Forest Research

Centre for Forest Protection

Research Note

'Now with climate change we're realising that diverse structure can be really good for resilience' – Exploring structural diversification of forests with forest managers

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As the climate changes, the frequency and intensity of extreme weather events such as storms and drought are predicted to increase across much of the world. With such events already being experienced throughout the UK, there is growing interest among practitioners and policymakers in how to introduce resilience concepts into sustainable forest management, particularly through the diversification of species-poor and structurally simple planted forests. Modifying even-aged, single species, clearfell forest systems through the application of greater structural diversification will require changes to forest planning and management. Thus, understanding forest manager perspectives of structural diversification, particularly the drivers, motivators, barriers, challenges, and enablers that they perceive and experience, will be crucial for understanding how future forest systems can be more resilient.

Methodology

To investigate these perspectives, interviews were conducted with 10 forest practitioners (forest managers, planners, consultants, and an ecologist) in England, Wales, and Scotland. Interviewees were working in both the public and private sectors. Three people were interviewed in forests during walking interviews, while the rest were conducted via Microsoft Teams. The activities and responsibilities of the interviewees included: reviewing and writing land management plans, forest operations, strategic business development across private land and estates, coordinating work programmes to achieve timber income business plan targets, and managing wildlife management programmes.

Box 1 Key questions on structural diversification

Why is structural diversification of forests important?

A proponent of structural diversification (SD) stated: 'Why am I an advocate for CCF [continuous cover forestry]? I just think it's the system that works best with nature. You're not fighting against it. The idea being that you're working with it and using natural processes to help us along and once you've got those systems in place I think maintaining it becomes a lot easier.'

Why is structural diversification not always possible?

Some of the interviewees noted that SD is not going to work in all situations: 'Some sites are going to be so limited in upland forests by wind, risk of wind damage, that clearfelling and restocking is the only realistic management approach that you can use.'

What structural diversification has been applied?

Interviewees discussed a wide variety of ways in which they had begun to diversify forest structure: 'I have tried various different ways of thinning in different areas, including, [...] in an upland forest, all Sitka spruce, and we did a lot of strip-felling, variable thinning, different intensities of thinnings within the stand, regeneration, strip regeneration, and patch felling, like felling a quarter of a hectare, for example. Group selection, you might call it.'

What are peoples' experiences of drought?

A focus of the project is how SD may increase resilience to drought. Interviewees emphasised how their experiences of drought were primarily spring droughts that caused widespread loss of newly restocked sites following clearfell, particularly on south-facing slopes and/or on steep sites with thin soils.

Results

The results revealed drivers, motivators, challenges, and barriers to introducing SD into forests. Key themes, those which were most frequently mentioned across interviewees, are included in the tables below.

Table 1 What are the motivators and drivers for diversifying forest structure?

Driver	Example quotes
Weather event	*I think as those pressures become more and it starts to hit the bottom line in terms of higher restocking costs and loss of crops before they reach felling age then we'll start to move more to that.*
Economics	*One of the things that drives continuous cover is that you're doing things in order to optimise economic performance as well as biological performance. You want the thing to function in a natural way that's sustainable and that's resilient but you need also to have an economic driver there.*
Policy and regulation	*So, all of our estate is designated under UKWAS [UK Woodland Assurance Standard] and one of the requirements under UKWAS is that you need to consider whether LISS [Low Impact Silvicultural Systems] is a viable option or not.*
Management goals	*And all of our forest plans are reviewed every five years and then renewed every 10 years and at the 10-year renewal that will be the critical point where it will be asking those questions, what species have we got present, what's their age class, what's the long-term objectives for management, then is LISS a potential option or not. [...] it shows you when there's a bit of funding and managerial level will, what can happen.*
Personal	*As a forester, it's more interesting. Clear-felling and restocking is boring, to be honest, for a practitioner. So, these other systems are far more interesting. So, that was partly my personal motivation to get involved with it.*

Table 2 What are the challenges and barriers to diversifying forest structure?

Challenge	Example quotes
Skills and understanding	*So, yeah, quite a few challenges and the skills and knowledge on that kind of side of things are fairly thin on the ground.* *For me, I think the main thing is, silviculturally, operationally, it's difficult. It's more difficult, it's more challenging, and it's easy to get it wrong. So, if you think of felling and restocking, you fell it... say if you didn't do anything, that's the simplest model; you fell it and then 50 years old you chop it down. There's not much that can go wrong. But if I said to you 'right, I want you to thin it and then I want you to manage it in such a way that you've got big trees and little trees', there's all sorts of things that can go wrong then.*
Browsers	*And obviously deer are a massive issue; going to really struggle to get anything regenerated [that's not Sitka] ... you'd need to have your deer control well under way or fenced and fencing is becoming more and more expensive.*
Site conditions	*Well, the first thing to say is that thinning would be the first stage in diversifying your plantation. Not all our forests can be thinned.* *The other thing we have is we have a lot of mountain areas. You've got a lot of very wet peaty soils on the top of mountains so a lot of those are designated as no thin crops because that's the safest way that... their biggest risk is blowing over and so they're deliberately not thinned because that's their best chance of getting to be 50 years old before they blow down*
Forestry industry structure	*And that is one massive roadblock to CCF and creating structural diversity. We have spent the last 100 years organising forestry to gear around one species of a very specific size.*
Resources	*If you start adding complexity into what you're expected to do then that adds to the workload. For managing well you'd need more resources. To be blunt, you'd need more foresters. You'd need more staff, and there is no staff being offered to do this work. So, that is a challenge.*
Mindset	*People need to change their mindset and just adapt. That's a very uncomfortable place for people, given how the current education system works where you're taught to follow a process in the system and deliver on it.*

What enablers are needed?

Interviewees had many suggestions and ideas about what enablers would be helpful for facilitating SD, and about tackling some of the barriers and challenges. Those most frequently mentioned are listed below with illustrative quotes included. The figure includes extra detail to demonstrate the breadth of enablers that arose.

Markets: 'You do need to maximise your income but we also need a resilient system and if that resilient system creates a new timber product I suspect there will be a market out there for it even if it's not there now. If there's enough of it starts developing somebody's gonna find a market for it.'

Contracts: 'I think, relationships with contractors that develop trust, knowledge, and understanding. That doesn't happen by letting one-off sales for 20 hectares here or 20 hectares there. That's not gonna work. If you want specialist machinery like small forwarders, small thinnings harvesters, then you need to get that contractor and work programme that justifies the investment into something he's not going to be able to take onto a clearfell.'

Greater understanding: 'It does require a team that know what they're doing and until we kind of build that knowledge back up it's going to take a while.'

Training: 'I think the first thing is you need well-trained skilled foresters, silviculturalists really, who understand stand dynamics and what different species offer and what suite of options are available and that comes down to having them properly trained, supported, and having enough experience.'

Mindset shift: 'Most of those guys are still telling their staff to do what they were doing 35 years ago. People need to change their mindset and just adapt. That's a very uncomfortable place for people, given how the current education system works where you're taught to follow a process in the system and deliver on it. You're not taught to think outside the box, or wonder where the box is. Mindset is the right terminology, I think.'

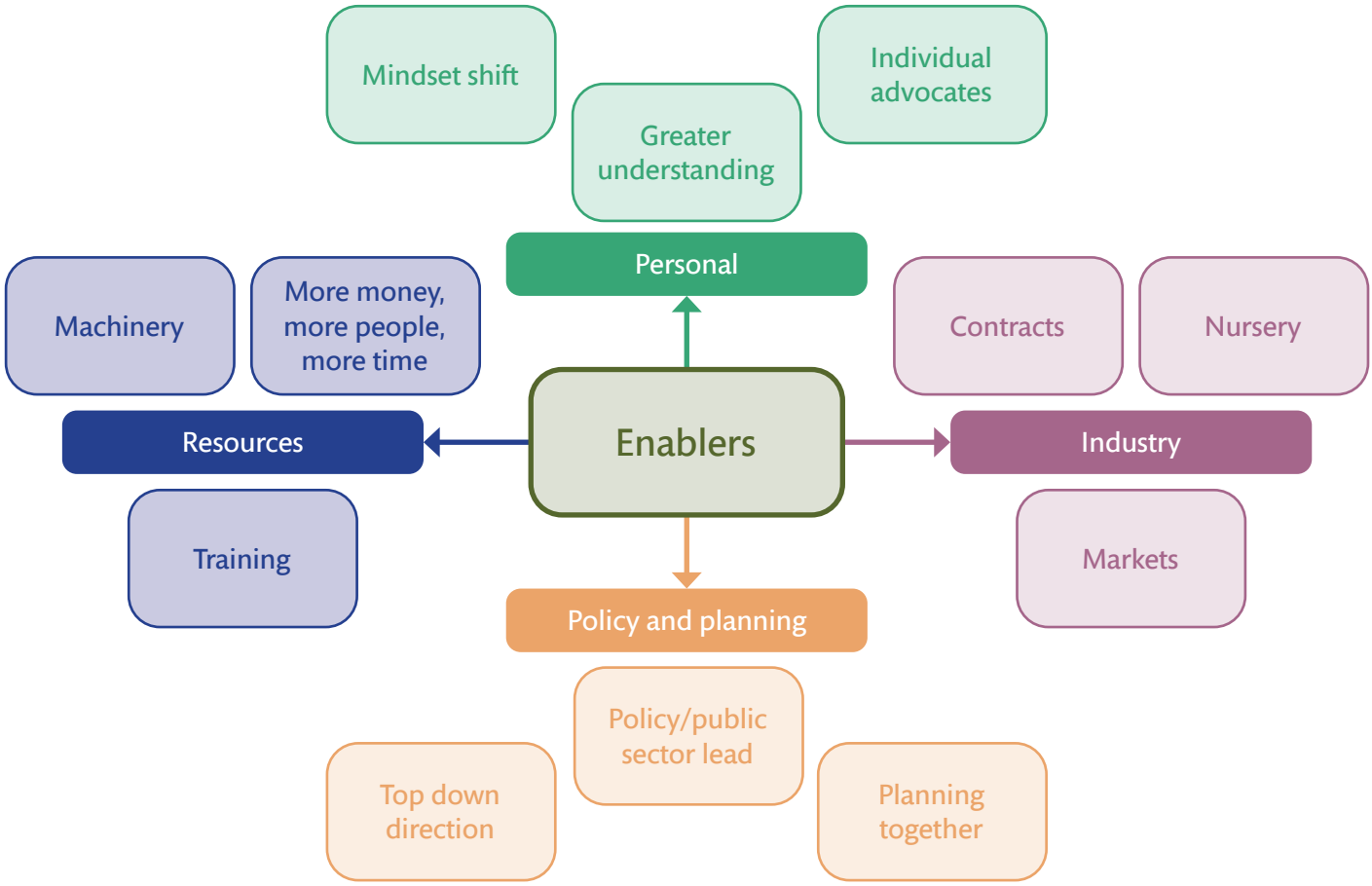
Resources: 'What would be the ideal solution would be a fleet of in-house direct production, thinnings machines, and squads, that that's all they do, but it requires a big investment and a big level of maintenance which is obviously not popular at the moment.'

Planning together: 'Planning and programming should be a bit more collaborative and a bit more creative on tying things together, and it needs area managers and operations managers to be on-board with that and be willing to work

Concluding comments

These interviews revealed widespread interest in the application of SD in forest management and a move away from a standard clearfell/restock system of timber production. However, there was recognition that SD may not be appropriate for all locations and contexts. It was also noted that considering diversification at a whole-forest scale was important and that this would likely still retain clearfell areas. Overall, there was an understanding that diversifying forest structure should make forests more resilient to future threats, including from climate change and pests and diseases, while also enabling realisation of financial returns more frequently. The challenges that interviewees identified, from site conditions, industry structure, and lack of understanding of the principles and techniques, point to the need for multiple areas of change to enable management diversification.

Figure 1 Mind map of enablers mentioned by interviewees



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For more information on this research visit:
www.forestprotection.uk/project/cfp2508/

The funding for the Forest Research work reported in this Research Note came from Defra through the Centre for Forest Protection funding stream.

ISBN: 978-1-83915-054-8
https://doi.org/10.70463/LWGP2106