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Attending to nature: Understanding care and caring relations in UK forest management

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Abstract

Increasing threats from pests and diseases fundamentally question what forest management is and must do in the 21st century. The sociological concept of 'care' offers new understandings of forest management as intimate and emotional relationships between people and trees. In this paper, we examine the empirical realities of conservation forest management at a UK publicly owned site to reveal the social, economic, and institutional contexts of care and caring relations and their role in management decisions.

This in-depth qualitative case study uses walking interviews with staff from all levels of the organisation and participatory data testing to show how care underpins the work of forest management, that forests are made and sustained through caring practices, and that management decisions are influenced by caring relations. Through the care framework we highlight the complexities of real-life decision-making and offer implications for forestry policy and practice. Applying the well-established components of care in a new setting, wherein the caring relations involve nonhumans, we extend care theory and demonstrate the potential of the single case study for deeply contextual forest and conservation research.

Keywords: forest management; care; trees; conservation; tree health; emotion

1. Vignette

Greenshire Forest is managed for conservation and recreation. John has worked here for twenty years, managing the veteran trees and working tirelessly to promote their value. John is a member of a professional organisation, corresponding with colleagues at other forests to develop his intimate knowledge of these trees. In his leisure time, John records woodland fungi with a local group, something he has done for many years. Like other forest managers he knows, John is very concerned by the decline in forest ecosystems and is looking at increasing income while preserving the forest for future human and nonhuman benefit.

2. Introduction

The urgency for new ways of understanding forest management stems from a range of threats, including the spread of pests and pathogens beyond their natural ranges (Brasier, 2008). Lawrence (2017: 51) has characterised this as "a coming time of extreme uncertainty and instability" and, in the UK, increased interest in tree health, particularly oak and ash, has led to changes in government policy and advice on forest management . However, policies and advice tend to be instrumental and rational , with the relational nature of forest management and the emotional influences unacknowledged at the core of decision making (Buijs and Lawrence, 2013).. Left unacknowledged, the risk is that decisions are made that do not align with people's relational understanding of and emotional investment in forest management. Such a misalignment undermines people's ability to care for and about forests.

With the rise in actual and potential threats from pests and diseases among other demands, difficult decisions need to be made around how to care for trees. The current challenges fundamentally question what constitutes forest management and how to make space for the emotional resources required. Multiple definitions of forests have emerged since the 1960s, broadening understandings of forest management from timber production alone to include ecological conservation, climate mitigation, and stewardship of ecosystems (Chazdon et al. 2016). In this paper we view forests as "complex systems composed of heterogeneous assemblages of individual agents (e.g. trees, animals, humans)" (Messier et al., 2015) and use the term 'nonhuman' to embrace all the species which, together with humans, make up the forest ecosystem (Herman, 2015).

Central to the processes of stewardship, underpinning sustainable forest management (UNFAO, 2018), are practices of strategy, planning, and intervention. Forest management teams, wherever they work, whatever the objectives, care for and about trees. In this paper, we define care as the paid and unpaid provision of support involving action and feelings (Thomas, 1993), and explore the empirical realities of management of a conservation forest (as experienced by people like John) by using Thomas's care framework, to reveal the actual and potential significance of care and caring relations between people and trees.

In sustainability science, care is increasingly identified as a motivating force in differentiating notions of stewardship from conventional approaches to management and governance (West et al. 2020). New frameworks are proposed to connect multiple meanings of stewardship, centred around care, knowledge, and agency (Enqvist et al. 2018) and to complement existing instrumental approaches to support justification for action, boost motivation, and broaden the spectrum of conservation practices (Jax et al. 2018). West et al. (2020) acknowledges care as "an embodied, collective and reciprocal practice involving humans and nonhumans".

The idea of forest management as care or as being made-up of care-taking tasks is rarely openly acknowledged or discussed in the sector: "Forestry, as a project of high rationalism, is particularly susceptible to the separation of emotion and management" (Buijs and Lawrence, 2013:109). Recent social science studies reveal an emphasis on attitudes as the main determinant of forest management behaviour, creating typologies of forest owner types, values, and objectives to understand and predict responses to policy instruments (Eriksson, 2012; Sauter, 2018; Blanco, 2015, among others). However, Ficko et al.'s (2019) review of private forest owner typologies questions their usefulness, stating: "In order to be realistic and useful in practice, typologies should be linked directly with forest owners' overt behaviour". They also find that typologies represent a snapshot in time when policy contexts are dynamic. What is missing from these studies is an acknowledgement of relational and emotional influences. The realities of forest management decision-making are dynamic, context specific, and exceed economic models and psychological frameworks. As de la Bellacasa (2011:198) suggests, care is "concomitant to life", present even when ignored or denied (Lawson, 2007). The care framework helps to uncover relational and emotional influences in decision making within their wider economic, social and institutional settings, while recognising the dynamic nature of care over time. Its aim is not to predict behaviour, but rather to gain a deeper contextual understanding of care, allowing us to create space for the emotional resources required in managing forests.

In this paper we draw on an in-depth qualitative case study of forest management for conservation at a single UK site, a large conservation forest with hundreds of thousands of

trees that we call Greenshire Forest. We investigated encounters between the management team and the forest, and how the team cares for trees. We discuss the social science literature on care and recent work on forest management, before moving to our methodological approach and introducing our case study. We then explore forest management at our conservation case study site using the care framework developed by Thomas (1993). We end with a discussion of the key insights emerging from forest management as care, the potentialities of this more care-full approach to forest management, and some avenues for future research. We encourage people to explore their own caring relations with trees or nonhumans as they engage with this paper.

3. Care and forest management

In the social science literature, care is regularly discussed in terms of caring for and about someone through caring work and feelings (Thomas, 1993). Studies have explored care as paid labour, as relations between family members, and as unpaid domestic activity (Milligan, 2000). Yet, the natural environment and those who care for it have also been affected by cuts to public spending (MacKechnie et al., 2011) and the notion of care is increasingly being applied to inter-species relationships. In this section, we introduce social science ideas about care, and then discuss how existing literature on forest management might make space for care.

3.1 What is care?

Care was first examined and conceptualised in the 1980s in the feminist literature (Graham, 1991; Thomas, 1993; Ungerson 1990; Finch and Groves, 1983; Tronto 1994), with scholars seeking to challenge both the prevailing gender ideologies and the types of research being undertaken, wherein questions of economic productivity were favoured over people's lived experience. At this time, care, even as waged work, was likely to be overlooked being generally outside the market. A key factor here was the gendered nature of care work, undertaken in domestic spaces, often with marginalised groups, such as the young or sick (Bowlby 2012; Daly and Lewis, 1998; Finch and Groves, 1983). Through a focus on care, feminist scholars explored important questions related to gender inequality and relations between capitalism and gendered power roles. Furthermore, these studies moved away from 'rational' models towards qualitative methodologies that examined the realities of people's lives.

To consolidate some of the ways in which care had been discussed, Thomas (1993:665) identified seven dimensions common to all concepts of care (see Table 1), thereby offering a more cohesive definition. These seven dimensions are the: social identity of the care-giver; social identity of the care-recipient; inter-personal relationships between care-giver and care-recipient; nature of care; social domain within which the caring relationship is located; economic character of the care relationship, and the institutional setting in which care is delivered. Importantly, Thomas' framework recognises the social, economic, and institutional settings of care.

**Table 1. **

Since then, social scientists have considered: *care of* someone or something by taking an interest in its wellbeing; *care for* by doing things; and *care about* someone or something that is rooted in deep emotion (Bowlby 2012). By considering care as "the provision of practical or emotional support" (Milligan and Wiles, 2010), empirical studies have emerged in settings as

diverse as friendship groups (Bowlby 2012) and bioscience laboratories (Kerr and Garforth, 2016). Types of care-givers include the public sector, the market, the family, and the not-for-profit sector (Razavi, 2006), while the time required for care work is limited by the capacity and capabilities of the care-recipient (Madörin 2013, cited in Wichterich, 2015:87).

After Thomas, scholars have continued to develop a more expansive notion of care, including but not limited to studies around: 'bounded' and 'unbounded' care (Atkinson et al. 2011), wherein degrees of proximity are linked to emotional attachment between care-giver and care-recipient; 'caringscapes' by Popke (2006) that draws attention to the spatial and temporal aspects of care, and its makeup of associations (Greenhough, 2011); 'care ethics' (Tronto, 1994; Cloke, 2002), a focus on understanding "who has access to care and who does care work" (Lawson, 2007); and the moralities of care, acknowledging that care is not always positive (Tronto, 1994), when creating dependency (Conradson, 2003). Critiques of care scholarship have tended to focus on the absence of analysis of racial and class dimensions and unacknowledged, but assumed, roles for women as care-givers and children as care-recipients (Razavi, 2006).

Care is an important means of understanding how people relate to the world around them, and the relationship between people and trees is no exception (as our vignette indicates):

> "Care work is understood to be tasks, interactions, labour processes and occupations involving care of others, physically, psychologically, and emotionally. Care work can be proactive or reactive, formal or informal, and when done by people, it may be paid or unpaid" (Coulter, 2016:199-200).

Care between humans and nonhumans is an embodied experience, emerging as touch and response-ability (Haraway, 2008; de la Bellacasa, 2015; Schuurman and Franklin, 2018) and can include nonhumans as care-givers and humans as care-recipients. Since the early 1990s, some scholars have sought to challenge and dismantle forms of dualistic thinking that enforce binary distinctions between the feminine-masculine, nature-society, subjective-objective, and irrational-rational. Giving way to care of, for, and about other species (Whatmore, 2006), an influential study in this area has been Haraway's work *When Species Meet* (2008) which describes her relationship of care and companionship with her dog. For Haraway, responding physically and emotionally to her dog is fundamental to caring relations, developing a sense of 'response-ability', namely commitment and obligation. In the case of plants, their cultural significance, agency, and the ways in which they are managed (Jones and Cloke, 2002; Head and Atchison, 2009), such as invasive plant management (Atchison and Head 2013), has attracted attention. What space is there for understandings of care and caring relations in existing social science work in and around forest management?

3.2 Potential contributions of care to the forest management literature

We identify three opportunities to make space for discussions of care and caring relations in forest management. First, recent thinking from human geography and allied disciplines allows us to say more about the relations between people and trees. Author (2010, p. 296) call for greater sensitivity to questions of scale, both spatial and temporal, to make connections between familiar landscapes, the lifecycles of geology, plants, and animals, and human action. Other studies include responding to nonhuman ways of being for forest biodiversity (Peltola and Tuomisaari, 2015), forest farms as entanglements of humans and nonhumans (Herman, 2016), embodied and affective encounters with trees (Pearce et al., 2015), and the roles and

motivations of those working with trees (Peltola and Tuomisaari, 2016). Such theoretically informed approaches create spaces to think differently about forests as entanglements of people, trees, and other species. A second opportunity is in emerging work on emotions in forest management, whereby private owners of inherited forests often make decisions on emotional, rather than economic, grounds to honour past generations and protect their own legacy (Lähdesmäki and Matilainen, 2014). Such emotions are reinforced within the owner's social networks, further influencing management practices (Vainio et al., 2018). Forest management conflicts are shown to involve emotional dimensions that are regularly unacknowledged, resulting in issues around problem definition and decision-making (Kennedy and Vining, 2007) and compounded by workplace cultures that emphasise 'rational' processes and suppress emotional responses (Vining and Tyler, 1999). Focussing largely on local communities, Buijs and Lawrence (2013) identify the productive potential of people's emotional attachments to trees for joint action, although many forest managers may be ill-equipped to mobilise them. Further work exploring the emotional dimensions of forest management, calls for more detailed empirical studies of forest management as lived experience.

The third opportunity stems from recent work on tree health issues, based largely on qualitative methods, that has sought to explore and understand forest managers' knowledge (Marzano et al., 2015, 2016), how this is used to frame tree health issues (Marzano et al., 2017), and what forest managers are doing in response (Lawrence, 2017), as well as to highlight the agency and resilience of trees in forest management (Dandy et al., 2018; Author). Such work exposes the complex relations between people and trees and the transformation of longstanding management practices in light of increased threats to trees. Caring relations have the potential to reveal critical information about the challenges associated with forest decisions, particularly when there are competing interests based upon the legacies, actions, and hopes of past, present, and future generations.

In what follows we use Thomas's care dimensions to explore the relational and emotional facets of forest management and human-nonhuman relations in a conservation forest. In the next section we introduce our case study and outline our methodology.

4. Methodology and case study

There are relatively few situated accounts of forest management. Earlier qualitative studies have tended to focus on specific forest management roles or forest types, with data collected across several sites, affording only a narrow perspective on the professional and personal influences at play. In our research, we adopted a single case study that allowed for a fuller examination of the social, economic, and institutional contexts that might affect decision-making. In the methodological literature, there has been considerable discussion of case study approaches. Yin (2014, p. 21) argues that single case studies may lead to important insights that may be "generalisable to theoretical propositions and not to populations or universes". Our decision to focus on one conservation forest means we have been able to explore the well-established components of care in a new setting and involving nonhuman species, while providing empirical data on everyday decision-making; we do not claim transferability of our analysis to other locations,

4.1 Greenshire Forest

Greenshire Forest covers several hundred hectares, comprising mainly broad-leaved deciduous woodland, with many ancient pollards, along with open grassland and water bodies. Parts of the forest are legally protected for conservation purposes. Historically, the forest was used for hunting, timber, and livestock grazing and in the nineteenth century there was a sustained campaign to save the forest. Now managed by a public authority, senior management is based at its urban headquarters several miles away. The authority's forest management objectives are environmental and social and the forest-based team develops the management plans and deals with operational issues. Current pressures such as climate change, air pollution, encroaching development, increasing visitors, tree health risks, and financial constraints present a complex set of challenges for the management team.

4.2 Data collection

An important element of our single case study approach was deep researcher engagement with the forest's management processes over twelve months. This involved attendance at meetings, at the authority's headquarters and in the forest, of forest managers with internal and external stakeholders, and documentary review. Stakeholders included regulatory and funding bodies, local groups, and professional organisations. Diverse documents were reviewed, including management reports; regional, local, and site-specific policies, plans and applications; academic studies; historical accounts; media; volunteers' newsletters and websites. This engagement provided important background information that fed into the interview design and analysis.

Data collection for this paper comprised of semi-structured interviews (Bryman 2012, p, 471) allowing for free-flowing responses. Most of the interview was spent outdoors, walking in and interacting with the forest, following a route chosen by the participant. The interview questions covered organisational and practical matters and, on a more personal level, questions about professional and personal motivations; what the forest meant to them; how they felt about the forest's future; their favourite place in the forest, and anything else they wanted to share.

Following a pilot interview at another site, interviews were carried out in 2017-18. The care literature acknowledges that care-givers are usually women, yet in forest management the reverse is the norm. We had 14 participants, including four women, ten individual interviews and one group of four. Interviews lasted up to two hours, with the same interviewer. We purposively selected participants from all levels and locations of the organisation, from elected politicians at the urban headquarters to arborists in the forest. Local volunteers and community representatives were also interviewed. Not all the participants worked directly with trees, those who did had job titles such as 'conservation arborist' or 'ecologist'. Those who were office-based, were engaged in what we call forest matters, such as strategic planning, land management, and the organisation of work (see Figure 1). In common with other forestry studies (Lawrence, 2017, among others), we have not identified the forest or individual roles to ensure participant anonymity.

**Figure 1. **

4.3 Data analysis

The interviews were recorded, transcribed professionally, and then shared with the participants for their comments, a form of participant validation for credibility (Barbour, 2001). Each transcript was coded, manually and using NVivo software, using an open coding scheme

based on the interview guide. Further codes and sub-codes were added as new topics emerged from the data (Bryman 2012, p. 568).

The coding was carried out by one person and issues of reliability were addressed by refining the codes following the pilot interview and intra-coder reliability tests (Joshi et al., 2011). The codes were then analysed thematically by grouping the codes into themes around which the empirical findings were structured. To further mitigate coding bias, “investigator triangulation” (Denzin, 1970; cited in Archibald, 2015) with three other project social scientists was carried out. The group then considered the theoretical implications alongside processes of management emerging from field notes and documents.

Through the analysis two stronger than anticipated themes emerged. Firstly, that responding to pests and diseases was inseparable from wider forest management , and, secondly, that participants were deeply attached to Greenshire Forest and concerned for its future, adopting a range of professional and personal strategies in response. This paper presents the analysis of the emotional attachment aspect of the data within the broader forest management context using Thomas’ seven dimensions of care.

4.4 Data testing with participants

The small number of participants led us to question how representative these findings might be of other forest managers. Silverman (2000) defines validity as the “extent to which an account accurately represents the social phenomena to which it refers” and we decided to test our analysis by holding a “Data Party” (Franz, 2018), a novel participatory workshop, in September 2018. Participants comprised seven of those interviewed at Greenshire Forest, eight managers / owners from public and private forests of different sizes and management objectives, and four specialist forestry advisers. Participants were asked how the dimensions of care related to their own experience, specific aspects of the findings, and whether anything was missing. Participants strongly identified with care as a useful way to think about forest management as it surfaced managers’ emotional attachments. There were no substantive differences between participants from conservation and commercial or public and private forests, suggesting forest managers, wherever they work and whatever the objectives, care for and about trees.

5. Forest management as care

In this section, we present the results of our analysis of the interview data following Thomas’s (1993) seven dimensions of care. When selecting quotes, we chose those that were illustrative of the care dimensions and, where relevant, represented different views.

5.1 Defining the care-giver and care-recipient

5.1.1 The social identity of the care-giver

The balance of decision-making powers between the authority and the forest-based team suggested that the definition of a care-giver in this case study included not only individual humans but also the institutions, in line with the analysis of Razavi (2006). The owner of the forest, the public authority, depicted its role as protector of the environment and facilitator of public culture and wellbeing. The forest-based team made recommendations for local policies and certain operational actions, e.g. removal of Rhododendron, in official reports, for the authority’s approval.

The key social characteristic defining individual care-givers in Greenshire Forest arose from their occupational and leisure-based roles. Participants' descriptions of occupational roles included arborists, ecologists, and land managers. Leisure-based care involved deep engagement with nature leading to expertise which was drawn upon in the professional role. Leisure roles included bird watcher, licensed bat handler, bushcraft instructor, and hedge-layer, sometimes in parallel with occupational roles. In some cases, leisure-based caring inspired career paths:

"the original motivation to become a tree surgeon was a love of trees and a love of outdoors and a love of expressing myself physically through bodily movements, climbing three-dimensionally through a living object is something really quite special, which not a lot of people get to experience" (IP11).

More than one participant mentioned that their leisure interests led them to apply for jobs in the Forest, suggesting a blurring of roles and potential amplification of vocational commitment.

"I did a five year study on bats in [named part of the forest] … I was looking at how our management work affected the… foraging behaviour of local bat species" (IP10).

5.1.2 The social identity of the care-recipient

In Greenshire Forest the main care-recipient were the nonhumans. However not all care-recipients were cared for equally. Due to economic constraints, care-givers were unable to care for the whole forest as they would like:

"It's quite tough… on a lot of those areas where they're not being managed today and remaining dark, things are falling over… we've got lots of ancient trees, we're going to lose them" (IP9).

Forced to choose who or what was afforded care, care-recipients were framed based on rational as well as personal preferences across the different institutional levels. Criteria included conservation importance, socio-cultural identity, and health and safety as well as socially constructed hierarchies. This resulted in framings of nonhumans into binary groupings, including healthy and unhealthy specimens, native and non-native species, young and old, and rare and common species. In the forest some young trees were removed to give space for ancient trees and relating to pests, one participant used the native and non-native binary to comment on the removal of rhododendron to stop the spread of *Phytophthora ramorum*:

"reducing the potential damage to the forest as a whole by removing something that… isn't native anyway, and has got something on it that could spread, then it's a bit of no-brainer really" (IP1).

Forest managers recognised the different spatialities of care-recipients for example by framing individual trees as habitats and using this to influence their decision making.

"…protection of an oak tree is really protecting that oak forest habitat and all the other species that are then associated with that habitat" (IP3).

Beyond accepted rational criteria, forest management decisions were influenced by the personal preferences of those working at all levels of the institution. Higher management afforded a level of discretion at the ground level and proposals for specific tree management, which were partly based on personal preferences, were put forward and supported by higher

management. Participants expressed preferences for certain bird species “I would love to hope that some of the bird species like nightingales, that we could actually get them back and by our habitat management” (IP9), and tree species: “I do love oaks as an individual species… it’s the iconic English oak” (IP1). Others indicated their appreciation for trees with historical significance: “You can’t help being influenced by the trees and some of the trees have individual names and histories” (IP8)

5.2 The nature of caring relations between people and trees

5.2.1 The interpersonal relationship between the care-giver and care-recipient

The interpersonal nature of the relationship between care-giver and care-recipient is defined in terms of “ties or bonds signifying degrees of personal familiarity and obligation” (Thomas, 1993:652). In the Forest participants drew on their occupational and leisure activities, describing bonds at both the individual and institutional level.

Personal and institutional familiarity were framed by participants in two ways: (1) the distance between the care-giver and the forest; and (2) the length of time spent in a caring role. In terms of distance, some participants lived locally to the forest, while others worked at the authority’s urban headquarters. Participants discussed the implications of distance for the care of the forest: “most of the members of the [authority] don’t live anywhere near here and don’t have any knowledge of the Forest” (IP2). The perception that proximity positively affected decision-making was challenged by the understanding shown by headquarters-based participants.As for time spent in a caring role and the resulting deeply held knowledge about the Forest, a high degree of personal familiarity with Greenshire Forest was built over decades, in some cases from childhood: “As a child I was walking in it, playing in it… from the age of 11, 12, I was natural historicising” (IP2)

“[Greenshire] Forest was one of the main reasons for getting on to the [authority], just because I was born [nearby], grown up there my entire life” (IP1)

Extended occupational caring in one forest was particularly valued, with one professional with 10 years’ experience described as a “newbie” (IP6) by his peers. Participants expressed concern at the loss of in-depth site knowledge as long term care-givers moved jobs or retired. The types of knowledge that indicated familiarity were technical, ecological, and/or scientific, gained through work and leisure activities or formal education. For the authority also, its decades-long role in preserving the forest produced historical knowledge which highlighted changes to the forest ecosystem: “when you’re looking at biological records for, even like just 30, 50 years old, you just want to cry… it’s all gone” (IP10).

The bonds of obligation were discussed in terms of both personal and institutional commitment to the forest. Beyond occupational roles, participants described how they spent their leisure time in caring activities, such as giving public talks and being involved in local groups. For one, a sense of responsibility reinforced their loyalty to the Forest: “The ancient trees are amazing; you gradually get into the ‘I can’t leave these to somebody else’” (IP9). Others showed commitment by extending their place-based relationship with the Forest forward to the next generation and others: “my kids love that particular tree… if I have friends who don’t know the Forest well, that’s the sort of place I’ll take them to” (IP8). Personal commitment also extended to the past with some describing how they returned to sites where they had worked previously to view progress: “to see what you did 20, 30 years ago and how it’s looking now. It reassures you that you’re doing broadly the right sort of things” (IP3).

The authority's bonds of obligation arose from two sources, firstly legal requirements relating to health and safety, pests and diseases, and the site's designations for nature conservation. Meeting the requirement to maintain the site in a favourable condition involved a broad caring approach: "all those individual components, particularly the veteran trees, have to remain healthy" (IP8). Secondly, caring commitments beyond minimum legal requirements were evident, such as the provision of "social goods and public service" (IP8), with the authority's historical role in preserving the forest mentioned: "you do feel you have the hand of history on your shoulder in this job" (IP8). Despite the distance of the authority's headquarters from the Forest, its longstanding connection to the forest underpinned its statutory and voluntary obligations to protect the forest and secure its future: "we'll be handing it on in as good a condition or better than it has been in for the last 50 years" (IP3).

The analysis suggests that distance to the care-recipient did not affect institutional familiarity significantly, perhaps due to the regular formal and informal discussions between the headquarters and forest teams, and that bonds of obligation manifested in the authority's strategies and policies, as well as individual personal commitment.

The participants also talked about the benefits the forest provided to humans, such as biodiversity, water, and cultural services. This fits with recent attempts to include a reciprocal dimension in reframing ecosystem services as Nature's contributions to people (NCPs) (Diaz et al, 2017).

5.2.2 The nature of care

Caring is described by Thomas (1993) as either feeling and activity together or activity alone, while sociological studies suggest caring about something can motivate caring actions (Katila, 2002). In this section, we consider the nature of care in forest management as both feeling *and* activity.

5.2.2.1 Caring feelings

The participants, wherever they were based, described positive and negative emotions associated with their caring relations, including affection and even love: "I live and breathe the forest" (IP2). "we all have a passion for nature and so that's always going to reflect on our interest in what we do" (IP6). These intense feelings supported participants' bonds of obligation: "we would certainly not want to lose our forest and I think that whatever it took to preserve it … we would accept that and work to maintain it" (IP14).

Participants also described positive feelings for trees they had worked on, parts with childhood or family connections, areas with specific natural characteristics, features of historical significance, and places of quiet and beauty. Negative emotions also featured as participants described feelings of grief over ecosystem losses: "A skylark was singing there last year… Suddenly, the sense of place… it's had its heart ripped out." (IP9). When asked to imagine the future of the forest, participants were uneasy about the long-term implications of their forest management decisions: "But who knows really? Are we just dabbling? In 100 years' time they're going 'What the hell were they doing that for?'" (IP10).

Participants also expressed frustration at damage caused by human and nonhuman visitors to the Forest and wanted to limit public access as a result:

"God, look at the litter exposed by our cutting. That's a real bugbear, god, if we could just change people's attitude … it's probably quite a large number of people that don't care" (IP9).

“Dogs, I oppose dogs… People are letting their dogs bite into trees and it’s, the other issues around dogs as well. Faeces, urination, and stuff” (IP4).

Participants’ feelings about the forest were suffused with personal meanings and, while public opinion about the forest was a management consideration, the occupational and personal attachments of those involved in forest management may unknowingly have influenced the authority’s decision-making (as suggested by Vining and Tyler, 1999). Yet, caring feelings motivated caring activities.

5.2.1.2 Caring activities

The participants made clear that forest management involved much more than looking after trees, with planned and reactive work relating to administration, car parks, contractors, livestock, and education activities mentioned. Administrative tasks involved staff supervision, internal and external communication, strategy writing, applying for grants, regulatory compliance, and policy-making. The balance of administrative and practical tasks varied between roles and increasingly used technology: “I don’t have much contact with nature now really, I have a lot of contact with budget sheets, disciplinary, HR issues, strategic planning” (IP 8). If time available for hands-on caring was reduced for some participants, then the extended timescales of trees meant that care activities also extended temporally: “A 100-year tree strategy… Everything is looking way beyond our lifespans, it’s long long-term vision” (IP3). Yet, not all care decisions resulted in action; ‘doing nothing’, for example allowing natural regeneration of trees or leaving deadwood in place, was sometimes thought to be the best approach.

Those who were regularly in contact with trees described a range of practical caring tasks such as pollarding and spraying pesticides. These tree work practices revealed the embodied nature of care in forest management:

“[one] thing that’s really interesting is creating new pollards… you look at a relatively young tree, maybe only a 40, 50 year-old tree, and you take the top out of it and see if you can get it to sprout and produce the new stems” (IP3)

“When you start climbing one of these big, old trees, on the way up you begin to understand how it moves and how it feels underneath you and how it responds to your weight. It’s very tactile” (IP11).

Participants were also involved in occupational and leisure-based research-type activities in the forest, such as monitoring, counting, identifying, and recording to inform management policies. Notwithstanding this, not all care activities were regarded as beneficial: “they have produced a number of management plans of the forest - all of which I’ve spoken out quite strongly against but being a minority didn’t make a lot of progress” (IP2).

The authority’s caring approach was set out in its management plans yet care-givers were also known to disagree on the best form of care based on their professional perspectives. One participant highlighted the difference between silviculture and arboriculture: “[in silviculture] you are encouraging oak trees through a thinning programme and… you’re growing a nice straight stem of timber; we don’t have any of that [here]” (IP3).

5.3 The caring context in forests

5.3.1 The social domain within which the caring relationship is located

We found that the social domain within which forest management was located was discussed by participants in terms of management objectives, decision-making processes, and knowledge networks. At this site, the management team aimed to conserve the forest while maintaining access for public recreation. This resulted in differences of opinion over which objective had priority; one participant said: "…ecology-wise and natural history… put a big wall round it" (IP10), while another concluded: "We don't want to put a big fence around it and say 'You can't come in', it's very much open access" (IP3). These objectives were perceived by some as mutually exclusive, with participants describing the impact of increasing visitor numbers in terms of ecological damage, such as soil compaction or fungi picking. Others maintained that without public access the forest's future would be uncertain: "If you're going to reduce the number of people that go to the wood … there's not much point in having the wood. I would go that far" (IP5).

As a public organisation, formal decision-making processes existed at every level. Local interest groups lobbied the authority, and their knowledge was sometimes called upon, yet some participants from community organisations felt that they were not consulted enough. Public attachment to the forest meant that staff felt that communications about caring operations risked negative responses: "…trees do need to be removed sometimes… it's that whole thing about making people understand and sometimes you can't, they just simply won't accept it". (IP7)

Care-givers required knowledge and skills to perform their caring activities. Occupational knowledge was shared though training, events and social structures such as professional organisations and biosecurity groups. Sources of leisure-based knowledge involved family, local groups, site visits, and observation. The role of nonhuman networks was also acknowledged as supporting the forest's natural regeneration:

"We do have a lot of regeneration… [planted] trees just don't establish as well as a tree that's done it itself… It's got all its mycorrhizal connectivity" (IP10).

The social structures of decision-making in the authority included the public, while other local people proactively engaged through volunteering. Human social structures acted as knowledge exchanges for care-givers, while nonhuman networks supported the establishment of new trees.

5.3.2 The economic character of the care relationship

The main economic distinction identified in the literature is between the waged and unwaged nature of caring. While the uncompensated care work of nonhumans was conceptualised as NCPs, waged and unwaged human work was a feature in the Forest. Some staff purportedly took a pay cut to work in the forest:

"we have incredibly talented arborists, many of which could earn a great deal more in the private sector dragging *Leylandii* out of people's back gardens" (IP8).

In effect, these arborists worked partially unwaged because they were keen to work with ancient trees, while earlier we saw that forest staff worked in their leisure time out of their sense of obligation to the forest. Volunteers, on the other hand, were unpaid and through their caring activities fulfilled personal obligations to the forest: "we are happy to volunteer without reward, because we see it as a contribution to the environment" (IP14). Unwaged volunteers were of economic benefit to the institution, severe financial restraints in the public sector

means that cost-cutting and income generation had become increasingly important: “we’ve identified that this is an expensive thing to do and to do it well we need more income” (IP8).

The authority adapted to these financial pressures by adjusting the management objectives, imposing income goals and expenditure limits, with implications for their caring obligations: “You can’t just do the management for the benefit of wildlife, that’s one of the motivations, but I think there has to be an economic aspect to it as well” (IP3). Economic pressures meant reprioritisation of scarce resources to meet demands, such as removing unsafe trees and costs relating to pests and diseases, particularly notifiable pests where monitoring and treatment was a legal requirement. One described the ecological and economic factors involved in selecting a pesticide:

“One’s more specific but you can only do it at certain times of the year… [or] you have to use this general one which just wipes out every Lepidoptera… And it’s a massive amount of money as well” (IP10).

In this forest some paid staff also carried out unpaid caring work, while unpaid volunteers supplemented limited paid human resources. Maintaining caring activities in the face of financial pressures meant forest managers were turning towards managing nonhumans to yield NCPs and income for humans in order to pay for tree care.

5.3.3 The institutional setting in which care is delivered

The care literature defines the institutional care setting as the physical location of caring activities and, in Greenshire Forest, there were several. First, the forest was the primary care setting, with care for nonhumans taking place according to management priorities and resource availability. Parts of the site were the setting for legally required care activities relating to nature conservation.

Second, administration as a caring activity occurred at different levels of the institution. At the operational level, it took place around the forest in offices, meeting rooms, vehicles, and other spaces used by care-givers. Strategic planning and decision-making took place at the institution’s urban headquarters, in offices and formal committee rooms, involving legal procedures and long-established protocols. The historical narrative was important to management coherence between the caring locations:

“it’s being true to our history… we don’t need a creation myth, we’ve got a very well documented story about why we’re created but we’ve in many cases lost contact with it. So it’s important to keep telling that story to modern audiences” (IP8).

Earlier, participants suggested that distance from the forest diminished an individual’s commitment to its care, yet here we see that care extended spatially beyond the open air of the forest to other spaces, such as institutional buildings. In a large organisation, administration relating to strategy, finance, and policy were essential to the execution of operational caring activities in the forest. Although one participant suggested that “the real work is done” (IP2) when committee members held their regular visits to the forest, in this case, the main locus of power was away from the forest.

6. Discussion

Returning to John in our opening vignette, forest management, as practice and attendant decision-making, can be framed as care work. This is particularly evident in Greenshire Forest

where forest management contends with ill health of any species or ecosystem and is motivated by a broad set of objectives including conservation and recreation. We consider forest management as caring relationships between humans and nonhumans that influence and inform decision making and practices. The gaps identified in the literature call for greater qualitative attention to be paid to how forest management is practiced, to achieve a more reflective and reflexive practice. At a time of increasing threats to trees, this paper shows the relevance of a theory of care to forest management as it relates to motivations for action, mutualistic relations between humans and nonhumans, and the complex relationships in which decision making is situated. Framings of forest management relationships as stewardship have started to include care as a dimension of that relationship along with knowledge, and agency/practice/enactment (Engvist et al., 2018, West et al., 2018). Following from our in-depth case study in Greenshire Forest, in Table 2, we reprise Thomas' seven dimensions of care as they might apply to human-nonhuman relationships. We identify how knowledge, agency, and enactment stem from care, offering four areas of insight relating to the opportunities identified earlier.

Table 2.

6.1 Care underpins the work of forest management

Care – as both feeling and activity – underpins and motivates forest management. Care is embodied and expressed as an emotional investment that draws on positive attachments to individual trees and other elements of the forest, as well as feelings of grief and unease over its future. Regardless of their role in the forest, our participants described emotional embeddedness in the forest, for some starting in childhood and for others spanning their career and multiple different jobs. While this might be more particular to forests with primarily conservation and recreation management objectives, these objectives are becoming increasingly prominent across forest types.

Participants in our research rarely described a distinction between occupational and personal interests (a point also made by Peltola and Tuomisaari (2016)), rather they oscillated between these roles, maintaining their enthusiasm for and emotional investment in the forest. As an activity, care involves a range of tasks. Some of these tasks are practical and hands-on with trees, others draw on expert knowledge, others involve detailed administration; in forest management, policy, planning, funding applications and paperwork is care. For many, emotions motivated action that was not just tree-related; for others, such activities were part of the job. Emotion and activity are mutually reinforcing, leading to increased knowledge and expertise. This is not to say that care gives rise to undisputed decision making, outcomes may be uncertain or may compromise some objectives while meeting others. These sometimes-conflicting positions are compounded by the forest itself, an ever-changing and contested space that serves multiple objectives concurrently: conservation site, public recreation space, income generation. Familiarity and personal commitment might be mobilised to challenge decision-making, with views strongly and passionately held, while statutory obligations mean that care-taking involves compliance, sometimes mediated by personal preferences or local priorities. For some, their personal activities gave them agency to act on care in a way that might be constrained within their professional roles.

Therefore, understanding the social domain of forest management, for example management objectives and decision-making processes, is as important as understanding the on the ground practices of forest management.

6.2 Multi-dimensional care

Care is multi-dimensional across space, time and, as described above, social domains. Tree health management brings the spatial implications of decision making into focus, with national policies being applied at a local level having implications that are go beyond the issue in question. In Greenshire Forest, when discussing how statutory obligations required trees infested with notifiable pests to be treated with insecticides , this had direct negative implications for other insect species and drew resources away from actions which benefit trees with higher conservation priority. Yet, care-work maintains the forest even as management objectives shift, pests and diseases increase, or career paths divert.

This dimension of time has resonance when thinking with trees, where the interconnected and interdependent lifespans - from centuries to days - of multiple species , are overlaid with the short-term timescales of human management and decision making . The implications of management decisions in the past play out in the present and the very landscape that the managers of Greenshire Forest sought to conserve is an artefact of social and cultural human history. The legacy of their caring activities was an important consideration for our participants and while conservation management objectives at Greenshire Forest allowed managers to take a longer-term perspective than timber production managers, tree timescales give forest managers, no matter the objectives, a responsibility that will likely last beyond their time in the role and even their lifetimes.

6.3 Care as relational

Forest management decisions involve complex caring relations between humans and nonhumans. Care is given and received in more than one direction: between humans and between nonhumans and humans. While the personal and professional emotional bonds that our participants felt for the nonhumans in their care were satisfied through caring activities, their care for the forest has wider societal benefit in terms of nature's contributions to people. For some the conservation objectives of the forest were about protecting the intrinsic value of the forest as a whole or a particular group of species, which inevitably led to a hierarchy of priority species , undoubtedly influenced by personal preferences, with those of greatest perceived conservation value getting most care. In Greenshire Forest, often unacknowledged personal subjectivities influenced decision making yet 'evidence-based' policy often discounts social and cultural values.

Prioritising nonhumans led inevitably to conflict with recreation and access objectives, as human well-being is bound up in caring for nature as a space for leisure and recreation (Jax et al., 2018), even when the benefits to wider society may negatively impact parts of that nature. Funding for conservation management is dependent on expressions of care for nature, as manifested through policies, and the trade-off between human and nonhuman wellbeing is not always explicit.

6.4 Enacting care

While the challenge of thinking with nonhumans, and particularly plants, remains, care for them, for their own benefit and the benefit of humans, is apparent through the emotional bonds that our participants describe. Like Jax et al. (2018), we found that the ability of our participants to enact that care within the functionalist and rationalist system that they operate in was problematic. Our data shows that emotion is highly influential in decision-making, acknowledging this, and making space for it would allow humans to give greater

representation to the interests of nonhumans as they see them. Our participants had found ways to subvert official narratives of forest ill health by developing treatments and research based on their own observations, but resources were limited as these actions were semi-official. Entanglement holds the key to management in uncertain times. While our work was conducted in a forest with primarily conservation and recreation management objectives, ill health is just as dominant an issue in production forests. Allowing emotion, and consequently care, into forest management would allow space for more creative responses to ill health.

7. Conclusion: challenges and potentialities of caring for trees

In this paper, we have examined the empirical realities of conservation forest management at a UK publicly owned site to reveal the social, economic, and institutional contexts of care and caring relations and their role in management decisions. This in-depth qualitative case study has shown (1) that care underpins the work of forest management, (2) that care is multidimensional across time and space, (3) that forest management decisions are influenced by caring relations and emotions and (4) that forests are made and sustained through caring practices. In this context trees have emerged as both care-recipient and care-giver, motivating human actors to care for and about them. While we do not claim transferability of our analysis to other forests, these insights have resonated strongly with forest managers from other UK locations attending our Data Party. Therefore, we consider this paper as a first step towards encouraging those involved in forest management research, policy, and practice, to make space for care to support decisions that align with people's relational understanding of and emotional investment in forest management.

We have also extended care theory by applying the well-established components of care in a new setting which involves caring relations between humans and nonhumans and demonstrated the potential of the single case study for deeply contextual forest and conservation research. In the context of increasing threats to tree health and where economic pressures mean not all care-recipients can be cared for equally, further questions arise: what is ‘good’ care and what are the moralities involved when vulnerability and dependency are often central to the care of nonhumans? To further refine our understanding of care in forest management, we suggest future research applies the care framework in other settings, for example in commercial timber production and urban areas, in the UK and internationally. Social scientists interested in care, and researchers working in and around forests, could usefully learn from a more care-full attention to the on-the-ground relations between people and trees. If forest management in the 21st century recognises care and caring relations it could better support people like John in our vignette to continue to care for and about forests.

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Dimensions	Description
Care-giver and care-recipient	
1. Social identity of the care-giver	Social characteristics defining care-givers: (1) gender; (2) familial or occupational roles.
2. Social identity of the care-recipient	Social characteristics defining those in receipt of care: (1) group membership, e.g. age; (2) dependency status, e.g. policy-defined dependency, such as the elderly.
The nature of caring relations	
3.Inter-personal relationships between care-giver and care-recipient	The nature of the relationship defined in terms of bonds signifying degrees of personal familiarity and obligation: ranging from family/friendship to between strangers (e.g. statutory).
4. Nature of care	The primary social content of caring, either: (1) feeling state (emotion, affection) – 'caring about someone'; or (2) activity state (work, labour) – 'caring for someone'. Can be both feeling and activity.
Caring context	
5. Social domain within which the caring relationship is located	The social division of labour in capitalist society between the public (formal care - paid/voluntary) and domestic (informal care).
6. Economic character of the care relationship	The waged and unwaged status of caring work, governed by normative obligation or monetary transactions.
7. Institutional setting in which care is delivered	Physical location of caring activities e.g. home or institutional/organisational setting.

Table 1. The seven dimensions common to all concepts of care (based on Thomas, 1993)

1. Social identity of the care-giver	Humans care for nonhumans in both professional and personal roles, underpinned by care.
2. Social identity of the care-recipient	Nonhumans receive care according to hierarchies socially constructed by care-givers' preferences and policy objectives.
The nature of caring relations	
3. Inter-personal relationships between care-giver and care-recipient	Human care-givers' personal commitment derives from familiarity with and proximity to nonhumans in occupational and personal roles over extended periods. Institutional caring is influenced by legal obligations and social norms. Nonhumans offer contributions to all humans, whether care-givers or not. These contributions could also be described as care.
4. Nature of care	Caring feelings for nonhumans include affection, love, sadness, and fear for the future. Caring activities occur in direct contact with nonhumans, as well as being mediated through decision making. The outcomes of care are not positive for all organisms. The outcomes of care may not be immediate, temporally or spatially, but may emerge in the future or at a distance.
Caring context	
5. Social domain of the caring relationship	Caring for nonhumans is enacted through formal (professional and amateur) and informal (personal) social structures.
6. Economic character of the care relationship	Care work by humans is paid and unpaid, often motivated by a strong attachment to nature. Humans manage natural assets to yield nature's contributions to people, with the expectation that nonhumans will make reciprocal contributions to people.
7. Institutional setting in which care is delivered	The location of caring activities extends beyond the nonhuman site to human decision-making places and domains of policy and planning.

Table 2. The seven dimensions of care applied to human-nonhuman relationships (based on Thomas, 1993)

	Working directly with trees (n=5)	Working on forest matters, often in the forest (n=5)	Working mainly on forest matters, office based (n=3)	Partly working on forest matters, office based (n=1)	

Figure 1. Interview participants showing proximity of work activities to the forest.