed category to ensure anonymity

The majority are from Scotland, but the study included stakeholders from England and Wales, because both nursery and timber supply occur across borders, and private forest

¹ CJC Consulting, *The economic contribution of the forestry sector in Scotland*. <https://forestry.gov.scot/forestry-business/economic-contribution-of-forestry> 2015, CJC Consulting. p. 38.

² Forest Research. *Forestry Statistics 2019*. <https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2019/>. 2019.

³ Wilson, S.M., *Using alternative conifer species for productive forestry in Scotland*. 2011, Edinburgh: Forestry Commission Scotland.

management companies operate across the UK. Qualitative interviews allow the stakeholder to describe and explain their experience and decisions in their own terms. This approach is recommended for exploring a complex topic which is affected by personal and shared values, interacting with technical and policy factors. The study analyses the interviews to draw out themes, and to highlight where there is consensus and where diversity of views. This approach focuses attention on areas where policy may be able to support change. Quotations are used (in italics) to illustrate points, and to bring the report alive in the words used by stakeholders themselves. This short report summarises a much longer data analysis which is available from the author on request.

3 Context: range of land use

The choice of species is affected by land use gradients which combine ecological, social and economic factors:

1. West - East: more traditional mixed estates in the east, more commercial forestry in the west. Many stakeholders take the view that *"In the west there is no drive whatsoever to consider any other species than Sitka."*
2. North – South: a similar gradient to West – East, with more mixed estates and diverse forestry in the south (of the UK), with the added factor that forest managers in the south report that they are already experiencing climate change.
3. Upland – lowland: diversification is considered to be relatively straightforward on lowland sites, where there are plenty of options and experience. Forest managers have fewer options, and less confidence, on upland sites which is where most commercial forestry is located.

4 Stakeholders' perspectives

In this section we summarise the experiences of each stakeholder group. Where relevant we also summarise how their contribution is experienced by other stakeholders.

4.1 Nurseries

Conifers are supplied from a small number of nurseries in the UK. Apart from the Forestry Commission's own nurseries, the nurseries are private businesses, and supply tree seedlings according to demand.

- *What our customers are going to buy, that's what we grow. We are a business.*

This has important implications for species choice. Sitka spruce is cheap to produce, and is planted at two years old. Alternative conifers generally require more time in the nursery, up to four years, sometimes with extra time to source seed, and specialist treatment to germinate it. They are therefore more expensive to produce, and they also need to be ordered further ahead of the planting date compared with spruce (an additional 1-4 years, depending on species). Nursery staff report that this requires a change in mindset where forest managers are used to buying spruce on request. Nurseries have produced alternative conifers speculatively, and offered them for sale; there have been some painful experiences of financial loss when these were not sold.

Forest managers plant according to grant availability, and delays in approving new grant schemes also contributed to large-scale failures to sell, with some nurseries burning tens of thousands of seedlings which could no longer be accommodated in nurseries.

- *The private sector is very open to the vagaries of the markets. For example, this year the grant system has fallen apart in Scotland and nurseries have been left with millions of unsold seedlings.*

Nursery managers are therefore bearing (and suffering from) a significant portion of the privatised risk associated with change, and many have been put off by recent hits. These constraints apply less to the public sector, which has invested in expanding its own nurseries, but also buys on contract from private nurseries and has a rolling planning system which can allow advance orders.

These constraints also affect the buyers (forest managers) who do want to diversify. They find it difficult to source alternative conifers particularly if they want to plant in significant quantities and not ordered in advance.

4.2 Private forest managers: investment forestry

Scotland does not have data about the proportion of forests managed as investment forestry. One study estimated this at 27%⁴, and respondents in this study also estimated somewhere between a quarter and a third of the forest area to be owned by this segment. Such forests are managed by forest management companies, including large international companies and small local companies. The investment objective, combined with the fact that the owners are usually remote investors not living near the forest, translates into a strong financial imperative for decision-making. Recent media attention has highlighted the exceptionally high returns on forestry investment, which is free of income tax, capital gains tax and inheritance tax⁵.

- *There is one difference between the public and private sectors in forestry and that is money.*

Respondents reported that in most areas of Scotland the returns on investment from Sitka spruce are 2-2.5 times those for the next best species. Furthermore, because rotation length is so short (35-40 years in many areas) many feel that if there is any need to change, they have the flexibility to do that after the current crop.

- *Changing species is not in the client's interests.*
- *It's not that we can't take the risk on alternatives ... alternatives are not an option at the outset.*

The exception is in areas which are experiencing the impact of tree diseases. These areas are diversifying rapidly, often in response to changed regulations. For example, statutory plant health notices require owners to clear larch potentially affected by *Phytophthora*; and in some areas where pine is affected by *Dothistroma* needle blight, restocking with pine as the main species is disallowed.

Some owners have broader objectives. For example, those whose priority is to protect an investment to pass on to their heirs may be more interested in trying out a wider range of species in a small area.

Some managers were uncritical of the financial focus, while others said that it conflicted with their own values.

- *I'm not alone in wanting to do nice things.*

⁴ Wightman, A., *Forest Ownership in Scotland. A Scoping Study*. Available at: http://www.andywightman.com/docs/ForestOwnershipScotland_2012.pdf. 2012, Forest Policy Group. p. 29.

⁵ John Clegg and Co., *UK Forest Market Report 2019*. 2019.

- *Good foresters think diversification is good. [But it is] against the interests of private clients.'*

4.3 Private forest managers: estate owners

Another significant proportion of Scotland's forests are managed as traditional estates (also estimated at 27%)⁶. Estate forest managers may be the same people as the investment forest managers, or employed directly by the estate. However their management decisions reflect the values of the owners, who are usually concerned with a wider mix of land use and objectives, including landscape and conservation values. The interviews highlighted both opportunities and challenges related to this mix of land uses, and often highlighted the wider range of conifers and silvicultural systems found on estates:

- *The private estates who focus on shooting are not easy bedfellows with certification [and therefore with harvesting].*
- *If we have ground that will support nice alternative conifers we will do it.*
- *These big estates - there is a lot of mixtures, in the past they carried out the silviculture with correct methods, they gave you lots of different varieties of species.*

4.4 Public forest managers

Public sector forest managers and planners, from former Forestry Commission (FC) organizations in Scotland, England and Wales, feel under pressure to diversify. Some have been forced to change the main species, because tree health concerns have prevented the use of more familiar choices. For some this is a long-awaited opportunity to do good silviculture and plant the 'right tree in the right place'; for others it is a source of stress, resulting from decisions made elsewhere, and difficult to implement when staff and budgets have been reduced. Much depends on the support of line managers, and this varies widely between districts.

- *We spend a lot of time keeping up to date with policy and that's not easy, particularly because it's made at higher levels and it doesn't always work.*
- *People talk about resilience a lot but nobody's told us what it means.*
- *You have to do it on a reasonable scale but there is very little support. If we don't do quite drastic things we have no impact.*
- *I feel very empowered. If you want to try something you just get on with it. Use your experience and discretion.*

Other stakeholders, particularly forest managers in the private sector, are not always sympathetic to the dilemmas of the public forest managers, but have contrasting views:

- *We are seeing FC buying land and planting it with a diverse range of shrubs. And deep down I see it as ridiculous.*
- *The public forest estate should be smaller and more adventurous. Why does the state need to manage spruce farms?*

⁶ Wightman, A., *Forest Ownership in Scotland. A Scoping Study*. Available at: http://www.andywightman.com/docs/ForestOwnershipScotland_2012.pdf. 2012, Forest Policy Group. p. 29.

4.5 Sawmills

Sawmill machinery and settings are adapted to particular species. Spruce is easy to mill while some of the alternative species have higher resin content, more bark, less regular trunk shape, or tend to be grown to sizes larger than the standard machinery settings – all factors which reduce efficiency of the mill. Much of the discourse around the forest industry's slow adoption of alternative conifers, accuses the sawmills of reluctance to change.

- *The saw mills are their own worst enemy - they've got to move with the times as we're being asked to do*

However the sawmills have a different story to tell. Almost all the mills included in this study pointed out that the UK sawmill industry has benefited from a lot of investment over recent years. Many also expressed concerns about future timber supply, and particularly about decreasing supply from public forests. By moving more into the private forestry sector, they find themselves encouraged to take a wider range of species.

- *It's not so much about expanding, it's doing things better, trying to reduce your costs. We [big sawmill] have to engage more with the private sector.*
- *We [big sawmill] understand that species diversification is a fact of life.*
- *There will have to be more private estate volume coming to market. Because there's less [timber from] public forests.*

At the same time, the total number of sawmills has decreased, with capital concentrated in a few very big mills, and declining numbers of smaller mills. Size, location and product group affect species selection; the medium sized mills are more flexible and smaller mills cater to niche markets and are often more able to adapt to different species input. There is an interdependence among sawmills of different sizes, and potential value in supporting medium and smaller mills.

- *We may not be able to pay the higher prices that the big boys will pay but we'll take everything that you throw at us. So we're good at sweeping up specifications.*

4.6 Policy stakeholders

When policy aims to change land managers' behaviour it usually relies on a mixture of regulation, financial incentives and / or information, advice and encouragement. Policy in Scotland, England and Wales relies heavily on the advisory approach to encourage change of species in commercial forestry. There are regulatory components; felling licences, grants and certification all rely on compliance with the UK Forestry Standard, which permits no more than 75% of a site to be planted with a single species, and requires a minimum of 10% other species (in addition to a minimum of 5% native broadleaved species). There is also some financial support in Scotland, where higher levels of restock grant are available for species other than spruce, but many report that the higher level does no more than cover the extra cost of fencing to protect from deer. This leads to a general level of scepticism about the effectiveness of policy measures:

- *This mad rush to do something different! If the public purse is wanting to pay for the diversity then fine.*
- *There can't be a policy because it's not always going to work ... There are going to be failures so if it was [policy] driven, people would point fingers.*

On the whole, stakeholders outwith the public forest sector did not find the policy direction on conifer diversification compelling:

- *What is the policy?*
- *Policy is being made on the hoof.*
- *Policy is not there yet.*

5 Themes and issues

5.1 Diversification is driven by tree health concerns not by climate change concerns

Where forest management policies have shifted to embrace new species for productive forestry, this is mostly in response to tree health concerns. In south-western areas of Scotland, Wales and England, measures to control the spread of *Phytophthora ramorum* involve the felling of large volumes of larch; in eastern areas *Dothistroma* needle blight has prompted moves away from reliance on pine as the main species⁷. This response to major external forces is very different from a considered implementation of adaptation measures that might lead to an increased resilience. Many interviews reflected this sense of compulsion:

- *We have to do something. To do nothing was the risk – of having dead trees.*
- *[With Phytophthora] we are like rabbits in the headlights.*

Others less affected by these shocks, saw the drivers as less clear-cut. Some felt the logic of species diversification was missing; others blamed inertia and profit-seekers in industrial forestry.

- *The drivers [for species change] are tree health, climate and ideology.*
- *There is a blockage in the heartlands of the spruce industry.*

5.2 Public and private interests

One advantage of a research focus on stakeholder perspectives, is that it reveals the underlying values and drivers for decisions. We move away from technical questions of what is biologically possible, or logistically feasible, to cultural factors (shared value systems) and social institutions (such as the costs and benefits of different forms of land ownership). When, for example, stakeholders say that 'there is no drive to diversify in the west', their views are based on a combination of factors including biophysical environment (Sitka spruce is the fastest growing species in Atlantic conditions), economic factors (attractions of investment forestry, plus market for whitewood) and social institutions (landownership structures).

Of these, only the biophysical environment is a 'given'. There are ecologically and socially viable alternatives, but current choices are driven by the social and political predominance of profit, and acceptance of monoculture as a permitted means to private profit. Stakeholders from all sectors (nursery, forestry and sawmill) pointed out that change would come, if policy incentives supported it.

⁷ Scottish Forestry. *Tree health*. . 2020; Available from: <https://forestry.gov.scot/sustainable-forestry/tree-health>.

- *People are not philanthropic. They want the best outcome for the least spend and least risk.*

Views were divided on whether grants or regulation would best achieve a shift, but noted that some systems of landownership were more amenable to public benefit than others:

- *We [traditional estate] thinned through the late 90s, 2000s when it was financially horrific – because of our social obligations.*

5.3 Deer

Most of the conifer species considered as 'alternative' are more palatable to deer than is Sitka spruce, and require fencing or other protection measures to ensure establishments⁸. Concerns about the scale of deer herbivory have escalated over decades, noting the failure of voluntary measures to achieve a balance in the interests of all stakeholders, and the cost to the public purse of fencing and culling⁹.

- *Establishment [of seedlings] is an issue. It's a huge cost. It's killing us.*

There is no doubt among forest managers, public and private, that the current situation militates against the diversification of the productive forestry resource.

5.4 Scale and pace of change

For many who were open to the need for change, there was frustration at the slow and small scale of change. The forest industry, to them, works on economies of scale, and change would need to be confident and deep-seated if it was going to work:

- *We have so much Sitka and we are just tickling around the edges. How do we work with that?*

This view was particularly expressed by the large sawmills:

- *I want 8 million alternative conifer, not a few thousand.*

Figures for GB indicate that about 0.7% of the total forest area is clearfelled each year, while less than this is restocked¹⁰. With only 10% of restock currently being diversified, change is on a millennial timescale and unlikely to prepare forests to be resilient.

5.5 Revitalisation of silviculture

Many forest managers (and other stakeholders) recognised that forestry was experiencing a renewed interest in silviculture (the science and practice of growing trees) in contrast to the single-objective 'cellulose farms' of previous decades.

- *People have to accept that silviculture isn't a dirty word and that diversity has to be a new paradigm for silviculture.*

⁸ Wilson, S.M., *Using alternative conifer species for productive forestry in Scotland*. 2011, Edinburgh: Forestry Commission Scotland.

⁹ Pepper, S., A. Barbour, and J. Glass, *The Management of Wild Deer in Scotland: Report of the Deer Working Group*. <https://www.gov.scot/publications/management-wild-deer-scotland/>. 2020.

¹⁰ Forest Research. *Forestry Statistics 2019*. <https://www.forestryresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2019/>. 2019.

Many felt that their education and practical knowledge is now valued more than in the past, and some expressed pride in 'good silviculture'¹¹ but others felt this was threatened by a simplistic approach to planning and decision-making.

- *I would like to do what the old foresters did, practice good silviculture, go back to mixtures.*
- *More people are relying on decision support tools and taking it as the decision. This can lead us up the wrong path.*

6 Conclusions: constraints and resources

Despite widespread awareness and discussion of species diversification, stakeholders agree that real change is very slow. The risks of *not* adapting are catastrophic loss of forest cover and timber supply, and the public and private ecosystem services that go with that, as a result of either extreme climatic events or a pest / disease impacting Sitka spruce. The risks of *adapting* are more subtle, and relate to opportunity costs (currently estimated as less than half the returns of Sitka spruce), unknown performance, loss of client confidence and business.

In practice change has to happen at the beginning of the supply chain with the tree nurseries, but nurseries need to have confidence in growers, industry and ultimately policy, to make those changes. The risks of changing or not changing, are experienced in different ways by different stakeholders, with nurseries in particular bearing the private cost of risk, and the public forestry sector bearing the cost of experimentation. In a climate of policy and institutional uncertainty, and decreases in staff and budget for public forestry, the will and capacity to deliver diversification are further undermined.

Underpinning this distribution of risk and confidence, wider policy issues including land ownership, business and land taxation systems, and deer management, all have a bearing on incentives to make particular decisions and the risks borne in doing so. Diversification of tree species is related to owner objectives, which in turn are related to scale of land use and land ownership, and social engagement with the inputs and benefits, so the outcomes cannot be determined by any single policy measure or incentive mechanism.

There are however important resources and opportunities to support diversification. The revival of silvicultural values, and a newly emerging culture of experimentation building on interactions between practice, historical trials, new trials, and climate modelling provides a receptive culture for change. The forestry professional culture is good at networking, debate and exchange of experience often based on field visits. Furthermore, the sawmilling sector is changing faster than has been acknowledged, because of the pragmatic need to source timber in a competitive field. However most of those involved in this study felt that this will only make a real difference if supported by policy across land ownership, business, taxation systems and deer management, and the incentives that derive from these.

¹¹ Lawrence, A., *Adapting through practice: Silviculture, innovation and forest governance for the age of extreme uncertainty*. Forest Policy and Economics, 2017. **79**: p. 50-60.

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