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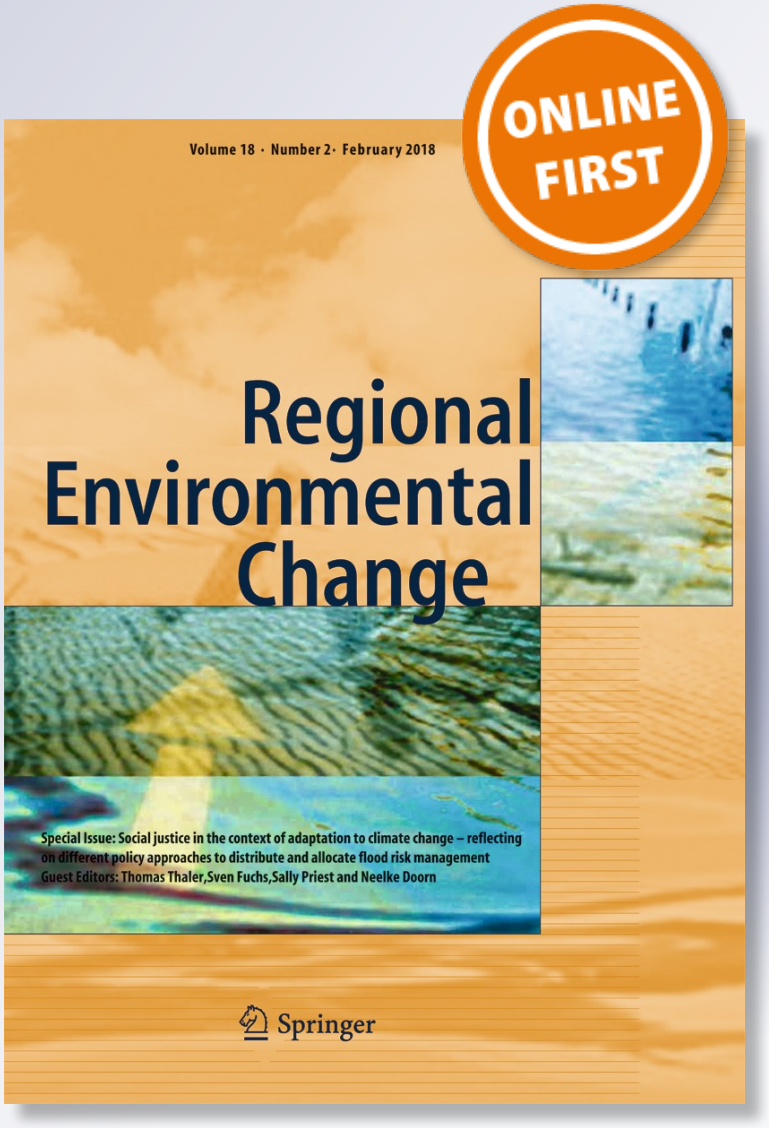

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ORIGINAL ARTICLE

My land? Your land? Scotland?—understanding sectoral similarities and differences in Scottish land use visions

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Abstract

Understanding agreement and differences between land use visions forms a first step for assessing and comparing alternative pathways towards a sustainable future. This study presents an analysis of 20 semi-structured interviews with representatives of the principal land use sectors in Scotland. The aim was to understand what, in their ideal vision, they would want rural Scotland to look like in 2050. Inductive content analysis was used to identify similarities and differences amongst interviewees. There was general agreement on the following: the importance of the environment; the wish for more partnerships, dialogue and collaboration; the desire for society to be more engaged and aware about land use; and a strong need for short-, medium- and long-term policies helping to achieve these goals. The most notable differences relate to land ownership and governance. The outcomes form a basis for further facilitated discussions, emphasising common ground and exploring where, how and to what degree land use sectors can prepare and plan in the light of uncertainties posed by Brexit and climate change. The method was effective for understanding commonalities and differences between stakeholder groups and is transferable to other countries or regions.

Keywords Rural · Land use · Visions · Drivers · Social capital · Trade-offs · Scotland

Introduction

Scenarios and visions

Scenarios of alternative plausible futures have been used extensively to explore the potential effects of socioeconomic and environmental change, and the ultimate objective of any explorative scenario is to assess the variation in possible futures and to give insights into the range of potential outcomes (Metzger et al. 2010). The results of these scenarios offer guidance to stakeholders for policy development, planning and management (Rashkin 2005). Therefore, the strength of explorative scenarios is mainly in exploring uncertainties in the future (Zureck and Heinrichs 2007). Visions, on the other hand, are inherently normative and provide an opportunity to explore conflicts as well as synergies derived from different viewpoints on contentious land use issues (Rounsevell et al. 2012). They can also be more salient than explorative scenarios because they focus on a single defined goal in the future, rather than a suite of different futures (Alcamo 2001).

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Land use visions

The successful transition towards a global society that can live within the planetary boundaries (Rockström et al. 2009) is one of the greatest challenges for the twenty-first century. Sustainable land use and land management will be essential to ensure the continued delivery of the ecosystem goods and services needed to support a rapidly growing global population (MA 2005). To support the transition towards sustainable development, science needs to better understand how land use change affects people and the environment (Rounsevell et al. 2012). However, these insights are of limited use without societal agreement on what future land uses should look like. Understanding synergies and differences between land use visions forms a first step in assessing and comparing alternative pathways towards a sustainable future (Brown et al. 2016; Verkerk et al. 2016).

The importance of visions is widely recognised for successful planning (Boaventura and Fischmann 2008; Johnson et al. 2008; Pérez-Soba and Maas 2015) and for land use (Börjeson et al. 2006; Rounsevell et al. 2012; Gebhard et al. 2015). Visions can be defined as normative scenarios describing a picture of the future that is achievable through specific actions (Pérez-Soba et al., 2015. However, the complexity of land use systems and the diversity of stakeholders with different objectives and interests (Buijs et al. 2006; Glass et al. 2013) pose major challenges for any study trying to elicit or understand land use visions. Achieving a better understanding of different visions is an important step towards identifying common ground and understanding different perspectives.

The aim of this paper is to provide insights into the contrasts and synergies in land use visions for Scotland, a country with significant rural land use conflicts (Glass et al. 2013; Rural Policy Centre, 2014). These include conflicts between maintaining large deer herds on 'sporting' estates and objectives for native woodland expansion (Scottish Natural Heritage 2016), persecution of raptors (Whitfield and Fielding 2017) and impacts on peatland function from heather burning associated with grouse moor management (Stewart et al. 2004; Brown et al. 2014), landscape impacts and impacts on habitats and native birds resulting from the development of large-scale onshore renewable energy developments (SNH 2014; Bright et al. 2009) and clashes between established or 'traditional' land uses (e.g. hill farming) and emergent approaches (e.g. species reintroductions and nature-based tourism) (Deary and Warren 2017; Milner and Redpath 2013). Scotland also now faces major uncertainty in relation to future land use (and wider policy domains) following the UK's recent decision to leave the European Union (EU), i.e. Brexit (Rural Policy Centre 2017).

Land use in Scotland

In recent decades, major drivers such as urbanisation, agricultural intensification, demand for renewable energy and a changing climate have resulted in changes in land use across the globe. Whilst these drivers may vary in magnitude and intensity, they can generally be grouped under similar themes (Bürgi et al. 2004; Erdogan et al. 2009; Rounsevell and Metzger 2010). Here, we adopt the Societal, Technology, Economic, Environmental, Policy (STEEP) classification (Rounsevell and Metzger 2010), as a framework for reviewing land use change drivers in Scotland (below) and structuring the stakeholder interviews (see 'Stage 2: interview design').

From the 1950s until the 1980s, rural land use policy in Scotland had a strong sectoral focus, lacking integration and joined-up thinking (Davidson 1994; Crofts 2000; McMorran et al. 2017). Agriculture and forestry were at the forefront of rural objectives, limiting the delivery of wider rural development policy (Scott et al. 2007). From the 1990s, a more integrated policy approach has been adopted, with a stronger focus on multi-functionality and sustainability (Midgley et al., 2008; Scottish Executive, 2006; Warren 2009), reflecting wider European trends (Mander et al., 2007). A sectoral overview of current land use in Scotland and uncertainties for the future is presented in Table 1, and major drivers of future change are presented in Table 2, and discussed in more detail in Online Resource 1. It is acknowledged that the categories presented often overlap and are interlinked; however, creating a distinct set of categories facilitated a functional framework for structured interview discussions and subsequent analysis.

Methods

Stage 1: stakeholder selection

Following an extensive literature review, seven land use sectors were identified that either cover large areas, are under major pressure of change or have considerable policy relevance in Scotland: agriculture; crofting[1]; forestry; renewable energy; sporting (or 'hunting' as it might be better known outside the UK); biodiversity and conservation; and tourism and recreation. In addition, given the unique pattern of land ownership mentioned above, the attitudes and aspirations of land managers and land owners can have significant impacts on the way land is used now and in the future. Consequently, an eighth 'cross-cutting' land use sector was added to the list, to represent those who consistently work across different sectors on their land.

For each sector, one individual was selected to represent private (P), non-governmental (NGO) or public (PU) stakeholders, as follows. First, a shortlist of key stakeholders in the

[1] A croft is a small agricultural unit (1/2 ha to more than 50 ha), rented and farmed by the crofter typical for northern and western Scotland (Scottish Crofting Federation 2016). At present, there are 20,566 crofts: 14,898 tenanted crofts and 5668 owned.

Table 1 Sectoral overview of current land use in Scotland and uncertainties for the future

Sector	State	Uncertainties
Forestry	• 18% woodland coverage of which 79% are coniferous • 34% owned by Government and 66% owned and managed by private land owners, local authorities and NGOs	• Cover to be extended to 25% by 2nd half of century to meet climate targets • Privatisation versus public ownership • Deer management
Agriculture	• 80% of the total land area in Scotland mainly comprising of rough grazing • Land Capability Map official classification system as a basis of land valuation • Based on Classification 85% classified as LFA's	• On-going Brexit negotiations • Decreasing livestock numbers • Biodiversity implications associated with reduction in livestock, numbers on hills and intensification of suitable agricultural land
Crofting	• 7 crofting counties • System of pluri-activity • Constitutes 11% of the population and 10% of households in rural	• Collective system of community ownership versus individual system of owner-occupiers tradable on the open market
Recreation and tourism	• Albeit seasonally it is becoming the biggest sector in the majority of rural Scotland • UK is Scotland's biggest market (83%) who provide 67% of all tourism expenditure • 'Nature Tourism' becoming significant subset	• Potential conflicts over scenery due to developments • New employment opportunities in the face of traditional employment versus seasonality and high rate of business failure
Renewables	• 50% of heat, transport and electricity needs to be derived from renewable sources in 2030 • Majority of this from on and offshore windfarms • In the first 6 months of 2017, enough energy was created to supply more than all of Scotland's national demand for 6 days	• Need to upgrade current electricity grid • Increasing conflict due to impact on tourism and conservation • Importance of small scale renewables undervalued
Sporting	• 340 estates cover 50% of privately owned land • Typical estate size 5000–8000 ha grouse and deer are predominant species for sporting land use	• Debates on moral, political and economic legitimacy • Population of red deer has doubled in the last 30 years • Muirburn (heather burning) versus carbon storage
Biodiversity and conservation	• Shift from nature and landscape conservation to integrated approaches viewing the ecosystem as a whole • Due to area covered by agricultural land, agri-environment schemes could offer huge potential for integrated conservation	• Preservation versus recreation • 'Hands on' versus 'hands off' • People versus no people • Local versus global

sector was created. Then, interviewees were selected based on their level of involvement in land use, land use policy or strategic planning within their organisation. If the candidate was unable to participate, s/he was asked to suggest an alternative contact.

Stage 2: interview design

The focal questions and spatial boundaries for interviews were defined by the study aim: to understand land use visions for rural Scotland in 2050. The STEEP classification (Rounsevell and Metzger 2010) was used to structure the interview questions. Participants were specifically asked to outline their preferred or 'ideal' future—as opposed to the 2050 which they thought would realistically happen—although it is recognised that there was often overlap between the two futures of rural Scotland (cf Metzger et al. 2016). They were asked the following questions:

> What is society/technology/economy/environment/policy like in 2050?

Within each question, participants were encouraged to talk about a range of land use drivers such as the following:

Society—demographics of the rural society, affordable housing, jobs, transport, services and amenities; and the concerns and preferences of wider society such as equality, ethics and community spirit

Technology—transport and infrastructure, smart technologies, broadband and mobile phone coverage, high-precision farming and renewable energy supplies

Economy—timber and agricultural prices, transport infrastructure, housing and tourism

Environment—climate change-related adaptation and mitigation, ecosystem health

Policy and governance—shifts from sectoral to integrated policies to multi-functionality, partnerships and community involvement

Interviews were recorded. At the end of the interview, participants were asked to fill out a short table, identifying their three most important vision characteristics for each STEEP category, as well as the three main barriers to achieving their overall vision. It should be noted that the interviews were conducted in January 2015, before the referendum that led to Brexit in June 2016.

Table 2 Major land use change drivers in Scotland

Category	Driver	Explanation
Societal	• Shift towards participative land use decision-making	• Incorporating local is increasingly recognised, e.g. in the 2015 Community Empowerment (Scotland) Act ,and could fundamentally change land use decisions
Societal	• Land reform	• Scotland has the most concentrated land ownership in Europe, but the recent political shift towards land reform, e.g. the 2016 Land Reform (Scotland) Act, could impact land use
Technological	• Infrastructure improvements	• Rural vitality and land use is heavily influenced by accessibility and high-speed broadband is integral to the social and economic development of rural areas
Economic	• Brexit	• Brexit poses significant challenges for rural Scotland's agriculture and landbased businesses, but also provides an opportunity to reflect and reassess objectives and policies
Environmental	• Climate change	• Projections indicate Scotland predicts an increase in flooding, crop productivity, species distributions and pests and diseases which will interact with other drivers and impact land use (Holman et al. 2016)
Policy and governance	• Ambition for join-up land use policy	• The Land Use Strategy sets out a vision for more integrative land use policy relating to the economy, environment and communities, which could lead to significant land use change, e.g. wood land expansion.

Stage 3: transcribing and coding interviews and analysing visions

Each interview was fully transcribed and sent back to the interviewee to check whether he/she agreed with the record, which was the case for all interviewees. The material was then imported into NVivo to carry out the primary analysis: deductive coding of the transcribed text to identify specific vision elements across the sectors.

Three stages of analysis were undertaken. Firstly, questions were grouped by STEEP category and responses inductively coded for similar vision elements (i.e. themes). Secondly, these vision elements were compared to key vision aspects that interviewees had written down at the end of the interview. Finally, each interview was read in its entirety to identify any vision elements that were expressed across the STEEP categories, but were not picked up when reviewed within the separate categories.

Stage 4: comparison and analysis of visions

The vision elements (codes) were extracted from NVivo and exported into Excel where they formed the basis for a synergy table. In this table, vision elements were grouped into the relevant STEEP categories (rows) and sectoral interviewees were listed along the top (columns). Cells in the table were checked when a vision element was discussed by a specific stakeholder. An overall vision summary was written for each sector. Finally, an attempt was made to aggregate the vision elements into a limited set of cross-sectoral visions, like the process described by Perez-Soba et al. (2015) to create three consolidated land use visions for Europe.

Results

Steps 1 and 2: stakeholders and interviews

It was not possible to find private stakeholder representatives within the conservation sector, and NGO stakeholder representatives were also absent from the crofting sector, resulting in 21 interviewees (for details see Online Resource 2). Furthermore, the public stakeholder interviewee from the cross-cutting sector had to withdraw due an internal policy change, and it was not possible to find a suitable replacement. The public interviewee from the tourism sector was not involved in any policy-related work within the organisation, resulting in the topics and themes of this interview deviating slightly from those who worked in policy.

Interviews lasted on average 45 min, with the longest lasting 64 min and the shortest 35 min. All interviews were face-to-face, apart from one conducted over the phone for logistical reasons. Most interviewees engaged very well with the rather abstract topic, although some struggled to keep their thoughts in the future and kept being drawn back to a range of possible trajectories in the here and now. Nonetheless, all interviewees engaged passionately during some parts of the interviews, particularly when talking about the issues of concern to them. They felt that they had been given a safe platform to speak about their visions and to voice their concerns, in contrast to being part of a wider stakeholder workshop or focus group.

Similarities and differences between land use sectoral vision elements

The qualitative analysis of vision elements is summarised in Table 3, distinguishing 35 vision elements, between 3 and 13 per STEEP category. This overview depicts which elements

were mentioned by each interviewee. Together with the sectoral summary visions discussed in 'Sectoral visions', this formed the basis for presenting the results. There were also two concepts which many interviewees referred to, as defined below:

> *Coherent policies*—the logical promotion of mutually reinforcing policy actions across government departments and agencies to achieve the agreed aims (OECD, 2016).

> My interpretation of the current government is that they tend to avoid any real forward thinking, and any controversial decision is pushed to another group. So there is no coherent vision which is determining policy. Policy decisions are just being made on the basis of what will work politically at that moment. And that means there's no big forward look. If we want to see real progress that this needs to happen. (Cross-Cutting, Private)

> I think we need more coherent polices - maybe the land use strategy should pull together all these standalone policies and act as the overarching framework for land use? So then everyone (farmers, foresters, land owners) will have to work together rather than different groups pursuing their own goals (Renewables, Public)

> *Strong communities and resilient local economies*—attractive places where people want to come to live and work; where they have access to education, health care, shops, good transport links, internet and mobile phone coverage and access to the countryside (Berkes and Ross, 2013).

> My belief is that people are happy in smaller communities where they have that feeling of connection in the way that people do in their family, and then you have that kind of slightly tribal connection with the community you're from, and we don't live like that and does it make us happier? (Tourism and Recreation, NGO)

> There are different ways of doing it (boosting the rural economy). You can just give people cash. Or you can try and create a sort of spirit of entrepreneurialism, so your start-up businesses and people setting up new initiatives that are then durable. That way you are actually making it an attractive place to be and people want to come and live there. (Sporting, Private)

Seven vision elements were mentioned by at least 15 or more interviewees:

- The environment underpins everything; ecosystem health will be improved (20/20)
- There will be coherent long- and short-term policies and payment mechanisms (19/20)
- More dialogue, collaboration and partnerships between regions and estates (18/20)
- Meeting the climate change targets (17/20)
- A diverse multifunctional landscape (17/20)
- Scotland's society is more aware and appreciative of land use and land use decision-making (15/20)
- Diverse and resilient local economies (15/20)

There were also significant differences in visions, predominantly when talking about society and policies in 2050. Interviewees often discussed ownership and societal involvement in decision-making in their visions, which ranged from increased public ownership and involvement in decision-making to no change in land ownership and only limited involvement in decision-making. A few (notably NGO) stakeholders were indifferent about land ownership, but emphasised sustainable land management.

The other principal areas of divergence concerned policy instruments and payment mechanisms. Payment for ecosystem services (PES) (Huxham et al. 2014) was very popular with private and public sector stakeholders, whilst interviewees from the NGO sector highlighted the importance of true cost accounting—a method tracing direct costs and allocating indirect costs by collecting and presenting information about the possible environmental, social and economic costs and benefits or advantages—rather than PES, emphasising that sound environmental land management should be the default and not a reward. There were also differences within the private and public sectors: some favoured a restructured subsidy system rewarding good environmental practices (e.g. PES), whilst others would like less market intervention, to allow rural businesses to reinvent themselves based on their strengths and innovation.

Visions of stakeholder groups (private, public, NGO)

As mentioned above, the three stakeholder groups shared similar visions for an improved environment, a diverse and multifunctional rural landscape with strong rural communities at its heart, and coherent polices and support mechanisms for short- and long-term management decisions. There was also a shared wish that society will have a better understanding about land management and the public benefits of good land management. Figure 1 summarises the vision elements per stakeholder group (private, public, NGO). The differences between the groups are detailed below.

Table 3 Vision elements per land use sector

	Vision elements/sectors	Agriculture			Crofting		Forestry			Renewables			Sporting			Biodiversity and conservation		Tourism and recreation		Cross-cutting	
	Vision elements	PU	PR	NGO	PU	PR	PU	PR	NGO	PU	PR	NGO	PU	PR	NGO	PU	NGO	PU	NGO	PR	NGO
Society	Less conflict		X				X		X		X		X	X	X	X				X	
	Dialogue, collaboration and partnerships between estates/regions (PR)			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Society has a better understanding about how the land is managed and about the benefits good land management brings but has only limted involvement in decision-making		X											X						X	
	Society has a better understanding about how the land is managed and about the benefits good land management brings through increased dialogue, collaboration and partnerships			X	X	X	X	X	X	X	X	X	X		X	X	X		X		X
	Society has a better understanding about how land is managed and about the benefits that good land management brings and what impact their choices make	X																			
	Strong, engaged, inclusive, empowered communities/localism and equal voices			X	X	X	X		X	X	X	X				X	X		X		X
	Diverse culture with strong links to natural heritage																	X			
	More egalitarian form of land ownership			X		X			X		X	X									
	It is not about land ownership but land management				X										X		X		X		X
Technology	Energy efficiency											X							X		
	Improvement in the decentralised energy network through small-scale renewables (*combination of small and large scale)				X*	X	X	X	X		X*	X					X		X	X	
	Better quality data and data sharing (leading to better decision-making tools)			X			X			X			X		X	X					X
Economy	Resilient and diverse local economies fostered by investment in rural development (e.g. investment, IT and community services)		X	X	X	X	X	X	X	X					X	X	X	X	X	X	X	X
	More investment in land-based businesses		X	X	X	X	X	X	X					X			X	X	X	X	
	Strong profitable sector							X			X			X				X		X	
	True cost accounting (*global)			X			X		X			X					X		X		X*
	Sector-specific improvements	X	X		X	X		X	X		X		X							X	
	Payments for ecosystems (*instead of subsidies, **on agreed objectives, ***for particular species)	X*											X*	X*		X***	X**			X*	
Environment	Landscapes are places where people live and work as well as places for recreation. Scotland has a diverse and multifunctional landscape		X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X
	Environment underpins everything	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Improved ecosystem health	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Scotland is on track of meeting its climate change targets	X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X
	Political will and open discussion about trade-offs			X			X		X			X	X	X						X	

Table 3 (continued)

	Vision elements/sectors	Agriculture			Crofting		Forestry			Renewables			Sporting			Biodiversity and conservation		Tourism and recreation		Cross-cutting	
	Vision elements	PU	PR	NGO	PU	PR	PU	PR	NGO	PU	PR	NGO	PU	PR	NGO	PU	NGO	PU	NGO	PR	NGO
Policy and governance	Less political intervention													X		X	X			X	
	Clarity on management objectives (e.g. function or composition)															X					
	Clarity over Scotland's position in the wider global political landscape (e.g. independence, EU memberhip)		X		X		X		X		X										
	Coherent policies and payment mechanisms which consider short- and long-term management decisions		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	LUS is the key document for land use and its coherent policies and payment mechanisms which has led to better decision-making tools (*including advisory service)			X	X		*X	X	X*	X	X	X	X								
	Efficient and restructured local more independent authorities				X		X			X									X		X
	Efficient and restructured local and public authorities into geographical regions (e.g. catchment)													X	X						
	Better environmental legislation (*if free markets)						X							X			X			X*	
	Advisory approach						X			X				X							
	More rule making powers	X					X														
	Restructuring of CAP in favour of the environment					X	X			X							X				
	Abolishment of CAP and free for all markets	X																		X	

Private stakeholders

Despite the diverse range of private stakeholders, the key themes across the sectors were similar. Overall, their vision was that, by 2050, the private sector will be strong and profitable, with good investment in land-based businesses and entrepreneurism. Sector-specific improvements and their anticipated benefits featured in all visions, as did the emphasis on a more decentralised energy network (except from the sporting and agricultural sectors).

All interviewees, apart from those from the forestry and crofting sectors, expressed their wish for less conflict around the subject of land use in 2050. Except for the interviewee from the agricultural sector who did not mention this, all would like to see more dialogue and partnerships either between estates and regions (Sporting and Cross-cutting sectors) or between society, sectors and the government (Crofting, Forestry, Renewables sectors).

Whilst the interviewees from the renewable and crofting sectors highlighted the importance of a more egalitarian model of ownership in 2050, those from the sporting and cross-cutting sectors argued that it should be more about land management rather than ownership.

Although the interviewees from the sporting and cross-cutting sectors would like to see less political *intervention*, they would like to see more political *will* and open discussion about trade-offs and a potential strengthening of environmental legislation in case of a free market for all scenario. The introduction of PES was also a strong element in their vision.

> I mean I think that there needs to be a mechanism for payment for ecosystem services and then that would align the landowner's interests directly with the public interest. (Cross-Cutting, Private)

Some of the interviewees spoke about their wish for the introduction of PES instead of a subsidy regime, but none mentioned the principle of true cost accounting, which was a dominant theme in the visions of the NGO stakeholders.

Public stakeholders

The overall vision from this group was that, by 2050, Scotland's ecosystem health will have improved and Scotland will have met its climate change targets. Everyone, except the interviewee from the tourism sector, spoke about their wish for a society that better understands how land is managed and the benefits that good land management brings. There was also wide agreement (crofting, forestry, renewables, sporting and biodiversity sectors) about the need for improved dialogue and collaboration between sectors and the government (see 'Challenges and opportunities'). This closely tied in with those wanting improved access to, and sharing of, data.

A more equal, engaged and empowered society was an important vision element from the interviewees from the crofting, forestry, renewables and biodiversity sectors. The interviewees from the crofting, forestry, renewables and tourism sectors spoke about their wish for resilient

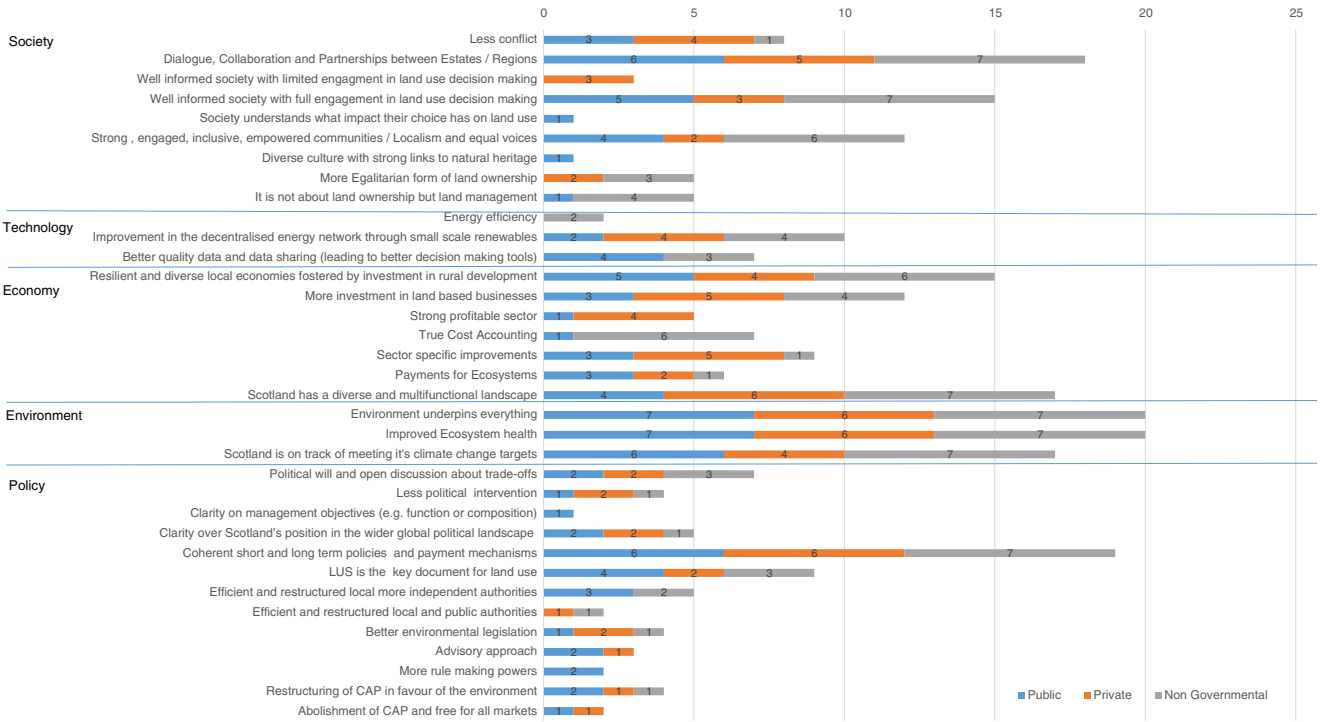

Fig. 1 Vision elements mentioned in the interviews, grouped for public, private and non-governmental stakeholders

and diverse local economies in 2050. Improved broadband internet and phone reception were important to the interviewees of the crofting, forestry, biodiversity and tourism sectors, who also spoke about the importance in seeing the countryside as a working living landscape.

> I would like to see a change in understanding and a change in awareness of the value of land. I want people to recognise that it is not just the place where you go hiking or mountain biking on the weekend but where people actually trying to make a living. (Biodiversity, Public)

A fit-for-purpose Land Use Strategy and efficient, restructured authorities were essential vision elements from the interviewees from the crofting, forestry, renewables and sporting sectors. Those from the forestry, sporting and biodiversity sectors expressed the hope for less conflict around issues such as controlling deer numbers, woodland creation and conservation, combined with improved political will for open discussion of these bottlenecks to discuss solutions and trade-offs.

The agricultural, sporting and biodiversity sector interviewees would like to have PES instead of subsidies in 2050. A restructuring of the EU's Common Agricultural Policy (CAP) in favour of the environment and an improved advisory approach were important to the interviewees of the forestry and renewables sectors.

Whilst no interviewees spoke about a wish for less political intervention, they did wish for improved environmental legislation and more rule making power. For the interviewee from the agricultural sector, the abolishment of the CAP and free for all market rules was a dominant vision element.

NGO stakeholders

NGO interviewees were the most homogeneous about their vision elements. In 2050, they hope that Scotland will be meeting its climate change targets and will have observed a steady increase in ecosystem health. However, apart from recreational benefits, the rural landscape is also a workspace producing vital goods and services on which the wider society relies. There was also agreement about the need for improved dialogue and collaboration between sectors, geographical regions and the government.

A more equal, engaged and empowered society, a focus on localism, and resilient, strong local and diverse communities with equal voices were key vision elements for the NGO interviewees.

The concept of true cost accounting was also firmly embedded in the interviewees' visions, with one interviewee stating that global true cost accounting is required to achieve effective outcomes.

> It (True cost accounting) would work I think for some land uses but for others again you're back to this kind of transnational issue that if you can't do it here maybe you can do it in China… So the externality globally is still going to be the same, but all you're doing is displacing it or pushing it somewhere else. (Cross-Cutting, NGO)

Land reform was mentioned by all NGO interviewees, but there was a notable split in responses as to whether this related to *how the land is owned* (agriculture, forestry and renewables sectors) or *how the land is managed* (sporting, biodiversity, recreation, cross-cutting sectors).

The interviewees from the agricultural, forestry, renewable and biodiversity sectors would like to see more political will and open discussion about trade-offs in the future. Better decision-making tools were an important vision element for the interviewees from the agricultural, sporting and cross-cutting sectors; more investment in land-based business stood out in the responses from the agriculture, biodiversity and tourism sector interviewees.

As with the public and private sector interviewees, NGO interviewees from the sporting and forestry sectors expressed the wish for less conflict. A restructuring of the CAP in favour of the environment and species-specific payments for ecosystems and better environmental legislation were important elements from the interviewee from the biodiversity sector.

Sectoral visions

As well as highlighting the similarities and differences between stakeholder groups, the qualitative analysis of the data allowed the development of sectoral visions which are presented below. Extended versions can be found in Online Resource 3.

Agriculture

The agricultural sector was particularly heterogeneous, with the public and NGO sector interviewees calling for removal of subsidies and true cost accounting, whilst the private sector interviewee did not want to see any 'huge, radical, changes'. Competitiveness within the European market, investment in land-based businesses, technological development and continuation of European subsidies were important for the private sector interviewee. The public sector interviewee highlighted the importance of farmers needing to reinvent themselves as businesses receiving PES, and for society to be aware of the impacts of consumer choices on land management. The NGO sector interviewee focused on true cost accounting, strong

communities, resilient local economies and a more egalitarian model of land ownership.

Biodiversity and conservation

The public sector interviewee predominantly discussed the difficulty of developing a feasible vision in the light of uncertainty, stressing the importance of developing resilience options through open discussion, in order to take difficult decisions and agree on management objectives. The vision from the NGO sector interviewee focused on strong communities, resilient local economies and the importance of true cost accounting—and that land ownership is a less critical driver than land management.

Crofting

Coherent policies, strong communities, resilient local economies and access to capital were key themes in the visions of both the public and private sectors regarding crofting.

Cross-cutting

The vision of the private sector interviewee is dominated by investment in rural development and a free for all market approach. It incorporates a strong wish for less conflict and increased understanding of why land is managed the way it is. Land use sectors are working in the same direction and the silo mentality has disappeared. In contrast, the vision of the NGO sector interviewee focuses on impacts and consequences of climate change and biodiversity loss through global changes and how Scotland could develop resilience. Data quantity, quality and management are also of concern as is a more non-career politician government structure.

Forestry

The forestry sector was very homogeneous; its vision very closely resembles that of the Scottish Government's Forestry Strategy. Scotland is a much more wooded country, and its healthy sustainable forests deliver a wide range of public goods and services such as timber, biodiversity and spaces for recreation and outdoor learning. Concerns about future timber shortages (due to peaks and troughs in projected timber outputs) have been recognised in 2016 and suitable areas across Scotland were planted with new forests, so that the predicted wood shortage did not have a significant impact.

Renewables

Despite differences on how to achieve climate change targets (i.e. focussing on energy efficiency rather than the creation of more solar, hydro and wind farms), the interviewees from the renewables sector had rather homogeneous visions, beginning with the firm embedding of the land use strategy in land use management, resulting in a fairer, equal and sustainable country with a strong community spirit and resilient local economies. Renewables are mitigating the worst effects of climate change and thus, together with more energy efficient housing and a shifting social consciousness on how energy is used, Scotland is meeting its carbon emission targets.

Sporting

The vision from the sporting sector is very like today's picture, largely because upland management is dictated by soil type, climate and elevation. However, key changes are improved collaboration on deer management, and that society understands and values the sporting sector and the benefits that the associated land management brings.

Tourism and recreation

The interviewee from the NGO sector would like to see strong communities and a thriving rural, resilient economy with state-of-the-art IT services. People will be engaged in governance, and the interviewees from both the NGO and public sectors agreed that tourism and recreational activities will still play a vital role in connecting people with the land.

Consolidated visions

From the interviews, it was possible to extract three broad visions for the future land use of Scotland (see Fig. 2). These visions were developed by sorting vision elements into those with wide agreement (e.g. importance of environment), some agreement (e.g. investment in land-based business) and disagreement (e.g. societal involvement in decision-making).

The main contrast around land ownership and governance formed the basis for the somewhat contrasting visions of MY LAND, which has increased community land ownership at its heart, and YOUR LAND, which is like the status quo, with a larger proportion of the land being owned by few individuals.

SCOTLAND, on the other hand, is based on a combination of the vision elements which were shared by all interviewees, without specifying a preference for future change in land governance. Whilst ignoring the current land reform debate, it paints a picture of collaboration between the land use sector and society to deliver the best products and services, thereby ensuring vibrant rural communities and a healthy environment.

Fig. 2 Consolidated land use visions for rural Scotland in 2050

Discussion

Similarities as the basis for collaboration

Scottish land use and management have been the topic of heated and polarised debates for decades (Warren 2009). However, the systematic analysis presented here highlights significant agreement between diverse interviewees about the desired future of land use in Scotland. Nevertheless, there are also important differences, mainly related to land governance. The three consolidated visions (Fig. 2) summarise these points and can form a basis for further facilitated discussions in the land use debate, emphasising common ground and exploring how differences can be overcome.

Open dialogue, partnerships and collaboration stood out as a key theme, and examples of good practice were identified (e.g. the catchment-based Tweed Forum and the regional Deer Management Groups). However, the historic and long-standing conflicts over certain aspects of land management and use (see Online Resource 3) mean that careful facilitation and mediation are required to move forward more widely.

> My vision would be that all the different people in the rural sector are actually working in the same direction. At the moment the rural sector is so fractured with everyone fighting each other that actually we just hold ourselves back. (Cross-Cutting Private)

There was widespread agreement that such examples should become commonplace, as called for in the Land Use Strategy. Building social capital will be a key factor in achieving participatory governance and collaborative working (McMorran and Scott 2013). Lee et al. (2005) argue that social capital is strongly linked to the development of a single and unified sense of identity in rural areas. Both the private cross-cutting and sporting sector interviewees identified the building of social capital as a requirement for reducing conflict.

Challenges and opportunities

Several substantial challenges and opportunities were identified, both within and between sectors.

Private sector interviewees from the agricultural, cross-cutting and sporting sectors expressed hope for a society that is more aware and understanding of rural land management decisions, whilst also accepting limited societal influence on management practices.

> Trying to coerce too much from our land in terms of its political value and making everybody feel they're involved in land use decision-making, planning land use and all the rest of it. That's only going to stifle it. I can see why people want to do it, but I think it's counterproductive. (Agriculture, Private)

This is in stark contrast to NGO interviewees, whose visions included engagement and involvement in land use decision-making as a key component.

> There would always be the challenges but I think you'd be far more likely to get sustainable development if people had that overall say and stake in it. (Renewables, NGO)

However, even amongst NGO interviewees, there was a divide between those working on the land (e.g. in the agriculture, crofting, forestry sectors) who want to see a more radical change in land ownership, enabling them to have more influence on how their sector wants land to be managed, and those who care about the societal benefits the land can provide (e.g. in the conservation and tourism sectors). The latter was more concerned that land is managed in favour, or consideration, of the environment, with adequate access for recreational activities, rather than the how it is used. Due to these complexities and the current polarisation, resolving the differences and barriers around land ownership will require time and carefully facilitated dialogue.

Potential change to subsidy regimes, including the possible introduction of PES-based schemes through which land managers are paid to provide public benefits, was another challenging topic that emerged. Whilst six interviewees from a range of sectors would like to see some form of payment for public goods and services, the stakeholder from the private agricultural said that the current subsidies are important to ensure food security. By contrast, the public sector stakeholders would like farmers to receive payments for delivering public goods and services.

> It was really opportunity mapping that I was particularly interested in. And I'm sure it's going to happen way before 2050, but it's going to be an essential tool there. And these sorts of maps could be used much better for payment for ecosystem services and links in with SRDP and influencing much more strongly land use, but also increasing awareness and knowledge of land managers and consultants involved with it. (Renewables, Public)

Meanwhile, the private sector stakeholders from the forestry, sporting and cross-cutting sectors already see themselves as businesses delivering both market and public services and goods. They were proud of their limited reliance on subsidies, whilst acknowledging the importance of some public support (e.g. PES). Spatially targeted incentives can help maximise ecosystem service provision and provide the potential to reward multi-objective land management (Tzilivakis et al. 2016; Reed et al. 2014).

A much more decentralised energy network also featured very strongly across the sectoral land use visions, although the issue of scale is a point of concern.

> I still think wind, onshore and offshore, is going to be the single biggest player, but there will be other technologies, small-scale technologies especially and I think it will begin to take up a larger slice of the burden of reducing our carbon emissions. (Renewables, private)

Hydro, wind and biomass energy present an opportunity for developing local resilient economies that are not dependent on expensive energy sources such as oil and coal (Warren 2009, 2014). Wood fuel can also be a sustainable heating source; greater adoption would provide land managers with revenue and an incentive to better manage under-maintained forests (Strachan and Beck 2008), leading to both socioeconomic and environmental benefits.

> So in my view these huge-scale onshore wind developments, they don't really have a place because they're just not very efficient. For me the real move forward would be decentralized energy structure which used to be the vision of many in the green movement and environment movement. (Renewables, NGO)

Reaching any of the identified visions will require a supportive policy framework to encourage land managers to deliver more sustainable land management. At the time of the interviews, high hopes were placed on the Scottish Land Use Strategy (Scottish Government 2016) to guide these policy shifts but since the UK's decision to leave Europe in June 2016 discussion are held on a more national level. With that come major uncertainties that will challenge the rural economy and the current policy instruments guiding land management, including direct farm subsidies, the Scottish Rural Development Programme (SRDP) and all environmental legislation. However, whilst the next few years may bring a period of great uncertainty, it may also ultimately provide new opportunities for tailored land use policies.

Climate change poses another great challenge (see 'Land use visions'), and limitations in the recognition of cross-sectoral interdependencies can leave society and government vulnerable to the dangers of conflicted or unintended adaptation policy outcomes from sectoral decisions (Holman et al. 2016). Developing cross-sectoral adaptation strategies (e.g. investment in innovation, best use of land, improved flood management) present important opportunities in bringing the different land use sectors closer together.

A successful methodology

The research methodology presented here provided a structured approach to eliciting rich visions from a diverse group of stakeholders. The STEEP categorisation was useful for structuring the interview analysis and helped participants to focus on a theme whilst still telling a wider story. Comparisons between stakeholder groups and across sectors provided a rich understanding. The more subjective aggregation into consolidated visions helped to identify common ground and challenges for land management and governance in Scotland.

Despite the systematic approach to stakeholder selection, explicitly aimed at achieving stakeholder diversity, it is unlikely that we could reach full saturation with the current sample size. The findings for a specific sector/stakeholder group combination (e.g. private forestry) should be treated with some caution. Nevertheless, the stakeholders were carefully selected based on their involvement in land use policy or strategic planning within their organisation and, as such, should have good awareness of issues in their peer groups.

Our research suggests that identifying 'shared vision elements' across the sectors and stakeholder types is an effective way to understand and compare visions. The approach also proved useful for deriving a limited set of consolidated visions that identify common ground and differences. This is similar to the approach by Verkerk et al. (2016) who identified building blocks within narrative visions to link these to model outputs. When visions are developed with a modelling application in mind (cf Verkerk et al. 2016; Brown et al. 2016), these elements can be included as themes in the inductive coding of the interviews.

The methodology described worked well at the national scale for Scotland, but would work equally well in other countries or at the regional scale, e.g. to support the development of catchment management plans. The outcomes can facilitate societal debate by making trade-offs explicit, and help to reach consensus about desired land management outcomes.

Conclusions

This research has shown that, whilst there is no unified land use vision for Scotland, there is general agreement amongst the sectoral land use stakeholders on several aspects, including the importance of the environment; the wish for more partnerships, dialogue and collaboration; the desire for society to be more engaged and aware about land use; resilient local economies; and a strong need for short-, medium- and long-term policies that help to achieve these goals. The most notable differences relate to land governance.

Brexit and climate change pose significant challenges to rural Scotland but also present opportunities to critically reflect on instruments and objectives and how to change them to better reflect Scottish preferences and conditions. Whilst there is great uncertainty about the outcomes of national and international negotiations and the impacts of climate change, it is important to have discussions now to work on solutions and explore preferred directions of travel.

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