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Unity in diversity? When advocacy coalitions and policy beliefs grow trees in South Africa

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ABSTRACT

Competing coalitions can stabilise policymaking and hinder policy changes that are required to address the mounting pressures on land use systems across the globe. Thus, understanding the driving forces of coalition formation is important. This paper builds on the Advocacy Coalition Framework to determine the relative contributions of two sets of beliefs (more general policy core beliefs and more specific beliefs concerning policy instruments) to coalition formation in South African tree plantation politics and to identify coalitions therein. Discourse Network Analysis was used to code 656 statements regarding 40 beliefs to create network data from 55 interviews with organisational elites. Results from a network analysis of the twelve most salient beliefs indicate that dissimilar policy core beliefs about the validity of environmental regulation, social costs of tree plantations, and the conditionality of land reform in South Africa divide actors into two coalitions: the hegemonic "business-as-usual" coalition and the minority "justice and change" coalition. These boundaries were confirmed by comparing the network based on shared policy core beliefs with a co-ordination network. Dissimilar beliefs concerning policy instruments, including eco-certification and an indicative zoning, also divide actors, yet actors' reasoning for or against these instruments differ to the degree that united fronts are unlikely to form. Hegemonic coalitions that combine selected state and business interests with labour arguments and prioritise short-term economic efficiency threaten to delay the necessary changes away from business-as-usual across land use systems in South Africa and beyond.

1. Introduction

The state of the global ecosystem continues to decline as a consequence of the increasing exploitation of natural resources by humans (Díaz et al., 2019; Erb et al., 2018). This decline threatens the ecological processes upon which humanity ultimately depends (Pilling et al., 2020; Song, 2018; Steffen et al., 2018). The intensification of land use systems across the globe and their connections to global markets have also situated humanity in a "global production ecosystem" that is highly connected, geared to monoculture production, and vulnerable to unexpected and pervasive risks (Keys et al., 2019; Nyström et al., 2019). Understanding the factors that either foster or hinder policy change to address such challenges is an urgent priority for scholars and practitioners alike.

Coalitions formed by policy actors to advocate for a common policy position have become an important means of political engagement (Weible and Ingold, 2018). Actors form coalitions to push for policy change, to defend material interests, or to uphold an existing social order. It is often crucial for a policy actor to be a member of coalition to achieve success in the policy process (Baumgartner and Jones, 1991). In conflictual policy contexts that rarely have clear-cut solutions to problems, such as those related to land use systems, policy processes tend to be shaped by competing coalitions (Pierce et al., 2017). A frequent consequence of this is the presence of policy stability for a decade or more (Jenkins-Smith et al., 1991; Zafonte and Sabatier, 2004). If a hegemonic coalition connects powerful actors and prioritises, for example, high and predictable supplies of biomass in the short term over long-range sustainability, coalition formation can be the focal social

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force that holds the existing policies and practices in place.

The Advocacy Coalition Framework (ACF) is a well-established lens through which researchers can examine how policy actors behave, how their beliefs translate into policy, and for investigating whose interests policy serves, especially where economic interests collide with social and ecological concerns (Sabatier, 1988, 1987). Over the years, it has evolved into a generalisable theory of policy change (Wellstead, 2017). The ACF argues that subsets of actors that share a set of policy core beliefs that are broad in scope, resistant to change, and have been the source of protracted conflict will band together to form coalitions. However, this theoretical argument has received uneven empirical support (Weible et al., 2019). Due to inconsistent operationalisation in empirical applications, determining the extent to which actors' beliefs about policy instruments contribute to coalition formation has been particularly challenging.

This paper examines tree plantation politics in South Africa to investigate how policy core beliefs and beliefs about policy instruments both underpin coalition formation. In South Africa, the politics of tree plantations spans a century of conflict fought over the effects that highly productive tree monocultures have on biodiversity, wildlife, wildfires, streamflow, and for social justice. Various policy instruments are contested, such as the indicative zoning of land for the establishment of new plantations. Considering the changes after the end of apartheid in the nineties and the then emerging window of opportunity to reform the land use sector, there are still persisting challenges rooted in this sector in South Africa (and elsewhere, see Malkamäki et al., 2018). This case is of particular interest to inform decision-makers on the role of coalitions in fostering or hindering policy change in the face of unprecedented pressures on land use systems. By focusing on an African country, this paper extends the geographical area where the ACF has been applied. To date, it has largely been drawn upon analyses of European and North American policy processes (Pierce et al., 2017). Using network data collected through 55 interviews with organisational elites, this paper addresses two specific research questions:

i) *Can we identify competing coalitions based on shared policy core beliefs and what is the relative contribution of such beliefs to coalition formation?*
ii) *Can we identify competing coalitions based on shared beliefs concerning policy instruments and what is the relative contribution of such beliefs to coalition formation?*

This paper is organised as follows: the next section introduces the ACF and its theory of coalition formation. This is followed by a description of tree plantation politics in South Africa, our data, methods, and results. The paper concludes with a discussion on the implications of our findings.

2. Policy beliefs and coalition formation

According to the ACF, actors engage in politics to translate their beliefs into action. Although actors' beliefs and material interests are highly correlated and the causation tends to be reciprocal (Sabatier, 1988, p. 142), the ACF suggests that policy actors act according to their enduring beliefs rather than their short-term interests (Sabatier, 1993, p. 27). Because groups of actors may pool critical resources to enhance the prospect of a favourable outcome, it rarely makes sense to advocate alone (Mahoney and Baumgartner, 2015). From the perspective of an individual actor, the perceived benefits of joining a coalition can be substantial if one or more of the coalition members are especially influential (Hojnacki, 1997).

An advocacy coalition consists of actors "who share a particular belief system—i.e., a set of basic values, causal assumptions, and problem perceptions—and who show a non-trivial degree of co-ordinated activity over time" (Sabatier, 1988, p. 139). In policy subsystems (i.e., domain-specific networks) that are both conflictual and pervasive in government (bureaucrats routinely consult with researchers, civil society organisations, and interest groups, among others), coalitions compete to dominate the policymaking process. This equilibrium tends to hold until external perturbations, such as natural hazards or changes to constitution, cause coalition members to refine their belief systems (Sabatier and Weible, 2007, p. 193). The resulting policy is often a manifestation of hegemonic coalition's beliefs (Weible et al., 2019).

The ACF distinguishes between three levels of beliefs (Jenkins-Smith et al., 2014). *Deep core beliefs* are fundamental (e.g., views of human nature) and resistant to change (i.e., akin to a religious conversion), but often too broad to guide detailed policy. *Policy core beliefs* are more specific, but still resistant to change. They range from value priorities and views about whose well-being counts the most (normative) to beliefs about the causes and severity of problems (empirical). *Secondary beliefs* relate to policy implementation (e.g., budgetary allocations) and are most amenable to change, as actors learn from the effects of earlier policies. However, learning is argued to occur through the lens of deeper and more resistant beliefs, leading actors in competing coalitions to select and interpret information in different ways.

The ACF explains the endurance of beliefs with its "model of the individual" that combines some well-known cognitive biases that govern the behaviour of individuals – these include the hierarchical model of attitude constraint (Peffley and Hurwitz, 1985) and the overestimation of political opponents' malice (Sabatier et al., 1987). However, biased assimilation is argued to be the main factor driving self-organised coalition formation around beliefs (Lord et al., 1979): actors tend to interpret information in a way that reinforces their prior beliefs. Actors with similar beliefs are understood to be more likely to draw similar interpretations of the same piece of information (e.g., the implications of biodiversity loss). Conversely, actors with dissimilar beliefs are more likely to draw dissimilar interpretations of that same piece of information. Dissimilar interpretations may breed distrust (Leach and Sabatier, 2005), and because co-ordination necessitates trust, coalition formation is more likely to occur among those with similar beliefs than among those with dissimilar beliefs.

Shared deep core beliefs and secondary beliefs may also contribute to coalition formation, but shared policy core beliefs are the "stickiest glue" that hold coalitions together (Jenkins-Smith et al., 2014; Weible et al., 2019). Despite its intuitive appeal, the ACF's broad conceptualisation of a policy actor's belief system can be considered a weakness of the framework. On the one hand, the endurance of beliefs is dependent on the geographical and substantial context. On the other hand, the definitions of the different levels of beliefs in the ACF could simply be too wide to allow clear classification.

Most applications of the ACF classify beliefs about policy instruments as secondary beliefs. These may be related to an actor's policy core beliefs, but they are argued to be more empirically based, narrower in scope, and thus more amenable to change (Sabatier and Weible, 2007). In one exposition of the ACF, Sabatier (1998, pp. 116–117) describes a fourth level of beliefs: policy core policy preferences. He contends that these can constitute part of the policy core if they have the same features as the policy core beliefs (e.g., being broad in scope and having been the source of conflict for years). Possibly stemming from such conceptual plurality, researchers have operationalised beliefs concerning policy instruments somewhat inconsistently in empirical applications. Empirical findings concerning their relative contribution to coalition formation have as a result been somewhat contradictory.

In a study of marine life protection politics in California, Weible and Sabatier (2005) measured policy core beliefs as both problem perceptions and policy instruments. Their operationalisation of policy core beliefs predicted the structure of co-ordination networks more accurately than the structure of advice networks. Ingold's (2011) study of Swiss climate politics operationalised beliefs about policy instruments as secondary beliefs, which differed from policy core beliefs. She found that both were significant drivers of coalition formation. Analysing German pension politics through media debates, Leifeld (2013) noted

that coalitions could form based on shared beliefs about policy instruments alone. Conversely, Kukkonen et al. (2017) identified coalitions in climate politics of the US based on shared policy core beliefs, but not based on shared beliefs about policy instruments. Metz et al. (2018), in a study of Swiss water protection politics, show that actors tend to reject policy instruments if they co-ordinate their actions with many others who also reject the same instrument. They argue that engaging in co-ordinated action may cause actors to share beliefs about policy instruments, and that the sharing of these beliefs could also lead to co-ordination. Following Zafonte and Sabatier (1998) hypothesis and subsequent findings, beliefs about policy instruments may thus exhibit a reciprocal causation with co-ordination (in contrast to the hypothetical unidirectional causation between policy core beliefs and co-ordination as the cause and the effect, respectively).

3. Tree plantation politics in South Africa

South Africa enacted its first democratic constitution in 1994. Soon thereafter, Tewari (2001) identified two coalitions in the tree plantation subsystem based on an analysis of policy documents: a commercial forestry coalition and an environmental coalition. Dissimilar beliefs about water use pricing as a policy instrument was the only policy that divided actors. After the flurry of policy reforms that occurred between 1994 and 2004, the subsystem has become more divisive over the implications of these reforms. Specific issues concern the distribution of costs and benefits and the scientific validity of existing policies, whereas broader questions of how and to what extent to reconcile economic goals with social and environmental concerns largely remain unresolved (Bennett and Kruger, 2013; Francis and Webster, 2019; Goldin, 2010; Kruger and Bennett, 2013; Masipa, 2018; van Wilgen and Richardson, 2014; Witt, 2014).

South Africa hosts an essentially semi-arid grassland biome. Natural forests were never abundant in the southern tip of Africa, which allowed the early colonial and national governments to embark on large-scale planting of alien tree species to supply local uses (Kruger and Bennett, 2013). Planting of trees in the mountainous watersheds soon led to conflicts with downstream water users. The debate on plantations went on until the government begun regulating their extent in 1972 based on their estimated effects on streamflow. Most of the 1.26 million hectares of wattle, pine, and eucalypt plantations are in the provinces of Mpumalanga and KwaZulu-Natal (Fig. 1). Some 80 % of those lands are under private ownership, 15 % are under public ownership, and the rest belongs to communities, many of which are land reform beneficiaries. The industry is relatively important for the South African economy by contributing positively to foreign trade and job creation in rural areas with few alternatives. High rates of unemployment combined with relatively generous social protection describe much of everyday life in this part of Africa (Zizzamia, 2020). From a low of 53 % in 2011, 56 % of South Africa's 55 million inhabitants were living in poverty by 2015 (Francis and Webster, 2019).

After the end of apartheid, many policies were either repealed or reformed. The National Water Act of 1998 imposed further regulations on tree planting by classifying it as a streamflow reducing activity and making it subject to additional fees and water use licensing. The Biodiversity Act of 2004 obliged plantation managers to control for invasive alien species, some of which are commercial tree crops that encroach riparian zones and wetlands (van Wilgen and Richardson, 2014). Since 1998, very little tree planting has taken place, of which consequences an industry that grew powerful and international before the enactment of these restrictions is currently experiencing. Plantation extent has in fact been shrinking for various reasons, including pathogens and wildfires. South Africa falls under the projection of a drier climate (Maúre et al., 2018), which is expected to reduce the area suitable for plantations and to aggravate the biotic and abiotic damage factors (Kraaij et al., 2019; Warburton and Schulze, 2008; Wingfield et al., 2013). The South African grasslands have been highlighted as hotspots for future conflicts over the use and control of land with water (Johansson et al., 2016).

South Africa has been going through a land reform process under the Restitution of Land Rights Act of 1994. Those who were either forcefully relocated or forced to become labour tenants under the Land Act of 1913 are entitled to a restitution of that property or to an equitable redress. A complication is that most current owners acquired their lands legally somewhere between 1913 and present. Whereas the government has privatised some of its own plantations, it remains a shareholder on behalf of the actual beneficiaries to maintain production and share dividends to beneficiaries until they are capitalised to overtake the business. However, some contend that this model has diverged from the original idea of land reform as a means of wider decolonisation, reproducing the paternalistic relations of the apartheid and reinforcing the pernicious logic of a capitalist economy (Cousins, 2019; Kepe and Hall, 2018). Around 40 % of privately-held tree plantations and 70 % of publicly-held tree plantations remain under land claim (Chirwa et al., 2015).

The policy instruments specific to the case include voluntary sustainability standards, multi-functional management, and indicative land use zoning. We briefly explain these below.

In 1997, the South African government was one of the first to meet the sustainability criteria of the Forest Stewardship Council (FSC) on its own plantations. The National Forests Act of 1998 encouraged the uptake of eco-certification to enhance bottom-up sustainability, instead of relying on top-down regulatory institutions (Scotcher, 2006). Currently, around 80 % of the plantations in South Africa are certified under the label of the FSC. The criteria stem from an international multi-stakeholder dialogue,

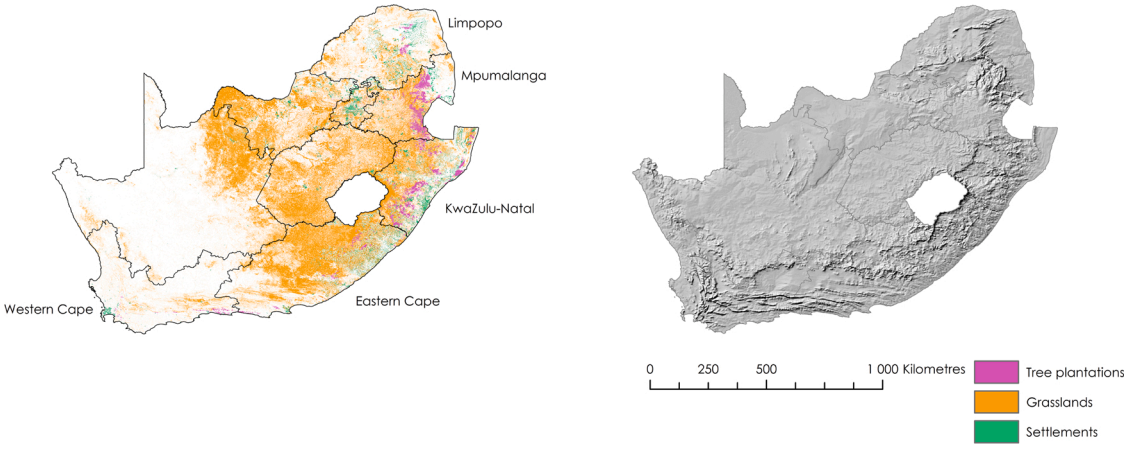

Fig. 1. Tree plantations in South Africa (own elaboration based on DEA, 2019).

which supposedly offers enhanced transparency and accountability. Compliance may be rewarded through a price premium, enhanced market access, or sustained production (Lambin et al., 2014).

The idea of managing plantations for functions that are complementary to wood production has also been under debate. Such functions include biodiversity conservation (Samways and Pryke, 2016), carbon sequestration (Rahlao et al., 2012), recreation (Dhakal et al., 2012), and rural livelihoods (Bussoni et al., 2015; Malkamäki et al., 2016). Multi-functionality may also entail reconciliation of conflicts with customary or communal land tenure systems (Macqueen et al., 2018). While there is little experience of adoption or success on the ground in South Africa, the National Forests Act of 1998 endorses such aspirations.

Approved by the government, business interests, and labour unions, the Forest Sector Code of 2009 highlighted the need to "streamline and expedite" environmental licensing procedures to facilitate a net increase of 100,000 ha in plantation extent in Eastern Cape. It aimed to spur job creation and counter a "looming" supply shortage of wood. With slow progress on the ground, the Amended Forest Sector Code of 2017 reaffirmed this target and listed twelve additional means to achieve it, including the "creation of a regulatory environment" that renders the costs of environmental licensing affordable. Although Eastern Cape lags in socio-economic indicators, it hosts the last unallocated water resources in the whole of South Africa.

4. Methods

In this section we outline our methods of data collection, data preparation, and data analysis. Additional details are supplied in the supplementary file.

Researchers have used quantitative surveys (Di Gregorio et al., 2017; Ghinoi et al., 2018), media materials (Kukkonen et al., 2017; Leifeld, 2013), policy documents (Heikkila et al., 2014; Tewari, 2001), and qualitative interviews (Heinmiller and Pirak, 2017; Sotirov and Winkel, 2016) to measure actors' beliefs. We collected our data in South Africa in 2017 through semi-structured interviews with 55 organisational elites that we identified as being involved in the country's national tree plantation politics.

To ascertain which actors are members of the tree plantation policy subsystem in South Africa we began by consulting freely available information (e.g., trade magazines, policy documents, scientific and grey literature, and websites). We then asked three independent experts to review the organisations that we identified. Based on their feedback we expanded the roster of actors to 59 organisations (Table 1). Four of these organisations either declined to be interviewed or could not participate due to recent changes in their administration, and as result, they were omitted from our analysis. We identified and contacted the organisational elites (e.g., government commissioners, executive and deputy directors, professors and principal investigators, and national and provincial co-ordinators) through various means, including contact directories and by using contact information of specific elites provided by other elites. By interviewing organisational elites, we ensure that the beliefs that we analyse are those of the organisation rather than those of the individual.

We collected data on organisational beliefs by asking the elites to set out their preferred vision for the future of tree plantations in South Africa and by asking them to elaborate on their realistic expectations. We then asked them to cite any challenges that they saw as barriers to realising their vision. We also asked specific questions about the consequences and feasibility of indicative zoning in Eastern Cape and about the quality of the policymaking process and the resulting policies in the subsystem (see the supplementary file for the exact formulations of the questions). By using open-ended questions, we accepted that interviewees would give different degrees of detail when answering our questions, which would make comparisons more challenging (Creswell and Creswell, 2019). However, the advantage of this approach is that it allowed us to tease out the tensions between the different framings and meanings attached to the policy beliefs in the subsystem (Hajer, 1995). The elites were inclined to bring forward the issues most salient to them. This followed the commonly observed reality where some coalition members work on and articulate views on multiple issues while others occupy more auxiliary or specialised roles in advocacy (Hojnacki, 1997; Weible et al., 2019).

Table 1
Roster organisations.

Government departments and agencies	Scientificorganisations
g1. Dept. of Agriculture, Forestry and Fisheries	s1. Council for Scientific and Industrial Research; Nat. Res. and the Environment
g2. Dept. of Environmental Affairs	s2. Forestry & Agricultural Biotechnology Institute
g3. Dept. of Rural Development and Land Reform	s3. Institute for Commercial Forestry Research
g4. Dept. of Science and Technology; National Research Foundation	s4. Nelson Mandela University; School of Natural Resource Management
g5. Dept. of Trade and Industry	s5. Univ. KwaZulu-Natal; Chemical Engineering
g6. Dept. of Water and Sanitation	s6. Univ. KwaZulu-Natal; Development Studies
g7. Ezemvelo KZN Wildlife	s7. Univ. KwaZulu-Natal; Geography
g8. Fibre Prod. & Manuf. Skills Education Training Authority	s8. Univ. Pretoria; Forest Science Postgraduate Programme
g9. Industrial Development Corporation	s9. Univ. Stellenbosch; Dept. of Forest and Wood Science
g10. National Forest Advisory Council	s10. Univ. Venda; Dept. of Forestry
g11. South African National Biodiversity Institute	s11. Univ. Witwatersrand; School of Animal, Plant and Environmental Sciences
x1. Forest Sector Charter Council (not interviewed)	x3. South African Water Research Commission (not interviewed)
x2. South African National Parks (not interviewed)	
Interest groups	**Businesses**
i1. Chemical, Energy, Paper, Printing, Wood & Allied Workers' Union	b1. Merensky
i2. Food & Allied Workers' Union	b2. Mondi/Zimele
i3. Forest Industry Training Providers Association	b3. MTO
i4. Forestry South Africa	b4. NCT Forestry Co-operative
i5. Paper Manufacturers Association of South Africa	b5. PG Bison
i6. Sawmilling South Africa	b6. R&B Timber Group/Masonite
i7. South African Utility Pole Association	b7. Rance Timber/Amathole Forestry Company
i8. South African Wood Preservers Association	b8. SAFCOL/Komatiland Forests
i9. South African Forestry, Farming, Catering & Allied Workers' Union	b9. Sappi
i10. South African Forestry Contractors Association	b10. Timrite b11. TWK Agri b12. York Timbers
Civil society	**Other**
c1. Association for Rural Advancement	o1. Fort Cox College of Agriculture and Forestry; Dept. of Forestry
c2. GeaSphere	o2. KwaZulu-Natal Land Reform Beneficiaries/SiyaQhubeca Forests
c3. Forest Stewardship Council Africa	o3. SA Forestry Magazine
c4. Lima Rural Development Foundation	o4. Wood SA & Timber Times
c5. Timberwatch Coalition	x4. Southern African Institute of Forestry (not interviewed)
c6. Wildlife and Environment Society of South Africa	
c7. World Wide Fund for Nature South Africa	

Note: "Civil society" refers to non-governmental organisations with environmental and/or social focus; "interest groups" refer to both industry associations and labour unions; "other" includes two sector-specific media representatives, an educational institute, and a group of land reform beneficiaries.

All interviews were transcribed before manually coding them using Discourse Network Analyzer (Leifeld, 2010) – a software tool designed for Discourse Network Analysis (DNA). DNA combines qualitative content analysis with social network analysis to create relational data on actors' ideational alignment (Leifeld, 2017). To analyse raw text data, what must be coded are statements: portions of text where actors state their views about different themes in a positive or in a negative way. Each statement is attributed to an actor and a belief is then identified by the coder. The coding was conducted inductively, with the coder navigating back and forth between the statements to ensure consistency. The first author, who collected the data and was most familiar with the case, was the unique coder. This was a labour-intensive strategy, but avoided concerns over intercoder reliability.

The coding yielded 656 statements, which we then categorised as being one of 40 different beliefs about policies. They all fall under one of the levels of the ACF belief system. This paper focuses on twelve of these: (i) stances for and against three policy core beliefs, and (ii) stances for and against three beliefs about policy instruments (Table 2). Statements that fall under these twelve beliefs account for 33 % of all the statements made during the interviews with elites (see also the supplementary file).

Choosing beliefs about policy instruments for the analysis was relatively uncomplicated: an actor either supports or opposes a policy instrument. Choosing the policy core beliefs was less straightforward. We focus on beliefs that revealed actors' causal assumptions, problem perceptions, and normative orientations, the latter of which are largely beyond direct empirical challenge (Sabatier, 1988, p. 110). For example, we identified beliefs about the necessity, principles, and validity of existing environmental policy. Additionally, none of the elites may have openly opposed the moral justification of land reform in South Africa, but they may have had very different beliefs about under what circumstances it should advance (i.e., who retains control of those lands). Most importantly, we chose the beliefs that the largest share of actors made statements either in favour or against, meaning that they were the most salient issues in the subsystem.

Table 2
Policy beliefs included in the analysis.

Type		Statements
POLICY CORE BELIEFS		119 (55 %)
Environmental regulation		
c1a	"In its current form, is contradictory, unfair, and harmful – must become more consistent and less costly"	28 (13 %)
c1b	"In its current form, is imperative, yet not necessarily sufficient to sustain our delicate environment – must become more effective through better resourcing and enforcement"	15 (7 %)
Social costs of tree plantations		
c2a	"Despite externalities, social benefits of plantations through the value chain outweigh their social costs"	28 (13 %)
c2b	"Social costs of plantations outweigh their social benefits, which is why their existence must be questioned"	13 (6 %)
Decolonisation through land reform		
c3a	"Land reform must happen to drive decolonisation in South Africa, although the current models tend to reproduce past injustices by favouring existing elites"	18 (8 %)
c3b	"Land reform can happen as long as it does not lead to abandonment or conversion of that land"	17 (8 %)
BELIEFS CONCERNING POLICY INSTRUMENTS		**99 (45%)**
Voluntary certification to sustainability standards		
i1a	"Voluntary sustainability standards improve sustainability and should be promoted"	10 (5 %)
i1b	"Voluntary sustainability standards favour those who focus on exporting and promotes illogical or unsustainable practices"	10 (5 %)
Multi-functionality of tree plantations		
i2a	"Multi-functional and community-based growing of trees come with high uncertainty and concerns over economies of scale"	14 (6 %)
i2b	"Plantations can and should be managed for multi-functionality to be more sustainable, although it might come at the expense of short-term economic gains"	15 (7 %)
Eastern Cape expansion		
i3a	"Consequences of Eastern Cape expansion can be socially and economically positive, provided that communities receive support from industry and the government"	29 (13 %)
i3b	"Consequences of Eastern Cape expansion would be socially and environmentally negative, which is why it is likely that it will not happen"	21 (10 %)
POLICY BELIEFS INCLUDED IN THE ANALYSIS		218 (100 %)

The DNA tool represents the relationship between actors and their beliefs as ties in a binary affiliation matrix, where actors and beliefs are distinct modes. To determine how far "ideational alignment" is present in this structure, we transformed these data into a weighted adjacency matrix, where actors connect to one another and where ties represent the number of shared beliefs. The contention that we make is that the more beliefs that any pair of actors share, the more similar their set of beliefs (Leifeld, 2017).

We collected relational data during the interviews by presenting the roster of network actors to each interviewee and then asking them to indicate which actors they recognised as information exchange partners. To control for the voluntary nature of information exchange, representatives were asked to tick an 'only when necessary' option where applicable. In addition, we asked them to rank how highly they trusted those organisations that they identified as information exchange partners on a five-point scale, from zero to complete. Finally, we asked the representatives to indicate which actors they considered to be especially influential. The cut-off point for past interactions was set at the last three years.

We used these data to construct another weighted adjacency matrix, which captures the voluntary exchange of information with trusted partners (four or five on our five-point scale), where actors connect to other actors and where the ties represent the intensity of the connection (0=disconnected; 1 = non-reciprocal tie; 2=reciprocal tie). As a form of co-ordination, information exchange may be less intensive and less risky than alternative forms, such as collaboration. However, the psychological safety brought about by trusting somebody enables the willing contribution of one's ideas and actions to collective effort (Edmondson, 2004). We therefore regard this operationalisation as a proxy for collaboration.

We use the software package Gephi to conduct our network analysis (Bastian et al., 2009). For the three undirected and weighted networks, we applied the Louvain algorithm to determine how well the resulting networks decompose into communities of densely connected nodes, with nodes belonging to different communities being only sparsely connected; differences are usually meaningful when the resulting "modularity" value exceeds 0.4 (Blondel et al., 2008) (see the supplementary file for more details).

5. Results

5.1. Contribution of shared policy core beliefs to coalition formation

Network X in Fig. 2 shows how actors divide into two communities, A and B, with more ties inside the communities and fewer between them. Where a tie between two actors in the network is present, it indicates that they share at least one of the three policy core beliefs. The modularity value for this network is 0.42, which suffices to establish that there is a line of division between these communities. We can therefore identify two competing coalitions based on policy core beliefs. We can validate this finding by comparing the members of these communities to those present in the co-ordination network Z (Fig. 2; Table 3). The modularity value for this network is lower, 0.27, but the actors falling into communities E and F are largely the same as the ones detected in communities A and B, respectively.

We provide further evidence of the existence of these coalitions by describing their composition and characteristics. There is a minority "justice and change" coalition (JAC; 36 % of actors) that challenges the ideas of the hegemonic "business-as-usual" coalition (BAU; 64 % of

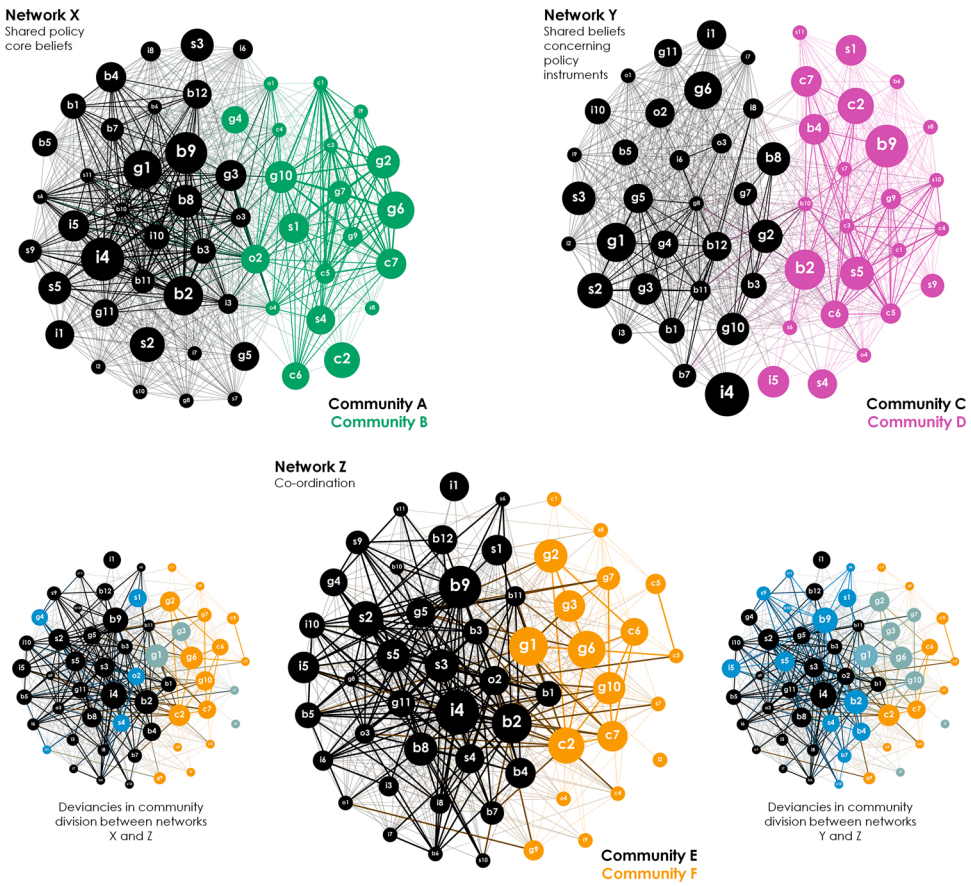

Fig. 2. Communities identified in networks based on shared policy core beliefs (A and B), shared beliefs concerning policy instruments (C and D), and co-ordination (E and F). The smaller co-ordination networks with blue nodes at bottom left and at bottom right mark the deviancies in community division between networks X and Z as well as Y and Z, respectively. The node size reflects the logarithm of each actor's reputational influence (i.e., number of recognitions of being especially influential). The node label reflects the actor type: a business (b); a civil society organisation (c); a government department or agency (g); an interest group (i); a scientific organisation (s); or some other type of organisation (o). To match labels with organisations, see Table 1.

actors). The core actors within each coalition tend to agree on several of the three policy core beliefs and form stronger ties, as illustrated by the relative width of the ties in the network, while others with a more specific focus occupy auxiliary roles.

Table 3 presents the profiles of opinion over the three policy core beliefs. It shows that the members of the BAU coalition are rather consistent in expressing their beliefs. The members of the JAC coalition are less unanimous with regard to the validity of environmental regulation. We thus find some actors at the border of this coalition because they share some beliefs with actors in the BAU coalition. However, we observe steep polarisation in terms of beliefs concerning the social costs of tree plantations and decolonisation through land reform.

The BAU coalition includes some actors with very high reputational influence scores. A majority (65 %) of the other organisations in the network perceive the tree growers' interest group as being especially influential. Businesses, two of which are global pulp and paper giants, and private sector interest groups, including those of sawmillers, paper manufacturers, and treated wood product manufacturers are also members of this coalition. The coalition also includes focal government departments – that is, those of trade and industry and of agriculture, forestry and fisheries. We also note that the incumbent labour unions, with long histories in South Africa, whose interests lie in creating and maintaining jobs, are in agreement with several businesses and state interests at an ideational level. This "iron triangle of power" is present in the coalition that defends the existing social order and prioritises economic values and industrial modes of production over environmental values and principled moral conscience. A number of scientific organisations in this coalition are also tied to the industry through funding. These include institutes with a relatively narrow focus that are highly relevant for the industry, including those concerned with enhancing (or maintaining) the productivity of mills and plantations.

The BAU coalition is primarily unified by the belief that tree plantations provide important economic opportunities through the manufacturing of wood-based commodities. All actors are rather cognisant of the environmental issues in relation to the growing of alien tree species and their effects on streamflow and biodiversity. Nevertheless, such externalities are seen as manageable and the overall benefits of the practice are perceived as outweighing social costs. Regarding land reform, the actors acknowledge the need to redress past injustices, but given the situation where their own existence is threatened, they appear to pre-empt risks and advocate for the maintenance of the redistributed lands in tree production at all cost. However, most of the actors in the coalition contend that the environmental regulations that cover the sector are complex, costly, illogical, and contradictory, and are not backed by scientific evidence. The following quote exemplifies this.

"We know there are limits to how much we can grow given the water, discourse in South Africa. But we're seeing two things: one, catchments that the Department of Water and Sanitation say are closed, because all the water is allocated. When they do the compulsory licensing process, they find that 50 % *in most cases, of the water that is allocated on paper, to farmers, is not being taken up. But in those situations you can't apply for water use license for timber, that's the very first thing. And so we're being unnaturally constrained, because government believes there's a water scarcity in the country, and there is in some cases different interpretations. In other cases, we're scarce on paper, in practice the rivers are pumping into the sea, which as a colleague of mine said is full enough as it is. So that's an issue for me is that there is a constraint to growth, physical expansion of the plantations in South Africa, that is built on constructs that are not scientifically defensible." [Interest group]*

The interviews also brought up some underlying tensions within the BAU coalition. A fracture lies in the debate over the conversion of grown species from pine to eucalypt, which complicates sawmillers' raw material procurement. Many of the actors associated pine growing and sawmilling with broader beneficiation than the processing of eucalypt

Table 3
Descriptive statistics for the analysed networks.

NETWORK X. SHARED POLICY CORE BELIEFS Modularity value: 0.42			
Belief *(see Table 2)*	Number of endorsing actors in community A	Number of endorsing actors in community B	Number of endorsing actors in the network/ subsystem
c1a	23	5	28
c1b	1	14	15
c2a	26	2	28
c2b	0	13	13
c3a	2	16	18
c3b	16	1	17
Actor type	Number of actors in community A	Number of actors in community B	Number of actors in the network/ subsystem
Business	12	0	12
Civil society	0	7	7
Government department or agency	5	6	11
Interest group	9	1	10
Scientific organisation	8	3	11
Other	1	3	4
NETWORK Y. SHARED BELIEFS CONCERNING POLICY INSTRUMENTS Modularity value: 0.51			
Belief *(see Table 2)*	Number of endorsing actors in community C	Number of endorsing actors in community D	Number of endorsing actors in the network/ subsystem
i1a	3	7	10
i1b	4	6	10
i2a	11	3	14
i2b	5	10	15
i3a	29	0	29
i3b	0	21	21
Actor type	Number of actors in community C	Number of actors in community D	Number of actors in the network/ subsystem
Business	7	5	12
Civil society	0	7	7
Government department or agency	10	1	11
Interest group	9	1	10
Scientific organisation	2	9	11
Other	3	1	4
NETWORK Z. CO-ORDINATION Modularity value: 0.27			
Actor type	Number of actors in community E	Number of actors in community F	Number of actors in the network/ subsystem
Business	12	0	12
Civil society	0	7	7
Government department or agency	4	7	11
Interest group	8	2	10
Scientific organisation	9	2	11
Other	3	1	4

into fibre before exportation. For some, this was understandable due to the lucrative export markets for fibre, while others blamed environmental regulations for creating the current zero-sum situation. Nonetheless, actors in this coalition engage in co-ordinated activity (as shown in Fig. 2 as the abundance of thick reciprocal ties among them) and are able to influence policy both formally and informally. It also appears that they have managed to translate their beliefs into policy, in the form of the Forest Sector Code of 2009 and the Amended Forest Sector Code of 2017.

The JAC coalition represents a minority of the actors in the network, and its members are not entirely unified in their beliefs. Some organisations agree with the members of the BAU coalition who contend that environmental regulation of the industry is inconsistent and unbalanced in comparison to other sectors that are not subject to similar fees and licensing. The core of the JAC coalition consists of civil society organisations and the government departments in charge of implementing and enforcing environmental regulation, including those responsible for environmental affairs, water, and sanitation. The mandates of these departments differ to those of the government departments in the BAU coalition. Civil society organisations are also divided into those that emphasise the environmental problems, but are willing to work with the members of the other coalition to find solutions (which has also led to accusations of them being co-opted by the BAU coalition). A few others that operate at the grassroots level (i.e., those making the accusations) focus on revealing social injustices and mobilising resistance against what they see as the destruction of the environment for the benefit of a privileged few. Members of the JAC coalition do not co-ordinate with one another as closely as those in the BAU coalition do (Fig. 2), as explained by the relatively low modularity value for the co-ordination network. The JAC coalition critiques the status quo and advocates for policy change (ranging from reform to revolution), grounded in the universal principles concerning environmental and social justice. The actors in this coalition generally tend to question the very existence of the industry because of its social costs, which they argue exceed its benefits, exemplified in the following quotes.

"But I think the major barrier, is assuming the failure of industry to realise just how bad the situation is specifically with pines and to a degree euca in the mountainous areas. So the key mountains are eight percent of the land producing 50 % *of the water, and if they get covered by invasions they're not going to produce much water. And they've gotta understand that if the invasions carry on the way that they are in the Southern Cape, we would have no option but to either bring in biological control to kill the pines, or look at some gene drive option, to do so which we would think in, the latter case that they would need to pay for. But that could destroy the forestry industry." [Government department]*

"So, I think at the first level, is to say that, hang on, we need to ask the question about is this an industry that we simply want to grow. […] OK, let's presume they pay their taxes. So what? Do we really have to allow them a free hand? Whereas if we can have alternative economic activities, some of which may include sustainable forestry, in a mix of land use, why not? So, as far as we can see, this is a predatory industry. It makes profits for few people. It doesn't employ vast numbers of people, and it has major negative social, economic and rights impact. So they can keep their profits as far as we are concerned. Their profits don't contribute anything. Their profits are their profits. This is not an industry that really has much of a leg to stand on to say, it actually is doing something socially useful, environmentally progressive or, yeah." [Civil society organisation]

At the border of the two coalitions is a group formed by four traditional leaders and their subjects in the northern KwaZulu-Natal province. They have been returned former government-owned plantation land, which they have been managing in collaboration with a business actor and a government department under the auspice of a partnership model of land reform. Although they do not really co-ordinate with the members of the JAC coalition, their beliefs place them in it. For example, they prioritise the vital environmental functions of their lands over (externally-imposed) short-term economic goals.

Although traditional leadership under customary law is a constitutionally recognised level of government in South Africa, we were not able to identify any organisation that would have collectively represented traditional leaders in the context of national tree plantation politics. Overall, rural communities, as the ones living with the impacts of tree plantations, whether positive or negative, are not well-represented in the policy subsystem. Labour unions and civil society organisations voice concerns on their behalf, but the communities themselves are neither well-organised nor well-recognised.

5.2. Contribution of shared beliefs concerning policy instruments to coalition formation

The modularity value for the network based on beliefs about policy instruments is relatively high at 0.51. Therefore, beliefs about policy instruments also divide actors into two communities, pictured as C and D in Fig. 2. However, after comparing the actors in these communities to those identified in the co-ordination network (E and F, respectively), we find that these beliefs neither strongly contribute nor are the result of coalition formation. The actors support the same instruments for various, often conflicting reasons, suggesting that they are unlikely to form broad united fronts to advocate for or against specific policy instruments. However, this does not exclude the possible contribution of beliefs about policy instruments to the formation of factions within coalitions. We therefore cannot identify competing coalitions based on shared beliefs about policy instruments. Rather, policy instruments find both support and opposition across coalition lines. The following qualitative analysis substantiates this argument.

The achievements of eco-certification as a policy instrument in improving management practices in South Africa since 1997 are well-recognised. However, actors disagree about their future use. The civil society organisations that are willing to work with industry actors defend such voluntary self-regulation as a means of continuous improvement and as a window for dialogue. Their grassroots counterparts accuse the eco-certification schemes of certifying something as 'sustainable' which they view as fundamentally unsustainable. Businesses with a more local focus are among those who oppose eco-certification, but only because they view the standards as economically illogical. For them, certification is an unnecessary and costly form of environmental regulation. These actors are keener to adopt an eco-certification where standards are developed and enforced by the industry. Hence, while actors unite in resistance, the arguments underlying their positions are, to some extent, filtered through their deeply held beliefs.

The same pattern applies to the policy instrument of multi-functional management, which government agencies and many scientific and civil society organisations favour to enhance the social acceptability of tree plantations. While some businesses favour this approach and report having made their premises accessible to livelihood practitioners and recreationists, others oppose multi-functionality because they believe it is too risky to grant public access to plantations and because they believe it is not economically viable. Others challenge this short-term view by stating that granting the public access, promoting local control of the resource, and conserving biodiversity will pay off in the long term through avoided sabotage and sustained productivity.

Opinions on Indicative zoning of Eastern Cape explain much of the relatively high modularity value of the network constructed on the basis of shared beliefs concerning policy instruments. This can be explained by the fact that each organisational elite was asked specifically to comment on this instrument. Thus, everyone expressed their beliefs concerning it – but two groups of actors who were against this instrument based their beliefs on very different reasoning. The debate over indicative zoning has been welling for years, with little development on the ground. Many actors across coalition lines reject this instrument because they think it is simply not feasible: they believe that the remoteness, weak infrastructure, and ownership issues cannot be overcome. They have also learned from the past failed attempts to implement this instrument. However, this places them in the same community in the network with those who reject the instrument on the grounds of their policy core beliefs opposing plantations in the first place. Those resisting the instrument on the grounds of their deeply held beliefs base their argument on their experiences of plantations elsewhere in the country. Those in favour of the instrument are the businesses that focus on local markets, interest groups that have advocated for an expansion in plantation extent for years, and, notably, every government department. Given that the Eastern Cape region lags in socio-economic indicators and its degraded lands are perhaps unsuitable for competing land uses, even the departments that would generally be very critical of plantations support the instrument.

"I think in some areas it's actually a positive step. In parts of the Eastern Cape, particularly the former so-called homeland areas the land is very degraded, and we've got to look pragmatically at what is the best land use practice, and it might be that in those areas the growing of invasive or preferably less invasive species would be an advantage, something, that we would support and, where we believe, that the industry could do well enough out of that, going forward. […] My sense in all these things is that the full set of costs must be picked up by those who wanted to profit from the use of an invasive species, and it's a challenge." [Government department]

6. Discussion and conclusions

In the face of unprecedented pressures on land use systems across the globe, coalitions of policy actors can foster or hinder, if not reverse, the changes in policies and practices that are needed to change the course of our currently irrational global production ecosystems. Building on the Advocacy Coalition Framework (ACF), we set out to study the highly conflictual politics of tree plantation policy in South Africa to determine the extent to which (i) general policy core beliefs and (ii) specific beliefs about policy instruments underpin coalition formation. We achieved this using network data collected through 55 interviews with organisational elites.

Advocacy coalitions consist of actors who share a particular belief system and who show a non-trivial degree of co-ordinated activity over time (Sabatier, 1988, p. 139). The relative contributions that the two different sets of policy beliefs play in coalition formation has been subject to an enduring debate among those applying the ACF (Weible et al., 2019). The results of our analysis of South African tree plantation politics show that beliefs about policy instruments play a significantly weaker role in coalition formation than policy core beliefs. The network that we created from actors' shared stances for or against a set of three policy core beliefs divided the actors into two communities, which largely overlap with the two communities observed in the co-ordination network. Conversely, the two communities that we find by examining actors' stances on a set of three policy instruments do not overlap with those that we observe in the co-ordination network. The set of policy instruments that we analysed, including eco-certification, multi-functional management, and indicative zoning for the establishment of new plantations, found support across coalition lines.

The ACF, rarely utilised in African contexts, functioned well as a framework for our analysis of the tree plantation politics of South Africa. Regarding the empirical question about the number and characteristics of coalitions in this turbulent policy context, we found two competing coalitions: the hegemonic business-as-usual (BAU) coalition and the minority justice and change (JAC) coalition.

We found that two coalitions hold diverging beliefs over a set of three policy core beliefs: the principles and validity of existing environmental regulation, the balance of social costs and benefits of tree plantations, and the conditionality of using land reform within the wider process of decolonisation in South Africa. The BAU coalition connects selected business and state interests with labour arguments and prioritises economic efficiency over environmental sustainability and social justice. Similar coalitions that have assumed a hegemonic position have been found to hinder pro-environmental or pro-social policy change in various other environmental and land use policy processes (Di Gregorio et al., 2017; Gronow and Ylä-Anttila, 2016; Kröger and Raitio, 2017; Sabatier et al., 1995; Wagner and Ylä-Anttila, 2018). The relatively weak JAC coalition challenges the dominant paradigm by questioning the existence of tree plantations on South African soils. These coalitions are in line with those that Tewari (2001) identified in the aftermath of the changes that took place in South Africa in the nineties. However, our network analysis provides an updated portrait of the actors, issues, and ideological polarisation inside the tree plantation politics of South

Africa.

A curious feature of the tree plantation policy subsystem is the absence of any actors representing the rural communities that are often the most severely affected by land use and land use change. This differs from similar contexts, such as Brazil, where strong pressure from the Landless Workers' Movement (MST) and neutral parties was instrumental for changing the policy landscape (Ghinoi et al., 2018; Kröger, 2011). This may be due to the inability of the post-apartheid state to establish itself, both politically and economically, in the South African hinterlands, which has allowed traditional leaders to recast themselves as decision-makers on behalf of sizeable communities (Koelble and LiPuma, 2011). An earlier analysis of tree plantation politics in South Africa has also revealed that policy actors who co-participate in focal policy forums (i.e., collective decision-making institutions) tend to build trust and forge relationships of political nature (Malkamäki et al., 2019). Much of the coalition building and the mechanisms that make coalitions self-reinforcing are thus bound to occur in such forums, meaningful participation in which requires actors to have resources that rural communities in South Africa rarely possess.

Our findings support the central claim of the ACF that shared policy core beliefs are the "stickiest glue" that hold advocacy coalitions together. Our results provide evidence that beliefs about policy instruments occupy an inferior position in the belief hierarchy of the ACF. However, contradictory results have been found elsewhere (Ingold, 2011; Metz et al., 2019; Tewari, 2001; Zafonte and Sabatier, 1998). This leads us to call for the clarification of the conceptual foundations of the ACF to better account for the conditions under which beliefs about policy instruments are significant contributors to coalition formation. It may be the case that lower sanctions for coalition defection, weaker path-dependencies, and an early introduction of one or more instruments in the policy process facilitate such conditions.

In one of his expositions of the ACF, Sabatier (1998) stated that preferences concerning instruments may produce such an effect if they share the crucial characteristics of policy core beliefs, such as being broad in scope, involving resistant beliefs, and having been the source of protracted conflict. The instruments that we considered, especially eco-certification and zoning, largely meet these criteria. However, we did not identify coalitions based on the similarity of actors' beliefs on these issues. If learning occurs through policy implementation or there is a novel instrument to begin with, policy instruments may act as a means for reconciliatory interactions across coalition lines (Jasny et al., 2018; Sotirov and Winkel, 2016).

Our study has several limitations. The data collection in 2017 occurred at the peak of protracted economic stagnation and uncertainty about the future, during which the views across coalition lines could have become even more polarised. Most actors, including governmental ones, expressed frustration and discontent with the political leadership at the highest level. We used open-ended questions to measure policy beliefs, which meant that the interviewed elites gave varying degrees of detail in their answers. This approach allowed them to express concerns that mattered the most to them. It also provided a realistic view of the debates in which they were most engaged. Core actors focused on several issues, whereas others assumed more specific or more auxiliary roles. With only a few statements that were made by the elites that we interpreted as deep core beliefs, it could be argued that our approach was not necessarily ideal for eliciting such fundamental beliefs. Testing and developing measurement scales to expose beliefs at the deepest level of the belief system is a potential alternative (de Witt et al., 2016; Ripberger et al., 2014).

Through our analysis of actors, beliefs, and coalition formation in South African tree plantation politics, we identified two competing coalitions in this conflict-stricken setting. Additionally, we have illuminated the causal mechanisms for self-organised coalition formation under conflict and uncertainty, thereby contributing to the clarification of the conceptual foundations of the ACF. There is a need to continue testing the mechanics of the ACF in diverse empirical settings and to refine the framework accordingly. Inside tree plantation politics in South Africa, media debates warrant more attention. Such analyses could focus on emerging issues, such as the possible contribution of tree monocultures to aggravated wildfires and baboon damages (Germishuizen et al., 2017; Kraaij et al., 2019). The recently enacted policy packages, the "land expropriation without compensation" and the carbon tax, are also worth exploring.

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CRediT authorship contribution statement

Arttu Malkamäki: Conceptualization, Methodology, Investigation, Formal analysis, Visualization, Writing - original draft. **Tuomas Ylä-Anttila:** Conceptualization, Methodology, Writing - review & editing. **Maria Brockhaus:** Writing - review & editing. **Anne Toppinen:** Supervision, Writing - review & editing. **Paul M. Wagner:** Writing - review & editing.

Declaration of Competing Interest

The authors report no declarations of interest.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.landusepol.2021.105283.

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