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LETTER

The diversity of people's relationships with biodiversity should inform forest restoration and creation

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Abstract

Forest restoration/creation is a policy focus worldwide, with initiatives pledging to plant billions of trees. While there is an emphasis on providing "the right tree in the right place," we need to understand for whom the trees are right. Such social dimensions are frequently overlooked, despite being critical to successful forest restoration/creation. We used Q-methodology to examine what forest biodiversity attributes (e.g., functions, behaviors, colors, smells) people ($N = 194$) relate to and how in Britain. We found that shared public perspectives on biodiversity attributes are multifaceted, influenced by personal experience and vary across taxa. This heterogeneity highlights the importance of gaining a richer understanding of human–nature relationships, as restoration/creation initiatives need to deliver biodiverse forests to accommodate the plurality of preferences brought to bear upon them. Based on our findings, emphasizing biodiversity in forest restoration/creation should contribute to greater use of, comfort in, and meaningful engagement with, forests in the future by a wider set of publics.

KEYWORDS

climate change mitigation, ecosystem services, forest creation, forest restoration, human wellbeing, human–nature interactions, Q-methodology, reforestation, tree planting, woodland

1 | INTRODUCTION

Biodiversity conservation and ecosystem service delivery are underpinned by intact habitats (Chase et al., 2020). However, pervasive anthropogenic pressures are reducing the extent and quality of habitats worldwide, driving biodiversity loss and constraining ecosystem functioning (Williams et al., 2020). Given humanity's reliance on nature, international cooperation is required to reverse environmental degradation (Díaz et al., 2019). The Convention on Biological Diversity's (CBD) "Post 2020 Zero Draft" outlines global agreement on the need "to put biodiversity on a path to recovery" before 2030 (CBD, 2020). This urgency is further underlined by the United Nations (UN) Decade on Ecosystem Restoration (https://digitallibrary.un.org/record/3794317?ln = en).

Forests (including woodlands) are one of the world's most productive land-based ecosystems and essential to life on Earth (FAO & UNEP, 2020). Consequently, forest restoration is one of twelve targets for maintaining "Life on Land" (Sustainable Development Goal 15; FAO & UNEP, 2020) and has become a policy focus worldwide. A series of international initiatives have been devised and implemented to retain, restore, and create forests, including Reducing Emissions from Deforestation and Forest Degradation (REDD+) (Alexander et al., 2011); the complementary Bonn Challenge and New York Forest Declaration, calling for the restoration of 350 million hectares of degraded forest by 2030 (Stanturf & Mansourian, 2020); and the UN Strategic Plan for Forests 2017–2030 (UN, 2017). Indeed, public and private forest initiatives have pledged to plant billions of trees worldwide (Seddon et al., 2021), but these interventions can have low success rates and/or fail to meet anticipated outcomes (Duguma et al., 2020).

Forest restoration/creation programs often seek to provide so-called "triple wins" for climate change, biodiversity, and human wellbeing (Pritchard, 2021; Zhang et al., 2021). However, many often overlook the social (Erbaugh et al., 2020; Irvine & Herrett, 2018) and cultural impacts (Dodev et al., 2020; Seddon et al., 2021) of instigating such forest-based policies. While there are widespread calls for forest restoration/creation to provide "the right tree in the right place," there is also a need to understand for whom the trees are right. Such initiatives have socioeconomic and biophysical impacts that can transform landscapes which are already used by people, and public backing and stewardship is crucial for success (Coleman et al., 2021). Exclusion of local communities from decision-making processes raises ethical issues (Erbaugh et al., 2020) and can severely hinder potential support (Pritchard, 2021). Therefore, forest restoration/creation should be viewed as both an ecological and social science (Pritchard, 2021).

Forests are often discussed as single entities and in physical terms (e.g., canopy cover), yet they are rich and diverse habitats supporting 80% of terrestrial biodiversity (Augustynczik et al., 2020). Biodiversity is dynamic (e.g., seasonal changes, life cycles, range shifts), possesses a variety of attributes (e.g., functions, behaviors, colors, smells, shapes) and offers inordinate possibilities for human interaction. Furthermore, forests are not equal in size, connectivity, distribution or composition, and neither are the human communities that interact with them. Temperate forests form 16% of global forest area, support relatively fewer species than tropical forests, and are less intact in regions with high human population density and intensive agriculture (FAO & UNEP, 2020). They are, therefore, frequently the focus of forest restoration/creation initiatives. The forests are part of complex landscapes which serve many stakeholders, but social preferences for biodiversity are largely ignored (Augustynczik et al., 2020).

In the United Kingdom, the government is promoting tree planting (e.g., Woodland Carbon Guarantee) to extend forest cover from 13% to 19% to help achieve net zero carbon emissions by 2050 (Woodland Trust, 2020). With forest biodiversity (53% of species) declining and just 7% of Britain's native forests in good ecological condition (Reid et al., 2021), policies to increase tree cover, along with those for habitat restoration (e.g., The Green Recovery Challenge Fund) and a "greener" future (25 Year Environment Plan; https://www.gov.uk/government/publications/25-year-environment-plan), have important implications for conservation. However, there is a paucity of information available on public preferences for forest biodiversity (Reid et al., 2021) to inform decision-making. Here, we seek to answer the questions: (i) what shared perspectives do the public hold regarding the attributes of forest biodiversity that they relate to? and (ii) do these shared public perspectives vary according to season (winter, summer, spring and autumn)? We therefore held four workshops, one per season, where members of the British public were engaged in a series of Q-methodology exercises representing an array of taxa (vertebrates, invertebrates, trees, and understory plants and fungi). Q-methodology is a participant-led approach to exploring human preferences, and associated perspectives. It facilitates exploratory research whereby participants convey what is, or is not, important to them in their own words, and allows researchers to assess the extent to which these personal perspectives are shared by other participants. The type of information we generate is needed to make the treescapes of the future "legible" to communities (Lynch, 1960), contributing to greater use of, comfort in, and meaningful engagement with, forests by a wider set of publics.

2 | METHODS

2.1 | Study system

British forests tend to be publicly accessible, occur inside and outside of urban areas and are the third most visited type of outdoor green/blue space, behind "urban parks" and "paths, cycleways and bridleways" (www.gov.uk/government/statistics/monitor-of-engagement-with-the-natural-environment-headline-report-and-technical-reports-2018-to-2019). The forest estate is evenly split between broadleaf and coniferous habitats, both of which are widely but unevenly distributed, vary in age (e.g., ancient woodland, plantation) and are a mix of native and nonnative species (Reid et al., 2021).

2.2 | Participants

Participants were recruited via a social research agency to attend one of four seasonal workshops (winter, February;

spring, April; summer, June; autumn, October) in 2019 (Appendix 1). The participant recruitment criteria for each workshop ensured gender balance across male and female (or people who identify as such); age balance across three brackets (18–29 years; 30–59 years; >60 years); a mix of White British and other ethnicities (≥20%); people from different government regions of England, plus individuals from Wales and Scotland; a mix of individuals from different social grade; and a mix of both urban and rural (≥20%) dwellers (Table S1). All participants had to have been living in Britain for at least 5 years, irrespective of their nationality. We did this to capture the diversity of the British public, including sectors of society who are often underrepresented in research (e.g., elderly, ethnic minorities, lower income earners) (Fischer et al., 2018). Incentives, comprising travel reimbursement and financial remuneration on completion of the workshop, aided inclusivity. The research was approved by the School of Anthropology and Conservation Research Ethics Committee, University of Kent (Ref: 009-ST-19). Participants gave written informed consent before joining the workshop.

2.3 | Q-methodology

Q-methodology uses a combination of quantitative and qualitative data collection and analysis techniques (Zabala et al., 2018). Participants are provided with a diverse set of stimulus items, known as the Q-set, which reflect heterogeneity in the subject matter (Appendix 2; Watts & Stenner, 2005). The Q-set items are then ranked and discussed from the participant's perspective (Watts & Stenner, 2012). At each workshop, our participants took part in a visual Q-sort exercise, using image-based Q-sets (Figure S1) (Austen et al., 2021). Images are universal in appeal (Sherren et al., 2010) and can cross literacy and language barriers. We selected images to embody the diverse attributes of British forest biodiversity, informed by the literature (e.g., Smith et al., 2012; Sumner et al., 2018; Zhao et al., 2017), including traits (e.g., colors, sounds, behaviors), functions (e.g., food provision, pollination) and cultural significance (e.g., folklore, popular media, symbolic). We created four Q-sets (Table 1) to make the preference task manageable: vertebrates ($n = 32$ images), invertebrates ($n = 43$), trees ($n = 32$), and understory plants and fungi ($n = 32$), and multiple Q-sets allowed us to compare shared preferences across the broad taxonomic groupings. The same Q-set images were used at each workshop. All images were of species associated with British forests, occurring across different strata (e.g., understory, canopy) and active at different times (e.g., diurnal, nocturnal, seasonally). The images were also of species that people could potentially encounter. Wherever possible, images included representations of seasonal variation (e.g., illustrations of deciduous trees in winter and summer, butterflies as adult and larvae).

2.4 | Data collection

Data collection in Q-methodology is an individual task, with each participant ranking the Q-set images from "most prefer to encounter" to "least prefer to encounter," and recording the number of the image in rank order in a quasi-normal distribution grid (the Q-sort; Appendix 3; Figure S2). Participants were then invited to explain, in their own words, their image rankings in a post-Q-sort interview. We used "encounter" following extensive testing in focus groups and pilots. It elicited the widest variety of responses from our participants, covering different types of human–nature interaction (e.g., direct, indirect, incidental, thereness; Kaplan & Kaplan, 1989; Keniger et al., 2013), ecosystem functions/services (e.g., fuel, recreation) and resulted in participants discussing both tangible (e.g., visual, olfactory, auditory, tactile) and intangible (e.g., symbolic, culturally significant, personal associations) perspectives of biodiversity attributes. Each participant completed four Q-sorts, one per Q-set, in a randomized order to limit the possibility for bias due to fatigue.

2.5 | Data analysis

All Q-sort grids were completed, but some contained errors, such as using a single image number more than once. There was no systematic bias associated with the errors and these grids were discarded, resulting in 693 (vertebrates, $n = 175$; invertebrates, $n = 174$; trees, $n = 171$; understory plants and fungi, $n = 173$) being analyzed. The four Q-sets were analyzed independently, per workshop, allowing comparison of shared participant perspectives across seasons.

For each Q-set, quantitative multivariate data reduction techniques were used to identify shared perspectives from across the individual views expressed (Zabala & Pascual, 2016) (Appendix 4). Data were analyzed with the package *qmethod* (Zabala, 2014) in R (v3.6.0) (R Core Team, 2019), reducing the multivariate dataset to "factors" (Watts & Stenner, 2012). Factors are interpreted by studying quantitative factor arrays (a hypothetical Q-sort for each factor, formed by calculating scores for each image; Zabala, 2014) (Tables S2–S5) in conjunction with the qualitative transcriptions for participants loading onto that factor. The transcripts of all participants loading onto each factor were extracted and coded using NVivo (Version 12) (QSR Intl Pty Ltd., 2018). We then conducted an iterative process of factor

TABLE 1 Summary of the highest and lowest ranked British forest species that participants would most/least prefer to encounter, derived using Q-methodology at four seasonal participatory workshops

	Winter			Spring			Summer			Autumn		
Rank	**Species**	**Score**	***n***	**Species**	**Score**	***n***	**Species**	**Score**	***n***	**Species**	**Score**	***n***
Highest												
1	Tawny Owl (*Strix aluco*)	82	33	Tawny Owl (*Strix aluco*)	87	35	Roe deer (*Capreolus capreolus*)	95	43	Tawny Owl (*Strix aluco*)	105	44
2	Roe deer (*Capreolus capreolus*)	73	39	European Hedgehog (*Erinaceus europaeus*)	67	33	European Hedgehog (*Erinaceus europaeus*)	95	41	Roe deer (*Capreolus capreolus*)	91	42
3	European Hedgehog (*Erinaceus europaeus*)	43	29	Roe deer (*Capreolus capreolus*)	66	33	Tawny Owl (*Strix aluco*)	82	44	European Hedgehog (*Erinaceus europaeus*)	84	45
1	Buff tailed Bumblebee (*Bombus terrestris*)	85	32	Buff tailed Bumblebee (*Bombus terrestris*)	103	37	Buff tailed Bumblebee (*Bombus terrestris*)	135	45	Buff tailed Bumblebee (*Bombus terrestris*)	108	40
2	Small tortoiseshell (*Aglais urticae*)	82	34	Purple emperor (*Apatura iris*)	95	37	Small tortoiseshell (*Aglais urticae*)	111	43	Small tortoiseshell (*Aglais urticae*)	91	37
3	Purple emperor (*Apatura iris*)	65	29	Small tortoiseshell (*Aglais urticae*)	86	36	Purple emperor (*Apatura iris*)	100	40	Purple emperor (*Apatura iris*)	79	37
1	English oak (*Quercus robur*)	89	36	English oak (*Quercus robur*)	74	33	English oak (*Quercus robur*)	96	37	Horse chestnut (*Aesculus hippocastanum*)	86	43
2	Sweet chestnut (*Castanea sativa*)	58	30	Horse chestnut (*Aesculus hippocastanum*)	68	36	Common beech (*Fagus sylvatica*)	77	39	English oak (*Quercus robur*)	67	38
3	Horse chestnut (*Aesculus hippocastanum*)	56	33	Common beech (*Fagus sylvatica*)	53	30	Sweet chestnut (*Castanea sativa*)	55	32	Common beech (*Fagus sylvatica*)	63	36
1	Common bluebell (*Hyacinthoides non-scripta*)	94	35	Common bluebell (*Hyacinthoides non-scripta*)	90	37	Common bluebell (*Hyacinthoides non-scripta*)	90	36	Common bluebell (*Hyacinthoides non-scripta*)	84	35
2	Common foxglove (*Digitalis purpurea*)	66	39	Common foxglove (*Digitalis purpurea*)	71	33	Common foxglove (*Digitalis purpurea*)	88	42	Bramble (*Rubus fruticosus*)	77	44
3	Common primrose (*Primula vulgaris*)	56	35	Common primrose (*Primula vulgaris*)	51	26	Common primrose (*Primula vulgaris*)	72	34	Common foxglove (*Digitalis purpurea*)	75	37
Lowest												
30	Slowworm (*Anguis fragilis*)	−70	37	Slowworm (*Anguis fragilis*)	−61	35	Slow worm (*Anguis fragilis*)	−76	41	Barbastelle bat (*Barbastella barbastellus*)	−55	42

(Continues)

TABLE 1 (Continued)

Rank	Winter Species	Score	*n*	Spring Species	Score	*n*	Summer Species	Score	*n*	Autumn Species	Score	*n*
31	Grass snake (*Natrix helvetica*)	−81	38	Brown rat (*Rattus norvegicus*)	−85	37	Grass snake (*Natrix helvetica*)	−87	44	Grass snake (*Natrix helvetica*)	−65	41
32	Brown rat (*Rattus norvegicus*)	−92	36	Grass snake (*Natrix helvetica*)	−88	38	Brown rat (*Rattus norvegicus*)	−113	42	Brown rat (*Rattus norvegicus*)	−102	36
41	Ash grey slug (*Limax cinereo-niger*)	−38	18	Greenbottle (*Lucilia caesar*)	−60	28	Common earwig (*Forficula auricularia*)	−61	29	Sabre wasp (*Rhyssa persuasoria*)	−49	28
42	European hornet (*Vespa crabo*)	−48	24	European hornet (*Vespa crabo*)	−66	28	Greenbottle (*Lucilia caesar*)	−66	28	European hornet (*Vespa crabo*)	−54	31
43	Common greenbottle (*Lucilia caesar*)	−51	24	Ash grey slug (*Limax cinereo-niger*	−66	33	European hornet (*Vespa crabo*)	−75	31	Common greenbottle (*Lucilia caesar*)	−59	26
30	Hazel (*Corylus avellana*)	−32	22	Sitka spruce (*Picea sitchensis*)	−35	26	Lodgepole pine (*Pinus contorta var. latifolia*)	−30	25	Lodgepole pine (*Pinus contorta var. latifolia*)	−42	27
31	Ash (*Fraxinus excelsior*)	−34	20	Lawson cypress (*Chamaecyparis lawsoniana*)	−44	28	Juniper (*Juniperus communis*)	−34	36	Lawson cypress (*Chamaecyparis lawsoniana*)	−48	37
32	Lawson cypress (*Chamaecyparis lawsoniana*)	−40	26	Lodgepole pine (*Pinus contorta var. latifolia*)	−45	28	Lawson cypress (*Chamaecyparis lawsoniana*)	−60	31	Juniper (*Juniperus communis*)	−53	32
30	Common puffball (*Lycoperdon perlatum*)	−54	31	Puffball/wood millet (*Lycoperdon perlatum*)/ (*Milium effusum*)	−34	22/18	Dog's mercury (*Mercurialis perennis*)	−48	28	Giant fescue (*Schedonorus giganteus*)	−54	32
31	Wood horsetail (*Equisetum sylvaticum*)	−58	25	Giant fescue (*Schedonorus giganteus*)	−36	20	Turkey tail (*Trametes versicolor*)	−65	33	Commom puffball (*Lycoperdon perlatum*)	−61	37
32	Turkey tail (*Trametes versicolor*)	−59	32	Hairy brome (*Bromopsis ramosa*)	−38	22	Common puffball (*Lycoperdon perlatum*)	−69	32	Hairy brome (*Bromopsis ramosa*)	−65	33

Note: Highest (top 3) and lowest (bottom 3) cumulative scores of participants' answer sheets (Figure S2) per season, per Q-set (vertebrate, invertebrate, trees, understory plants and fungi). "Score" is the cumulative total, "*n*" is the number of participants that ranked that image positively or negatively (i.e., nonzero). For example, in winter vertebrates, the tawny owl (*Strix aluco*) scored 82, which was higher compared to the roe deer (*Capreolus capreolus*) which scored 73. However, 33 participants ranked the owl, yet 39 ranked the deer, showing that although fewer participants ranked the owl image, it received a higher weighting (i.e., "most prefer," +4; Figure S2) reduction, using the image scores and inductive thematic analysis of the transcriptions (Braun & Clarke, 2006), to identify the shared participant perspectives for each factor that can be considered qualitatively different from one another.

3 | RESULTS

Participants ($N = 194$, $n = 46–50$ for each seasonal workshop; Appendix 1) focused on a range of attributes, with both tangible and intangible factors emerging (Table 2). Although the task was repeated with new participants during each workshop, the species rankings were highly consistent (Table 1), as well as the biodiversity attributes people related to, positively or negatively (Table 2). However, the perspectives and focus varied between the taxa (e.g., childhood memories for trees, color for understory), showing the importance of understanding the complexities of how people relate to different components of forests.

3.1 | Vertebrates

Morphology and behavior were predominant attributes for vertebrates (Table 2), with participants noting preferences for generic form (e.g., look cute/massive) and behavior (e.g., owls hunting). Human–animal interactions were frequently mentioned, even if unrelated to forests (e.g., squirrels in gardens). Paradoxically, both familiarity and intrigue/curiosity associated with novel encounters were salient. Certain species (e.g., bats, reptiles, rodents) were consistently viewed negatively, irrespective of their attributes, predominantly based on perceived behaviors (e.g., dangerous/diseased) rather than participants' experiences.

3.2 | Invertebrates

Invertebrates elicited many anthropocentric perspectives (Table 2). The strongest factor emerging from each workshop was related to ecosystem function, particularly behaviors that directly benefit humans and the environment. Moreover, participants related to how encounters would affect them physically, with many perspectives expressed through previous experiences (e.g., being stung/bitten), fears (e.g., look aggressive/dangerous) and perceptions of behavior (e.g., flies are annoying/spread disease). Colorful morphology (e.g., red/purple/patterned) was aesthetically pleasing and indicated a sense of safety; color was however secondary to other attributes (e.g., morphology/behavior) rather than a separate point of discussion. However, these perspectives were not consistent across species (e.g., colored striations of bumblebees were viewed positively, but negatively for hornets/wasps). Invertebrates were the only Q-set to elicit factors based on taxa (i.e., spiders in winter, lepidoptera in summer).

3.3 | Trees

Trees had strong connections to childhood memories and activities (e.g., playing "conkers," tree climbing), history (e.g., longevity, tradition) and personal/national identity (Table 2). The symbolism of season was a factor in spring, with participants linking times of year with their emotions (e.g., leaves falling in autumn being negative as winter is approaching, snow/frost on trees related to happy "Christmassy" feelings). There was a preference for the variety of tree features (e.g., blossom/berries/nuts/seeds) mainly associated with deciduous forests. Color was only a focus in autumn, relating to leaf color and how tree density affects space and light levels. Despite the importance of trees in improving air quality, managing flood risk and mitigating against climate change, regulatory ecosystem functions were not discussed.

3.4 | Understory plants and fungi

Relationships with plants and fungi had a multi-sensory focus, with vision being dominant (Table 2). Unlike trees, color was consistently significant, acting as an indicator (e.g., danger, seasonal change). Furthermore, although seasons were not named, attributes were discussed in terms of seasonal cycles (e.g., florescence, fruiting). Grasses were considered to lack color and structure and did not align with expectations of what "belongs" in forests. Most fungi were considered drab and predominantly discussed in terms of edibility, but without reference to seasonality or foraging.

3.5 | Cross-cutting perspectives

Influences of culture (e.g., literature, films) and community (e.g., family, friends) were evident. Preconceived normative expectations of forest habitat and associated biodiversity attributes were shaped by reference points in popular cultural discourse (e.g., comic/movie superheroes, gaming characters) and other people's experiences (e.g., stories of being scared/bitten). Furthermore, there was evidence of media influence, with some participants adding caveats that their personal preference went against

TABLE 2 Shared public perspectives (factors) for different broad taxonomic groupings of British forest species, derived using Q-methodology at four seasonal participatory workshops

	Vertebrates				Invertebrates			
Factor	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn
1	**Appearance and behavior in the wild** Narrative around how animals look (aesthetics and behavior) when seen in their natural habitats	**Morphology** The way animals look and move, with anthropomorphic narrative around the animals' "intent"	**Morphology** Generic descriptions of form, including perceptions of behavior linked to the animals' appearance	**Morphology and behavior** Generic descriptions of whether animals are attractive, based on both appearance and behavior	**Purpose** Function and purpose of species in the ecosystem and for humans	**Purpose** How behaviors affect humans and the environment (e.g., pollination, movement, sound, decomposition)	**Purpose** Functions that affect humans	**Purpose** Behaviors that impact humans and the environment
2	**Encounters** The actual or perceived experience of encountering animals.	**Familiarity** Familiar species seen in everyday life and those not encountered regularly. Used in terms of both population trends and to the individuals	**Behavior** Behaviors of native species discussed positively, and nonnatives negatively.	**Behavior** Linked to animal being perceived as being endangered or elusive. Many perspectives relate to experiences	**Harmless** How the appearance or behavior of a species affects perception of being harmful of harmless	**Attraction and repulsion** Narrative around aesthetics, behavior & life cycle (color, movement, morphology, texture metamorphosis), but often vague	**Perceptions of harm** Based on appearance and previous experience, with a focus on the dislike of spiders	**Attraction and repulsion** Color and morphology influence feelings of attraction or repulsion, particularly in terms of human interaction Colorful perceived as harmless, and many legs perceived as repulsive
3	**Characteristic of forests** How some animals are indicative of forest, and is where they belong	**Encounters** Perspectives shaped by positive and negative experiences, predominantly in a nonforest setting (e.g., pets, school, holiday)	**Perceived danger** Perceptions related to superstition, appearance and fear of the unknown	**Intrigue** Preference for encountering animals that are elusive or not often observed by the participant	**Encounter of spiders** Participants shared an aversion to a range of spider attributes	**Perceptions of harm** Preferred species are nice/cute/pretty and look harmless, whereas others look aggressive/mean/evil. Few reasons given as to why, and not linked to specific attributes	**Lepidoptera** Narrative focused on the positive attributes of butterflies and moths, with reference to childhood experiences	

(Continues)

TABLE 2 (Continued)

Factor	Vertebrates: Winter	Vertebrates: Spring	Vertebrates: Summer	Vertebrates: Autumn	Invertebrates: Winter	Invertebrates: Spring	Invertebrates: Summer	Invertebrates: Autumn
4	**Familiarity** How familiarity of species influences preference to encounter		**The unusual and the mundane** Whether animals are perceived as elu-sive/endangered or "everyday" species		**Curiosity** Wish to encounter unique animals that piqued curiosity. Associated with childhood memories			
5	**Captivating** The wonder of encountering certain animals							

Factor	Trees: Winter	Trees: Spring	Trees: Summer	Trees: Autumn	Understory: Winter	Understory: Spring	Understory: Summer	Understory: Autumn
1	**Childhood memories** Attributes linked to positive, interactive childhood memories and imagination. Trees part of a socialization and learning process	**Importance of mature, deciduous forest** Provides variety within the landscape and across time, as well as important resources for animals and humans. Conifers perceived as lacking these attributes	**Variety and symbolism in deciduous forest** Include the effects of shape, seasonal cycles, longevity, tradition and provision associated with deciduous trees but not conifers	**Color and morphology** Includes density of trees and how that affects light and space	**Color** Aesthetics of flowering plants and dislike of fungi	**Expectations of forest assemblages** The appeal of vibrant colors, smells, shapes and edibility over boring, nondescript grasses	**Color** Colors, especially flowers, stand out and are more noticeable than the fungi	**Color and structure** Vibrant colors, especially flowers, are associated with forest and preferable to weed-like grasses that can be seen elsewhere
2	**Size/shape and resource provision** Longer lived trees provide resources that benefit wildlife and humans, especially deciduous trees	**Blossom, nuts, seeds and berries** Produce for use by humans and wildlife, with a focus on color representing these things	**Blossom, berries, nuts, seeds and catkins** They add color and variety to the forest, and are useful for humans and wildlife	**Time** Long and short term, including seasonal change, memories and history	**Colorful and complexity** Appeal of flowers and mushrooms that provided a variety of colors, shapes, and structures. Grasses lacked these favorable attributes	**Color and danger** Colorful flowers and berries are uplifting, and preferable to dominating plants and dangerous fungi	**Color and structure** Colorful and bold forms are associated with forest and preferred to grasses	**Color and danger** Colorful flowers were pleasing. Other species, especially fungi were dangerous and scary

(Continues)

TABLE 2 (Continued)

	Vertebrates				Invertebrates			
Factor	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn
3	**Characteristic of forest** Expectations of what a forest should look like, with a focus on variety	**Nostalgia** Linked to childhood, family and national identity	**Expectations of forest** Perceptions of which trees and attributes constitute forest, including undergoing seasonal changes and trees considered "traditional"	**Morphology** Includes size, shape and symbolism	**Appealing to the senses** Sensory interactions particularly smell, texture and edibility	**Indicators** A range of attributes acting as indicators to the observer	**Expectation and familiarity** Perceptions of what belongs in a forest habitat, with reference to known attributes.	**Texture** Some textures invite touch and others make you want to avoid
4	**Flowers, berries, leaves and cones** Their colors, shapes and textures of and their importance in attracting wildlife	**Feelings associated with season symbolized by tree**						
5	**General likes and dislikes** Unarticulated views about trees, linked with feelings							

Note: The same Q-set images were used in each workshop. Each box represents a factor for a Q-set (vertebrates, invertebrates, trees, understory plants and fungi) for a specific season (winter, spring, summer, autumn). Factors were named (bold text) following interpretation of the post-Q-sort interview transcripts. Factors are listed in descending order of variance (i.e., explanatory power).

an accepted truth that they had seen in the news. A notable example was a shared preference for encountering grey squirrels, countered by a feeling that this was "wrong" because they had seen/read that the species is invasive. Memories, reminders and symbolism were used to convey preferences and were influential in shaping them. Metaphors (e.g., leaves described as nature's "bubble wrap") were also a tool by which perspectives were expressed.

4 | DISCUSSION

Forest regeneration and creation are becoming ubiquitous globally. In the UK, this has led to an array of initiatives from both government and nongovernmental organizations (NGOs) at local, regional and national scales. For instance, the Northern Forest is a 25-year scheme that aims to plant 50 million trees, covering an area of ~26,000 km^2 and is home to a human population of 13 million people (thenorthernforest.org.uk). While there is a growing recognition that we need to proactively understand the social and cultural perspectives and preferences of the human communities that interact with forests to successfully deliver on such restoration/creation plans, it remains a substantial knowledge gap (Pritchard, 2021; Reid et al., 2021). Our participant-driven discussions regarding British forest biodiversity revealed a rich and diverse range of shared public perspectives that were influenced by personal experience, and that varied across taxa. These results were independent of the season in which the workshop took place, although participants showed an appreciation of seasonality.

A previous study found that preferences for imaginary animals are influenced by aesthetics and information about the animal (Curtin & Papworth, 2020), but the reasons behind the preferences were not investigated. Here, we found that perspectives for different taxa varied, with people relating to different attributes. For example, sensory biodiversity attributes (e.g., color, smell, taste) featured in every workshop for understory plants and fungi, but were rarely mentioned for other taxa. Color was alluded to for trees, but this was only in reference to variety and life cycles. Morphology and behavior were the focus for vertebrates, with attraction to "cute" animals (e.g., dormouse, deer) and repulsion to others (e.g., bats, reptiles). This links to the "Cinderella" species concept (Smith et al., 2012), whereby threatened species are overlooked in favor of aesthetically pleasing alternatives in fundraising campaigns. Ecosystem functions only emerged for invertebrates, which is likely to reflect the fact that the British public value the aesthetics of forests more than attributes linked to provisioning services (Maund et al., 2020).

Seasonality is significant in human–nature relationships (e.g., food availability, outdoor activity) and has cultural value (e.g., cherry blossom in Japan), yet these phenological patterns are often unaccounted for in conservation (Mittermeier et al., 2019). While there was limited reference to seasons by name, indicators of seasonal change and associated biodiversity attributes were important (e.g., bluebells preceding warmer days, holly "feeling Christmassy"). The consistency of shared perspectives across the different workshops show that people appreciate seasonal cycles, but that these preferences were not dependent on the season in which the workshop took place.

While our focus was forest biodiversity, everyday encounters (e.g., in gardens or parks) were central to participant preferences and perspectives. This highlights that nature is more than a "place we go" and needs to be better recognized as a part of people's everyday life (Hess, 2010). Furthermore, the influences of memories, experiences, media, and cultural influences were strong, with some participants comparing their own perspectives against what they believe to be a social norm. This highlights the importance of exploring the reasons underpinning preferences, as they can disclose influences behind choices and potential axioms or misinformation unknown to researchers, policymakers and practitioners.

Forest restoration/creation policy discourse tends to reference scales (e.g., landscape, local community) and frames "nature" as a setting (e.g., park), theatre of activity (e.g., recreation) or generically (e.g., green/blue space), with minimal consideration of the biodiversity occurring within it. People's relationship with these spaces are often expressed in vague terms (e.g., connectedness/relatedness; Capaldi et al., 2014) and overlook the attributes of biodiversity people relate to, and how. While forests are assemblages of tree species, they are also ecosystems inhabited by many interacting organisms, which possess a multitude of attributes and can have cultural meaning. The heterogeneity we reveal stresses the importance of going beyond generic terms, such as green/blue space, to gain a richer understanding of human–nature relationships. The social and cultural preferences and perspectives of the human communities living in forest regeneration and creation treescapes need to be accounted for in policy/management alongside any ecological considerations. Consequently, we hope that more studies like this one are conducted in other geographies, to provide a valuable evidence-base to inform local/regional policy/practice decision-making. Perhaps most essentially, our results emphasize the need for restoration/creation initiatives to focus on providing biodiverse forests to accommodate the plurality of preferences that are brought to bear upon them.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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