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Governing like a forest: achieving diachronic integrity or emergency carbon sequestration through post-Brexit forest policy?

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Abstract

Whilst Brexit presents many challenges, it also creates a juncture to address longstanding tensions in rural land use policy. There is increasing pressure to expand forests in Britain, particularly for carbon sequestration, but also to acknowledge the wider uses and values of trees. An important tension here is not only the ultimate balance of land uses, but the rate of change that Brexit might herald. In this chapter we explore the current pressures for rapid change through afforestation, balanced against lessons from the past. This involves a closer look at policy time-cycles and who, and what, they serve. We highlight a need for more durable and adaptable approaches to forest policy making, but also to look beyond an anthropocentric focus to acknowledge the agency and rhythms of forests themselves. Our perspective is grounded in the concept of diachronic integrity. This argues that for conservation to succeed it must pay attention to place narratives – the socio-ecological interactions that, over time, generate places and their human and non-human components. We explore two post-Brexit forest policy scenarios and highlight critical choices that need to be made. We conclude that considerable adaptability is required to deliver policy that is sensitive to diverse narratives.

Introduction

Whilst Brexit presents a number of challenges, it also creates a juncture to potentially address longstanding tensions in rural land use policy. Increasing pressure is now being felt to expand the extent of forests in Britain, particularly to meet carbon sequestration targets (Committee on Climate Change, 2020) but also to acknowledge the wider set of uses and values that trees provide for society, which are increasingly described as 'ecosystem services' (UK Government, 2021a; Waters, 2021). Critical questions have arisen about the balance between the wooded components within landscapes and other rural land uses/covers and whether Brexit could mark a turning point towards greater forest cover (Burton *et al.*, 2019; O'Neill and Osborne, 2020). An important tension here, in ensuring sustainable rural land use governance, is not only the ultimate balance of land uses, but the rate of change that Brexit might herald. In this chapter we explore the current pressures for rapid change in the UK's forest landscape, whilst balancing this against lessons from the past. This involves a closer look at the time-cycles of forest policy and who, and what, they are intended to serve. Here we highlight a need for more durable and adaptable approaches to forest policy making, but also to look beyond an anthropocentric focus to acknowledge the non-human agency and rhythms of forests themselves.

The chapter is structured as follows: In section 2, we begin by considering some past tensions in forest policy before turning to consider potential policy and regulatory changes brought about by Brexit in section 3. In section 4, we explore the potential impacts of changes arising in our rural landscapes after Brexit, specifically in terms of the extent and form of forest cover arising, and the pace of such changes. We discuss this in the form of two hypothetical scenarios and, in our concluding discussion we reflect on the relative merits of both scenarios and the balance that needs to be struck between them.

Past Tensions

To inform our evaluation of the current pressures for change, we begin by exploring some of the past tensions in forest policy and the role time and human priority plays there-in.

Time and Adaptation

Trees take time to grow. Forests develop and change over timescales well beyond most people's reckoning, and certainly over periods extending far beyond standard 'policy cycles' of around five years. In the UK, for example, most native species take at a minimum twenty years, but more often at least fifty years to mature. Many trees outlast people, spanning and linking generations and watching over our landscapes through markedly different eras. These timescales can make *deliberately* growing trees a tricky business, requiring a different mind-set to many modern enterprises: including farming which, whilst founded on long-term concerns such as intergenerational commitments and land stewardship, is dominated by a focus on annual crop cycles and rotations. Foresters have had to learn to plant trees for the next generation and harvest what the last generation left for them. Whilst such rhythms may often be understood and accepted by foresters themselves, they can lead to notable tensions and 'policy failure' - particularly when and where linked to demands for specific forest products and markets.

Since its earliest development forest policy has generally been designed to optimise the benefits accrued to people from the management and use of trees, focusing on human values and timescales. The relatively stable and generic goal of timber production has provided a firm foundation for decades of forest policy. The objective of producing high quality timber for use within the manufacture of various products – construction material, fencing etc. – has long underpinned the market in the UK, prompting planting-harvesting-replanting cycles. This generic goal does not, however, motivate sustainable management in every forest, nor stimulate widespread woodland creation amongst contemporary land managers (Lawrence and Dandy, 2014). Notably, woodland planting rates have been at historically low levels in the UK and less than half of the UK's woodlands are 'certified' with a management plan, let alone actually being managed (Forestry Commission, 2020). These policy 'failures' can, in part, be explained by the mismatch between society's human timescales and forest timescales.

Although objectives relating to recreation and biodiversity conservation have become more prominent over time, woodland creation efforts have long been explicitly grounded in the need to supply specific wood products. In the UK, for example, we hear of Admiral Nelson's early 17th Century efforts to restore and replant the Forest of Dean so as to ensure a ship-building resource, the post-World War I drive to ensure timber for use within trench warfare and to maintain domestic coal mine production (West, 2003), and post-World War II incentivisation of poplar and willow growth for the match and basket making industries (Tabbush and Beaton, 1998). More recently the sector has sought to stimulate woodland creation and better management by highlighting the potential for various forms of woody biomass (woodchip; logs) as a source of renewable energy (Forestry Commission England, 2007). These initiatives led to the creation of numerous forests and woodlands across the UK - from the oak of the Forest of Dean to widely distributed patches of short-rotation willow coppice – much of which continues to exist.

However, non-human agency acts as a check on human ambition. Given the time required to grow trees, in many cases society's needs and economic demands have moved on before the established forests had matured sufficiently to provide the intended products. Ironclads replaced wooden ships, trenches disappeared with the Blitzkrieg of tank warfare, basket-making shifted to plastics, and concerns about air quality are rapidly eroding trust in woodfuel. The outcome of this is a forest landscape that has grown in the shape of past policy needs: featuring numerous forests and woodlands in search of new, contemporary purposes and contributing to widely held understandings of woodlands as 'uneconomic', especially amongst farming stakeholders (Dandy, 2016). In the post-Brexit rush to afforest land in response to climate change, it seems pertinent to avoid establishing

forests that could become similarly redundant as other technological fixes develop that usurp the current position of trees as perhaps the premier carbon capture technology.

Despite these policy ‘failures’ (in fact, likely in part *because* of them), in recent decades the forest sector has learnt the need for ever increasing adaptability. The demand for timber has provided a foundation on which to build innovation and multifunctionality – such as the repurposing of forest areas for recreation (from mountain biking in conifer plantations to maze creation in short-rotation willow coppice) and the provision of education and healthcare. Forest policy has continued, however, to (re)define and target suites of products and services within relatively short (policy-oriented) time scales and with an unyielding faith in human intervention as the route towards realising those benefits. However, the tensions around the specificity and short-termism of policy, accelerated by the urgency of Brexit, draw attention to broader questions about the extent to which trees’ non-human agency has been given consideration and allowed to play a role. By focusing forest policy on human timescales and values we systematically ignore the ecological narratives of the forest, manifest over longer timescales. This has a range of implications, both ethically and ecologically, in terms of the health of the resulting ecosystems and the dominance of human needs. It also raises questions about the integrity of the places that result and the ways in which social and ecological elements combine within a landscape to provide a sense of meaning through continuity and attachment over time.

Diachronic Integrity

The environmental sustainability challenges created by the incongruity of (human) social and (non-human) ecological timescales have long been acknowledged. Within environmental ethics, foundational positions, such as Aldo Leopold’s land ethic, directly draw attention to the need to extend our thinking temporally in order to fully comprehend the ecological impacts and consequences of our actions. Generally, social change, and more specifically anthropogenic environmental change (both intentional and unintentional), can occur at a faster pace than some longer-term components of ecological change: thus threatening sensitive balances and overwhelming ‘natural’ regulating processes. This is not to suggest that natural systems are static and unchanging, but that human interventions can destabilise and overwhelm the dynamic equilibrium of such systems, particularly through repeated interference. For example, Grove-White (1997) was amongst those who identified the problems flowing from short-term case-by-case environmental impact assessment relative to cumulative impacts, and the challenges associated with ongoing entrenched governmental and industry control over policy timescales and embedded evaluation methodologies, including within forestry.

Amongst the many responses to this problem from environmental philosophers and sociologists has been an emphasis on place, narrative, and associated deliberative valuation and policy-making processes. Giving attention to place narrative(s) – both social and ecological – enables a focus on temporal aspects of place and the intrinsic dynamism of environmental settings. In an attempt to provide an effective foundation for these processes, Holland and O’Neill (1998) suggested a commitment to the ‘integrity of the environment over time’. Looking both backwards and forwards in time, they advocated seeking ways in which to continue place narratives that acknowledge interdependent human *and* non-human rhythms, dynamics, and timescales. As Roberts *et al.* (2021) summarise, this concept of ‘diachronic integrity’ centres on “maintaining some form of coherence in a place’s ‘character’ through time” (p. 4). This entails policy and management processes that ask “what would make the most appropriate trajectory from what has gone before?”, particularly recognising the diverse lifeforms involved (Holland and O’Neill, 1998: 10, emphasis in original).

Holland and O’Neill do little beyond this to set out what might constitute such an ‘appropriate trajectory’, however they argue that avoiding “too little change or too much” is critical as both can disrupt place narratives, thereby compromising their integrity. Consequently, they critique those forms of conservation that stifle change and risk ‘transforming the lived world into a museum piece’ (1998: 11), echoing learning from forest ecology where-in prevention of natural disturbance can be as

disruptive as creating too much disturbance. By contrast, rapid change can be equally disruptive due to its tendency to exceed 'natural' limits and thresholds. Of course, 'natural' disturbance can be very rapid (wind storms, fires, earthquakes) but most forests have developed a high capacity to recover from such changes. From an ecological perspective, what is problematic is intense and/or frequent human disturbance well beyond the limits of the current natural disturbance regime. Here we might add consider the disruption generated by rapid land-use transformation – such as large scale afforestation efforts – which have previously (Kitchen *et al.*, 2006; Tsouvalis, 2000) and may again disrupt senses of place. We return to consider these tensions, and the need for more appropriate forest policy time-cycles and priorities, after we have reviewed the current Brexit window for policy change.

Brexit

Across the land use sector Brexit has been seen as a watershed to bring in new policy approaches now that the UK is no longer bound to European policy stipulations. This is particularly notable in relation to the Common Agricultural Policy (CAP), prompting a major rethink in the way we reward and incentivise farmers. Whilst forestry is not bound by an equivalent framework, the end of CAP does have a number of ramifications for the forest sector. Perhaps most notable is the sense of opportunity the Brexit transition is engendering for foresters, given the difficulties predicted for the agricultural sector without continued CAP support (Confor, 2018; AHDB, 2017). The UK Government (and its devolved counterparts) is seeking to replace CAP with new payment schemes, meaning that the previous model of 'direct payments' based solely on farm area (with only basic levels of conditionality) will not continue, leading to a major shortfall in farm incomes (Dwyer, 2018). Instead, payments are far more likely to be contingent on the delivery of public benefits in the form of ecosystem services – including carbon sequestration, water quality and flow regulation, biodiversity and the amenity, or more specifically human wellbeing, value of land – which will potentially prompt a change in farmers' priorities and land use practices (UK Government, 2021b; Welsh Government, 2020). Notably, there has been increasing interest in the level of ecosystem services delivered by trees and the integration of trees within agricultural landscapes, often deemed to be in excess of those delivered by agriculture alone; although this is hotly debated (Lamb *et al.*, 2016; Torralba *et al.*, 2016).

What this means for forestry is threefold. Firstly, schemes may be more tailored towards paying land managers that are already engaged in tree planting; secondly, there is now more scope for engaging farmers with tree planting on their land through new payment schemes; thirdly, some farmland could become available for forestry expansion at a larger scale where farmers do not engage with new schemes and chose to withdraw from agriculture entirely. Where land does become available for non-farming uses, there is substantial enthusiasm evident from the commercial forestry sector to use Brexit as a springboard to accelerate conifer afforestation and rejuvenate domestic timber production (Confor, 2018). This is often incentivised by corporate interests seeking to acquire land to secure ecosystem service benefits through tree planting, particularly carbon sequestration (Garside and Wyn, 2021).

The ending of CAP in UK also has a number of technical implications, which could influence the future trajectory of forest and woodland creation. Linking to the above arguments about the potential for farmers to engage with woodland creation, a notable current barrier is the legacy of the European stipulation that land (for which farmers receive 'direct payments') has to remain in 'Good Agricultural and Environmental Condition' (European Union, 2013). This means land has to be maintained as farmland and natural processes of 'vegetation succession', i.e. natural seed dispersal leading to the establishment of shrubs and trees, and ultimately woodland cover, are not allowed to occur. The presence of trees on land also meant the areas under tree cover were ineligible for 'direct payments'. Ironically, however, farmers were being paid under a separate stream of CAP to plant trees for environmental reasons. All of this has meant that farmers have previously been actively dissuaded from wanting – or simply allowing – trees to grow on their land, which could now change leading to a marked transformation of our rural landscape.

Looking more specifically within the forestry sector, Britain's departure from the EU could mean an end to, or significant relaxation of, regulatory requirements for full Environmental Impact Assessment (EIA) before permission can be granted for large scale woodland and forest creation schemes (Bond *et al.*, 2016). The EIA rules meant that the rate of change for the establishment of forest landscapes in the past was significantly slower than it could now be. The underpinning assumption of the EIA process was a "do no harm" approach that was deeply rooted in European policy thinking (Glasson and Therivel, 2019). By contrast, within the UK there is now increasing interest in the potential of determining land use/cover change on the basis of whether a "net environmental benefit" can be achieved (Atkinson *et al.*, 2018).

Departing from the EU means a break with these regulations and frameworks, but it is also coinciding with broader pressures and interests that are strengthening the case for trees. In particular, concerns around climate change have led to ambitious commitments for reduced carbon emissions and enhanced sequestration (UK Government, 2008). This has led to specific commitments for tree planting as a means to deliver on targets for carbon sequestration and storage (Grassi *et al.*, 2017; UK CCC, 2019; UK Government, 2021a; Waters, 2021), and meant that wider environmental initiatives are being tailored to ensure that expansion of tree cover comprises a central component of their proposals (National Trust, *no date*; Rewilding Britain, 2019). A critical issue is the rapidity of change required. It is now widely accepted that carbon dioxide needs to be removed from the atmosphere and its carbon securely stored in the shortest possible timescale for us to avert predictions of catastrophic climate change. This not only adds urgency to the argument for more forests to be established (Forster *et al.*, 2021), but has implications for how we do this and what types of forest landscape result, which we explore in the following section.

Alongside the government mechanisms outlined, which serve to replace previous EU agricultural payments, there is increasing interest from the corporate sector in tree planting as a means to offset their emissions, operating in accordance with the UK woodland carbon code¹. This is leading to increased pressure on rural land to serve these needs and in some instances is leading to a change in land ownership where corporations wish to buy areas for this purpose, resulting in considerable controversy about impacts on the continuity of rural communities and culture (Westminster Hall Debate, 2021).

Taking these increasing pressures to enhance levels of afforestation together with the potential windows of opportunity outlined – for tree cover to replace areas of farmland and for more rapid processes of change to occur without the EU EIA stipulations – we see the potential for significant land use/cover change to occur in the UK within a short space of time. Set against these pressures for rapid change, there are also indications of policy development over longer than usual time horizons emerging post-Brexit. Two of the clearest manifestations of this are *A Green Future: Our 25 Year Plan to Improve the Environment* (UK Government, 2018) and the Well-being of Future Generations (Wales) Act (Welsh Government, 2015). This may signal learning amongst contemporary policy stakeholders and present an opportunity to capitalise on wider acceptance of adopting longer term perspectives going forward. In the following section we consider the impacts of these different pressures in our post-Brexit landscapes and what considerations need to be taken into account in light of the past tensions outlined earlier.

Afforestation Policy Scenarios

Here we consider two post-Brexit forest policy scenarios mapping different routes towards the expansion of woodlands across the UK and considering the form and function that trees could take there-in. Whilst the expansion of woodland cover within rural landscapes is the central goal, open questions remain regarding how, and in what form, this expansion will occur.

The critical dichotomy between our two scenarios is the rate of change. Urgency and society's need to respond to the climate 'emergency' underpin the rapid changes sought within the first scenario. Within this, carbon management is the priority with carbon sequestration the central forest 'product' –

although trees and forests can play a wider role within society's response to a warming world where this complements carbon management. The second scenario is founded upon a commitment to maintaining diachronic integrity as society transitions to a more wooded landscape. This scenario adopts a 'long view' within which non-human agency can play a more prominent role, and demands a much greater role for adaptive management approaches that enable a more flexible approach to the production of human benefits from forests. These distinctions lead to differences in the resultant types of forest and tree established; how forest/woodland creation is incentivised and facilitated; and who is involved in tree planting/establishment and management. To some extent these scenarios are two 'extremes' of what transition could look like in the post-Brexit era. We do not seek to advocate one or the other and envisage that the optimal pathway would likely be between the two.

Scenario 1

Policy

In response to continuously increasing evidence of the climate emergency and ever greater calls for action from the public, the UK government seeks rapid afforestation entailing extensive land cover change in a short timeframe. High targets are set for the area of planting to be achieved within five to ten years. Policy focuses on ambitious carbon sequestration targets above and beyond wider objectives for the provision of other ecosystem services, although the multifunctionality of forests is acknowledged and present as a secondary consideration in the policy portfolio.

Afforestation is supported primarily through financial mechanisms including generous grant aid, tax relief, and effective carbon markets and offsetting. This attracts investment from stakeholders well beyond the established land management sector, including industrial actors and international financial institutions. Policy support does not extend to measures specifically aimed to maintain marginal farming or support diversification activities to keep farming families *in-situ*. There is also a significant upturn in government and private investment in the development of wood processing industries and other bio-economies, which draw through an increase in the intensity of management of the existing forest as a sustainable resource – bringing additional carbon management benefits. Given the strength of commercial norms and drivers, new tree cover primarily takes the form of large-scale plantations with proven capacity for rapid carbon sequestration. These are often monoculture conifer plantations although new forms of more diverse plantation forest emerge offering greater resilience of timber production under conditions of a changed climate alongside other ecosystem servicesⁱⁱ.

Outcomes

With the presence of sizable financial capital interests and without continuation of the levels of support provided by the EU CAP, marginal farming enterprises become vulnerable. Some farmers decide to leave farming given the economic pressures and lack of interest by their children in sustaining the 'family farm'. Many farmers and other existing land owners access funding (both public and private) to plant trees on their land, often fast-growing plantations but including the adoption of some carbon-sequestering agroforestry systems. However, significant areas of farmland are acquired by investors who establish conifer plantations in larger blocks with the aim of offsetting the carbon emissions of their other activities. Many local landscapes quickly alter in appearance and aesthetic. Existing rural economies and cultures in these locations are consequently negatively affected. In particular, farm enterprises lose out in the conversion from agriculture to forestry, where tree planting is poorly integrated with, and less sensitive to existing farm operations. Even where farming families remain resident in these areas, the abatement and reduction of farming activities have knock-on impacts on existing subsidiary industries and services. The subsequent loss of community and of the existing shared cultural heritage associated with farming (Wynne-Jones *et al.*, 2020) is substantial. Some compensatory growth in the rural economy and employment is seen in forestry and associated wood processing industries, alongside sectors well aligned with plantation forest landscapes including outdoor recreation. Furthermore, the increased growth and availability of good quality 'home-grown' softwood timber from conifer trees sparks a boom in its use for construction purposes. The conversion

of trees into such products, with a long lifespan (Forster *et al.*, 2021), brings significant cumulative carbon sequestration benefits. In particular, rapid afforestation to address climate change aligns with ambitions to expand commercial forestry, given the mutual focus on large-scale conifer plantations.

The prioritisation of carbon sequestration leads to trade-offs with delivery of some other ecosystem services, much like in Britain's past when singular planting interests were prioritised on a large scale. Water quality and some components of biodiversity are negatively impacted, especially during the initial forest establishment phase, though many express confidence that these can be minimised through "best practice" (e.g. adherence to the UK Forestry Standard) and the evolution of new forms of more diverse plantation forestry. Even where others dispute this optimism, there remains a powerful argument that the urgency of the global climate emergency (and the threat that it poses to global biodiversity as well as human wellbeing) means that these negative impacts on UK landscapes are a "price worth paying".

The urgency of the policy response and rapid transformation in the economic context for forestry leads to difficulties monitoring and verifying actual carbon gains from afforestation, with some planting occurring where this does not result in worthwhile carbon sequestration (e.g. on peat soils). Whilst official standards and government incentive structures seek to deter such planting via a 'right tree, right place' policy, the loss of in-depth environmental impact assessment (demanded under European law) and availability of alternative funding sources and high demand for carbon emissions offsetting projects and timber continue to drive less considered approaches to afforestation. Consequently, in the long-term, the overall net contribution to climate change mitigation and other ecosystem services provided by forestry may be less than that claimed by its advocates.

Scenario 2

Policy

Aware of the profound multifunctionality and heterogeneity of land, and seeking to future-proof and optimise adaptability of the forest resource, the post-Brexit UK government seeks afforestation in such a way as to prioritise socio-ecological (diachronic) integrity. Ambitious targets are set for increasing tree cover across UK landscapes, however these are cast over the next 100 years. This builds on, and radically extends, the ambition for longer-term thinking set out in the current 25 year Environment Plan (UK Government, 2018) and Well-being of Future Generations (Wales) Act (Welsh Government, 2015). This commitment is made in recognition of the need to account for both human and non-human timescales in sustainability planning. Policy prioritises local alongside 'global' objectives, acknowledging the likelihood that where dramatic land use change is incompatible with local societal demands it is unlikely either to be achieved in the short-term, nor sustained in the longer-term.

Policy seeks a gradual transformation of rural landscapes, with more diverse and often less extensive forms of afforestation that are sensitive to the existing character of urban and rural places – including the subjective values of resident communities. Environmental objectives, including carbon sequestration, remain an important element of forest policy, however policy goals are broad and adaptive (and, therefore, less prescriptive in terms of ecosystem service delivery). Public resources are split between limited investment in forestry sector infrastructure development and policy measures to support alternative forms of enterprise and the gradual transition of farms, and rural communities more broadly, to more diverse and resilient modes of enterprise and cultures.

Considerable effort is expended to empower the capacity of local stakeholders to collaborate in collective decision-making about the future trajectories of their place including identifying the contribution that trees can make. Regulatory and financial measures are in place to constrain external investment in land purchase, and to ensure that existing rural landowners can fully access and benefit from support schemes. This means that change in landownership is limited and some continuity within rural communities maintained.

Financial support and incentivisation is realised through a combination of public, private and charitable funds. Investment in novel market development (i.e. carbon markets) is limited, given the lack of such a singular emphasis on the short-term carbon benefits of tree-planting. Equally, direct large-scale tree planting incentives are limited. Policy is instead focused on encouraging forms of afforestation with lower initial costs and requiring less intervention in existing rural land-use systems. These include agroforestry, continuous cover forestry, and natural colonisation (potentially associated with rewilding), which is now permissible given the relaxing of former EU 'Good Agricultural and Environmental Conditions'. Within this support, priority is also given to the re-establishment and restoration of hedgerow trees, shelterbelts and wood pasture – in many landscapes acknowledging their greater presence in the recent past and thus strengthening socio-ecological integrity. Significant resource is also invested in increasing urban tree cover with its high-level of associated public benefit.

Outcomes

Afforestation rates across the UK increase meaningfully, but in the short and medium term make only a limited contribution to mitigating climate change through carbon sequestration. The result is a relatively familiar 'mosaic' landscape; although featuring a greater proportion of trees in many areas, increasingly as part of continuing agricultural practice (e.g. for livestock shelter or soil conditioning, or to provide fodder for livestock). Areas of highly productive farmland remain largely free of tree cover. Scrub and transitional woodlands become more familiar and commonplace. Significant co-ordination (and leadership) occurs at landscape scales, resulting primarily in small- and medium-scale planting across diverse ownerships, rather than large-scale plantings on individual land holdings. This planting mainly utilises 'native' species, but not to the exclusion of those 'non-natives' recognised as suited to changing environmental conditions. Scope for commercial plantations remains, but as part of an explicitly mixed and complex landscape and primarily located in areas with pre-existing plantation forests. In the management of these particular forests, maintenance of a continuous cover of trees is a priority with limits on clear-felling patches above a defined size in order to reduce the impact of harvesting on the socio-ecological integrity of the forest. Significant tree planting (and other 'greening') occurs within urban areas as demands for shade and associated cooling effects grow with climate change taking effect.

In the medium and longer term, the outcome of this policy approach is mixed forest systems blending the old and the new, broadleaf and conifer, integrated with diverse land uses. These diverse forest systems are strongly resilient and adaptable, and in some cases strongly productive (Forrester and Bauhus, 2016). There remain, however, numerous tensions with practical management realities and the economics of production forest management (Messier *et al.*, 2021). Compromise solutions for production forests emerge, including planting in a mosaic of smaller monoculture blocks (Paquette & Messier, 2010).

Some change and diversification of land ownership and associated usage does occur. Indeed, there is growth in place-based, community-focused, and other novel rural enterprises – particularly those associated with, for example, the eco-economy, 'nature-based' tourism, and health promotion. The highly varied forms of forests that emerge over time are able to provide the suite of venues for these activities, which themselves are effective in communicating and delivering sensitive local leadership and climate change adaptation.

SCENARIO 1		SCENARIO 2	
<i>Objective:</i> rapid transition prioritising global climate change mitigation		<i>Objective:</i> gradual transition focused on maximisation of diachronic integrity	
Policy	Outcomes	Policy	Outcomes
<ul style="list-style-type: none"> • Rapid transition to meet the climate emergency • Major investment and incentivisation of, short-medium-term benefits of carbon sequestration • Strong and effective carbon markets • Very limited economic protection for marginal land management (especially food production in the uplands) 	<ul style="list-style-type: none"> • Widespread conifer plantation establishment • Bioeconomy, biofuel, bioprocessing expansion • Large-scale wood product use (including in construction) • Development of forestry-oriented rural communities • Loss of agricultural community identity, places, and products • Loss of employment in the agricultural sector, which may be partially replaced by greater employment in forestry • Some trade-offs for water quality and biodiversity observed 	<ul style="list-style-type: none"> • Managed, long-term transition • Assessment and protection of (the recent state of) place • Long-term investment in agricultural diversification processes • Incentivisation of long-term ecological outcomes • Promotion of 'natural' transition, colonisation and regeneration • Continuous cover forestry, mixed woodlands – not clear-felling • Agroforestry – mosaic landscapes rather than wholesale change 	<ul style="list-style-type: none"> • Resilient forest systems, with more 'natural' characteristics and capacity for adaptation • Long-term adaptation (diversification) of agricultural communities • Greater biodiversity at the local scale due to retention of a higher diversity of habitats, but this will not necessarily extend to the landscape or regional scale

Discussion

Through the two hypothetical policy scenarios, we have sought to present and explore contrasting visions for the expansion of tree cover across the UK. They identify different post-Brexit opportunities and each respond to differing policy priorities and feature elements that could be deployed in the post-Brexit context. Indeed, a number of proposed mechanisms already exist in some form. For example, the necessary investment in understanding the contribution trees might make to local areas within Scenario 2 is akin to the Area Statement process already being undertaken by Natural Resources Walesⁱⁱⁱ. These ‘documents’ seek to better understand the challenges of managing natural resources for multiple objectives, each prioritised by different stakeholders, in specific localities and how it could be improved. The key distinction between our two scenarios is the attempted rate and spatial intensity of afforestation. Each scenario affords a contrasting level of priority to tree planting for directly tackling the climate emergency through carbon sequestration and its consequent urgency. This is then connected to differences in the type of forest and tree species desired, along with highlighting divergence in the policy mechanisms used and the people who are most involved in and affected by these actions.

Scenario 1 is underpinned by the imperative of the climate emergency and the widely held view that tree planting is the optimal current solution. With the potential for change in the regulatory context and considerable economic shifts, the post-Brexit environment offers a clear opportunity to head along the path of economically driven large-scale afforestation. Whilst a number of potential linked benefits are outlined for the rural economy, especially through the expansion of forest industries, our scenario also clearly identifies the potential trade-offs that could occur for rural communities and the environment arising from pursuit of such a singular policy goal and the rapid and dramatic change at a local scale that it entails. This contrasts with Scenario 2, which recognises some past follies of short-term forest policy, and associated likely stakeholder opposition, and therefore seeks to grow future-proofed multifunctional forests that maintain diachronic integrity across rural landscapes. Ambitions to increase tree cover are set over a considerably longer time scale and at a slower pace. This enables attention to be directed towards a more diverse set of policy priorities and creates considerable space for natural autonomy within forests’ establishment and eventual form. Yet here, there is the question of whether a more tempered long-term approach to enhancing tree cover, through ‘organic’, small-scale and integrated techniques, will be sufficient to tackle the climate emergency. Whilst Scenario 2 offers a more measured and potentially, therefore, more socially ‘acceptable’ approach that avoids sudden dramatic change in both landscape and socio-economic terms, it is highly likely that the unmitigated impacts of climate change would lead to unavoidable critical impacts to these same landscapes and society in the medium to long term.

Whilst there is no question over the urgency of actions needed to address the climate emergency, uncertainty remains about the extent to which tree planting really can deliver a substantial contribution to national goals for carbon sequestration (Grassi *et al.*, 2017). It is often said that we need the ‘right tree in the right place’, but this implies the existence of considerable knowledge not only about trees, but also about place. It is key to ensure that our measurement and accounting of effective sequestration is careful, nuanced across species, and part of a coherent framework for climate action that reaches beyond forestry (Sovacool, 2021). It is similarly key to understand what, and which actors, make a place, socially and ecologically (Gulsrud *et al.*, 2018; Santos Nouri & Costa, 2017). In their analysis of place in intertidal landscapes, Roberts *et al.* (2021) identify the value of ‘dynamic stability’ as a component of place. They highlight tensions between the notions of ‘continuity’ and ‘integrity’ entangled with this and the need to respond (disruptively) to problems caused by climate change induced sea level rise. These tensions echo those described above between the need to rapidly sequester carbon and the desire to avoid too much change to landscapes (and places). A forest policy focused on maintaining diachronic integrity over the long term can reach back to understand the social and ecological forces (human and non-human) that have led a place to become what it is, as well as look forward to consider what social and ecological forces may lead it to become in the future. Without this knowledge, the trade-offs presented above could be much exacerbated and the sense of injustice for those most negatively affected could be acute. It is not simply the case of weighing up what is most

important (e.g. the viability of farming businesses in marginal rural areas, versus the global climate), but acknowledging the distinct geographies of where action needs to take place to ensure that different priorities can be met. As a consequence, some stakeholders will face trade-offs that others elsewhere will not (Eriksen *et al.*, 2015; Smith and Stirling, 2010). Policy processes need to be in place to account for situations where rural communities suffer serious personal dis-benefits to enable wider public and global goods. These issues have been covered in the literature on carbon offsetting and payments for ecosystem services in the global south, but there is a lot of learning we now need to transfer to a UK context (Wynne-Jones, 2013; Shapiro-Garza *et al.*, 2020).

At a broader scale, there is a need to consider the fit of national policy targets with global measures and objectives, and how action within national territory can have wider ramifications. Whilst Scenario 1 is clearly designed to address UK policy targets for carbon sequestration, the trade-offs for rural land-use outlined have the potential to increase imports of food produce from overseas. This is a major concern raised by farming interest groups and media objecting to the tree planting agenda (Stanley, 2021). The pressures on UK farming are further exacerbated by the challenging post-Brexit market and reduced levels of government support (as outlined above), potentially leading to further reductions in domestic food production capacity. The impact of increasing levels of food imports into the UK, due to a reduction in food growing area here, would mean that the global carbon budget may not benefit as much as UK carbon accounting would suggest due to 'leakage' of the carbon emissions from UK to the food exporting countries (Franks and Haddingham, 2012). By contrast Scenario 2 might reduce this 'off-shoring' effect, by seeking to balance food production with measures to sequester carbon. However, it is important to acknowledge that most of the land of interest for woodland expansion is low-grade agricultural land, which is predominantly used for livestock production. This is sector where the UK is a net exporter of produce (AHDB, 2017). This presents a complex picture in terms of understanding the overall impacts of reduced agricultural land availability. Nonetheless, the importance of acknowledging national versus global carbon budgets is receiving increasing scrutiny in the process of agreeing collective targets to address the climate emergency (Prudhomme *et al.*, 2021; van den Berg *et al.*, 2020).

Our discussion has highlighted potential trade-offs, but it is equally important to consider the feasibility of the rapid change proposed in Scenario 1. Whilst we observe a clear enthusiasm from the forestry sector for such a dramatic expansion of tree cover, it is not clear whether the mechanisms outlined will be sufficient to lead to the levels of change demanded by new policy targets. Indeed, past forest policy has been notable for its failure to achieve such dramatic levels of change, as outlined in section 2. Although both scenarios include a number of marked changes from past EU policy mechanisms and contexts, which are likely to result in more substantive levels of tree planting than previously observed, there is no guarantee that the more ambitious targets set by UK and Welsh Government will easily be met. Scenario 1 clearly sets out to engage with a new set of stakeholders in the mission to increase tree cover, however they often lack familiarity with the location in question (indeed they may have no existing stake in the particular place). In contrast, the push-back that could arise from longstanding rural stakeholders may be significant (Flechard *et al.*, 2007; Wynne-Jones *et al.*, 2018). A key question, therefore, when comparing the two scenarios, is whether the dramatic proposals of Scenario 1 will be seen too unfavourably due precisely to the rapid nature of the change they could herald. By contrast, would Scenario 2 actually be more successful over the longer term, in achieving higher levels of tree cover, as a less threatening approach? Or would it too be equally opposed by farmers who see their mission as narrowly focused on food production. Therefore, do we need a more dramatic push to change engrained norms around tree planting and to break down past barriers (Scenario 1) or a more long-term process of adjustment of perceptions and norms within the social component of the socio-ecological system (Scenario 2)? A critical element in the success of Scenario 2, is effective local leadership and participation within forums to express and deliberate the value of trees within our landscapes, and then take these forwards to enable planning and implementation of desirable future landscapes. There are no easy mechanisms through which this can be achieved, but the impetus of Scenario 2 is to acknowledge the importance of values across a community who collectively construct notions of place (Ellery and Ellery, 2019; Franklin and Marsden, 2015). Furthermore, the policy approach of Scenario 2 embeds the potentially critical element of time: time over which inclusive, adaptive planning processes can emerge and over which the non-human agency of the trees and

forests can contribute to defining the form and function of the landscape and the benefits it provides, rather than acting as a check on exclusively human ambitions. For Scenario 1, however, the subjective values of communities may tend to be suppressed, with significant risks of ongoing local opposition, as have persisted for decades after afforestation of open land in the vicinity of communities in the valleys of South Wales Valleys (Kitchen, 2013). It would also continue to steadfastly ignore natural rhythms and agency.

Looking to the long term, the scenarios could have very different trajectories. For Scenario 1, it is possible that a lot of carbon storage could be achieved in a relatively short space of time. But over the longer term, it is not clear whether tree planting will continue to be needed to provide the same carbon sink service, if technological alternatives for carbon capture and storage come to fruition alongside other pathways to radically decarbonisation of our global economy (Forster *et al.*, 2021), or if the less diverse forests suffer catastrophic damage due to their lack of resilience to the impacts of climate change. As with some past forest policy failures, future generations could find themselves in a situation where this policy objective expires – once again leaving a legacy forest resource which needs to be repurposed. This makes the trade-offs presented both more and less palatable. Key to resolving the tensions arising will be the adaptability of the forest landscapes that are created. From an environmental and landscape aesthetic perspective, if forests can be adapted over the longer term to take greater account of other priorities, beyond carbon, and maintain their resilience under future climates there is scope for some of the concerns raised to be ameliorated. From a socio-economic and cultural perspective, adaptation may be too late for businesses and communities that have undergone irreversible change. This makes the short-term nature of the changes undergone particularly difficult.

For Scenario 2, gradual change characterised by a strong sense of continuity is key. Maintaining these changes into the longer-term will be an essential aspect of this, allowing the forest ecosystems to realise their potential for carbon sequestration *and* other ecosystem services, as a component of a sustainable socio-ecological system. The consistency of this scenario is attractive in that it avoids policy U-turns, but adaptability will still need to be a core principle as goal setting is less rigid and the forests arising will need to accommodate a range of needs both at any one time and over time. Across both scenarios, then, the importance of an adaptive policy approach is paramount, even for Scenario 1, which is clearly much more prescriptive and targeted in the immediate goal sought.

Comparing the scenarios, a key question emerges over how we conceptualise our long-term goals, if we aim to meet them through more immediate forms of land-use change, which may or may not become redundant, or whether we consider a different approach to temporality, where we allow change to occur over a longer term and relax our need to 'design the future'. In the latter approach, the rationale is that healthy forest ecosystems will provide useful goods and services but we do not have to over-design and force any specific elements. This gives greater acknowledgement to the agency of trees and other forest species in the development of future landscapes. This is, therefore, not only a question of what time frames and levels of flexibility policy makers can envisage and work with, but the extent to which we can be responsive to the more-than-human elements of our ecosystems.

What could this look like in policy terms? If we want to move beyond a short-term policy focus we need commitment to frameworks where longer term objectives are sustained across the cycles of government. This requires a shared vision and legislative architecture to be in place, above and beyond individual administration's policy documents, goals and instruments. A clear example of this is the Welsh Government's 'Wellbeing of Future Generations Act' (2015), which has introduced requirements to ensure accountability to the needs of future generations in Wales and to adopt substantially different ways of working within and beyond government (Gonzalez-Ricoy and Rey, 2019). Commitments to future human generations have long been at the heart of sustainability, but this formalised legislative agenda moves beyond adopting longer term policy visions, such as with Defra's 25 year Environment Plan (UK Government 2018), towards a binding legal architecture that enables future human needs to be considered and protected. There is, of course, also a need to shift mind-sets as well as institutional frameworks, although policy makers would intend for such transformations to be interlinked. In this regard, it is notable that foresters, and others working on the land, may find it easier and more intuitive to be attentive to the rhythms and agency of trees and other non-human nature,

because they have physical contact with the environment. Increasingly experiential and embodied knowledges are being sought within policy processes. An important step could, therefore, be to increase the material engagement and experience that policy-makers have with the natural environments they are setting targets for (Dandy and Porth, 2021).

Overall, our recommendation for the development of post-Brexit forest policy in the UK would be a mixture of scenarios 1 and 2. It would require significant intrinsic flexibility to enable implementation that accounted for the significant variation in suitability between places depending on the historical land use legacy and potential futures. However, it is important to analyse the two scenarios because the combination of the policy drivers of the climate emergency and Brexit have the potential to radically shift the balance between the scenarios, threatening highly valued diachronic integrity and social justice as we have outlined. Whilst the present urgency of the climate emergency, and the apparent opportunities opening up through our exit from the EU, provide both the incentive and window for radical change, our discussion here has highlighted the importance of taking time to attend not only to people's values but also the lifecycles and agency of the trees we wish to see proliferate. Encouraging forest policy stakeholders to take an even longer view than they are used to may be critical to achieving this.

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ⁱⁱ See <https://newgenerationplantations.org/> [last accessed 10/9/21]

ⁱⁱⁱ See [Natural Resources Wales / Area Statements](#) [last accessed 10/9/21]