



Full Length Article

Defining invasive alien species from the roots up: Lessons from the ‘De-eucalyptising Brigades’ in Galicia, Spain

Diego Cidrás^{a,*}, Marien González-Hidalgo^b

^a Departamento de Xeografía, Universidade de Santiago de Compostela, Praza da Universidade, 1, 15703, Santiago de Compostela, Spain

^b Department of Urban and Rural Development, Swedish University of Agricultural Sciences, Box, 7012, Uppsala, 750 07, Sweden

ARTICLE INFO

Keywords:

Invasive species
Eucalyptus
Environmentalism
Political ecology
Conflict

ABSTRACT

Social and cultural perspectives are increasingly considered in the literature on invasive alien species (IAS), after decades of being underexplored. However, within this growing body of research, there is little investigation into the role and knowledge of everyday rural and environmentalist networks in defining and engaging with or against the expansion of IAS. This paper contributes to debates on the political and spatial implications of this concept, through a critical examination of the bottom-up initiative of the ‘De-eucalyptising Brigades’ (Galicia, Spain), which aims to remove eucalyptus trees from community-based property lands. A survey of participants of this movement paired with semi-structured interviews show the relevance of social-cultural dynamics in defining IAS. Our results also show how investigating activism against forestry involving a potential IAS sheds light on the everyday conflicts around who defines IAS and how they are defined.

1. Introduction

Alexander von Humboldt’s (1808) holistic observations of ecosystems laid the basis for an innovative ‘description of biological organism in their local and landscape relations to the earth’s surface’ (p. 321). His work constituted an iconic contribution to the current scientific understanding of landscape, which transcends the interaction of tangible, ecosystem dynamics (Corbera-Millán, 2014). Today, it is the ‘intangibles’ that seem to lead to recurring debates between social and natural scientific approaches to landscape management (European Council, 2000). At the heart of this dialogue there remain questions on the scope of key notions in landscape management, such as invasive alien species (IAS). IAS have been traditionally theorised and managed through tangible approaches —e.g. reproduction, growth, adaptability— than through the intangible —what humans actually see, feel and interact with (Robbins, 2004). However, IAS are daily managed and negotiated under complex environments that transcend the natural dimension of these species (Graham et al., 2019; Head et al., 2015).

Social and cultural perspectives of IAS are increasingly considered in the literature after decades of being underexplored. Beyond Robbins’ (2004) work, which, employing an actor-network model, encouraged a cultural and political turn in how we conceptualise IAS, Kull and Rangan (2008), Shackleton et al. (2019) and Antonsich (2021) further explored,

among other issues, the human values and attitudes that condition the management of IAS. Estévez et al. (2015) also presented a broad revision of the cognitive and social factors that influence the way humans see biological invasions, in order to better evaluate IAS-related social conflicts. This body of research further underlines the need to understand and engage the perception of the local public when it comes to IAS —indeed, this is underscored by the fact that consultation is one of the cornerstones of public participation in land use management (Innes & Booher, 2004). Shackleton et al. (2019) and Kapitzka et al. (2019) noted gaps of knowledge about how the analysis of values, attitudes or perceptions towards IAS is translated into day-to-day practices. Yet, the role of everyday environmentalist and rural networks has not been adequately explored in this emerging body of research.

In this article, we engage with and analyse activism against IAS to explore how environmental grassroots groups conceive and define invasiveness in day-to-day practice. We aim to better understand everyday conflicts around how IAS are defined and how its definition is employed. Our hypothesis is that studying activists engaged in action against IAS can provide nuances into how these species are conceptualised and discussed in the literature and policy circles. To do so, we explore a case of a group of activists who aim to push for the identification of eucalypts (chiefly *Eucalyptus globulus*) as an IAS, by organising to directly uproot them. Importantly, we do not start from a closed

* Corresponding author.

E-mail addresses: diego.cidras.fernandez@usc.es (D. Cidrás), marien.gonzalez.hidalgo@slu.se (M. González-Hidalgo).

<https://doi.org/10.1016/j.polgeo.2022.102746>

Received 7 June 2021; Received in revised form 29 July 2022; Accepted 2 September 2022

Available online 21 September 2022

0962-6298/© 2022 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

definition of IAS. Our case study in rural Galicia, North-West Spain will help us discuss the relevance of socio-cultural aspects in defining an IAS as such, as well as the key role of activist and civil society networks in defining and disseminating key ideas around invasive species. We will argue how their knowledges and practices need to be taken into account not as 'biased' or 'emotional', but as providers of key political aspects that help to understand past, present and future scenarios of conflicting perceptions of forest management based in tree plantations.

The paper is structured as follows. First, we summarise how IAS is currently understood and conceptualised, particularly focusing on the contested debates about their socialisation. We note the implication and relevance that political ecology has had over this area of knowledge. Following this, we introduce the case of the *Brigadas Deseucaliptizadoras* (De-eucalyptising Brigades) and our participatory action research methods. Third, in discussing the results of our findings, we define four latent discursive elements of IAS, as reported by the activists. Lastly, we contrast and discuss the understandings of IAS with the factual activism observed against eucalypts, emphasizing the key role of rural environmentalist movements in disseminating critical perspectives on IAS based in socio-cultural analysis of their territories. In addition, we highlight the benefits of including sociocultural variables to invasion theory, which can, in particular, reduce social friction derived from rural development plans based on (contested IAS) tree plantations.

2. On the politization of invasive species: the voice of environmental grassroots

Determining whether, how and under which conditions certain species become invasive has, since the mid-20th century, been one of the key problems for researchers and policy makers in the fields of biodiversity conservation and landscape management (Elton, 1958). As any object of knowledge, the idea of invasion has never emerged as fully formed within the academic world. Modern science, philosophically based on the notions of prediction and control over nature (Tiles, 1996), has generated constant debates on the definition of the boundaries between controllable and uncontrollable events in the natural milieu. As noted by Fall (2021)) in her recent revision of the IAS paradigm, 'defining certain species as invasive aliens relies on rhetorical acts of category-making that stem from this conception of the scientific method, a reflection of what has been called uniquely Western classifying imagination' (p. 41). In the context of management of IAS, a wide range of perspectives exists between those who aspire to restore a pristine nature and those who aim to leave plants to their own devices (Pysek et al., 1995). Head et al. (2015) showed, in the context of Australia and North America, that current commitments to the management of invasive species tend to move beyond the argument of eradicating species or restoring pure original landscapes. Similarly, at the European Union level, current biodiversity 'LIFE' projects are prioritizing actions to prevent spreads and manage plants already existing in sensitive areas.¹ There is less evidence on this matter in developing countries, whose comparative potential is lower given the differences—not only in political economy, but also in data availability (Nunez & Pauchard, 2010). Beyond the contextual nuances of each specific case, a generic commitment to cohabitate with IAS and 'let them be' seems to be consolidated. A first inference of this matter is that the conceptualization of IAS has neither been stable over time, nor universal for the scientific community.

Nonetheless, the institutionalization of 'invasion science' has led to the promotion of a broad, but increasingly hegemonic working definition of IAS. In line with the UN Environmental Programme, a key agent like the International Union for Conservation of Nature (IUCN) has defined and diffused the notion of IAS as 'animals, plants or other

organisms that are introduced into places outside their natural range, negatively impacting native biodiversity, ecosystem services or human well-being'.² Within this broader definition, scholars have established a set of features that identify the invasiveness of a species in relation to that of others, such as: adaptability, which refers to the conditions under which species can thrive (Pysek, 1995); reproduction (Baker, 1986; Tiébré, Vanderhoeven, Saad, & Mahy, 2007); and vigorous growth (Baker, 1965, pp. 147–172). On the other hand, scholars extended definitions of IAS to include the level of vulnerability to invasions a habitat or landscape has, or its 'invasibility' (Alpert et al., 2000). This variable involves the degree of suitability for germination and establishment of IAS (Hobbs & Huenneke, 1992). Landscape fragmentation (Teixido et al., 2010) or land abandonment are examples of elements on which invasion may depend, but which are seldom considered as stable criteria for cataloguing IAS. Still, Robbins (2004) has pointed out that the invasiveness and invasibility of IAS overlooks as a whole the human dimension of invasion. This is not only because these two categories partly discard human behaviour, but also because they omit how the designation of IAS may be culturally contingent and subjective. Following Brown and Sax (2004), 'science can elucidate the causes and consequences of these changes [invasions] in biodiversity, but ultimately deciding what is good or bad is a moral and social issue' (p. 535).

Along with the potential damage of the species, the distinction between natives and aliens has been central to the identification and monitoring of plant invasions. This dichotomy, which is essentially a geographical categorization hinging on questions of placement and displacement (Warren, 2021), has been strongly supported in the last few decades in invasion science. Basically, 'natives are species occurring within their natural (sic.) range and whose dispersal is independent of human action, whereas aliens are species which have crossed a biogeographic barrier thanks to human action' (Antonsich, 2021, p. 304). Inherently, humans ground this paradigm in a sense of belonging, where species labelled as 'alien' are seen either out-of-place or out-of-control and, conversely, 'natives' are perceived in their rightful place. Despite the critiques that the concept of nativeness has received for fossilizing nature (Brown, 1997) and the evidence that biogeographical happenstance has revealed on the matter of species assemblage for a region (Soulé, 1990; Head et al., 2015), the native/alien divide remains stable in nature conservation practice. Assuming that the borderlines we draw in this dichotomy are imaginary and constructed by us (Hattingh, 2001), Warren (2021) suggests a refinement of the paradigm, in which 'species' geohistories should be incorporated as one component of a broader evaluative framework, more pragmatic, place-specific, culturally sensitive and impact-focused' (p. 19). As we live in a geological epoch in which human beings are the dominant force in landscape transformation, it seems essential to understand how human interactions with introduced plants are socially evaluated.

In the field of geography, there is an understanding of perceptions as continuously transforming views of events, topics or forms of knowledge over space. Derived from individual self-interpretations, perceptions coexist with the material and discursive reality in which people live (Cidrás & Pauli, 2021). Therefore, perceptions around practices within a shared setting may even contribute to the creation of particular identities (Hoelle, 2011). A recent literature review of the research on the perception of invasive species (Kapitza et al., 2019) highlights the need of engaging with social and cultural contexts in order to better understand how and why human perceptions of invasive species vary among different stakeholder groups. However, this assessment is conditioned by the fact that we still lack scientific and legal consensus over the definition and terminology of IAS. Research on perceptions of plant invasions has revealed that IAS management transcends the mere ecological range that, on paper, conditions the prevention and

¹ See, for instance, LIFE Stop Cortaderia Project: <http://stopcortaderia.org/language/en/background-and-objectives/>. Last accessed on 22 July 2022.

² See IUCN resources <https://www.iucn.org/resources/issues-briefs/invasive-alien-species-and-climate-change>. Last accessed on 22 July 2022.

management of these species. For instance, López Cerezo and González García (2002) showed how scientific committees may identify widely varying indicators for determining the potential for invasiveness of a species, depending on their ideological positions. Consequently, stakeholders involved in the management of the species under discussion perceive that, beyond the problematic conditions of the species, controversy occurs in the sphere of bureaucracy. More recently, Novoa et al. (2018) discussed how IAS management can be contentious and conflictive when certain stakeholders acquire economic benefits, while others incur social costs. According to Kapitza et al. (2019), these debates are associated with definitions that tend to be ‘value-laden’ versus ‘transdisciplinary and transparent discourses about the inherent values of invasion science’ (p. 47).

Yet, even as it is important to strive towards more open discussions about who defines IAS, our aim is not to engage into a ‘value-free’ debate around alien species. On the contrary, and from a political ecology perspective, our aim is to better understand what others would consider definitions of alien species that are ‘value-laden’ (in the words of Kapitza et al.) or ‘emotionally charged’ (in Warren’s words, 2007, p. 429). As we discuss below, engaging with the definitions of those who are actively engaged with alien species eradication is not only necessary to better understand conflicts, but it also allows for taking them seriously, instead of undervaluing the power-laden and emotional engagements with landscapes and natural resources. That is, we see space, environment and knowledge as always interconnected with power: power relations strongly influence the perception of invasive species (Carruthers et al., 2011). Unpacking those power relations offers information about the sociobiological, cultural and political conditions that facilitate—or in our case, aim to stop—the spread of invasive species (Robbins, 2004). In addition, categorising some perceptions of invasive species as ‘emotionally charged’ is too often a way of under-estimating such arguments, instead of engaging with what those emotions have to do with questions of space, the environment and justice (see González-Hidalgo & Zografos, 2017, 2020).

As pointed out by Kapitza et al. (2019), activists and NGO-members are seldom considered in discussions on the perception of invasive species (only 9% of the publications analysed by the authors named ‘NGO-members, activists, tourists, journalists and web-users’, while 79% analysed local public perception of invasive species). Several authors have noted how environmental activists and workers need to be considered as key informants in ecological debates, since their situated perspectives bring to light the historical, political and economic contexts in relation to diverse spatial and temporal scales (Martinez-Alier et al., 2011), shaping the discussions on social sustainability through their creation, development, application, and dissemination of concepts and ideas (Conde, 2014). For example, one recent and ongoing debate facilitated by social movements is that of the definition of forests and its difference with tree plantations. Many forest communities and social movements, especially marginalised groups living close to forest development plans, have challenged the primacy of the economic valuation of forests as sites of production over other social and environmental values: as providers of food, fibres, water, medicines, and recreation (Gerber, 2011). The campaign, ‘Plantations are not Forests!’, supported by international environmental non-governmental organisations such as Friends of the Earth and the World Rainforest Movement, aims to show the value of forests beyond the economic. In collaboration with several local grassroots movements, mainly in the Global South, the campaign draws attention to and criticises definitions of forests based in productivity and extraction, and which do not consider forest-dependent human communities and the diversity of human-environmental relationships that take place in and near forests. The campaign deals precisely with the key debates around how a forest is defined, and who defines it, and is an example of how environmental movements may contribute to the official definition or designation of a contested concept.

3. Methodology

Our study, which took place between June 2018 and January 2020, involved engaging with the De-eucalyptising Brigades (DB hereafter; *Brigadas Deseucalitizadoras* in Galician language) through Participatory Action Research (PAR). The DB is a bottom-up initiative that seeks to mobilise and organise people in order to eradicate eucalypts in the rural areas of Galicia, Spain³. The aim of the initiative is not only to put a stop to their expansion as much as possible in this region, but also to restore and increase biodiversity, prevent the increased incidence of wildfires, and reclaim communal forest management⁴. The idea to organise the DB began in Froxán (Lousame, Western Galicia), a UN-designated Indigenous and Community Conserved Area (ICCA) where land is held in common. A group of young people in this community started an initiative where they connected local rural peoples and (mostly urban) collectives willing to stop the expansion of eucalypts on common lands. They then suggested expanding the idea beyond this localised experience, in order to connect to people (mostly) in urban areas of Galicia. The initiative gained the support of Verdegaiá, one of the main environmental organisations in Galicia, who helped to expand the initiative by facilitating some of the infrastructure, such as the provision of tools and other logistical materials and supplies (e.g. food and drinks) and helping to encourage a steady stream of adults and children to participate in their activities (see Fig. 1).

PAR is an experimental methodology that ‘acquires sufficient creative and transforming leverage as expressed in specific projects, acts and struggles to achieve goals in social transformation’ (Rahman, 1991, p. 4). From June 2018, we periodically assisted the DB events with the purpose of: 1) seeking a common understanding about perceived problems associated with eucalypts; and 2) engaging with the direct action of uprooting eucalypts, building relationships with other participants. Although the DB focuses on physical actions—uprooting eucalypts and planting native trees—, collective reflections emerged every now and then. In February 2019 we worked with Verdegaiá, an environmental NGO based in Galicia, some activists, and the DB to develop a process of data collection with the purpose of achieving transformative reflexivity around the topic (Crang, 2003).

During our participation in the DB during the working days we became brigade members, and our actions consisted in: uprooting small eucalypt sprouts, hacking eucalypt stumps, peeling eucalypt bark and collective transportation of eucalypt logs. We also participated in activities of planting endemic species like *Quercus robur* or *Castanea sativa*. After the working day, we participated in a communal lunch—*albaroque*— as well as the convivial activities that followed (going on walks in the surroundings). After these activities, our engagement shifted from informal participant observation to conducting a questionnaire (March–July 2019), interviewing (October–December 2019), and a focus group (November 2019), as explained below. During 2020–2021, due to the COVID pandemic, we did not attend any of the DBs, although we maintained informal contact with some *brigadistas*. One key figure of the DB has provided comments to early drafts, and we plan to present and disseminate the results among and beyond the *brigadistas* once the paper is published.

³ The initiative is concerned with all species of eucalypts. It is also engaged with preventing the expansion of other potential and/or designated IAS, such as the acacia (*Acacia decurrens* var. *dealbata*).

⁴ Forests in rural Galicia are 3% public, and the remaining 97% is privately owned, both by individuals (two thirds) or collectively, through communal forests—*Monte Veciñal en Man Común* in Galician— (one third). Communal forests are a unique kind of collective land tenure that has existed in Galicia for centuries, with a long history of conflict and struggles over control between peasants and the Spanish State (Díaz-Geada, 2020).



Fig. 1. Images of a spring working day of the DB in Froxán. Photographs by Montescola Foundation.

3.1. Questionnaire

An online survey was conducted right after the first ($N_1 = 364$) and second ($N_2 = N_1 + 35$) events were attended. 166 surveys were returned, 87 of which were male and 77 (47 per cent) female. The survey began with questions that explored the way activists understand and feel the forests in which they participate through the DB. Following this, participants had the choice of identifying the species *Eucalyptus globulus* as invasive or not; and finally, we asked them to write down, through an open-ended question, what ‘invasive species’ means to them—the ‘alien’ component of IAS was deleted with the purpose of suspending pre-existing assumptions about this category (Rose, 2016), as it often carries more negative connotations. After the five-month period dedicated to data collection, we reviewed and extracted a total of 164 reflections for analysis.

Responses were analysed through a constructionist approach with the purpose of observing the extent to which the idea of IAS provided by the activists is different from the legal norm. Namely, we followed Rose’s (2016) revision of the Foucauldian discourse analysis approach, which has a particular focus on how systems of knowledge seep through different societies and places. We used NVivo for content analysis, employing a descriptive coding technique that identified key themes and quantified the priorities reported by the activists (Lutz & Collins, 1993). Following Braun and Clarke (2006), descriptive codes ($N = 486$) were later aggregated in themes. Four overarching themes resulted from this process.

1. Origin: codes specifically linked to the sense of place, space and any forms of territorialisation that define an IAS;
2. Behaviour: codes that discuss the behavioural aspects of the species, specifically related to the perceived damaging capacity of the species;
3. Management: includes specific references to public and/or private management factors that define an IAS;
4. Landscape: any other forms of social or cultural elements that define an IAS.

3.2. Interviews and focus group

During or after the DB working days, we carried out personal interviews and debates with several participants. To do so, we first designed a semi-structured interview (Dunn, 2010) with the purpose of exploring personal motivations of activists to take part in the movement, as well as their understanding of the problem of eucalypt expansion in the area. The interview focused on four areas of discussion: 1) the socio-economic and cultural background of the interviewee; 2) motivations for the engagements in the DB; 3) perspectives of the rural context and expansion of eucalypts; and 4) main lessons and salient experiences from engagement in the DB. Criterion and snowball sampling were applied with the purpose of acquiring diverse views in terms of age, gender and area of participation within the DB. During November

2019 we interviewed eight activists participating in the DB. Usually, after a DB action, the *brigadistas*, including ourselves, would spend some time informally discussing the experience. On one occasion, we structured this collective discussion as a focus group, with around 20 activists participating. Both interviews and this focus group were recorded with permission and later transcribed anonymously. Following this, they were coded and analysed using the same content analysis criteria described above, with the purpose of composing a composite verbal and written set of data around the idea of eucalypts as an IAS.

4. Debates and struggles around eucalypts in Galicia

Galicia has been traditionally characterised as peripheral, not only because of its outlying location within Spanish or European frames, but also because of other cultural connotations. Even today, rural pride is a cornerstone of Galician culture, and has been continuously present in Galician nationalist discourse (Lois-González, 2003; Pereiro & Prado, 2013)⁵. Particularly in the late 20th century, social scientists put forward a view of this territory as a periphery, invoking the precapitalism of its rural economies (Beiras, 1972; Bouhier, 1979). Interestingly, in Bouhier’s (1979) work, we observe how forest management was a key component of the traditional agrarian system. That is, forests were in essence dedicated to agrarian and livestock activities (Balboa, 1990). Present-day sociological research on landscape and forest management in Galicia carries a certain idealisation of, or desire to restore, those multi-functional agroforestry systems (Barros, 2019; Cidrás et al., 2018)..

Since at least the 1950s, Galicia has in practice been home to an intense process of de-agrarianisation and de-ruralisation. Significant portions of the rural population migrated to urban areas, while declining agrarian lands gradually (–15% between 1985 and 2005) shifted to brush and other forms of abandoned land. This trend facilitated the expansion of the fast-growing forestry plantations as an alternative land-use, particularly in coastal areas, where they grow better (Vadell et al., 2016). Plantations were first promoted by the Liberal regime and later under Franco’s dictatorship between 1940 and 1984, formerly with pines (chiefly *Pinus pinaster*) and later eucalypts (chiefly *Eucalyptus globulus*)⁶. Eucalypts were increasingly planted as an easy source of

⁵ Under current Spanish law, Galicia constitutes, along with Catalonia and the Basque Country, a ‘historic nationality’ whose autonomy was legally defined during the Second Spanish Republic (1931–1939). These territories have their own languages, histories, cultures or traditions, yet their development has been significantly different from each other (Keating, 2001).

⁶ Other eucalypt species have been introduced in Galicia for forestry purposes, including *Eucalyptus nitens*, *Eucalyptus camaldunensis*, or *Eucalyptus viminalis*, although *Eucalyptus globulus* takes up the majority of the planted surface. Commonly, people in Galicia refer to any species of the gender *Eucalyptus* spp. simply as *eucalipto*. Therefore the term ‘eucalypt’ will be used indistinctly in this paper to refer to the tree whenever there is no specific reference to a species of the genus.

income, particularly for those landowners who are no longer involved in the primary sector (Evans Pim, 2020). The changes in the territorial system have led, particularly over the last 50 years, to a scenario that has been in line with an economic activity that can be carried out through consortium or lease contracts. In this process, the eucalypt brought new capital flows into a forest that was increasingly specialised. Plantations have expanded rapidly, ranging from 27,963 ha in 1973 to, 387,983 in 2009 (see Fig. 2). Overall, these transitions were so accelerated and challenging for the landscape management practices of the Galician administration, that some contemporary authors talk about a territorial ‘collapse’ (Constenla Vega, 2017).

Given this rapid expansion of forest plantations and the deruralisation associated with them, eucalypts exist at the nexus of diverse land use conflicts. Already in the 1980s, agrarian peasants rebelled against new plantations uprooting trees from private lands (López Cerezo & González García, 2002) and set fire to plantations (Cabana, 2007, pp. 555–580; Seijo, 2005). More recently, many local governments assembled together against the eucalypts through declaring themselves as ‘Eucalypt-Free-Zone’ municipalities (Cidrás, 2020). We should also note that there are many protests that are less directly a response to the expansion of plantations, such as those against wildfires (Calviño-Cancela & Cañizo-Novelle, 2018), biodiversity loss (Deus et al., 2018), or the presence of an environmentally controversial pulp factory in southwest Galicia, ENCE⁷ (Greenpeace, 1993). Thus, discussions around whether eucalypts should be declared an IAS are at the centre of numerous contentious issues, from national identity to the local economy (ADEGA - Asociación para a Defensa Ecolóxica de Galiza, 2018).

4.1. *Eucalyptus globulus*, an IAS in Galicia?

Public administrations with jurisdiction over our study area at different administrative scales (European Union, Spanish Government, and the Galician government) have increasingly regulated the conservation of biodiversity and thus the management of IAS by drawing on the IUCN definition discussed above. Their acts and consequent instruments—in the form of catalogues of IAS—regulate the legal status of the *Eucalyptus globulus*, currently not catalogued as invasive. However, the path to this decision has not been without controversy.

Conservation law is described in the penal code of the Spanish state, which includes a list of penalties for the introduction of exotic species that endanger endemic ecosystems (Article 333). However, the dichotomy between the autochthonous and exotic character of species is not regulated in this code—this is instead described by different legislative bodies. Firstly, the Spanish administration frames an ‘exotic species’ as ‘introduced out of its natural distribution and potential dispersion’ (Royal Decree 630/2013, of 21 August, *Towards the regulation of the Spanish catalogue of IAS*⁸). At the Galician scale, the Act 9/2001, *On nature conservation*, Article 45.2, defines ‘autochthonous species’ as ‘species that constitute stable populations in the Galician environment (...) being this territory part of its natural distribution’. Considering the scientific consensus around the arrival of the *Eucalyptus globulus* from southern Australia in the second half of the 18th century (Díaz-Fierros, 2001), there seems to be no debate about the exotic dimension of this species in our study area. However, its invasive character is recognised differently depending on the scientific or

political approach.

Biologists, forestry engineers and to a lesser extent social scientists have discussed the invasive character of *E. globulus* in Galicia and the Iberian Peninsula (Calviño-Cancela, Rubido-Bará, & van Etten, 2012; Teixido et al., 2010; Blanco Arias, 2017). These studies highlight how there is diverging and even contradictory evidence pointing to the invasiveness of the species. For instance, Jiménez et al. (2007) and de Paula Lima (2010) showed that the degree of water consumption reported by eucalypts was not higher than other commonly planted species, such as the pines. However, Carrere (2010) and Cordero Rivera (2011) questioned these conclusions, as the measurement of water consumption per unit of biomass skews the data if evaluated through a snapshot. This is because *E. globulus* are a fast growing species and, therefore, consume greater amounts of water for each cubic metre of wood produced.

Drawing from the academic literature, a scientific committee of the Spanish Ministry of Agriculture, Food and Environment concluded in 2017 that *E. globulus* should be catalogued as IAS in the Spanish environment (MAPAMA - Ministerio de Agricultura Pesca Alimentación y Medio Ambiente, 2017). Immediately after, based on an antagonistic report from an advisor of the forestry department of the ministry, the government rejected the designation of IAS (MAPAMA - Ministerio de Agricultura Pesca Alimentación y Medio Ambiente, 2018). In response, Teo, a municipality of Galicia that opposed the eucalypts, appealed the changing decision and, finally, in late 2020, the Spanish High Court of Justice concluded that ‘there is no scientific evidence [...] to catalogue *E. globulus* as IAS’ (CGPJ - Consejo General del Poder Judicial, 2020, p. 14). Taken together, this sequence of events highlights the controversy at different levels of jurisdiction, which is influenced by scientific as well as economic factors.

5. Situated, engaged and embodied definitions of *Eucalyptus globulus* as an IAS

Our quantitative results reveal a composite idea of IAS, which combines dominant codes on behavioural aspects of the species (322 coded references) with contingent socialised attributes such as its origin (59), management (59) and impact on the landscapes (47). The coding ratio of 2:1 between species and social codes was reproduced within all groups of participants, regardless of the urban/rural place of origin and their degree of linkage with forests. The order of the following sections responds to how the average order of themes emerged along the responses of participants: origin, behaviour, management, and finally landscape (see Fig. 3).

Our qualitative evidence, in a complementary manner, expands or exemplifies how activists define eucalypts as invasive species, showing how the aforementioned themes are never framed as ‘pure’, but as always mutually connected. Our interviews with activists also show how their situated knowledge and perceptions of eucalypts as invasive species are crucial in motivating, sustaining and expanding their everyday engagement with the DB. These conversations also showed how activists are especially interested in discussing and sharing social aspects of the invasiveness of eucalypts in Galicia, which also shows the role of the DB in facilitating spaces for critical discussions about the regional forestry model based on eucalypt monocultures.

5.1. Origin

Widespread knowledge of the alien character of the *Eucalyptus globulus* characterises the central thrust of most responses. Close to one third of our participants began their argumentations with a brief remark about the perceived alien origin of this species: ‘I think it’s invasive because it comes from abroad [...]’ (P007). However, ambiguity arose around what actually constitutes the alien condition of this tree: whilst some participants stated that eucalypts are just not in their ‘natural habitat’ (P046) or ‘ecosystem’ (P008), others limited the exotic

⁷ *Energía y Celulosa S.A.*, simply known as ENCE, is a multinational industry dedicated to the transformation of wood, dominantly *Eucalyptus globulus*. One of its factories is placed in Pontevedra (southwest Galicia) that has recently reached one of the highest productions of pulp in Europe (437,000,000 kg/year) (ENCE, 2019). The own presence of the factory in Pontevedra has been historically conflictive for environmental reasons such as air and water pollution, landscape impacts, etc (Greenpeace, 1993; Sobral et al., 2019).

⁸ All legislations translated by the authors.

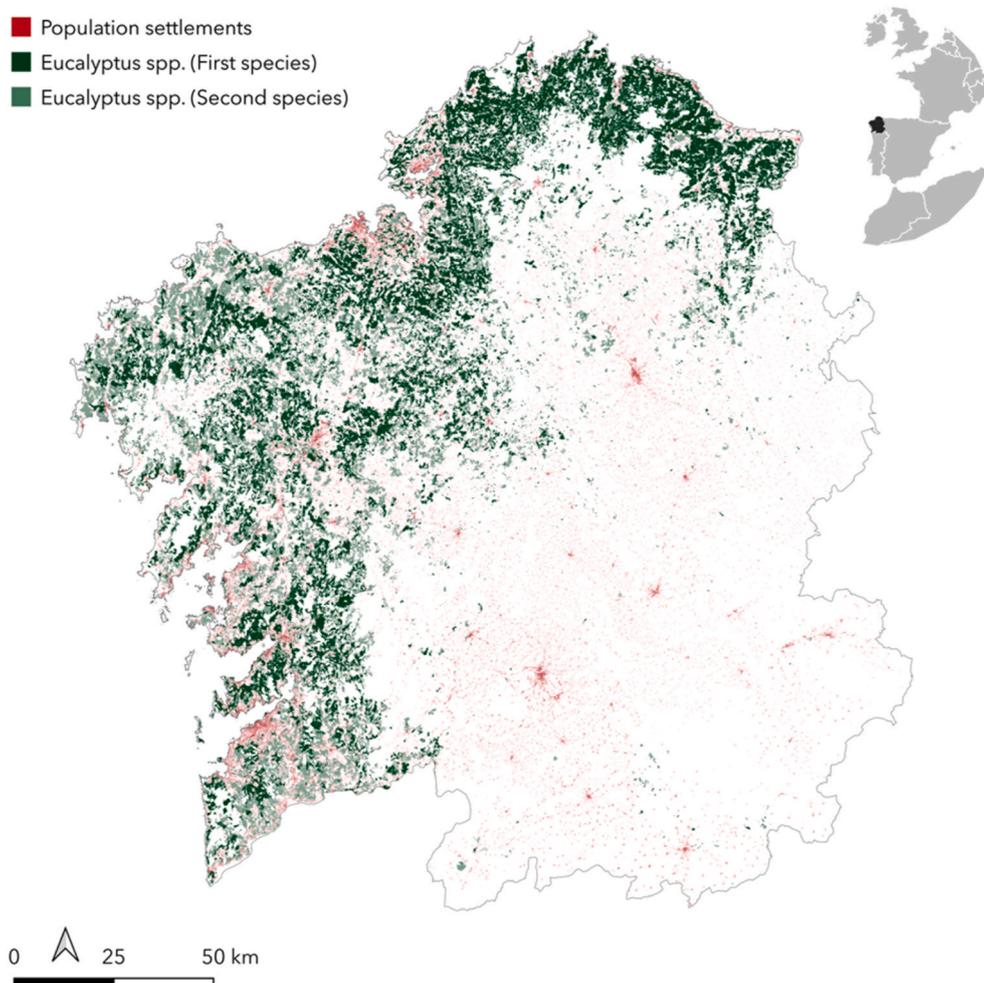


Fig. 2. Map of Galicia, representing the current expansion of eucalypts in its territory. Map by Diego Cidrás. Data by Spanish Forestry Map & Galician Government.

condition to physical distance: ‘it comes from a different part of the world’ (P123). The most expressed scale of reference for nativity was ‘Galicia’, which many participants then further scaled down and territorialised through qualifications like [Galician] ‘lands’ (P084), ‘forests’ (P150) and broader components like the ‘climate’ (P103): ‘[...] but also due to the significantly good adaptation of eucalypts to Galician agricultural lands’ (P089). Activists presumed that eucalypts are inherently alien for the Galician environment, not only due to their well known Australian origin, but also due to the relatively recent importation of this species to Galicia: ‘It’s invasive as in the times of our ancestors [...] Galicia used to have more representative native trees’ (P118). Therefore, beyond the territorial dimension of the native/alien construct, we found an inclusion of contingent functional (i.e. ecosystems) and cultural (i.e. history) attributes that contribute to its exotic character. The subsequent idea of invasion discursively transcends the biological dimension, towards a more politicised signification: ‘They [eucalypts] invade our territory’ (P102).

Geographies of placement and displacement also emerged in our interviews and discussions with the DB activists. Activists not only analysed the spatial logics and structural explanations associated with the expansion of eucalypts in Galicia, but they also reflected on how the history of the introduction and expansion of eucalypts was associated with how political and economic elites shape their definitions of the eucalypt as an IAS, as these quotes show:

‘The current state of the communal lands is the result of a forestry model based on monocultures, imposed during the dictatorship [...] they were looking just for wood pulp, basically for ENCE. The whole

self-management and self-organisation model that existed before was thrown into the trash.’ (woman, interview)

‘In the end we are struggling with a class problem, because all the people living in the rural areas end up as defenseless against public local institutions, the Xunta, etc. since they are all at the service of those people [referring to ENCE].’ (woman, interview)

These quotes show how the relevance of *origin* when defining the eucalypt as an IAS goes beyond a closed definition related to the biogeographical origin of the species. The notion of origin also refers to the (lack of) historical and cultural coexistence with the species in rural Galicia, and the political and economic scenarios which facilitated the introduction and expansion of the IAS.

5.2. Behaviour

Activists also expressed an extended set of perceived behavioural aspects of the species that, aside from being considered exotic, contribute to their being damaging. Invasiveness was constituted both by concepts of ‘reproduction’ and ‘degradation’. On the one hand, ‘reproduction’ implies perceptions of: 1) the rapid growth of eucalypts compared to endemic species: ‘Eucalypts grow way faster than endemic species’ (P055); 2) their ability to quickly recover and take over: ‘[...] lots of plantations in my province are in practice abandoned, hence eucalypts naturally regenerate and expand’ (P098); 3) the pyrophyte properties of the species ‘[...] every time there’s a wildfire, eucalypts regrow way better than autochthonous species’ (P011); and 4) their

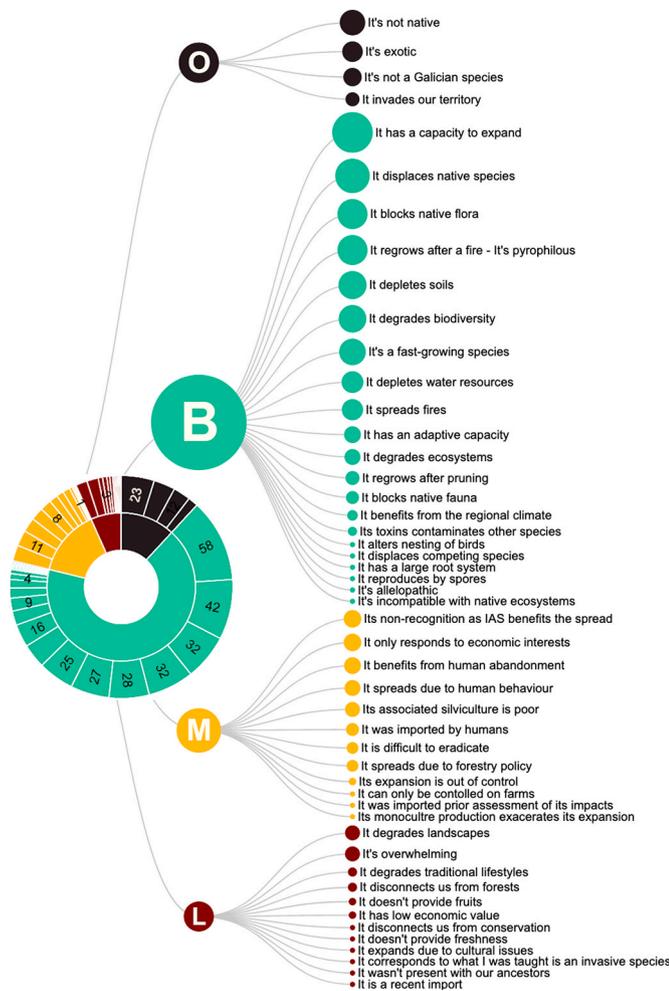


Fig. 3. Representation, through a tree graph, of the collective idea of *Eucalyptus globulus* as an IAS. Each colour represents the four themes (Σ codes = 486) analysed [O = Origin; B = Behaviour; M = Management; L = Landscape]. Figure contents developed by Diego Cidrás and produced with Rawgraphs. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

good adaptation to Galician climate ‘[...] and they [eucalypts] have found the best climatic conditions to expand’ (P057). All these arguments were often expressed in combination (e.g. rapid growth and quick recovery are often expressed together). Conversely, ‘degradation’ was overall connected to biodiversity loss, argued either in terms of floral or faunal issues: ‘When they [eucalypts] expand beyond plantations, those forests have way less biodiversity of plants and animals’ (P040). Additionally, degradation was linked to the decreasing quality of soils over time and their decreased ability to retain water: ‘they damage the fertile stratum of our soils, thus limiting the regeneration of endemic species’ (P074). We identified less consensus around whether they are able to naturalise. Some activists perceived no integration within endemic forests ‘as eucalypts are out of the faunal and floral cycle’ (P097). Others stated that the species’ capacity to be resilient, as described above, includes an increasing degree of naturalisation, especially as abandoned plantations ‘succeed for many generations without intervention’ (P056).

The behavioural dimension of the eucalypt also emerged in our interviews, both in the analysis of the implications of the extension and expansion of the eucalypts, but also through the motivations to transform these impacts. As this *brigadista* told us, it is the ecological attributes of eucalypts in the environment the main reason, but not the only, that sustained her subsequent involvement in the DB:

‘My motivation for joining the DB is to be able to eradicate something that is visibly bad: Eucalypt trees acidify the soil, they suck a lot of water, making the springs carry less water, and, on the other hand, all the underlying politics that in the end is nothing more than a productivist system that leaves out everything related to the popular culture related to the Montes[...] if the DB continue to grow and it ends up becoming something very, very big, we could achieve great achievements by favouring other types of monocultures that are more local, such as chestnut, oak, mushrooms [...] a little friendlier with the ecosystem, which do not mistreat it so much and at the same time which give an alternative to all these people in the primary sector who are with the ‘water up to their necks’ [referring to the difficult economic conditions of people whose income depends on agriculture and livestock].’ (woman, interview)

‘The DB is an initiative in which finally someone does something because until now, I do not know for how many years, we have been with this plague and neither the municipalities nor the *Xunta* nor the institutions nor practically almost any environmental association has done anything to handle this problem.’ (man, focus group)

As we can infer from these responses, *behaviour* as a theme combines the description of the species’ behaviour with aspects of human meddling. That is, activists’ argumentations tended to hybridize the ecological behaviour of the species with the anthropic consequences of and influences for (and against) its expansion.

5.3. Management

As noted in the previous section, activists connect the behavioural attributes of the eucalypt with critical reflections on the current management of this species. Three factors emerged above others (>10 cases) on this topic, hence constituting three key ways participants characterised eucalypts as invasive. First, invasiveness was defined through arguing that it is the market that is driving the accelerated increase of plantations: ‘[...] and it is the pulp industry that is driving this expansion’ (P054). Therefore, participants assigned the invasive dimension of *Eucalyptus globulus* to the presence of a pulp industry in the territory: ‘It’s an invasive species, completely due to an economic matter’ (P007). Second, the perception of a monoculture of eucalypts, consisting of single-species plantations, was expressed as a source of invasion: ‘I think that our own management, as humans, has been pretty bad, and invasion was caused by monoculture’ (P082). The fact that monocultures do not require active silviculture was interpreted as a contributor to human depopulation and progressive land abandonment, and these dynamics, in the eyes of participants, facilitated biological invasions. Third, and often expressed as being caused by monocultures, poor silviculture around eucalypt plantations was seen as a facilitator of large wildfires in forested areas, in turn facilitating the expansion of eucalypts due to the pyrophyte properties of this species. Abandoned plantations are therefore more likely to suffer wildfires and consequently regrow better than any competing species. Most participants acknowledged that while the autonomous capacity for invasiveness is limited—‘the reality is that the capacity of eucalypts to expand is not even remotely similar to that of others like the acacias (P048)—they often followed this acknowledgement by noting that the invasiveness is in great part due to human land management practices: ‘beyond the ecological range [...], it is our fault that eucalypts are harmful, although obviously not all of us equally’ (P048).

In our interviews and informal conversations with *brigadistas*, participants shared how the DB helped them to collectively analyse the implications of local forest management as well as the political interests shaping those forest governance decisions. As they said:

‘We have to take into account that this type of forest [eucalypt monoculture] has been established with a lot of propaganda, subsidies from the *Xunta* [Galician government] for planting, in order to

impose only one use of the forest [...] it is difficult to change all that discourse imposed over 35 years.' (woman, focus group)

'I understand that eucalypts can be cultivated, but in a controlled way [...] I have seen places where it is planted so that there is a correct separation for the tractor to enter [...] if they do it with some control I would not say anything, but here the seeds were massively thrown and the trees grew as they wanted [...] that is a mess.' (woman, focus group)

'I do not see a good future for Galicia and the rural areas [...] Because all the emphasis is put on the monocultures, and in Galicia if *the globulus* is a plague, *the nitens* (referring to *Eucalyptus nitens*) is much worse [...] Who will be willing to come and stay, or come and visit areas that are totally surrounded by eucalypts? [...] This is an enormous problem, and even if I join with and love participating in the brigades, I know the political agreements must be beyond these voluntary [DB] actions.' (man, interview)

These results show that *management* is seen by activists as a dominant force for defining the eucalypt as invasive. By emphasizing the environmental management of rural territory, the relevance that activists see in *management* also opens spaces for transformation. It is in these spaces for transformation that explain their engagement in the Brigades, even if acknowledging their limitations to undo decades of rural management based on the plantation and extraction of eucalypts.

5.4. Landscape

Cultural conditions of the territory were transversally present in the previous themes, but also became a part of the argument towards the end of most responses, especially after participant spoke about management issues. This fourth theme consists of a set of cultural connotations of the physical framework for invasions, that is, the way people live and interpret local landscapes in which eucalypts are expanded. The encounter of the eucalypt with stakeholders' imaginary of native forests resulted in a sense of the 'accidental' (P090) that transcends ecology and becomes an aesthetical and emotional concern. A dominant code in this category reveals that the expansion of eucalypt plantations is seen as a source of landscape degradation: 'They [eucalypts] are invasive because they smash our landscapes' (P002). In at least four cases, landscape degradation was specifically used as a factual proof of the invasion: 'You just need to have a walk and look around these damaged mountains, full of eucalypts [...]' (P064). These expressions of invasion were often accompanied with negative feelings, such as 'stress' (P092) or 'sadness' (P087).

Labelling the eucalypt as invasive due its impact on landscapes directs attention away from the species itself. Instead, stakeholders reveal that only through the interrelationship of the eucalypt with its physical and social context, it is possible to define its invasiveness. As stated above, the cultural dimension of eucalypts as invasive species permeated all the responses by activists. Critical and political analyses of historical and present-day environmental, economic and rural inequalities were common in spontaneous debates as well as in our interviews. Again, activists not only discussed and shared their ideas around the cultural dimensions of eucalypts as invasive, but also shared how the DB are trying to build a counter-hegemonic culture around eucalypt plantations. As these *brigadistas* told us:

'In the last brigade in which I participated, we commented on how in such little time the notion of the traditional landscape was completely erased [...] in less than 40 years it has changed [...] when I was young and we were in an environmental group, there were slopes on the south side of the mountain range that were cork oak forests [...] now it has been eucalypts for 30 years.' (man, interview)

'[In the DB,] in addition to the physical work of uprooting eucalypts, we are forming a community ... eating together, debating [...]

depending on the day [...] one day we visit a Castro [Iron Age hill forest], another day a book presentation [...] we have a good time, we learn things that you would not learn anywhere else [...] and all of that gives you a bit of a historical perspective.' (woman, interview)

Our survey and interviews signify that *landscape* is a relevant category for activists related to the cultural characteristics of eucalypt plantations, which are associated with abandonment of the land, versus a cultural and biodiverse landscape. As activists say, it is precisely the opportunity to be part of and build alternative cultural and biological landscapes that motivates them in their action in the DBs.

6. Discussion: rural grassroots as key actors for disseminating critical social-cultural perspectives of IAS

The previous section has illustrated how bottom-up initiatives to *de-eucalyptise* communal lands in Galicia define *Eucalyptus globulus* as an invasive species, and also how these definitions help people to engage with everyday activism. Our case study reveals a diversity of factors in such perception of invasiveness, in a rural, local and national context heavily polarised around the historical expansion of this species. We have briefly presented how activists point at *origin*, *behaviour*, *management* and *landscape* as key and complex themes when defining the eucalypt as invasive in Galicia. There are two main implications of these findings for the relevant literature. First, regarding the definitions of IAS itself, our case study shows the incorporation of a broad evaluative framework that transcends the ecological plane. That is, a culturally sensitive notion of invasions demarcated by anthropic circumstances. Second, regarding the key role of activist and civil society networks in defining and disseminating key ideas around invasive species, engaging with such definitions and actors provides a more nuanced picture of invasive species, both geographically and politically. In this regard, we argue that there is a need to acknowledge local activists' perceptions of invasive species beyond categorisations of being 'biased' or 'too emotional' since they help to understand past, present and future scenarios of conflicting perceptions of forest management based in tree plantations.

To expand on the first implication introduced above, our results show that activists understand an IAS mainly from a dominant ecological perspective. That is, relational features between two or more species take on a central position within their views of IAS. Particularly, more traditional scientific concerns like reproduction or vigorous growth, in *Baker's terms* (1965), were continuously expressed in relation to native species. Our evidence is also consistent with *Robbins' (2004)* argument around the invasibility of landscapes, since our interviewees did not see ecology as separate from human land management. In that sense, the DB activists do not explain the fragmentation of the landscape by only pointing to the inherent characteristics of eucalypts (*Teixido et al., 2010*), but they emphasise the key role of forestry management for this particular ecological effect. Moreover, in framing this 'human responsibility' of the invasiveness of eucalypts, activists tend to consider themselves holding some of the responsibility (even acknowledging huge unequal responsibilities), and are therefore willing to support a transformation towards a more sustainable, resilient and just forest management.

Therefore, beyond how it explores the ecology of invasions, this research has illustrated that there are broad social factors that influence activists' concerns about invasion. With respect to the sense of *origin* (first theme), our results show how the narrative of Galicia as a land of multifunctional forests (*Barros, 2019; Cidrás et al., 2018*) is relevant to the understanding of eucalypts as being disruptive. This is consistent with *Warren's (2007, 2021)* understanding of the native/alien paradigm, which prioritizes the pragmatic focus over biogeographic origins. In that sense, even if most would not hesitate to name and describe eucalypts as exotic, the activists we interviewed combine such

potentially prescriptive classification with definitions based on criteria of the damage caused. In fact, the perceived behavioural aspects of the species was the theme with the most codes associated with its origin. Then, in a clearer way, the matters of species and landscape management (third and fourth themes, *management* and *landscape*) have illustrated the prevalence of an anthropic influence that steps away from purist or nativist underpinnings of the notion of invasions. On these topics, our results are in line with various of [Head et al.'s \(2015\)](#) discussed cases, given that the concerns of the involved stakeholders and their decision to intervene are essentially derived from social and political circumstances.

Inversely, but also revealing the prevalence of such a social-political framework, the anthropic dimension of invasions was also present at the level of bureaucracy, namely over the Spanish legal case on the classification of eucalypts as IAS (Section 3.1). In this court case, it was alleged that the classification of eucalypts should not proceed given their economic relevance to the Spanish forestry sector ([CGPJ - Consejo General del Poder Judicial, 2020](#)). During the case, the Ministry of Agriculture—the one in charge of the forestry sector—argued that their economic benefits were a key factor in not considering the eucalypt as an IAS. Our research illustrates, however, how this claim is an example of unequal weight given to different kinds of knowledge, since many of the activists we talked to did not consider the economic benefits equally. [López Cerezo and González García \(2002\)](#) showed that scientific committees make decisions about invasiveness based on cultural and ideological biases. Our findings highlight how these scientific committees, and governmental legal proceedings, also obscure activists' knowledges and claims, even as they have the power to validate certain knowledges over others. This illustrates the unequal power relationships that determine what is legally considered invasive or not.

Second, our research also shows the key role of the DB as a social-ecological movement in framing the above-mentioned conceptualisations of *Eucalyptus globulus* as an IAS. Our participatory observations as (occasional) members of the brigades as well as *brigadistas'* answers to our survey and semi-structured interviews shows how, in their definitions, the themes *origin*, *behaviour*, *management* and *landscape* are seen as broad, historical, and inter-related themes. These themes were also organically discussed collectively while working on the land, sharing a meal, or walking in between more biodiverse and local forests. In this sense, the brigades not only help and disseminate particular critical views on the impacts of eucalypts in local and national scales; they also imply the collection, testing, and discussion of scientific knowledge in the local area ([Conde, 2014](#)). For example, activists can test and learn about the water needs of eucalypts, or where or when they grow better, while walking in between the plantations and uprooting of this tree. This means that the DBs do not analyse the invasiveness or damage associated with eucalypts in a technocratic top-down process, but in an engaged, embodied and collective way. Also, as pointed out by several of our interviewees, the presence of the DBs in the monocultures of Galicia imply a revival of the rural areas of Galicia, where non-extractivist activities also have space. Given the huge expansion of tree plantations in Galicia, initiatives like these do not imply an immediate transformation of the rural areas as a whole, although the daily efforts of de-eucalyptising and increasing forest diversity have already shown how certain areas are more socially and dynamic and prepared to cope with climate change, specifically related to forest fires.

Engaging with activists to define an IAS is necessary to attend to an important part of society—civil society—that has been underexplored in the literature ([Kapitza et al., 2019](#)). In addition, doing so helps us to better understand how and why conflict around these species are generated, persist and, very frequently, escalate. Pushing back against the idea that debates around invasive species should be void of emotions ([Warren, 2007, 2021](#)), our case helps us understand how, precisely, these so-called 'negative' emotions arise and are communicated. As we have discussed elsewhere (second author publication), tree plantations can generate very negative emotions such as anger, sorrow and

helplessness—associated with an environmental history of violence and dispossession. In our case, it is in the context of rural Galicia, a territory with a long history of 'peripheralisation', devaluation of local knowledge and other cultural threats, that the arguments against eucalypts start to be heard. In the eyes of [Warren \(2021\)](#), some arguments may be considered as *too* emotional, ideological, or as fostering ecological patriotism. However, in the context we have described, the DB activists uprooting eucalypts to combat their expansion have shown relevant scientific, geographical, cultural and, also, emotional reasons for their definitions and practices.

7. Conclusion

The paradigm of biological invasions is, through everyday practice, framed by species' geostories. This work has further deepened the notion of IAS through engagement with an environmentalist network focusing on invasive species management. Through this research, we conclude that social and cultural dynamics transcend the strictly ecological plane in which the concept of IAS has been dominantly framed. Importantly, our explored species, the *Eucalyptus globulus*, was, during the research phase, at the centre of bureaucratic litigation linked to the possible classification of such species, among others, as an IAS in Galicia. Aware of the implications that a cataloguing of the eucalypt would have over the forest space, activists assert the invasive character of *E. globulus* in Galicia. These results are eminently interesting for the field of geography: in line with the postulates of critical geographers and political ecologists, there is an intentionality in the de-eucalyptisations to socialise or, as we pointed out above, to hybridise the ecological affinities of the eucalypt with the anthropic action that enables or accentuates its ecological impact. As [Warren \(2007, 2021\)](#) remind us, the regulation of an IAS is key not only due to its legal soundness, but also because it tangentially affects land use planning as a whole. In all, the activists build a geographical story around the notion of IAS in which ecological attributes are hybridized with bureaucracies and management policies that have accentuated the contemporary expansion of eucalypts in their territory.

While in this paper we have engaged with a particular rural initiative in the periphery of the Global North, resistances, land occupations, environmental mobilisations and struggles for forest alternatives are common and recurring at (eucalypt) plantations all over the world (see [Gerber, 2011](#)). The relevance of such movements, given their key role in discussing, framing and disseminating concerns around the impacts of invasive species, should be further considered by researchers, local and national administrations and policy makers.

Funding

This work was supported by the scholarship 'Programa de axudas á etapa predoutoral' funded by the Xunta de Galicia (grant number ED481A-2018/263); and the project 'Learning from forest fires: Analysing unequal impacts, well-being and local knowledge and action', funded by FORMAS (grant number 2020-02299).

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Declarations of competing interest

None.

Acknowledgements

We would like to express our great appreciation to Joám Evans and

all the participating members of the *Brigadas Deseucaliptizadoras*. We also acknowledge the assistance of Aaron Vansintjan for his careful proofreading of the text, as well as the thoughtful comments provided by the three reviewers towards improving this manuscript. Last, we extend our gratitude to Rubén Lois and Valerià Paül for their support throughout this research. All mistakes remain ours.

References

- MAPAMA - Ministerio de Agricultura, Pesca, Alimentación y Medio Ambiente (2017). Dictamen del comité científico. Available in: <http://www.ibader.gal/archivos/2018-0409-DICTAMEN-EUCAL-510.pdf> (Last access: 03/05/2021).
- ADEGA - Asociación para a Defensa Ecolóxica de Galiza. (2018). *Unha ILP para pararlle os pés ao eucalipto e darlle unha oportunidade ao noso monte*. Available in <https://adega.gal/novas.php?sec=7&id=660&idioma=gl>. (Accessed 3 May 2021).
- Alpert, P., Bone, E., & Holzapfel, C. (2000). Invasiveness, invasibility and the role of environmental stress in the spread of non-native plants. *Perspectives in Plant Ecology, Evolution and Systematics*, 3(1), 52–66.
- Antonsich, M. (2021). Natives and aliens: Who and what belongs in nature and in the nation? *Area*, 53(2), 303–310.
- Baker, H. G. (1965). *Characteristics and modes of origin of weeds*. Berkeley: University of California.
- Baker, H. G. (1986). Patterns of plant invasion in North America. In *Ecology of biological invasions of North America and Hawaii* (pp. 44–57). New York: Springer.
- Balboa, X. (1990). *O monte en Galicia. Edicións Xerais de Galicia*.
- Barros, L. (2019). Montes veciñais, mulleres e un ecofeminismo posible. In *Proxecto Batefogo (coord.) Árbores que non arden. As mulleres na prevención de incendios forestais* (pp. 45–61). Catroventos Editora.
- Beiras, X. M. (1972). *O atraso económico de Galicia*. Editorial Galaxia.
- Blanco Arias, C. A. (2017). Un plan para controlar las plantas exóticas en las Islas Atlánticas de Galicia. *Quercus*, (376), 26–30.
- Bouhier, A. (1979). *La Galice: Essai géographique d'analyse et d'interprétation d'un vieux complexe agraire*. Imprimerie Yonnaise.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Brown, N. (1997). Re-defining native woodland. *Forestry*, 70, 191–198.
- Brown, J. H., & Sax, D. F. (2004). An essay on some topics concerning invasive species. *Austral Ecology*, 29(5), 530–536.
- Cabana, A. (2007). *Los incendios en el monte comunal gallego: Lugo durante el primer franquismo*. Historia agraria: Revista de agricultura e historia rural, 43.
- Calviño-Cancela, M., & Canizo-Novelle, N. (2018). Human dimensions of wildfires in NW Spain: Causes, value of the burned vegetation and administrative measures. *PeerJ*, 6, Article e5657.
- Calviño-Cancela, M., Rubido-Bará, M., & van Etten, E. J. (2012). Do eucalypt plantations provide habitat for native forest biodiversity? *Forest Ecology and Management*, 270, 153–162.
- Carrere, R. (2010). *Análisis crítico de la silvicultura y el agua: Ciencia, dogmas, desafíos*. (Walter de Paula Lima, 2010) (Vol. 159). Boletín Movimiento Mundial Bosques Tropicales.
- Carruthers, J., Robin, L., Hattingh, J. P., Kull, C. A., Rangan, H., & van Wilgen, B. W. (2011). A native at home and abroad: The history, politics, ethics and aesthetics of acacias. *Diversity and Distributions*, 17(5), 810–821.
- CGPJ - Consejo General del Poder Judicial. (2020). Tribunal Superior de Justicia de Madrid - Resolución 505/2020. Available in <https://www.poderjudicial.es/search/AN/openDocument/c52c6a1866b2dea7/20210121>. (Accessed 3 May 2021).
- Cidrás, D. (2020). Municipios 'libres de eucaliptos': análisis de los actores políticos locales en Galicia. *Boletín de la Asociación de Geógrafos Españoles*, (84), 10.
- Cidrás, D., Lois-González, R. C., & Paül, V. (2018). Rural governance against eucalyptus expansion in Galicia (NW Iberian Peninsula). *Sustainability*, 10(10), 3396.
- Cidrás, D., & Paül, N. (2021). The context is more important than the commodity in understanding stakeholder responses to blue gum plantations. *Australian Geographer*, 52(4), 453–473.
- Conde, M. (2014). Activism mobilising science. *Ecological Economics*, 105, 67–77.
- Constenla Vega, X. (2017). *O espazo en primeiro lugar. A teoría do Colapso Territorial en Galicia*. Doctoral dissertation, Universidade de Santiago de Compostela.
- Corbera-Millán, M. (2014). Ciencia, naturaleza y paisaje en Alexander von Humboldt. *Boletín de la Asociación de Geógrafos españoles*, 64, 37–64.
- Cordero Rivera, A. (2011). Cuando los árboles no dejan ver el bosque: Efectos de los monocultivos forestales en la conservación de la biodiversidad. *Acta Biológica Colombiana*, 16(2), 247–268.
- Council of Europe. (2000). European landscape convention. Available in: <https://www.coe.int/en/web/landscape> (Cons. February 2020).
- Crang, M. (2003). Qualitative methods: Touchy, feely, look-see? *Progress in Human Geography*, 27(4), 494–504.
- Deus, E., Silva, J. S., Marchante, H., Marchante, E., & Félix, C. (2018). Are post-dispersed seeds of *Eucalyptus globulus* predated in the introduced range? Evidence from an experiment in Portugal. *Web Ecology*, 18(1), 67–79.
- Díaz-Fierros, F. (2001). *¿Foi o padre Salvado o introductor do eucalipto en Galicia. En: O Bispo dos sen alma. Frei Rosendo Salvado (1814-1900), unha misión en Australia: Exposición no centenario da súa morte*. Santiago: Concello da Cultura Galega.
- Díaz-Geada, A. (2020). Change in common: Economic, social and cultural transformations in rural Galicia during Francoism (1939–1975). *The Journal of Peasant Studies*, 47(3), 544–565.
- Dunn, K. (2010). Doing qualitative research in human geography. In *Hay, I (coord.) Qualitative research methods in human geography*.
- Elton, C. S. (1958). *The ecology of invasions by animals and plants*. London: Methuen.
- Estévez, R. A., Anderson, C. B., Pizarro, J. C., & Burgman, M. A. (2015). Clarifying values, risk perceptions, and attitudes to resolve or avoid social conflicts in invasive species management. *Conservation Biology*, 29(1), 19–30.
- Evans Pim, J. (2020). *Indigeneity or peasantry? Indigenous wellbeing and enterprise*. Self-Determination and Sustainable Economic Development.
- Fall, J. (2021). What is an invasive alien species? Discord, dissent and denialism. In *Routledge handbook of biosecurity and invasive species* (pp. 40–54). Routledge.
- Gerber, J. F. (2011). Conflicts over industrial tree plantations in the South: Who, how and why? *Global Environmental Change*, 21(1), 165–176.
- González-Hidalgo, M., & Zografos, C. (2017). How sovereignty claims and 'negative' emotions influence the process of subject-making: Evidence from a case of conflict over tree plantations from Southern Chile. *Geoforum*, 78, 61–73.
- González-Hidalgo, M., & Zografos, C. (2020). Emotions, power, and environmental conflict: Expanding the 'emotional turn' in political ecology. *Progress in Human Geography*, 44(2), 235–255.
- Graham, S., Metcalf, A. L., Gill, N., Niemiec, R., Moreno, C., Bach, T., ... Lubeck, A. (2019). Opportunities for better use of collective action theory in research and governance for invasive species management. *Conservation Biology*, 33(2), 275–287.
- Greenpeace. (1993). *ENCE: Más de 20 años contaminando la ría de Pontevedra*. Available in <https://archivo-historico.greenpeace.es/OPAC?Id=1690ef818f2-3fc70ea21bb51884>. (Accessed 2 April 2021).
- Hattingh, J. (2001). Human dimensions of invasive alien species in philosophical perspective: Towards an ethic of conceptual responsibility. In J. A. McNeely (Ed.), *The Great Reshuffling. Human dimensions of invasive species* (pp. 183–194).
- Head, L., Larson, B. M., Hobbs, R., Atchison, J., Gill, N., Kull, C., & Rangan, H. (2015). Living with invasive plants in the anthropocene: The importance of understanding practice and experience. *Conservation and Society*, 13(3), 311–318.
- Hobbs, R. J., & Huenecke, L. F. (1992). Disturbance, diversity, and invasion: Implications for conservation. *Conservation Biology*, 6(3), 324–337.
- Hoelle, J. (2011). Convergence on cattle: Political ecology, social group perceptions, and socioeconomic relationships in acre, Brazil. *Culture, Agriculture, Food and Environment*, 33(2), 95–106.
- Innes, J. E., & Booher, D. E. (2004). Reframing public participation: Strategies for the 21st century. *Planning Theory & Practice*, 5(4), 419–436.
- Jiménez, E., Hidalgo, J. A. V., Rivero, P. P. G., Lliteras, M. T. F., Olmedo, P. C., & Fernández, C. (2007). Evaluación de la transpiración de E. globulus mediante la densidad de flujo de savia y su relación con variables meteorológicas y dendrométricas. *Boletín Informativo CIDEU*, (3), 119–138.
- Kapitza, K., Zimmermann, H., Martín-López, B., & von Wehrden, H. (2019). Research on the social perception of invasive species: A systematic literature review. *NeoBiota*, 43, 47.
- Keating, M. (2001). Rethinking the region: Culture, institutions and economic development in Catalonia and Galicia. *European Urban and Regional Studies*, 8(3), 217–234.
- Kull, C. A., & Rangan, H. (2008). Acacia exchanges: Wattles, thorn trees, and the study of plant movements. *Geoforum*, 39(3), 1258–1272.
- Lois-González, R. C. (2003). *Noves realitats territorials de Galicia* (pp. 151–176). Treballs de la Societat Catalana de Geografia.
- López Cerezo, J. A., & González García, M. I. (2002). *Políticas del bosque: Expertos, políticos y ciudadanos en la polémica del eucalipto en Asturias*. Cambridge University Press.
- Lutz, C. A., & Collins, J. L. (1993). *Reading national geographic* (Vol. 59). Chicago: University of Chicago Press.
- MAPAMA - Ministerio de Agricultura, Pesca, Alimentación y Medio Ambiente. (2018). *Resolución de 09 de febrero de 2018 de la Dirección General de Calidad, Evaluación Ambiental y Medio Natural, relativa a la solicitud de inclusión del *Eucalyptus nitens*, *Eucalyptus globulus*, *Eucalyptus camaldulensis* y *Eucalyptus* spp. En el Catálogo Español de Especies Exóticas Invasoras, presentada por el Concello de Teo (A Coruña)*.
- Martínez-Alier, J., Healy, H., Temper, L., Walter, M., Rodríguez-Labajos, B., Gerber, J. F., & Conde, M. (2011). Between science and activism: Learning and teaching ecological economics with environmental justice organisations. *Local Environment*, 16(1), 17–36.
- Novoa, A., Shackleton, R., Canavan, S., Cybele, C., Davies, S. J., Dehnen-Schmutz, K., ... Wilson, J. R. (2018). A framework for engaging stakeholders on the management of alien species. *Journal of Environmental Management*, 205, 286–297.
- de Paula Lima, W. (2010). *A silvicultura ea água: Ciência, dogmas, desafios*. Instituto BioAtlántica.
- Nunez, M. A., & Pauchard, A. (2010). Biological invasions in developing and developed countries: does one model fit all? *Biological Invasions*, 12(4), 707–714.
- Pereiro, X., & Prado, S. (2013). Cross-cultural perceptions and discourses between rural and urban in Galicia. In *Shaping rural areas in Europe* (pp. 227–245). Dordrecht: Springer.
- Pyšek, P. (1995). On the terminology used in plant invasion studies. *Plant Invasions: General Aspects and Special Problems*, 71–81.
- Rahman, M. A. (1991). *Action and knowledgebreaking the monopoly with participatory action-research* (No. 300.720172 A2).
- Robbins, P. (2004). Comparing invasive networks: Cultural and political biographies of invasive species. *Geographical Review*, 94(2), 139–156.
- Rose, G. (2016). *Visual methodologies: An introduction to researching with visual materials*. Sage.
- Seijo, F. (2005). The politics of fire: Spanish forest policy and ritual resistance in Galicia, Spain. *Environmental Politics*, 14(3), 380–402.

- Shackleton, R. T., Richardson, D. M., Shackleton, C. M., Bennett, B., Crowley, S. L., Dehnen-Schmutz, K., ... Larson, B. M. (2019). Explaining people's perceptions of invasive alien species: A conceptual framework. *Journal of Environmental Management*, 229, 10–26.
- Sobral, M., Bas, S., & Guitián, J. (2019). Os eucaliptos empobrecen a biodiversidade galega (pp. 79–80). Cerna.
- Soulé, M. E. (1990). The onslaught of alien species, and other challenges in the coming decades. *Conservation Biology*, 4(3), 233–240.
- Teixido, A. L., Quintanilla, L. G., Carreno, F., & Gutierrez, D. (2010). Impacts of changes in land use and fragmentation patterns on Atlantic coastal forests in northern Spain. *Journal of Environmental Management*, 91(4), 879–886.
- Tiébré, M. S., Vanderhoeven, S., Saad, L., & Mahy, G. (2007). Hybridisation and sexual reproduction in the invasive alien *Fallopia* (Polygonaceae) complex in Belgium. *Annals of Botany*, 99(1), 193–203.
- Tiles, M. (1996). A science of mars or of venus? In E. Fox Keller, & H. Lingino (Eds.), *Feminism & science*. Oxford and New York: Oxford University Press.
- Vadell, E., de-Miguel, S., & Pemán, J. (2016). Large-scale reforestation and afforestation policy in Spain: A historical review of its underlying ecological, socioeconomic and political dynamics. *Land Use Policy*, 55, 37–48.
- von Humboldt, A. (1808). *Ansichten der Natur mit wissenschaftlichen Erläuterungen*. Stuttgart, Germany: Cotta.
- Warren, C. R. (2007). Perspectives on the alien 'versus native' species debate: A critique of concepts, language and practice. *Progress in Human Geography*, 31(4), 427–446.
- Warren, C. R. (2021). Beyond 'native v. alien': Critiques of the native/alien paradigm in the anthropocene, and their implications. *Ethics, Policy & Environment*, 1–31.