# Green Gold to Wild Woodlands; understanding stakeholder visions for woodland expansion in Scotland

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RESEARCH ARTICLE

# Green Gold to Wild Woodlands; understanding stakeholder visions for woodland expansion in Scotland

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**Abstract**
*Context* Despite woodland expansion being advocated via a number of Scottish policy documents, barriers to woodland creation remain. These include contested views about land use, concerns about trade-offs between ecosystem services, and a lack of synergy between policies and plans.
*Objectives* To use existing published sources and stakeholder feedback and input to determine the values that different Scottish stakeholders have for woodland expansion, and to translate these into alternative storylines, or visions. To identify areas of common ground and divergence between the visions.
*Methods* We present a mixed-method approach combining a document analysis, a stakeholder workshop and semi-structured interviews.
*Results* The five visions elicited illustrate that at national level there is a great deal of consensus between stakeholders that woodland expansion can offer valuable public benefits, and that mechanisms should be put in place to provide long-term funding for these. Important areas of divergence include compatibility of woodland with current agricultural and sporting practices, and the extent of Land Reform and Community Empowerment. 'Landscape scale' collaboration and decision making is widely favoured for governing decisions about woodland expansion and other land use changes.
*Conclusions* By articulating the range of different objectives for woodland expansion, and capturing stakeholder suggestions for how governance could be adapted to achieve each vision, the results provide a synthesis of potential overarching ways forward for woodland expansion policy. The visions have also stimulated dialogue between national level stakeholders, suggesting they may be able to support necessary discourse as part of strategic land use planning.

**Keywords** Scenarios · Afforestation · Forestry · Land use · Governance

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## Introduction

What does society want from its relationship with the land in the 21st century? With a 'perfect storm' of ecological and social challenges converging (Beddington 2009) and the recognition that we are exceeding planetary boundaries (Rockström et al. 2009), there is a strong argument to be made for transformative changes in the ways that we coexist with the natural world. However, sustainability remains a contested concept, with a wide range of possible interpretations of the term grounded in different worldviews (Giddings et al. 2002; Beder 2006). We are now in an age of post-normal science, characterised by uncertainty and plural values (Funtowicz and Ravetz 1993; Ravetz 2004). This is especially obvious in the case of debates surrounding sustainable land use and land use change.

Scotland has an ambitious national Land Use Strategy, which builds on wider shifts from sectoral to multifunctional land use (Warren 2002; Stockdale and Barker 2009; Glass et al. 2013) to define overarching principles for sustainable land use (Scottish Government 2011, 2016). However, there remain contested views about land use among many different stakeholders, as well as inequalities in terms of property rights and resources between those stakeholders (Bonn et al. 2009; Glass et al. 2013; Valluri-Nitsch et al. 2018). The agenda for woodland expansion, in the form of a government aspiration to increase woodland cover to 21% (from the current 18%) by 2032 (Forestry Commission 2009; Scottish Government 2017) provides an interesting lens for this contention. Indeed, achieving woodland expansion goals in Scotland has been classified as a 'wicked problem' (Rittel and Webber 1973; Duckett et al. 2016). This is due to the difficulty of implementing it in the face of conflicting food and climate change policy goals, low acceptability of woodland planting among Scottish farmers, volatile stakeholder perceptions, and grazing pressure from high deer populations (Duckett et al. 2016; Environment Climate Change and Land Reform Committee 2017).

Woodland cover in Scotland is low both historically and in comparison with other countries in Europe (Thomas et al. 2015). It also has one of the most concentrated patterns of land ownership in the world, a legacy of feudal tenure (Skerratt et al. 2016), as well as the largest average forest holding size in Europe, dominated by large estates and absentee investors (Forest Policy Group 2011). A recent comparison of ownership structures across Europe shows that they are rarely formed or influenced by policy, but Scotland is an exception to the rule in this regard, with the 2003 Land Reform (Scotland) Act introducing the Community Right to Buy (Weiss et al. 2018). With this, the Scottish Government aims to diversify the concentrated pattern of land ownership. Furthermore, the Community Empowerment (Scotland) Act 2015 provides a framework for empowering community bodies through the ownership of land and buildings and strengthening their voices in decision making (Skerratt et al. 2016).

Since the end of WW1, woodland cover has increased from 5 to 18% via the expansion of the public Forestry Commission estate, and a succession of grant schemes supporting private woodland planting. This increase was characterised by an initial dominance of conifer investment forestry, shifting towards increasing emphasis on broadleaved woodlands for multiple, predominantly environmental, purposes (Wong et al. 2015). In recent years, annual woodland creation targets have consistently been missed, and the overall increase in woodland cover has stalled (Forestry Commission 2017). Many valuable ecosystem services (ES) are provided by woodlands in the UK (Quine et al. 2011; UK National Ecosystem Assessment 2011; Sing et al. 2017), and globally forest restoration is accepted as a strategy to tackle climate change, biodiversity loss, and increased flood risk (Bullock et al. 2011; Rey Benayas and Bullock 2012). Recent recommendations from an independent review are expected to improve a woodland planting grant application process previously criticised as being overly bureaucratic (Mackinnon 2016) and there is broad cross-party support in Scotland for increasing woodland cover. However, several barriers to further woodland creation remain, including a continuing farming-forestry divide and concerns around real or perceived conflicts with other land uses (Lawrence and Edwards 2013; Lawrence and Dandy 2014; Moseley et al. 2014). The forest ownership structure has had a major role in this divide, with rights to trees on tenanted land in Scotland vested in the landlord, resulting in alienation of tenants from the farm woodland on their land (Wong et al. 2015).

Futures-thinking, encompassing a wide range of scenario approaches, aims to address psychological

and other barriers to thinking openly and creatively about future possibilities and their implications for planning (Cork 2016). Scenario planning offers a framework for developing more resilient policies when faced with uncontrollable, irreducible uncertainty (Peterson et al. 2003; Metzger et al. 2018a, b). In particular, 'visions', or normative scenarios which revolve around positive descriptions of desired futures (Rounsevell and Metzger 2010), are seen as a way to pose challenges, stimulate dialogue between stakeholders, and build consensus on shared priorities (Pérez-Soba et al. 2018). In order to effectively mobilise science for sustainability, we must manage the boundaries between knowledge and action in ways which balance salience (relevance to decision makers), credibility (scientific quality), and legitimacy (respecting diverse values and beliefs) (Cash and Clark 2003). As such, it is argued that stakeholder engagement, and participatory methods with high saliency and legitimacy, should be used to better define normative visions of future worlds (Rounsevell and Metzger 2010). Furthermore, understanding and acknowledging different visions is an important step towards collaboration between stakeholders (Valluri-Nitsch et al. 2018). Previous research has shown that participatory scenario development can help people learn about the issues being addressed and how they can work together to deal with them, building adaptive capacity among stakeholders to implement change (Reed et al. 2013). It is also increasingly argued that better narratives or 'story-telling' are required to translate science through to evidence-based policy (Davidson 2017), and visions could have an important role to play in this regard. Spelling out the *how's* of achieving a vision is expected to be particularly beneficial (Shipley and Michela 2006; Metzger et al. 2018a, b). The topic of woodland expansion is particularly suited to scenario research given its long-term nature, the many uncertainties that need to be taken account of, as well as the need to understand the trade-offs which will inevitably need to be made when planning land use decisions.

This paper presents a novel mixed-methodology used to elicit five distinct visions for how woodland expansion might ideally unfold in Scotland over the 21st century. The objectives were (1) to use existing published sources and stakeholder input to determine the values that different Scottish stakeholders have for woodland expansion, and to translate these into alternative storylines, or visions, and (2) to identify areas of common ground and divergence between the visions.

## Methods

### Identifying stakeholders

Stakeholders were identified across particular sectors, ensuring that representatives were included from each main group: the public sector, private sector, charitable sector, and community groups (Durham et al. 2014; Colvin et al. 2016). This identification was carried out by the principal researcher, and in consultation with co-authors, using an interest/influence matrix, where stakeholders are placed on a matrix according to their relative interest and influence (Reed et al. 2009b; Durham et al. 2014). Selection maintained an organisational, Scottish focus, aiming to identify all stakeholders with a strong interest in, or influence on, forestry and woodland expansion in Scotland.

### Content analysis to understand views on woodland expansion

For each stakeholder, a search was carried out on their website to find material relating to the stakeholder organisation's aims or vision for woodlands and forestry in Scotland. These materials, including a range of published documents and webpages, underwent an iterative process of inductive coding (Bryman and Burgess 1994) using NVivo software. Themes relating to how each organisation viewed woodlands and their future development were extracted, and structured within broader Society, Technology, Environment, Economy, Policy and Governance (STEEP) categories (Rounsevell and Metzger 2010). STEEP analysis is commonly used in long-range business or environmental planning, and encourages clustering of important drivers and themes relating to a particular topic within each category (Bradfield et al. 2005). The main coded themes within each STEEP category can be found in Supplementary Fig. 1.

### Developing draft woodland expansion visions

Scenarios, including visions, can be developed in a number of different ways, but a common approach is to split identified themes using a two-by-two matrix based on four 'critical elements' (Cork 2016). The critical elements were chosen based on consistently recurring key themes identified by the content analysis. The coded themes within each STEEP category were then positioned on the matrix (Supplementary Fig. 2), resulting in five clusters, which were developed further to produce five visions for woodland expansion. Although there was some overlap, and a gradient of themes between clusters, outlying themes were used to justify distinct clusters. This involved interpretation by the principal researcher, but this was a key reason for asking for direct stakeholder input and feedback, to check whether the clustering carried out was appropriate. Using the information coded from the documents, each clustered draft vision was named, described, and a narrative further developed in terms of what that vision meant for the desired woodland types, locations, resulting ecosystem services and governance structures.

### Stakeholder feedback to finalise the visions

A full-day workshop was organised to receive feedback and input into how the draft visions were created and presented (Fig. 1). The workshop aimed to develop further understanding about which ecosystem services landscapes would ideally provide under each vision and which woodland types would contribute to providing these. Participants were also asked which actors and governance mechanisms could assist in achieving each vision. Invitations to attend a workshop were sent out to 71 organisations. A total of 18 participants attended the workshop. Four additional stakeholders were interviewed separately. The list of organisations represented is given in Table 1. Representation of stakeholders across sectors was dominated by NGOs (9) and was fairly even between public and private (5 and 4 respectively). Although invited, no one from the community sector was able to attend. However, the NGO Reforesting Scotland, who were in attendance, have a strong remit to encourage local communities to manage their woodlands. Following suggestions from these stakeholders, seven new documents were also coded and were included in the final analysis (Supplementary Table 1).

Stakeholders were assigned to the draft vision that best aligned with their expertise and published objectives, and formed break out groups for vision-specific discussions. Plenary sessions were used for discussions about broad land use implications and the relationships between the visions. In addition, semi-structured interviews were carried out with four further stakeholders who were unable to attend the workshop. The interviews were structured around the same objectives as the workshop, using the same materials and questions, and each took around an hour to complete. Prior to the workshop and interviews, woodland type categories were chosen using guidance from the National Forest Inventory, Forestry Commission guidance on native woodland, as well as WEAG recommendations (Woodland Expansion Advisory Group 2012). A wide range of woodland types were included as prompts to provide sufficient detail and options for different combinations or priorities. During analysis these were grouped into categories for simplification/visualisation purposes (Table 2). Others have concluded that future scenario research needs to make more effective use of visualisation techniques (Reed et al. 2009a). Both the workshop and interviews used stylised graphical materials to provide prompts for landscapes, woodland types, ecosystem services and actors/stakeholders (Metzger et al. 2018a, b), and were recorded and transcribed. The transcriptions were coded, using the same process as applied to the original documents. Additions and clarifications were made to the draft visions using these data, to produce the final visions. After the workshop, the visions were illustrated to facilitate communication (Fig. 3).

## Results

The online search resulted in a total of 53 published sources (30 documents, 7 policies, 5 consultation responses, 11 webpages). A full list of all the materials can be found in Supplementary Table 1. A post-workshop survey with a 68% response rate indicated that the majority (11/12) of respondents rated the discussions as either relevant or very relevant to their everyday work, and all respondents (12/12) viewed the


**Fig. 1** The workshop hosted 18 participants from a range of organisations and sectors. The pictures show the break-out tables used to host vision-specific discussions, the A0 stylised landscapes and tiles used to support discussions, and a ranking exercise used to assess participant's views on the likelihood of reaching a common vision for woodland expansion

expected outputs from the workshop as being of use to themselves or their organisation (Fig. 1).

## Five alternative woodland futures

The content analysis identified four critical elements on gradients from utility to conservation and land sharing to land sparing (Fig. 2). These choices were based on recurring themes identified from the coding process, with there being a clear gradient between future woodlands being desired mainly for productive use and those desired mainly for biodiversity and conservation. Land sharing (integrating conservation and production on the same land) and land sparing (separating conservation and production) have been identified as important concepts in the debate around optimising future land use (Phalan et al. 2011; Paul and Knoke 2015), and using these as the second axis enabled consideration of the relationship between new woodlands and other habitats and land uses. Five distinct clusters were identified (Fig. 2), and each vision shown in Fig. 2 is described below. Figure 3 provides illustrations for two visions. All visions have been illustrated and are available as public dataset under a Creative Commons 4.0 licence (Burton and Metzger 2018).

**Table 1** A summary of the organisations involved in the workshop and semi-structured interviews, by sector

| Sector | Organisations |
|---|---|
| Public sector | Forestry Commission Scotland, Forest Enterprise Scotland, Scottish Government (Land and Biodiversity Team), Scotland's Futures Forum, Cairngorms National Park Authority |
| Private sector | National Farmers Union, Tilhill Forestry, Scottish Land and Estates, Wild Media |
| Non-Governmental Organisation (NGO) | Confederation of Forest Industries (Confor), Royal Society for the Protection of Birds, National Trust for Scotland, Reforesting Scotland, Woodland Trust, Soil Association Scotland, Association of Scottish Hardwood Sawmillers, Trees for Life, John Muir Trust |
| Research | James Hutton Institute, Kings College London |
| Community | No attendees |

**Table 2** A description of all the woodland types included within each wider woodland category

| Woodland category | Woodland types |
|---|---|
| Native | Upland birchwood; upland mixed ashwood; native pinewood; native scrub; upland oakwood; wet woodland; lowland mixed deciduous |
| Plantation | Conifer; short rotation coppice; short rotation forestry |
| Mixed | Deciduous and coniferous |
| Farm | Small farm woodlands, productive farm woodlands, farm-forestry small holdings/crofts; agroforestry |
| Linear | Riparian woodlands; shelterbelts; hedgerows with trees |

### Green Gold

Woodland expansion largely comprises large scale, productive, sustainable plantations, which adhere to high environmental standards, and are an integral part of Scottish land use and the national economy. There is a focus on productive species which provide high value timber (e.g. non-native conifers), but plantations are designed with some areas of native species, riparian buffers and open spaces. The carbon stored in forests and forest products are highly valued.

### Multiple Benefits

Sustainably managed trees and woodlands 'stitch-in' and complement a diverse mix of land uses at the landscape scale. Emphasis is on 'the right tree in the right place', whether this be a conifer plantation for timber production, riparian woodland for water regulation or a native woodland prioritising biodiversity conservation. Agricultural land is a key asset to be protected, but forestry is seen by farmers and land owners as a potentially integral part of their portfolio.

### Native Networks

Native and semi-natural woodlands are protected, restored and reconnected at all scales, enabling integration with other land uses, and avoiding fragmentation of important open ground habitats. Natural regeneration and transition zones are encouraged between land uses. Woodland networks play a valuable role in facilitating species movement, developing climate change resilience, and providing greenways (sustainable green travel routes) for recreation.

### Woodland Culture

A well-forested and productive landscape encompasses small-scale diversity of tree species, woodland type and tenure. Communities are empowered and many manage local woodlands, with local people making their living from woodlands in a wide variety of ways. Hutting (Hunt 2016), where people own small woodland huts for recreational use and reconnecting to the land, is commonplace. All woodland types are potentially productive, and small-scale processing technology is widely accessible, supporting local

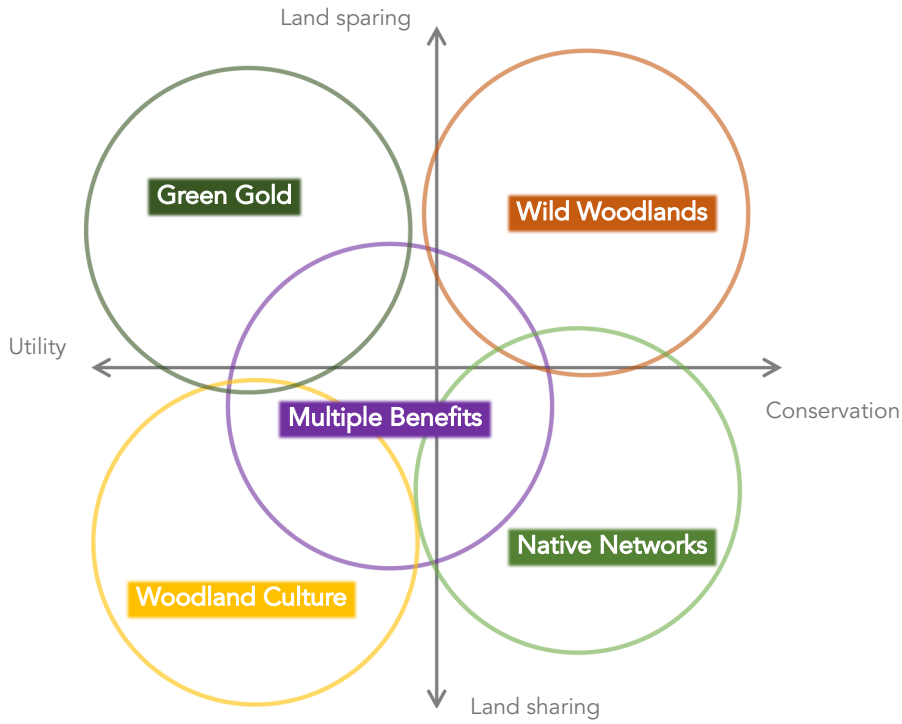



**Fig. 2** The two by two matrix used to elicit the visions. The critical elements of utility to conservation and land sharing to land sparing provide the axes. Coded themes were located on the matrix based on how they related to these elements. Each set of clustered themes is represented by a circle. This figure received positive feedback from both the workshop and interviews, with participants feeling that it effectively mapped out the current views held on how woodland expansion might proceed in Scotland

timber, woodfuel and non-timber forest product markets.

Wild Woodlands

Larger areas of land are given over to natural processes, with widespread naturally regenerating native woodland being a key indicator of dynamic, biodiversity rich wild land. Wild land is incompatible with most modern farming, but silvopastoral and transhumance systems thrive on the edges of wild areas. Productive forestry comprises native species e.g. Scots pine (*Pinus sylvestris*), and is managed under continuous cover approaches. Natural transitions between land uses are encouraged and biodiversity is restored, including native species reintroductions.

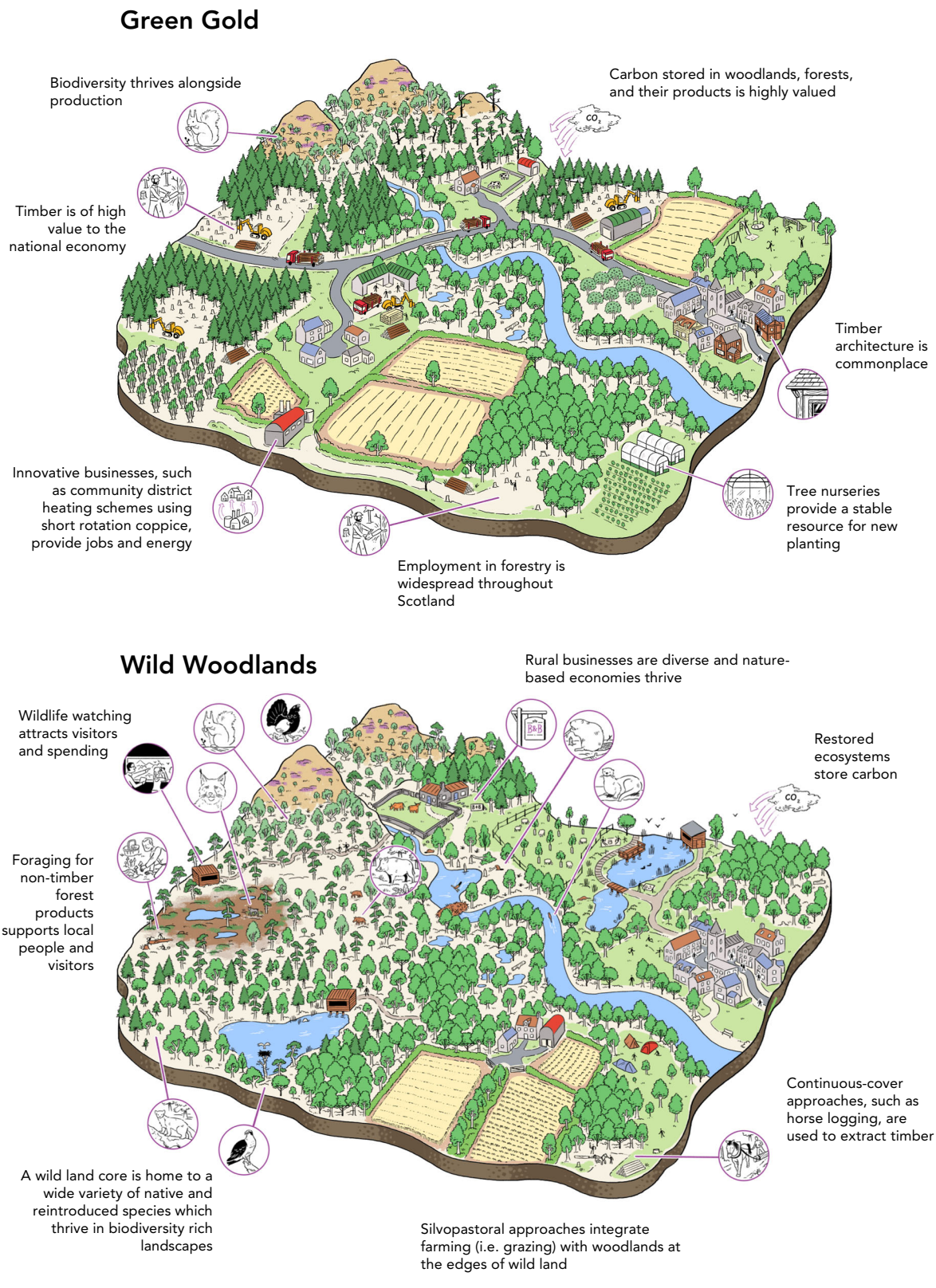
Comparing the visions by theme

Here each vision is compared according to several key themes which arose as important topics in the content analysis, and were subsequently principal questions in the workshop and interviews.

Woodland types

An indication of the preferred woodland categories for each vision is shown in Fig. 4. The simplification of woodland type preferences into ranked categories masks some distinctions. *Green Gold* incorporates a strong preference for plantation forests, with preference within this for non-native conifers providing high value timber. However, emphasis is also placed on developing diverse plantations that have a large proportion of native broadleaves, producing some hardwood timber, and riparian buffers which protect water courses. In *Wild Woodlands*, any upland plantations are synonymous with native pinewoods, managed under a continuous cover, low-impact silvicultural approach. In the lowlands, areas of short rotation coppice and forestry are envisaged, being easier to access for product extraction and closer to areas of population than upland woodlands.

A desire for greater integration of woodlands and forestry with agriculture and farming is observed across the visions. The extent of this varies from *Green Gold*, which sees farmers being more willing to allocate areas of their farm to productive woodland, and *Multiple Benefits*, which sees small farm


Green Gold
Biodiversity thrives alongside production
Carbon stored in woodlands, forests, and their products is highly valued
Timber is of high value to the national economy
Timber architecture is commonplace
Innovative businesses, such as community district heating schemes using short rotation coppice, provide jobs and energy
Tree nurseries provide a stable resource for new planting
Employment in forestry is widespread throughout Scotland
Wild Woodlands
Rural businesses are diverse and nature-based economies thrive
Wildlife watching attracts visitors and spending
Restored ecosystems store carbon
Foraging for non-timber forest products supports local people and visitors
Continuous-cover approaches, such as horse logging, are used to extract timber
A wild land core is home to a wide variety of native and reintroduced species which thrive in biodiversity rich landscapes
Silvopastoral approaches integrate farming (i.e. grazing) with woodlands at the edges of wild land

◀**Fig. 3** Illustrations of a catchment under the Green Gold and Wild Woodlands visions respectively. All visions have been illustrated and are available as public dataset under a Creative Commons 4.0 licence (Burton and Metzger 2018)

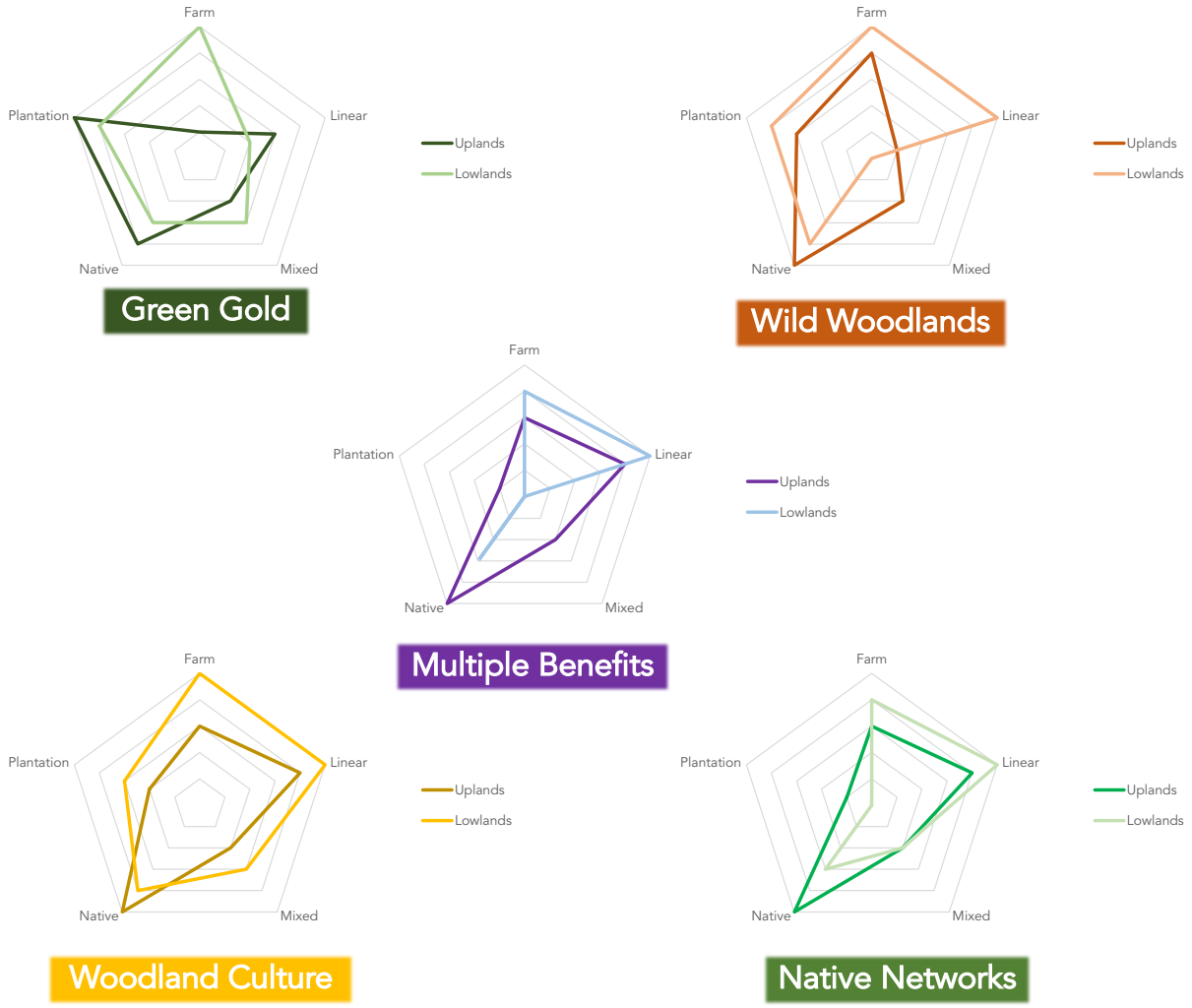



**Fig. 4** The woodland preferences for each vision elicited from stakeholders. The woodland type categories are described further in Table 2. Workshop groups and interviewees were asked to place desired woodland type tiles on A0, stylised, upland and lowland landscapes. These tiles were then counted and sorted into categories

buffers, but also shelterbelts and hedgerows with trees) are important components of woodland expansion across visions, particularly in the lowlands. *Woodland Culture* appears to be the most 'rounded', woodlands and silvopastoral agroforestry as becoming more commonplace, to *Native Networks* and *Wild Woodlands*, which envisage more integrated, small-scale, lighter use of native woodlands by farmers, landowners or crofters. *Woodland Culture* envisions the strongest integration, with woodlands being incorporated into productive farming businesses in a variety of ways. Linear woodlands (mostly riparian or diverse vision, with the most evenly spread woodland preferences across categories, although there is still a preference for native woodlands in the uplands. There is strong preference for native woodland across visions, although the details of this vary. *Green Gold* emphasises the value of native woodland as an important component of plantations whereas both *Native Networks* and *Wild Woodlands* include

more widespread natural regeneration of native woodland. *Woodland Culture*, *Native Networks* and *Wild Woodlands* all envisage more widespread natural transitions in the uplands, with hillsides forming gradients of native scrub, birchwoods and Caledonian pinewood.

Location and setting

Both *Green Gold* and *Wild Woodlands* emphasise large areas being given over to woodland, on land which may currently be economically fragile and which can therefore be expected to be given over to other uses in the future. In particular, *Wild Woodlands* envisions whole catchments being given over to natural processes, and it emphasises the value of this approach for creating space for biodiversity to adapt and fluctuate. By contrast, both *Multiple Benefits* and *Native Networks* see woodland expansion complementing, or "stitching-in" amongst other land uses. *Native Networks* is slightly more dynamic, emphasising the encouragement of natural 'transition zones' of natural regeneration and other natural processes between land uses. Of all the visions, *Woodland Culture* sees woodlands as being the most widespread, making up "the defining landscape structure", particularly in the uplands, and integrating with other land uses and practices wherever possible. *Wild Woodlands* takes a similar position, with it being argued that "it's hard to see where more trees won't be beneficial". As a result, these visions would advocate woodland cover expanding far more than the current aspiration of a 3% increase.

People, interests and motivations

A gradient of participation, or involvement of people, can be observed between the visions. *Woodland Culture* and *Wild Woodlands* strongly emphasise Community Empowerment, Land Reform, and developing a "groundswell of public support" for each vision. *Native Networks* also envisages "connecting people and nature", in particular through encouraging recreation and travel through greenways provided by woodland networks. In comparison, *Multiple Benefits* and *Green Gold* emphasise "appropriate engagement", with a focus on *informing* and *consulting* as opposed to true *involvement* or *collaboration* (Durham et al. 2014). For *Green Gold*, plantations are designed with benefits to local communities in mind, and there are new innovative collaborations between investors and local communities in the form of initiatives such as community district-heating schemes. In *Multiple Benefits*, tailored advice and facilitation gives land owners and managers the freedom and flexibility to make the best choices for their land.

Economy

Linking new woodlands into the economy came through strongly in several visions. In particular, *Green Gold* and *Woodland Culture* emphasise the employment value of new woodlands, as does *Multiple Benefits* in upland landscapes. For *Green Gold*, this is weighted towards the production of high value timber and biomass that have importance to the national economy, while *Woodland Culture* envisages a well-forested landscape supporting decentralised local economies with a wide variety of timber, non-timber forest products (NTFPs) and other forest related businesses. The ability of local people to make a living from local woodlands was strongly emphasised in *Woodland Culture*. *Multiple Benefits* also describes a diverse and productive forestry sector, with a variety of activities ranging from timber production to recreation benefiting from new woodlands. Both *Native Networks* and *Wild Woodlands* envisage some small-scale, lighter use of woodlands through low-impact silvicultural systems, and both place more emphasis on the recreation and tourism value of new woodland, as well as arguing for some form of investment or payment for the public benefits (such as carbon sequestration and flood control) provided by new native woodlands.

Governance

*Green Gold* envisages a free market within regulations, with high value timber and innovative funding sources, such as connecting new developments to woodland creation, supporting a diverse and strong forestry sector. Regulations, and incentives such as subsidies, create a "level playing field" between forestry and other land uses. There is a general willingness and enthusiasm for investing in forestry. Both *Multiple Benefits* and *Native Networks* see improved tailored public funding for new woodlands combined with innovative funding in the form of

Payment for Ecosystem Services (PES). *Native Networks* sees this going slightly further, with long-term funding for woodland secured, and tailored public funding giving greater support to new woodlands that increase connectivity or allow natural transition zones to develop.

Both *Woodland Culture* and *Wild Woodlands* are more transformative in terms of governance, arguing for a rethink of current habitat and species designations, thus allowing woodland to be planted, or to regenerate, on land that is currently protected. *Woodland Culture*, *Wild Woodlands*, and *Native Networks* all argue for either a complete ban on sporting practices such as deer stalking and driven grouse shooting in the way they are currently carried out (i.e. muirburn practices maintaining heathland for grouse, very high deer numbers resulting in high grazing pressure), or for new regulations or incentives to encourage better practices. *Wild Woodlands* argues that both hunting for deer and grouse shooting could be carried out on a smaller scale amongst new woodlands, as is the case in much of Scandinavia. Decision making is most decentralised in *Woodland Culture*, with democratic forest governance being in the hands of local people and communities. Community Empowerment and Land Reform are seen as integral first steps towards achieving this.

All visions view education as being hugely important, with it being less sectoral, with woodlands and forestry being integrated into curriculums in a variety of ways. *Woodland Culture*, *Native Networks* and *Wild Woodlands* emphasise the growth of 'forest schools', and outdoor education. The media's influence in communicating and encouraging support for each vision to the public was also recognised across the board.

### Which ecosystem services are envisaged from future landscapes?

The workshop participants and interviewees were asked to rank the priority ecosystem services that they envisaged upland and lowland landscapes providing in their vision (Fig. 5). Biodiversity is seen as the top benefit resulting from *Native Networks* and *Wild Woodlands* across landscapes. It also features in the priority benefits in all other visions, with the exception of *Green Gold* in the lowlands. Timber is the top benefit envisaged for *Green Gold* across both landscapes, but it does not feature in the priorities of *Multiple Benefits*, *Native Networks*, or *Wild Woodlands*. The workshop group responsible for *Woodland Culture* chose not to select a smaller number of ES at all, instead focusing on the diversity of the vision and the wide range of potential ES being provided across landscapes. Employment is valued highly in the uplands by several visions (*Multiple Benefits*, *Green Gold*, *Woodland Culture*), and continues to feature in the lowlands for *Woodland Culture* and *Green Gold*. *Multiple Benefits* sees soil stability or quality as an underpinning service, and so ranks this as a highly important benefit resulting from realising the vision in both upland and lowland landscapes. Unlike all other visions, aesthetics came through strongly as a benefit from both landscapes for *Wild Woodlands*.

In the lowlands, food is seen as a priority benefit for both *Multiple Benefits* and *Native Networks,* in the sense that woodland expansion should not compromise prime agricultural land. Water quality is also a greater consideration in the lowlands, compared to the uplands, with *Woodland Culture*, *Green Gold*, *Wild Woodlands*, and *Native Networks* all rating this highly. There is a spike towards health and wellbeing in the lowlands under several visions (*Wild Woodlands*, *Woodland Culture*, *Multiple Benefits*, *Native Networks*). As a workshop group, *Native Networks* included an additional ES (climate change resilience) for both landscapes.

## Discussion

### Mobilising science for sustainability

This paper has presented a mixed-method approach which combined document analysis and inductive coding together with a participatory workshop and semi-structured interviews. This approach was taken in order to ensure the credibility, saliency and legitimacy of the research through participatory processes that prioritise the needs and diverse values of decision-makers, while reducing the resource intensity normally associated with vision elicitation (Cash and Clark 2003; Rounsevell and Metzger 2010; Pérez-Soba et al. 2018). The post-workshop survey indicated that a high level of saliency had been achieved, while legitimacy was ensured through the wide range of stakeholders involved [71 invitees to the workshop,

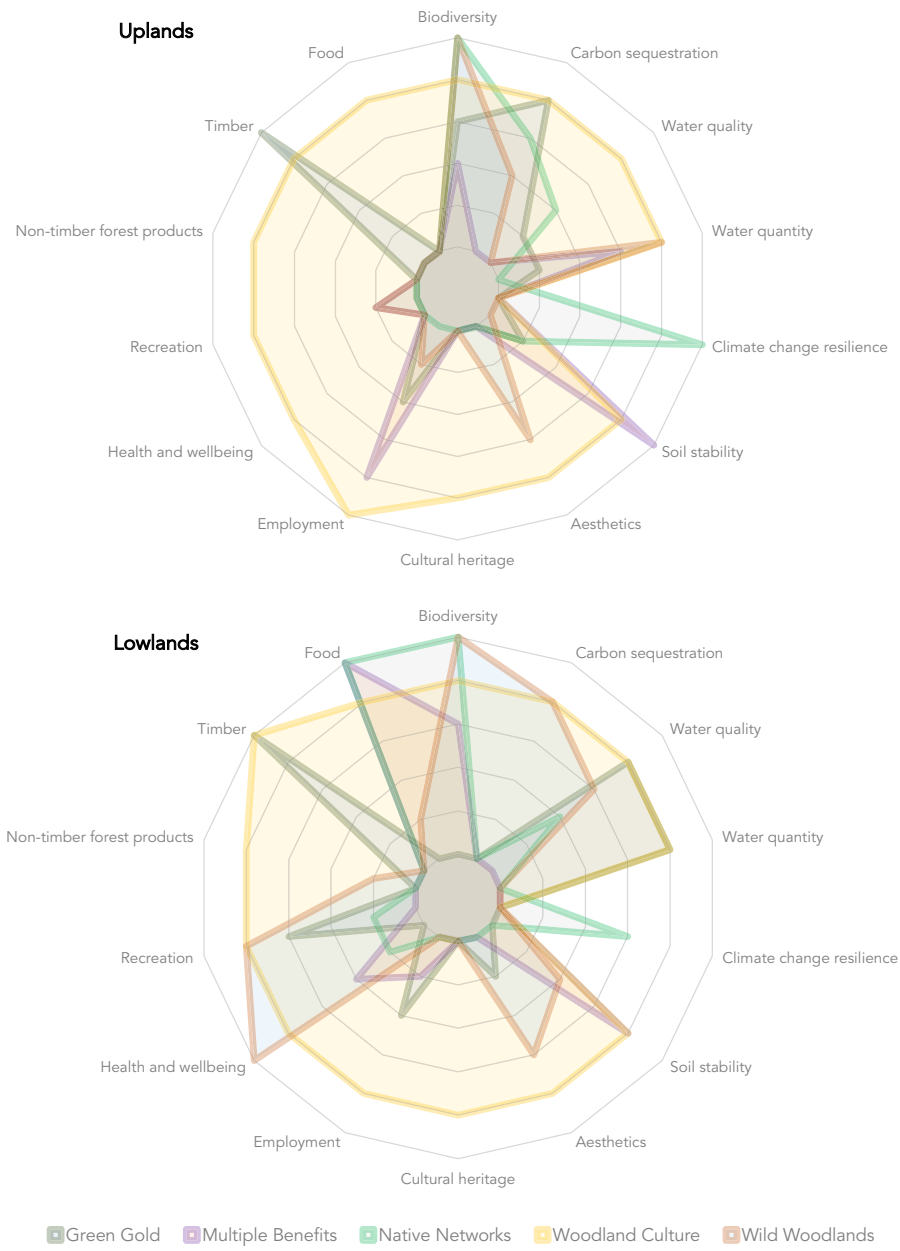



**Fig. 5** A comparison of the priority ecosystem services desired by stakeholders from upland and lowland landscapes under each vision. The task was to choose the top 5 ES desired from each landscape, but in some cases workshop groups kept more than 5 (i.e. Woodland Culture), or added a new ES not included as a prompt (e.g. climate change resilience)

with 18 attending and four more interviewed across several interest groups (Table 1)].

Nevertheless, the process adopted here had some limitations. It is difficult to predict who will be able to attend stakeholder events, however carefully invitations are balanced (Reed et al. 2013), and although over 70 organisations were invited across groups, the final attendance was slightly skewed towards the NGO sector. Even allowing for imbalances in the representation of particular interest groups, the 22 participating stakeholders might be viewed as 'the usual suspects' (Reed et al. 2009b; Colvin et al. 2016), with expertise and values based on top–down, national-level perspectives. The approach can therefore be defined as a 'neoliberal-rational' form of stakeholder engagement, with the objective being to involve stakeholders to efficiently obtain knowledge and data rather than to enable the participation of people 'on the ground' who may be unable to make their voices heard through established channels (Mielke et al. 2016). Interesting

further avenues of research could include more 'democratic' forms of stakeholder engagement (Mielke et al. 2016) to integrate the expertise and values of local people and land owners/managers in order to translate how visions might work in a specific local context. However, there are acknowledged to be problems with this approach, for example; a lack of sufficient knowledge, or preference for the status quo over change (Reed et al. 2009a). In addition, some participants with a strongly sectoral focus criticised the positive, idealistic nature of the visioning process, and its potential for obscuring trade-offs between woodland and other land uses. However, this positive approach is intrinsic to the nature of visions and their value as potential solutions to environmental problems, because it elicits forward-thinking storylines that can move beyond current constraints and identify transformational solutions to achieve desired futures (Jensen 2002; Gebhard et al. 2015).

The process of eliciting visions has been found to 'initiate communicative arenas in heterogeneous groups of stakeholders' (Gebhard et al. 2015), and in doing so, help to articulate different values. The workshop stimulated a great deal of dialogue between stakeholders, particularly in the plenary sessions, where facilitation focused on comparing and contrasting ideas from each vision. Follow-up telephone interviews with some participants found that the workshop process was positively received, with it giving people the opportunity for people to engage with other sectors, share views in a balanced way, and learn something new (Hall et al. 2018). The use of novel visualisation techniques, in the form of stylised landscapes, and tiles representing different woodland types and actors, was also praised for stimulating discussion and ideas. Overall, the document analysis, initial presentation of the visions to the stakeholders, and discussions held around the visions, helped to identify common ground between aims for woodland expansion.

## Common ground and divergent aims

Common ground is most obvious around the expected carbon, water and biodiversity benefits of new woodlands. This aligns with the findings of a UK policy review that identified the most frequently cited ES provided by forests and woodlands as climate change mitigation, biodiversity, water quality and flood protection (Sing et al. 2017). Research has shown that woodland creation can be a cost-effective method of climate mitigation and flood prevention (Thomas and Nisbet 2007; Nisbet et al. 2011; Iacob et al. 2014; Valatin and Price 2014), and afforestation is an important component of the UK's strategy to meet the terms of the Paris Agreement (Bell et al. 2016). *Native Networks* was the only vision to explicitly link these two benefits together in the concept of 'climate change resilience'; an emerging policy focus that is clearly prioritised by stakeholders even in the absence of well-developed strategies for its realisation.

Biodiversity is also valued in all visions, but there is a gradient in how it is perceived. In most visions (*Green Gold*, *Multiple Benefits*, *Woodland Culture* and *Native Networks*), woodlands are seen as being important for biodiversity, and in turn biodiversity is seen to underpin many other valuable benefits provided by woodlands. However, in these four visions the focus is on historical continuity of species and valuable habitats. *Wild Woodlands*, in contrast, represents a more transformative, dynamic view of biodiversity, with the aim of giving over larger areas of land to restoration and natural regeneration, allowing for fluctuations in the identity and extent of species and habitats (nevertheless with woodland being a key indicator of restoration). As such, *Wild Woodlands* positions itself within the new paradigm of accepting future novelty in the composition, functions and structure of woodlands and abandoning attempts to return to historical reference states (Ghazoul and Chazdon 2017).

Timber and employment were valued most highly by *Green Gold* and *Woodland Culture*, which were positioned towards high utility on the visions matrix, as well as *Multiple Benefits* in the uplands. These visions also rated biodiversity highly, illustrating an assumption that sustainable management can deliver all of these benefits. A review of the effect of management intensity on ES from forests suggests that high intensity management can have negative effects on biodiversity, although non-native plantation forests can also deliver biodiversity benefits by enhancing landscape connectivity for woodland species (Sing et al. 2017). Less intensive management, conversely, which allows for diverse species and age structures alongside (mimicked) natural disturbances, can be expected to be most beneficial across a range of species but at the cost of reduced timber yields (Sing

et al. 2017). This highlights an inconsistency between what is wanted from future forests and what may actually be achievable, and suggests that either biodiversity or timber production may have to be prioritised. Conversely, it may be that more (i.e. more woodland than stated in the aspiration), diverse woodlands managed in a low impact way, could meet demand for timber over larger areas. This further highlights another important area of divergence in terms of the amount of woodland expansion desired.

Both *Multiple Benefits* and *Native Networks* rate food as the top benefit in the lowlands, acknowledging the importance of agricultural land uses in lowland areas where soil quality supports them. Food was not chosen by any vision as a top benefit in the uplands, reflecting the low productivity and marginal nature of Scottish upland farming, particularly given potential loss of subsidy post-Brexit (Skerratt et al. 2016). In *Woodland Culture*, a full diversity of potential ES were maintained as the group emphasised that decisions on prioritising benefits would vary by context, based on decisions made by local people.

## Governance

The most notable differences between wider Scottish land use visions have been shown to exist in terms of land governance (Valluri-Nitsch et al. 2018). While we found that this is also the case for these woodland-specific visions, large areas of common ground were also evident, particularly in the selection of some form of landscape scale or regional collaboration and decision making by all workshop groups and interviewees. This aligns with the Regional Land Use Partnerships that were piloted through both iterations of the Land Use Strategy (Scottish Government 2011, 2016) and aimed to implement an Ecosystem Approach involving a wide range of stakeholders and giving local people a much stronger influence over land use in their area. This also links to the global agenda for Forest and Landscape Restoration (FLR), which, in contrast to site-scale restoration, is advocated on the basis that it allows development not only of the large scale ecological processes needed to generate ES, but also agricultural and environmental policies that support people's livelihoods (Dudley et al. 2005; Chazdon et al. 2017). Participants viewed partnerships such as these as particularly valuable for their ability to bring together a wide range of stakeholders and to facilitate debate about land use trade-offs and synergies, though felt that some form of facilitation or professional mediation may be necessary given the polarised views and potential conflicts about land use change. Nevertheless, it has been acknowledged that no one spatial or temporal level is appropriate for governing ecosystems, and that multi-level governance and new institutions working across levels are required (Brondizio et al. 2009). In addition, there is a fundamental tension between empowering local people and assuming they will want large-scale woodland expansion or landscape restoration. There is therefore a balance to be struck in terms of new governance giving decision making power to local people, yet also communicating the potential benefits of restoration.

In addition to regional collaboration, all workshop groups and interviewees saw a role for some new form of investment to provide income for landowners and managers for the ES or Natural Capital that new woodlands provide. This type of funding was envisaged for woodland types which were unlikely to provide income in other ways (e.g. timber) but that provide wider, long-term public benefits, such as biodiversity conservation or water regulation. Although the term was rarely specifically mentioned, this links to the concept of Payment for Ecosystem Services (PES). Spatially explicit economic modelling in New Zealand has illustrated that where the net private benefit of afforestation is negative, policy mechanisms such as PES can be used effectively to encourage woodland creation (Barry et al. 2014). Using public money to support desirable land uses is not new, with subsidies having supported the farming sector for decades, and grant schemes providing money to cover woodland planting costs. The explicit linking of public money to ES is currently missing, however. As a mechanism for nature conservation, PES have been the subject of both scepticism (McCauley 2006; Redford and Adams 2009) and support (Schröter et al. 2014). In the case of encouraging land use changes such as woodland creation, which are long-term and have little to no immediate benefit, they have the potential to play a powerful role. They would differ from traditional woodland grant schemes by providing a more continuous stream of income in return for the ES provided. Participants suggested that the necessary finance could come from corporate social responsibility (CSR) schemes, large

utility companies, or from a dramatic subsidy reallocation post-Brexit.

The most notable area where the visions diverged in terms of governance concerned the extent of Land Reform and Community Empowerment. Both these agendas aim to improve governance of the possession and use of land to facilitate an economically successful, socially just and environmentally sustainable Scotland (Land Reform Review Group 2014). The Land Reform (Scotland) Act (Scottish Parliament 2003, 2016) established the Scottish Land Commission, and among other things gave communities the right to buy land, and the power to buy land in order to further sustainable development. The Community Empowerment Act (Scottish Parliament 2015) further enables the purchase of abandoned, neglected or detrimental land (defined as harming, directly or indirectly, the environmental wellbeing of a community), and community participation in decision making. The National Forest Land Scheme was another important mechanism for facilitating community ownership (or lease and management) of land by communities and NGOs and allowed community acquisition of Forestry Estate Scotland land (Wong et al. 2015). In both *Woodland Culture* and *Wild Woodlands*, it was argued that both these agendas would need to be further developed, being prerequisites to many of the changes desired in each vision. For *Woodland Culture*, Community Empowerment and a significant increase in community capacity (e.g. developing local skills and resources) was envisaged before the central aspects of the vision (e.g. strong local control and engagement in woodlands and a variety of woodland businesses) could be achieved. In line with this, *Woodland Culture* also envisaged an increase in the availability of funding for smaller ventures, for example the planting of small woodlands or supporting related businesses, such as small-scale wood processing.

For *Wild Woodlands*, Land Reform was the more immediate concern, with the current concentrated pattern of land ownership (Wightman 1999) being a key factor, particularly under the current culture in which many large estates essentially hold land in ecological stasis through high grazing pressure and muirburn for grouse (Armstrong et al. 2014; Halley 2017). Indeed, grazing pressure was acknowledged to be a severely limiting factor in terms of natural regeneration of woodland, and *Wild Woodlands* included very strong landscape scale deer management (with population reduction preferred over fencing). Recent reports on deer management has concluded that deer are a major factor in limiting the recovery of woodland condition, and that the present reliance on fencing comes at a cost to the public purse, with wider implications for biodiversity and deer welfare (Scottish Natural Heritage 2016; Environment Climate Change and Land Reform Committee 2017). It was acknowledged that a change of ownership would not necessarily mean a change of management, and that single private owners ('Green Lairds') with large land holdings and resources could aid achievement of the visions if their interests were aligned (as e.g. with new ownership at Glenfeshie Estate in the Cairngorms National Park resulting in large-scale woodland regeneration). Nevertheless, stakeholders involved in *Wild Woodlands* wanted transformational change in land ownership, while enhancing democratic processes, even if this was not in itself conducive to achievement of the envisioned woodland expansion. Thus, they stressed the importance of encouraging wider cultural shifts and the role of education, media and science communication in ensuring such expansion occurred. The shift towards more participatory and interactive modes of policy making, favouring negotiation and trade-offs between different interest groups, has previously been identified as a barrier to rewilding (van den Belt 2004). As a result, it is argued that in order to gain wider traction, such ideas will require strategic high-level action (Jepson 2016). This highlights a fundamental tension between stakeholder proponents of *Wild Woodlands* wanting to maintain participatory democratic processes, and the likelihood of success likely depending on high-level, top–down strategy. A key consideration here may be the differing timelines over which stakeholders were considering changes. If rapid changes are wanted, then a national strategy may be more likely to succeed. However, the stakeholders interviewed for *Wild Woodlands* often talked on very long timescales, proposing that changes to education and effective science communication would slowly engender societal changes which would in turn lead to democratic support for a national strategy for wilder land use and restoration of nature.

Overall, it can be argued that *Multiple Benefits*, *Green Gold*, and *Native Networks* represent more 'status quo' visions, mostly involving tweaking of

current systems of incentives and regulations, with *Multiple Benefits* being closest to the current government position. By contrast, *Woodland Culture* and *Wild Woodlands* are more transformative, involving more dramatic changes in terms of Land Reform, Community Empowerment, and challenging current land use practices. Although these visions came under some criticism from some participants for being less realistic, or likely to happen, work in rural Estonia has found that the use of more 'surprising' or ambitious visions can be popular, and boost motivation in terms of long term planning (Palang et al. 2000). There are also calls for transformational change in land use in response to climate change (Kates et al. 2012), with reforestation highlighted as offering a particularly important pathway towards climate change mitigation (Griscom et al. 2017). They can also be linked to theory around the 'radical rural', defined as emerging transformational and utopian 'future ruralities' which are appearing in response to the search for sustainability and low-impact development (Halfacree 2007). The more transformational visions also link with wider Scottish (Valluri-Nitsch et al. 2018) and European Union (Pérez-Soba et al. 2018) visions (particularly amongst young people) for multifunctional landscapes, radical shifts to bottom-up governance, self-sufficiency and larger individual behavioural changes in terms of diet and travel (Metzger et al. 2018a, b). In any case, all interests are inherently valid and necessary to account for.

## How to move towards a common vision?

Previous research has indicated that there is a lack of synergy between policies advocating woodland multifunctionality and connectivity (Muñoz-Rojas et al. 2015), and improved coordination among actors and across scales may be necessary to achieve such synergy. Visions have a role to play in this because they stimulate dialogue and help to build consensus on shared priorities. However, the extent to which differences between visions can be resolved remains an open question. There was much discussion at the workshop about the extent to which the visions could be merged, or whether woodland planning could be weighted towards certain visions in appropriate areas. Many argued that Scotland's Land Use Strategy already formed a common vision. The third Principle for Sustainable Land Use in the Land Use Strategy states that: "Where land is highly suitable for a primary use (for example food production, flood management, water catchment management and carbon storage) this value should be recognised in decision-making" (Scottish Government 2016). This can be interpreted to mean that all visions could be implemented where the land most suits the objectives of that vision. This also links to the second recommendation of Muñoz-Rojas et al. (2015), who argue that spatially explicit planning instruments are required to increase synergies in planning for woodland expansion. There could be an opportunity to move away from considering the visions axes as opposing sectors, and instead using them as different options for guiding landscape scale planning within specific regions or landscapes in Scotland, depending on the objectives of the stakeholders in that vicinity.

## Challenges and opportunities

These results present both challenges and opportunities. Firstly, to what extent is a spatial strategy that incorporates all visions possible? To date, spatially explicit research has included an analysis of suitability for woodland expansion at the national level (Sing et al. 2013), and nested modelling of responses to climate change at the regional and national levels (Brown et al. 2014), but neither of these take into account governance or land owner decision making. The Land Use Strategy and Land Reform and Community Empowerment agendas suggest that decisions should be made, or at least strongly informed, by local stakeholders. However, as highlighted previously, this may be to the detriment of the necessary national-level planning as well as constraining the areas in which particular changes may be possible. This is particularly true given engrained cultural divides between, on the one hand, farming and sporting interests and, on the other hand, the generally more forestry and conservation-oriented interests represented by these visions. Another limiting factor was identified as the 3% increase in woodland cover stipulated by the current Government aspiration, which represents a miniscule amount of change when spread over the whole of Scotland. Some stakeholders and visions (in particular *Woodland Culture* and *Wild Woodlands*) argued for larger increases in woodland cover. Finally, many of the changes envisaged, particularly in the more transformative visions, are intrinsically linked to

wider, longer-term societal shifts that are very difficult to achieve. Together, these issues clearly constrain the extent to which all of the objectives articulated by these visions can be achieved.

In terms of opportunities, there is increasing discussion around the concept of rewilding in Scotland (Brown et al. 2011). Rewilding, with a focus on restoring natural processes and ecological dynamics, falls within the framework of restoration ecology, and is promoted as an ambitious alternative to current approaches to nature conservation (Lorimer et al. 2015; Jepson 2016). The concept generates significant debate given its range of possible definitions, and concerns that it may affect local livelihoods. Previous research has shown that rewilding was the least popular scenario amongst stakeholders in an analysis of predominantly English and Welsh upland scenarios (Reed et al. 2009a). However, it has recently been argued that rewilding and 're-peopling' are not exclusive to one another (Hunter 2017). This presents an interesting avenue in terms of linking the *Wild Woodlands* and *Woodland Culture* visions. Southwest Norway is also increasingly argued to be an ideal comparison to, or exemplar for, the Scottish Highlands, both ecologically and in terms of integrating increased woodland cover with other land use practices (Halley 2017). The combination of these two more transformative visions, with emphasis on giving back space to nature and power to local people, fits within the emerging Forest Landscape Restoration (FLR) agenda (Chazdon et al. 2017; Ghazoul and Chazdon 2017).

The number of initiatives advocating working at a landscape scale is increasing globally (e.g. Model Forests, Biosphere Reserves) and in the UK (e.g. Futurescapes, Living Landscapes), improving understanding of how to develop sustainable socio-ecological systems in different regions (Angelstam et al. 2013). This suggests an opportunity to move beyond the 'usual suspects' in land use policy and to work with visions at a landscape scale, with input from local stakeholders. Participatory, values-based research would also help to address the potential inconsistency in giving decision-making power to local people who may not share the same visions for woodland expansion or landscape restoration. The policy reforms required by Brexit provide an opportunity and a need for such research, to ensure that new policies reflect people's visions, knowledge and values.

### Future research

Interesting avenues for further research can be identified around linking qualitative storylines (i.e. the visions) with quantitative models (e.g. of climate and socio-economic change) to assess whether or not realistic scenarios of land use change match up with what is desired by society (Kok et al. 2014; Verkerk et al. 2016). Whether the visions can be achieved will also be dependent upon individual landowner behaviour (Brown et al. 2018). Thus, agent based modelling is a promising future avenue of research, as it can be used for scenario analysis whilst also representing heterogeneous land ownership and behaviour across landscapes. Furthermore, the effects of key pressures and risks on land use planning are still insufficiently considered (Muñoz-Rojas et al. 2015), and thus there is an opportunity for scenarios research to explore these further. To date, there has been little to no evaluation of visioning processes to assess whether or not they assist with long term planning (Shipley and Michela 2006). Future research should undertake an evaluation exercise of studies where visions have been developed, to assess their effectiveness.

## Conclusion

We present a mixed-method approach for eliciting visions for woodland expansion in Scotland. The streamlined approach is argued to be salient and legitimate at a national level. The visions articulate the wide variety of objectives and values associated with woodland expansion in Scotland. At a national level, there is a great deal of consensus between stakeholders that woodland expansion can offer valuable public benefits in terms of carbon sequestration, water and flood regulation, and biodiversity conservation. Some stakeholders envisage more dramatic changes, e.g. giving over larger areas of land to natural processes and natural regeneration by dramatically improving deer management and changing sporting practices, or fostering smaller scale local control of land and woodland expansion. Landscape scale collaboration and decision making, as advocated and tested through the Land Use Strategy, is widely perceived across visions to be the way forward in terms of governing decisions for woodland expansion and other land use changes. New incentives, perhaps some form of

Payment for Ecosystem Services, were viewed within all visions as a potential mechanism for encouraging more woodland creation, particularly for woodland types which are less likely to provide income in other ways in the long term e.g. for native woodlands providing biodiversity and water regulation benefits. Discussions highlighted that Brexit provides a window of opportunity in the next couple of years to change incentives and regulations relating to woodland, and other land uses, which have previously been strongly determined by the Common Agricultural Policy. Finally, the local context was acknowledged to be hugely important by more than one vision. It was recognised that some quarters might find the level of consensus for more woodland in the visions threatening, and that decisions for land use change would be best made by local people. Overall, the visions engaged and stimulated dialogue between stakeholders, and can support more joined up and effective approaches to land use planning.

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